

# Bound Reports

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114354-1

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT  
ENVIRONMENTAL RESOURCE PERMIT APPLICATION NO. 40-069-114354-  
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION NO. 1

HARTWOOD MARSH ROAD  
PHASE 1

From US 27 to 1500 feet east of Hancock Road

May 2008

Prepared For:



Lake County Public Works  
Engineering Division  
437 Ardice Avenue  
Eustis, FL 32726

Prepared By:



HNTB Corporation  
300 Primera Boulevard  
Suite 200  
Lake Mary, Florida 32746

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HARTWOOD MARSH ROAD – PHASE I  
US 27 TO 1500 EAST OF HANCOCK ROAD  
LAKE COUNTY, FLORIDA

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT  
ENVIRONMENTAL RESOURCE PERMIT APPLICATION 40-069-114354-1  
REQUEST FOR ADDITIONAL INFORMATION

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APPENDIX                      DRAINAGE CALCULATIONS

114 354-1X

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May 6, 2008

**HNTB**

Ms. Ruth Grady, E.I.  
Department of Water Resources  
St. Johns River Water Management District  
975 Keller Road  
Altamonte Springs, FL 32714

**Re: Hartwood Marsh Road Phase I  
US 27 to 1500 feet East of Hancock Road  
Application No. 40-069-114354-1  
Response to Request for Additional Information**

Dear Ms. Grady:

Please find enclosed the following revised documents to the North Winter Park Drive Environmental Resource Permit Application.

- Three (3) copies of the Construction Plans
- Three (3) copies of the Response to Request for Additional Information

We offer the following responses to your comments.

Comment 1: Please provide revised pre, "interim", and post-development drainage basin maps that include sufficient on and off-site area topographical elevations. Clearly delineate the specific flow paths used in determining the time-of-concentrations for each basin. This information is necessary to validate the water quality and quantity calculations submitted with your application. [40C-4.301(1)(a)(b)(c)(e)(i); 40C-42.026(1), F.A.C.; 10.3, 11.2 A.H]

**Response:** *Please refer to the Flow Path plan sheets for the Pre and Post Development Condition located in the Appendix of the Response to the Request for Additional Information.*

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Comment 2: Please amend *PLAN SHEETS 18 through 28* of the set of construction plans submitted to depict the existing grade elevations. This information is necessary to verify the stormwater drainage patterns. [40C-4.301(1)(a)(b)(c)(e)(i), F.A.C.]

**Response:** *Please refer to the Flow Path plan sheets for the Pre and Post Development Condition located in the Appendix of the Response to the Request for Additional Information. These sheets show the existing one foot contours along the project and offsite areas.*

Comment 3: Section 7.1 of the Drainage Calculations submitted states, in part, “*In the post development condition, the basin area contributing to Pond 1 consists of the roadway (Sta. 103+43 to Sta. 138+50) and offsite basins directly adjacent to the road. Pond 1 is considered a separate basin. The runoff from the area surrounding the pond will be bypassed around the pond. Pond 1 will discharge to the unnamed lake.*”

Please note that this appears to be inconsistent with the post development *Pond 1 Nodal Diagram* submitted, which indicates that runoff from *BASIN 1 - 5 (INTERIM)* will be routed into *Pond 1*, in addition to the offsite basins directly adjacent to the road. Reference the following excerpts from the Drainage Calculations submittal.

- a. Accordingly, please revise the set of construction plans to clearly show the boundary limits of all areas draining to the proposed *Pond 1* system.
  - Ensure that these areas have been accounted for in the water quality and quantity calculations.
  - Be advised that stormwater treatment systems must be designed to provide the required treatment and attenuation from the entire contributing basin area (including the pond).
- b. For the proposed diversion of any off-site basin runoff flow around *Pond 1*, revise the set of plans to include a more detailed grading plan for the construction activity in its entirety.
  - Show how the proposed contour lines will tie into the existing contours along the outer perimeter of the proposed diversion area.
  - Include cross-section details, as needed, to clarify the proposed grades.

- Show the extent of any fill to be placed, if applicable.

Submit any revised plans and calculations. [40C-4.301(1)(a)(b)(c)(d)(e)(i); 40C-42.026(1), F.A.C.]

**Response:** *The nodal diagram has been revised to show Basin 1-5 discharging to the unnamed lake. The runoff from this area will be routed around Pond 1 through a swale that will be located on the north side of the pond. This swale is shown on the Pond 1 Detail Sheet and the Pond 1 cross sections.*

Comment 4: Staff is unable to determine, from the information provided on the set of construction plans received by the District on December 6, 2007, as to whether or not the proposed *Pond 2* surface water management system will function as an off-line system, as indicated in the water quality calculations.

Please note that, all surface water management systems currently classified as off-line treatment must incorporate a diversion device within the design. The diversion device creates storage of a specified portion (i.e., first flush) of the stormwater in such a manner so that subsequent (i.e., second flush) runoff in excess of the specified volume of stormwater does not flow into the area storing the initial stormwater. In other words, the off-line system must direct the remaining flow (after the water quality volume is reached) to a separate system. The off-line system cannot be utilized to treat subsequent flushes of stormwater runoff in tandem with the storage of the first flush runoff.

- a. Please demonstrate that the proposed off-line system is designed in accordance with the above information.
- b. Or, as an option, redesign the system to meet on-line treatment volume requirements.

Additionally note that proposed off-line systems that also serve to provide significant detention storage above the off-line treatment volume storage will be considered to function as on-line systems. [40C-4.301(1)(3)(i); 40C-42.026(1), F.A.C.]

**Response:** *The Pond 2 calculations have been revised to show it as an on-line system.*

Comment 5: Section 7.2 of the Drainage Calculations submitted states, in part, *“in the post development condition, the basin area contribution to Pond 2 consists of the roadway (Sta. 138+50 to Sta. 152+39) and offsite basins directly adjacent to the road. Pond 2 is considered a separate basin. Pond 2 is located on the future First Baptist Church of Clermont property. The County has had discussions with the property owner to coordinate joint use opportunities. The County has designed this pond to accommodate the runoff from the First Baptists church site assuming that the future development will be no more than 80% impervious. In addition, Pond 2 has been designed to include runoff from a section of the future South Hancock Road extension.”*

Accordingly, please provide a draft copy of the joint use agreement between Lake County and the First Baptist Church of Clermont. Clearly identify, in the agreement, which components of the Pond 2 system each entity will maintain. [40C-4.301(1)(i); 40C-42.027(1)(2); 40C-42.025(6), F.A.C.]

**Response:** *The Pond 2 design has been revised to retain the entire volume of runoff from the storm event. There will be no discharge to the Regency Hills system.*

*Lake County will utilize the eminent domain process to obtain drainage easements and right-of-way. The County will provide the pertinent documentation prior to construction.*

Comment 6: Section 7.3 of the Drainage Calculations submitted states, in part, *“In the post development condition, the Basin 3 area consist of the roadway (Sta. 152+39 to Sta. 161+50) and offsite basins directly adjacent to the road. This runoff from this basin will be treated in the Hartwood Marsh Road Phase II project. In the interim condition, the runoff from this basin will discharge to the roadside swales. Ditch blocks paced 50 feet apart in the swales on both side of the road will retain a portion of the runoff. Because this is an interim condition and the roadway is transitioning to match the existing two lane road, a best management practices approach was taken to address storm water treatment and attenuation. Currently the roadside swales are very shallow or nonexistent. In the interim condition, better defined swales will be provided to retain as much runoff as possible without requiring the purchase of additional right of way that would not be needed in the future when the Phase II retention ponds are constructed.”*

Please be advised that there are no rule exemptions regarding the life of your project (i.e., temporary, interim or permanent) as a factor in determining as to whether or not the water quality and quantity requirements must be met.

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Accordingly, please submit a revised design and calculations demonstrating that the water quality and quantity requirements for the *Basin 3* area have been met, pursuant to current District criteria. Include all pertinent geotechnical information to support the parameters utilized in the recovery analyses. [40C-4.301(1)(a)(b)(c)(e)(i); 40C-42.026, F.A.C.]

**Response:** *The Basin 3 treatment system consisting of swale blocks to retain all the required storm water treatment volume and water quantity volume has been modified. Please see the Appendix for updated drainage calculations.*

Comment 7: Please justify the *Pond 2* base of aquifer and seasonal high water table elevations of 85.00 and 101.90 feet, respectively, as utilized in the POND-System Version 3.2.0145 Retention Pond Recovery Analysis. Based on the recommendations presented on Page 6 of the September 6, 2007 revised *Roadway Soil Survey* by Ardaman & Associates, Inc., the *Boring Nos. AB-P3 and AB-P4* profiles, the maximum depth of the soil borings (i.e., 20.0 feet), it appears that the average base of aquifer and seasonal high water table elevations may be located at elevations 101.90 and 106.90 feet, respectively.

- a. Accordingly, please clarify. Provide revised calculations demonstrating that 1) the *Pond 2* required treatment volume will be recovered within 72-hours and 2) the *Pond 2* storage capacity will be recovered within 14 days following the design storm event.
- b. Or, as an option, provide additional geotechnical information to support the aquifer base and seasonal high water table elevations utilized in the analyses.

Submit any revised plans and calculations, as appropriate. [40C-4.301(1)(e)(i), F.A.C.]

**Response:** *To address comment, Ardaman & Associates, Inc. performed a 50-foot boring in March 2008 to determine the seasonal high ground water level. They determined that the seasonal high ground water level was approximately 35 feet below the existing ground surface. Based on a seasonal high ground water level of 92 feet, the pond recovers the 25 year/96 hour volume in less than 14 days. Please see the Appendix for a copy of the most recent boring data and the revised pond calculations.*

Comment 8: The time of concentration  $T_c$  parameters utilized in the pre, "interim", and post development design storm event analyses appear to be low, especially for the existing land condition. Accordingly, please clarify and provide additional



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calculations that reconfirm the time of concentration parameters utilized, as follows:

- a. Provide revised calculations using the kinematic formula for the first drainage sheet flow length of 300 feet followed by shallow concentrated flow for the remaining flow lengths.
- b. Ensure consistency with the specific flow paths indicated on the revised pre, "interim", and post-development drainage basing maps.

[40C-4.301(1)(a)(b)(c)(e)(i), F.A.C.]

- Response:**
- a. ***The TR-55 methodology was used to compute time of concentration. This methodology is acceptable per Section 13.5 in the District's Applicant's Handbook. For some of the small basin, the 300 foot length for overland is not applicable.***
  - b. ***Please refer to the Flow Path plan sheets for the Pre and Post Development Condition located in the Appendix of the Response to the Request for Additional Information.***

Comment 9: The water quantity calculations appear to have utilized infiltration during routing of the mean annual (2.3-year, 24-hour), the 10-year, 24-hour, the 25-year, 24-hour, and the 25-year, 96-hour (i.e., design) storm events.

- Please note that, when utilizing infiltration during routing of the storm events, the proposed pond area must contain a curve number that is representative of an impervious surface to the design high water elevation in the post-development calculations.
- Further note that, the analyses must exclude unsaturated flow.

Accordingly, please clarify and provide revised calculations demonstrating consistency with the above. [40C-41.063(2)(a); 40C-4.301(1)(a)(b)(c)(d)(i), F.A.C.]

- Response:** ***To address comment, Ardaman & Associates, Inc. performed a 50-foot boring in March 2008 to determine the seasonal high ground water level. They determined that the seasonal high ground water level was approximately 35 feet below the existing ground surface. Based on a seasonal high ground water level of 92 feet, the pond recovers the 25 year/96 hour volume in less***

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***than 14 days. Infiltration during the storm event was not used in the revised calculations to determine the recovery time. Please see the Appendix for a copy of the most recent boring data and the revised pond calculations.***

Comment 10: Based on the incomplete water quantity analysis provided, it cannot be determined as to whether or not the proposed discharge from *Pond 2* will meet or exceed the discharge rates and volumes previously established by District Permit No. 40-069-82413-2 for the Regency Hills system. Reference the following notations provided on the excerpt below.

Accordingly, please clarify. Provide additional calculations demonstrating that the post-development discharge rates and volumes from *Pond 2* will not exceed those previously established for the Regency Hills system. Include all supporting information. [40C-4.301(1)(a)(b)(c)(i), F.A.C.]

***Response: This comment is no longer applicable because the connection to Regency Hills was eliminated from the project.***

Comment 11: Please provide revised calculations for each proposed surface water management system demonstrating recovery of the storage capacity within 14 days following the design (i.e., 25-year, 96-hour) storm event.

If back-to-back storm events are elected to satisfy this criteria, please input two repetitions into the PONDS model to simulate back-to-back storm events and the recovery period between each storm event. Please note that the analyses provided with this submittal did not consider this criteria. Provide the Detailed Results output file, as part of your response, in demonstrating that each pond is designed in accordance with this criteria. [40C-4.301(1)(a)(b)(c)(i), F.A.C.]

***Response: Back-to-back storm events were not utilized in the recovery analysis for Pond 2. The pond is able to recover the 25 year/96 hour volume within 14 days. Please see the revised drainage calculations located in the Appendix.***

Comment 12: Please address and/or provide the following with respect to *Sheet Nos. 67, 88, 91, 92, 93, and 94* of the set of construction plans submitted:

- a. Revise *Sheet No. 67* to include specifications for the proposed *Pond 1 S-128* outfall pipe. Include all pertinent information and invert elevations.
- b. The Storm sewer pipe connection between drainage structures *S-127* and the *Pond 1* mitered end section (*Sheet No. 67*), indicates a 36-diameter RCP is proposed. This appears to be inconsistent with the profile view

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(*Sheet No. 88*), which indicates a 42-inch diameter *RCP* is proposed. Please clarify and revise where appropriate, for accuracy with the post development condition.

- c. The *Sheet No. 88* plan view indicates 105 linear feet of 18-inch diameter *RCP* is proposed between drainage structure *S-128* and the *Pond 1* outfall. This appears to be inconsistent with the pond plan view (*Sheet No. 91*), which indicates 109 linear feet of 24-inch diameter *RCP* is proposed and the routing calculations, which indicate that 116 linear feet of 24-inch diameter *RCP* is proposed. Please clarify and revise where appropriate, for accuracy with the post development condition.
- d. The *Pond 1* bottom elevation (95.0 feet) utilized in the calculations and delineated on *Sheet Nos. 88* and *91*, appears to be inconsistent with that (less than 95.0 feet) indicated by the vertical scale for *STA 19+00.00* and *19+50.00* on *Sheet No. 93*. Please clarify and revise where appropriate, for accuracy with the post development condition.
- e. The *Pond 1* bottom elevation (95.0 feet) utilized in the calculations and delineated on *Sheet Nos. 88* and *91*, appears to be inconsistent with that (greater than 95.0 feet) indicated by the vertical scale for *STA 20+00.00* and *20+50.00* on *Sheet No. 94*. Please clarify and revise where appropriate, for accuracy with the post development condition.
- f. Amend *Sheet No. 92* to include the *SECTION A-A* detail.
- g. Revise the *Pond 1* and *2* section details to indicate that non-muck grown sod will be used for stabilization of the proposed retention ponds. Please note that the placement of muck-grown sod may impede the percolation of runoff into the ground and is, therefore, not recommended for the stabilization of retention pond bottoms. Provide notes, as necessary, for clarification.

[40C-4.301(1)(a)(b)(c)(e)(i); 40C-42.025(4); 40C-42.026(1), F.A.C.]

- Response:**
- a. ***The details for structure S-128 are shown on Plan Sheet 67 and 92A in the Construction Plans included in this response.***
  - b. ***The 36-inch pipe is correct. Sheet No. 88 has been revised.***
  - c. ***The pipe length is 109 feet. This length has been reflected in the AdICPR calculations.***

- d. *The pond cross sections were laid out on the cross section grid incorrectly. The updated plan sheets are include in the Construction Plans included in this response.*
- e. *The pond cross sections were laid out on the cross section grid incorrectly. The updated plan sheets are include in the Construction Plans included in this response.*
- f. *Section A-A was mislabeled on the plan sheet. The updated plan sheet is included in the Construction Plans included in this response.*
- g. *A note has been added to the Pond Detail Sheet.*

Comment 13: Please provide documentation from the appropriate entity allowing the connection of the *Pond 2* overflow into the existing Regency Hills surface water management system. Be advised that the previously permitted master system did not include the overflow discharge from the additional basin areas. References the following excerpts.

Be advised that this documentation is needed in order verify District presumptive criteria pursuant to 40C-42.025 (6) ***Design and Performance Criteria for Stormwater Management Systems***, which states that *the applicant must obtain sufficient legal authorization as appropriate prior to permit issuance for stormwater management systems which propose to utilize offsite areas to satisfy the requirements in subsection 40C-42.023(1), F.A.C. [40C-4.301(1)(i); 40C-42-025(6); 40C-42.026(1), F.A.C.]*

**Response:** *This comment is no longer applicable because the connection to Regency Hills was eliminated from the project.*

Comment 14: Please delineate and detail, on the set of revised plans, the physical locations of all erosion, sediment and turbidity control best management practices that will be utilized during construction of the proposed project.

- a. Include the erosion, sediment and turbidity control best management practices will be utilized during placement of the proposed *Pond 1* outfall pipe within the wetlands.
- b. Provide details, as appropriate.

[40C-4.301(1)(i); 40C-42.025(1), F.A.C.]

**Response:** *The erosion and control plans are included in the construction plans with this response.*

Comment 15: District staff needs to be able to determine the location of all wetlands and other surface waters within the project area and the extent of work proposed within wetlands and other surface waters. During a visit to the project site on December 11, 2007, staff could not locate the wetland flags in the field. It appears that widening of the roadway may result in impacts to the wetlands along the southern lobe of Johns Lake and other unnamed wetlands and surface waters within the project area. Note also that an environmental report included with the submittal also does not consider the location of the proposed retention ponds (s) for the road expansion in relation to existing wetlands. Please address the following:

- a. Reestablish the wetland flags and contact Gayle Albers at 407-659-4882 to set a site inspection. Provide a survey depicting the wetland flag numbers at a scale that is legible at the time of inspection.
- b. Provide an aerial map clearly labeling the onsite wetlands and other surface waters (e.g., Wetlands 1-X) and all associated impacts (e.g., Impacts 1-X).
- c. Describe how any temporarily disturbed areas will be revegetated after the proposed work is completed. Please note that the planting of non-native vegetation within these areas could adversely affect the surrounding wetland by encouraging the spread of nuisance species.
- d. Revise the construction plans to clearly depict the extent of the wetlands and other surface waters within and adjacent to the project area on a plan view. Crosshatch any proposed impact areas.
- e. Revise the application form (Sections A, C, and E, Tables 1-3), as necessary:
  - Total existing onsite wetland and other surface water acreages;
  - Proposed impact acreages for each and other surface water;
  - Proposed unaffected acreages for each wetland and other surface water;
  - Natural community type (e.g., FLUCCS code or list abundant canopy and groundcover species) of each wetland and other surface water;

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- Type of impact (temporary or permanent) to each wetland and other surface water.

{40C-4.301 (1); 40C-4.302(1)(a), F.A.C.}

**Response:** *Please refer to the attached response prepared by Lotspeich and Associates, Inc.*

Comment 16: The submittal for the proposed road project does not include details on how you intend to address secondary impacts to wetlands or other surface waters that may be caused during and after construction. An applicant must provide reasonable assurance that a regulated activity will not cause unacceptable adverse secondary impacts to water resources (12.2.7, ERP A.H.). Reasonably expected activities (e.g., landscaping maintenance, increased traffic, litter) will diminish the ecological functions provided by the wetlands by destroying wildlife habitat and introducing nuisance plant species. Pursuant to subsection 12.2.7 (a), ERP A.H. one way to demonstrate the proposed project will not have adverse secondary impacts to water resources is to establish a 15-foot minimum, 25-foot average undisturbed upland buffer landward of wetlands and other surface waters. The present design does not specify upland buffers on the construction plans or clearly demonstrate that the proposed works are sufficiently distant from offsite water resources. Please indicate how you will demonstrate that the proposed project will not have adverse unacceptable secondary impacts to water resources. Alternatively, secondary impacts will be assessed. Provide the linear extent of all impacted wetlands where adverse secondary impacts are expected to occur. Additional mitigation may be required to offset these impacts.

[40C-4.301 (1); 40C-4.302(1)(a), F.A.C.]

**Response:** *Please refer to the attached response prepared by Lotspeich and Associates, Inc.*

Comment 17: Should you choose to utilize upland buffers as the recourse for addressing secondary impacts to water resources, you must provide reasonable assurance that the upland buffers and unaffected onsite wetlands will remain in an undisturbed condition and that the buffers it will be sufficient to prevent secondary impacts to water resources in perpetuity. Pursuant to Subsection 12.2.7 (a), Applicant's Handbook, one way to provide such assurance is to place the upland buffer and wetland areas under a conservation easement (CE) dedicated to the District that will adequately preserve buffer structure and function. If you choose to establish a

conservation easement, please specify the acreage for the preservation of onsite wetlands and uplands separately in the supporting documentation.

Please submit a draft conservation easement that is consistent with Section 704.06, Florida Statutes, and that contains restrictions ensuring the ecological viability of the site. The draft easement must (i) identify the grantor of the easement and include an appropriate signature block for the grantor, (ii) include a "Return Recorded Original to:" block in the top left corner of the first page of the conservation easement indicating the recorded original easement should be returned to the Office of General Counsel, St. Johns River Water Management District, 4049 Reid Street, Palatka, Florida 32177-2529, and (iii) the permit number for the proposed project in the opening recitals. Please note that if the mitigation areas are owned in fee simple by different entities or individuals, a draft conservation easement must be submitted for each mitigation area owned by each entity or owner. Be sure to attaché Exhibits. Additionally, please **submit** the following documentation in support of each conservation easement:

- a) Proof of ownership of the real property described in the conservation easement area by the grantor. Examples of such documents include, but are not limited to, an attorney's title opinion, title certificate, owners and encumbrance report or warranty deed.
- b) An attorney's title opinion, title certificate, or ownership and encumbrance report to demonstrate that the conservation easement area is not subject to any encumbrance(s) (e.g. utility easements and right of way easements) which may impair the ecological value of the area subject to the conservation easement. If encumbrances exist or will exist at the time the conservation easement is recorded, please provide a copy of the instrument creating each such encumbrance and depict the location of the encumbrance within the conservation easement area on the mitigation plans and/or surveyor's sketch.
- c) Is the property that will be encumbered by a conservation easement subject to a mortgage? If so, please submit a draft Consent and Joinder of Mortgagee containing the name of the mortgagee, the title of the mortgage documents(s), including any amendments and UCC financing statements, and the official record book and page number(s) of the public records of the county where the mortgage is recorded. The Consent and Joinder of Mortgagee will need to be executed by the lending institution in the presence of two witnesses.
- d) The conservation easement must be executed by an individual who has the authority to transfer interests in the real property being encumbered by the conservation easement. Therefore, please identify the person who will be

executing the easement on behalf of the grantor. If the grantor is a business entity (corporation, limited liability company, limited partnership, etc.), please identify the name and title or position of the signatory in the signature block appearing at the end of the conservation easement. Please also submit documentation of the signatory's authority to convey property interests on behalf of the business entity. Examples of such documents include, a corporate resolution, partnership or limited liability company affidavit, or partnership/operating agreement.

e) The draft conservation easement should include as an attachment: (1) a metes and bounds legal description of the area to be placed under conservation easement, and (2) a surveyor's sketch with the easement area clearly delineated and labeled, with the acreage of the easement area noted on the sketch. Please clearly label the pages as Exhibit "\_\_\_", page \_ of \_. The District will need to review these documents and approve them in writing before the easement may be recorded. Please provide the acreages for the uplands and wetlands for each easement separately.

f) If the conservation easement area will be described by reference to a plat, please provide a copy of the plat. The conservation easement must reference the book and page number in a recorded plat. If the plat has not yet been recorded, please provide a preliminary or draft plat with the following note added to the face of the plat:

Tracts \_\_\_\_\_ are subject to a Conservation Easement in favor of the St. Johns River Water Management District pursuant to Section 704.06, Florida Statutes.

g) Please submit a USGS quadrangle map depicting the area to be preserved by conservation easement. Please ensure that the official quad map name is included on your submittal.

h) The District must be assured of access to mitigation areas that will be encumbered by the conservation easement. Please provide information confirming the District's right of access via public road or, if not available, a draft access easement conveying a right of access to the District.

[Sections 40C-4.301(1)(d)(f), F.A.C.; 40C-4.302(1)(a)2,7, F.A.C., 12.3.8, A.H.]

**Response:** *Please refer to the attached response prepared by Lotspeich and Associates, Inc.*



Ms. Ruth Grady, E.I.

May 6, 2005

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If you have any questions or need further information, please do not hesitate to contact our office.

Sincerely,

**HNTB Corporation**

A handwritten signature in black ink, appearing to read "Karen Van den Avont". The signature is written in a cursive, flowing style.

Karen Van den Avont, P.E.  
Project Manager

cc: File



**Lotspeich and Associates, Inc.**  
ECOLOGICAL CONSULTANTS

5 March 2008  
L&A No. 2005-118.23  
Doc: \2005-118-WMDRAI-05C08.wpd

Ms. Gayle Albers  
St. Johns River Water Management District  
975 Keller Road  
Altamonte Springs, FL 32714-1618

**RE: Hartwood Marsh Road Widening**  
Lake County, Florida  
SJRWMD File # 40-069-114354-1  
**Response to Request for Additional Information**

Dear Ms. Albers:

Lotspeich and Associates, Inc. (L&A) is in receipt of your Request for Additional Information (RAI) dated 4 January 2008. For convenience, we have restated each comment/question regarding ecological issues, followed by our response. The remainder of the responses will be prepared by HNTB, Inc., and submitted under separate cover.

**15. District staff needs to be able to determine the location of all wetlands and other surface waters within the project area and the extent of work proposed within wetlands and other surface waters. During a visit to the project site on December 11, 2007, staff could not locate the wetland flags in the field. It appears that widening of the roadway may result in impacts to the wetlands along the southern lobe of Johns Lake and other unnamed wetlands and surface waters within to the project area. Note also that an environmental report included with the submittal also does not consider the location of the proposed retention pond(s) for the road expansion in relation to existing wetlands. Please address the following:**

- a. **Reestablish the wetland flags and contact Gayle Albers at 407-659-4882 to set up a site inspection. Provide a survey depicting the wetland flag numbers at a scale that is legible at the time of inspection.**
- b. **Provide an aerial map clearly labeling the onsite wetlands and other surface waters (e.g., Wetlands 1 -X) and all associated impacts (e.g., Impacts 1 -X).**
- c. **Describe how any temporarily disturbed areas will be revegetated after the proposed work is completed. Please note that the planting of non-native vegetation within these areas could adversely affect the surrounding wetland by encouraging the spread of nuisance species.**



- d. **Revise the construction plans to clearly depict the extent of wetlands and other surface waters within and adjacent to the project area on a plan view. Crosshatch any proposed impact areas.**
- e. **Revise the application form (Sections A, C, and E, Tables 1-3), as necessary:**
- **total existing onsite wetland and other surface water acreages;**
  - **proposed impact acreages for each wetland and other surface water,**
  - **proposed unaffected acreages for each wetland and other surface water;**
  - **natural community type (e.g., FLUCCS code or list abundant canopy and groundcover species) of each wetland and other surface water;**
  - **type of impact (temporary or permanent) to each wetland and other surface water. [40C-4.301 (1); 40C-4.302(1)(a), F.A.C.]**

**Response:** L&A staff has had several conversations with Ms. Gayle Albers of the SJRWMD regarding the limits of the currently proposed work. The current project extends from U.S. Highway 27 to just east of South Hancock Road. As such, the wetland and surface water impacts referenced above are not part of the currently proposed work. Work adjacent to the referenced wetlands or surface waters, and any impacts that may be associated with that work, will occur in future phases of the project.

- a. There is only one (1) surface water (designated SW-1) associated with this phase of the project, and it is located adjacent to proposed Pond 1. This surface water/wetland was flagged by L&A staff during the summer of 2007. The flags associated with this surface water should still be in place.
- b. No wetlands are located within the roadway corridor. As noted above, there is a surface water located south of the roadway, adjacent to which a retention pond will be constructed. Please find attached an aerial photo depicting the location of the surface water/wetland relative to the roadway corridor and the proposed Pond 1. No impacts are currently proposed.
- c. Please refer to HNTB's erosion control plans for details regarding the re-vegetating of areas disturbed by construction activities.
- d. Plan Sheet 91 as originally submitted depicts the portion of SW-1 adjacent to the proposed Pond 1. Please refer to HNTB's submittal for an overall plan view that depicts the exact location of the surface water/wetland with regard to the roadway corridor.



- e. Although no impacts are proposed to wetlands or surface waters, L&A has prepared ERP Table 1 for the purpose of providing additional details regarding Surface Water 1 (attached).

**16. The submittal for the proposed road project does not include details on how you intend to address secondary impacts to wetlands or other surface waters that may be caused during and after construction. An applicant must provide reasonable assurance that a regulated activity will not cause unacceptable adverse secondary impacts to water resources (12.2.7, ERP A.H.). Reasonably expected activities (e.g., landscaping maintenance, increased traffic, litter) will diminish the ecological functions provided by the wetlands by destroying wildlife habitat and introducing nuisance plant species. Pursuant to subsection 12.2.7 (a), ERP A.H., one way to demonstrate that the proposed project will not have adverse secondary impacts to water resources is to establish a 15-foot minimum, 25-foot average undisturbed upland buffer landward of wetlands and other surface waters. The present design does not specify upland buffers on the construction plans or clearly demonstrate that the proposed works are sufficiently distant from offsite water resources. Please indicate how you will demonstrate that the proposed project will not have adverse unacceptable secondary impacts to water resources. Alternatively, secondary impacts will be assessed. Provide the linear extent of all impacted wetlands where adverse secondary impacts are expected to occur. Additional mitigation may be required to offset these impacts. [40C-.301(1)(d)(e)(f)(3); 40C-4.302(1)(a)2.,7.,(b), F.A.C.]**

**Response:** This phase of the Hartwood Marsh Road Widening project does not propose impacts to wetlands or surface waters. It is acknowledged that future phases of the project will likely impact surface waters associated with the Tarmac sand mine facility, as well as potential impacts to wetland or surface waters areas associated with the southern lobe of Johns Lake. The surface waters associated with the Tarmac facility have little to no wildlife habitat value, and primarily provide water quantity and flood control functions for the portion of the Tarmac facility that drains to the pit. These functions will likely be replaced or enhanced by the proposed surface water management facilities associated with the improvements to Hartwood Marsh Road, in addition to those associated with the development proposed to occupy the Tarmac site once the sand mining operations have been relocated to the east. Any impacts to wetlands or surface waters associated with Johns Lake that cannot be avoided or minimized will need to be mitigated in accordance with state guidelines. There are two (2) large mitigation projects currently available (or soon to be available) to provide mitigation for the project area - the Emeralda Marsh site and the Hammock Lake Mitigation Bank. Between the two, there should be sufficient mitigation available for any impacts to wetlands or surface waters that cannot be reduced or eliminated.



**17. Should you choose to utilize upland buffers as the recourse for addressing secondary impacts to water resources, you must provide reasonable assurance that the upland buffers and unaffected onsite wetlands will remain in an undisturbed condition and that the buffers it will be sufficient to prevent secondary impacts to water resources in perpetuity. Pursuant to Subsection 12.2.7 (a), Applicant's Handbook, one way to provide such assurance is to place the upland buffer and wetland areas under a conservation easement (CE) dedicated to the District that will adequately preserve buffer structure and function. If you choose to establish a conservation easement, please specify the acreage for the preservation of onsite wetlands and uplands separately in the supporting documentation.**

**Please submit a draft conservation easement that is consistent with Section 704.06, Florida Statutes, and that contains restrictions ensuring the ecological viability of the site. The draft easement must (i) identify the grantor of the easement and include an appropriate signature block for the grantor, (ii) include a "Return Recorded Original to:" block in the top left hand corner of the first page of the conservation easement indicating the recorded original easement should be returned to the Office of General Counsel, St. Johns River Water Management District, 4049 Reid Street, Palatka, Florida 32177-2529, and (iii) the permit number for the proposed project in the opening recitals. Please note that if the mitigation areas are owned in fee simple by different entities or individuals, a draft conservation easement must be submitted for each mitigation area owned by each entity or owner. Be sure to attach Exhibits. Additionally, please submit the following documentation in support of each conservation easement:**

- a) Proof of ownership of the real property described in the conservation easement area by the grantor. Examples of such documents include, but are not limited to, an attorney's title opinion, title certificate, owners and encumbrance report or warranty deed.**
- b) An attorney's title opinion, title certificate, or ownership and encumbrance report to demonstrate that the conservation easement area is not subject to any encumbrance(s) (e.g. utility easements and right of way easements) which may impair the ecological value of the area subject to the conservation easement. If encumbrances exist or will exist at the time the conservation easement is recorded, please provide a copy of the instrument creating each such encumbrance and depict the location of the encumbrance within the conservation easement area on the mitigation plans and/or surveyor's sketch.**
- c) Is the property that will be encumbered by a conservation easement subject to a mortgage? If so, please submit a draft Consent and Joinder of Mortgagee containing the name of the mortgagee, the title of the mortgage document(s),**



including any amendments and UCC financing statements, and the official records book and page number(s) of the public records of the county where the mortgage is recorded. The Consent and Joinder of Mortgagee will need to be executed by the lending institution in the presence of two witnesses.

- d) The conservation easement must be executed by an individual who has the authority to transfer interests in the real property being encumbered by the conservation easement. Therefore, please identify the person who will be executing the easement on behalf of the grantor. If the grantor is a business entity (corporation, limited liability company, limited partnership, etc.), please identify the name and title or position of the signatory in the signature block appearing at the end of the conservation easement. Please also submit documentation of the signatory's authority to convey property interests on behalf of the business entity. Examples of such documents include, a corporate resolution, partnership or limited liability company affidavit, or partnership/operating agreement.
- e) The draft conservation easement should include as an attachment: (1) a metes and bounds legal description of the area to be placed under conservation easement, and (2) a surveyor's sketch with the easement area clearly delineated and labeled, with the acreage of the easement area noted on the sketch. Please clearly label the pages as Exhibit "\_\_\_", page \_\_\_ of \_\_. The District will need to review these documents and approve them in writing before the easement may be recorded. Please provide the acreages for the uplands and wetlands for each easement separately.
- f) If the conservation easement area will be described by reference to a plat, please provide a copy of the plat. The conservation easement must reference the book and page number in a recorded plat. If the plat has not yet been recorded, please provide a preliminary or draft plat with the following note added to the face of the plat:
- Tracts \_\_\_\_\_ are subject to a Conservation Easement in favor of the St. Johns River Water Management District pursuant to Section 704.06, Florida Statutes,
- g) Please submit a USGS quadrangle map depicting the area to be preserved by conservation easement. Please ensure that the official quad map name is included on your submittal.
- h) The District must be assured of access to mitigation areas that will be encumbered by the conservation easement. Please provide information confirming the District's right of access via public road or, if not available, a draft access easement conveying a right of access to the District. [Sections 40C-4.301(1)(d),(f), F.A.C.; 40C-4.302(1)(a)2,7, F.A.C., 12.3.8, A.H.]



St. Johns River Water Management District

**Hartwood Marsh Road Widening**

L&A No.2005-118.23

Doc: \2005-118-WMDRAI-05C08.wpd

5 March 2008

Page 6

**Response:** As no impacts to wetlands or surface waters are associated with this phase of the project, preservation of upland buffers within Conservation Easements should not be necessary.

Please feel free to contact me if you require any additional information.

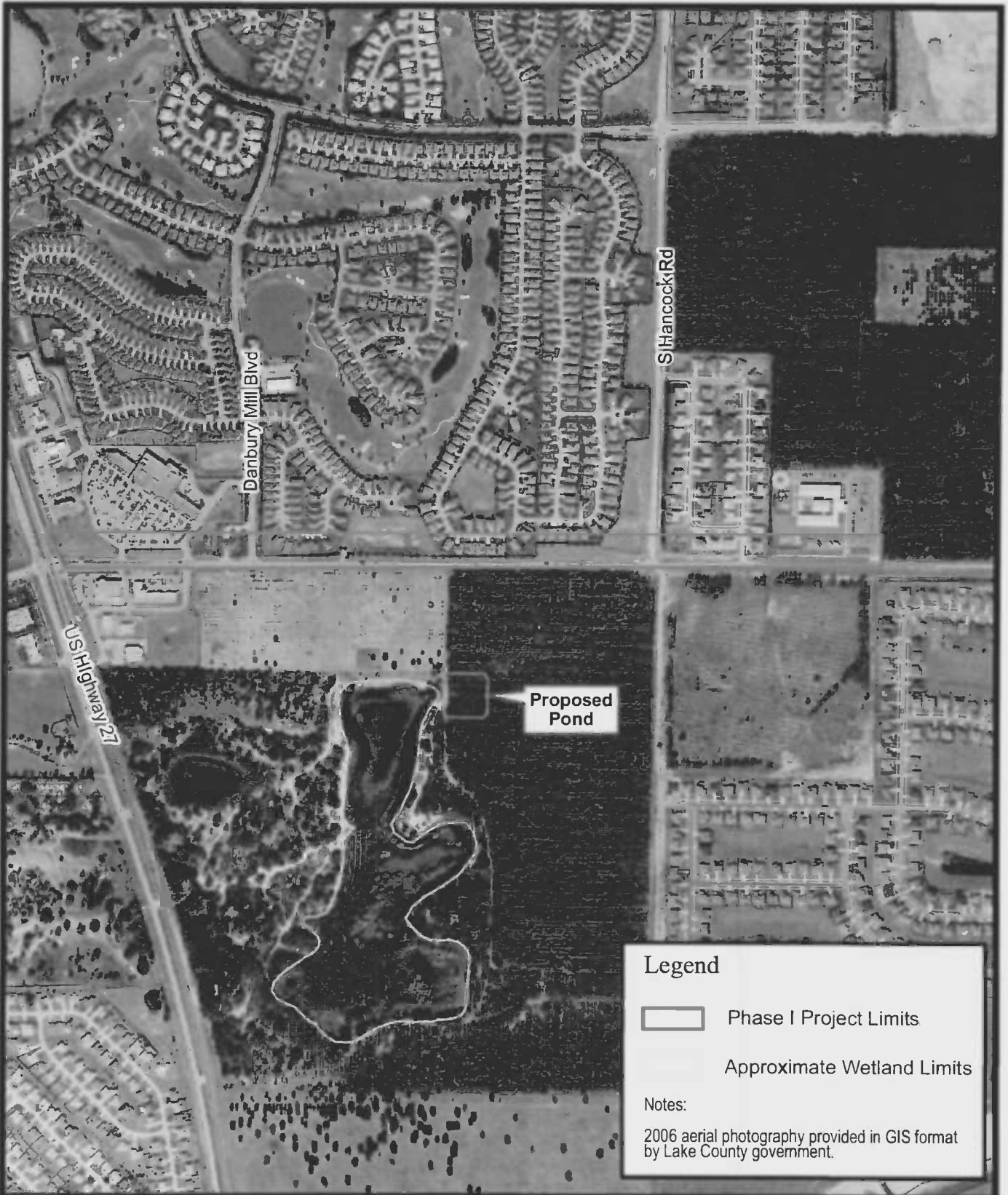
Sincerely,

**LOTSPEICH AND ASSOCIATES, INC.**

Don J. Silverberg  
Project Manager

DJS\amh

cc: Karen Van den Avont, P.E.; HNTB  
FILE/Renee L. Thomas, President



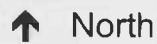
**Lotspeich and Associates, Inc.**  
ECOLOGICAL CONSULTANTS

2711 West Fairbanks Avenue, Winter Park, Florida 32789  
407.740.8482 Fax: 645.1305 www.lotspeichandassociates.com

**Hartwood Marsh Road Widening**  
(from U.S. 27 to Orange County Line)

In Sections 1, 2, 3, 9, and 10, Township 23 South, Range 26 East  
Lake County, Florida

**Aerial Photo**



**North**

Scale: 1" = 800'

Figure 1

File: 05118.MXD

Drawn By: BEH

Job No.: 2005-118.33

Date: 5 Mar 2008



**TABLE 1**  
**PROJECT IMPACT SUMMARY**  
**Hartwood Marsh Widening**  
 March 2008

| WL & SW ID            | WL & SW TYPE | WL & SW SIZE (ac.) ON-SITE | WL & SW (ac.) NOT IMPACTED | PERMANENT WL & SW IMPACTS |             | TEMPORARY WL & SW IMPACTS |             | MITIGATION ID |
|-----------------------|--------------|----------------------------|----------------------------|---------------------------|-------------|---------------------------|-------------|---------------|
|                       |              |                            |                            | IMPACT SIZE (ac.)         | IMPACT CODE | IMPACT SIZE (ac.)         | IMPACT CODE |               |
| SW-1                  | 533/641      | 32.05±                     | 32.05±                     | —                         | —           | —                         | —           | —             |
|                       |              |                            |                            |                           |             |                           |             |               |
| <b>PROJECT TOTALS</b> | —            | 32.05±                     | 32.05±                     | —                         | —           | —                         | —           | —             |

**LEGEND**

WL = Wetland; SW = Surface Water; ID = Identification number, letter, etc.

WETLAND TYPE: Use an established wetland classification system and indicate which classification system is being used in the "Comment" section below.

IMPACT CODE (Type): D = dredge; F = fill; H = change hydrology; S = shading; C = clearing; O = other. Indicate the final impact if more than one impact type is proposed in a given area. For example, show F only for an area that will first be demucked and then backfilled.

NOTE: Multiple entries per cell are not allowed, except in the "Mitigation ID" column. Any given acreage of wetland should be listed in one row only, such that the total of all rows equals the project total for a given category (column). For example, if Wetland No. 1 includes multiple wetland types and multiple impact codes are proposed in each type, then each proposed impact in each wetland type should be shown on a separate row, while the size of each wetland type found in Wetland No. 1 should be listed in only one row.

**COMMENTS:**

Wetlands are classified in accordance with the Florida Land Use, Cover and Forms Classification System, Florida Department of Transportation, 1999

REVIEWER: \_\_\_\_\_

***APPENDIX***

***DRAINAGE  
CALCULATIONS***

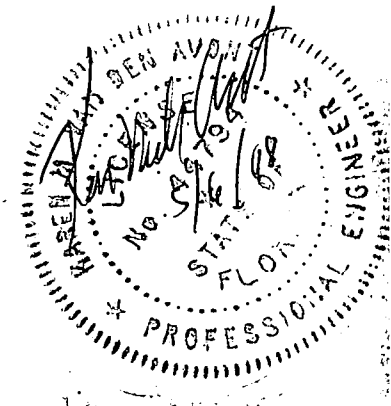
**HARTWOOD MARSH ROAD – PHASE I  
US 27 TO 1500 FEET EAST OF HANCOCK ROAD  
LAKE COUNTY, FLORIDA**

**DRAINAGE CALCULATIONS**

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## 1.0 INTRODUCTION

Lake County intends to reconstruct Hartwood Marsh Road from a two-lane undivided rural roadway to a four-lane divided urban roadway. The project begins at US 27 and ends 1500 feet east of Hancock Road.

This Drainage Report summarizes the revisions made to the drainage calculations that were originally submitted in December 2007.

## 2.0 SOIL CHARACTERISTICS

Ardaman & Associates, Inc. performed a 50-foot boring at the location of proposed Pond 2 in March 2008. This boring was performed to estimate the seasonal high ground water level. Ardaman & Associates, Inc. estimates that the seasonal high ground water level is approximately 35 feet below the existing ground surface. A copy of the report is located in the Appendix in the Basin 2 section.

Table 1 summarizes the encountered water surface and estimated seasonal high water elevation for Ponds 1 and 2.

Table 1

| Water Table Elevations |                                      |                                                  |
|------------------------|--------------------------------------|--------------------------------------------------|
| Pond                   | Encountered Groundwater Surface (ft) | Estimated Seasonal High Groundwater Surface (ft) |
| 1                      | 92.0                                 | 92.0                                             |
| 2                      | 87.5                                 | 92.0                                             |

## 3.0 EXISTING ROADWAY DRAINAGE

The Hartwood Marsh Road project is divided into three separate drainage basins, which are then divided into smaller sub-basins. The drainage basin data can be found in the Appendix

### **3.1 Basin 1**

Basin 1 begins at US 27 (Sta. 103+53) and ends just east of Hancock Road (Sta. 144+10). The pre-development condition consists of a two-lane roadway with contributing offsite drainage basins to the roadway corridor. The road runoff sheet flows to an unnamed lake located south of Hartwood Marsh Road and east of US 27. The basin includes four offsite basins adjacent to the road corridor. A fifth offsite basin is a large area located south of Hartwood Marsh Road that drains to the unnamed lake. A future detention pond for Basin 1 treatment will be located within the fifth offsite basin.

Table 2 describes the pre-development condition hydrologic data.

### **3.2 Basin 2**

Basin 2 begins just east of Hancock Road (Sta. 144+10) and ends 1200 feet east of Hancock Road (Sta. 152+39). The pre-development condition consists of a two-lane roadway with contributing offsite drainage basins to the roadway corridor. The roadway runoff is contained within roadside swales which do not have a positive outfall. There are two offsite basins contributing to the roadside swales. The proposed pond for this basin will be located on the vacant parcel owned by the First Baptist Church of Clermont. The church site has been included as an offsite basin. Runoff from the southern half of the church site flows to the south toward the Regency Hills subdivision. Table 3 describes the pre-development condition hydrologic data.

### **3.3 Basin 3**

Basin 3 begins 1200 feet east of Hancock Road (Sta. 152+39) and ends at the end of the construction (Sta. 162+21.77). The pre-development condition consists of a two-lane roadway with contributing offsite drainage basins to the roadway corridor. The roadway runoff is contained within roadside swales which do not have a positive outfall. Table 4 describes the pre-development condition hydrologic data.

**Table 2**

| <b>Basin 1</b>                             |                         |                   |                              |                     |                                     |
|--------------------------------------------|-------------------------|-------------------|------------------------------|---------------------|-------------------------------------|
| <b>Pre-Development Drainage Basin Data</b> |                         |                   |                              |                     |                                     |
| <b>Basin Name</b>                          | <b>Outfall Location</b> | <b>Area (Ac.)</b> | <b>Impervious Area (Ac.)</b> | <b>Curve Number</b> | <b>Time of Concentration (min.)</b> |
| 1 (Road)                                   | Unnamed Lake            | 8.91              | 4.01                         | 71.1                | 26.49                               |
| 1-1 (Offsite)                              | Unnamed Lake            | 0.25              | 0                            | 39.0                | 20.26                               |
| 1-2 (Offsite)                              | Unnamed Lake            | 0.26              | 0                            | 39.0                | 28.97                               |
| 1-3 (Offsite)                              | Unnamed Lake            | 0.30              | 0.02                         | 43                  | 23.34                               |
| 1-4 (Offsite)                              | Unnamed Lake            | 1.37              | 0.04                         | 40.7                | 9.73                                |
| 1-5 (Offsite)                              | Unnamed Lake            | 59.69             | 0                            | 39.0                | 49.19                               |
| <b>Total</b>                               |                         | <b>70.78</b>      | <b>4.07</b>                  |                     |                                     |

**Table 3**

| <b>Basin 2</b>                             |                         |                   |                              |                     |                                     |
|--------------------------------------------|-------------------------|-------------------|------------------------------|---------------------|-------------------------------------|
| <b>Pre-Development Drainage Basin Data</b> |                         |                   |                              |                     |                                     |
| <b>Basin Name</b>                          | <b>Outfall Location</b> | <b>Area (Ac.)</b> | <b>Impervious Area (Ac.)</b> | <b>Curve Number</b> | <b>Time of Concentration (min.)</b> |
| First Baptist Church                       | Regency Hills Ponds     | 23.71             | 0                            | 25                  | 51.00                               |
| 2 (Road)                                   | Hartwood Marsh Road     | 2.51              | 0.64                         | 47.3                | 19.09                               |
| 2-2 (Offsite)                              | Hartwood Marsh Road     | 0.30              | 0.08                         | 54.7                | 17.77                               |
| 2-3 (Offsite)                              | Hartwood Marsh Road     | 0.14              | 0.01                         | 43.2                | 12.16                               |
| <b>Total</b>                               |                         | <b>26.66</b>      | <b>0.73</b>                  |                     |                                     |

**Table 4**

| <b>Basin 3</b>                             |                         |                   |                              |                     |                                     |
|--------------------------------------------|-------------------------|-------------------|------------------------------|---------------------|-------------------------------------|
| <b>Pre-Development Drainage Basin Data</b> |                         |                   |                              |                     |                                     |
| <b>Basin Name</b>                          | <b>Outfall Location</b> | <b>Area (Ac.)</b> | <b>Impervious Area (Ac.)</b> | <b>Curve Number</b> | <b>Time of Concentration (min.)</b> |
| 3 (Road)                                   | Hartwood Marsh Road     | 2.73              | 0.84                         | 64.1                | 5.91                                |
| 3-1 (Offsite)                              | Hartwood Marsh Road     | 0.02              | 0.01                         | 68.5                | 11.83                               |
| 3-2 (Offsite)                              | Hartwood Marsh Road     | 0.46              | 0                            | 39                  | 5.79                                |
| <b>Total</b>                               |                         | <b>3.21</b>       | <b>0.85</b>                  |                     |                                     |

**4.0 PROPOSED ROADWAY DRAINAGE**

In the post development condition, the drainage basin boundaries will essentially be maintained. Storm water will be conveyed in storm sewer to the respective discharge points. A detention pond located south of Hartwood Marsh Road and east of US 27 will be used to provide treatment for Basin 1. A detention pond located south of Hartwood Marsh Road and east of Hancock Road on the future First Baptist Church site will provide for treatment for Basin 2. Roadside swales utilizing ditch blocks to retain runoff will provide treatment for Basin 3. The post development drainage basin data can be found in the Appendix .

**4.1 Basin 1**

In the post development condition, the basin area contributing to Pond 1 consists of the roadway (Sta. 103+43 to Sta. 138+50) and offsite basins directly adjacent to the road. Pond 1 is considered a separate basin. The runoff from the area surrounding the pond will be bypassed around the pond. Pond 1 will discharge to the unnamed lake.

Pond 1 has been designed for an interim condition. A portion of the future First Baptist Church property contributes runoff to Basin 1. When the Church property is developed, this area will be included in the Basin 2 drainage area and will not discharge to the unnamed lake. However, the time for development of the Church parcel is unknown. Therefore, the

area that is currently draining to Basin 1 will be included in the Basin 1 calculations.

Water quality treatment and attenuation of the 25 year/96 hour runoff volume will be provided in Pond 1. Pond 1 is designed as a dry detention pond. The control structure in the pond consists of a ditch bottom inlet with the grate set slightly above the stage of the attenuation volume for the 25 year/96 hours storm event. The recovery of the attenuation volume is through infiltration through the pond bottom and side slopes.

Table 5 summarizes the post development drainage basin data. Table 6 shows the routed discharge volume for the 25 year/96 hour event to the unnamed lake. Table 7 shows the pre-development and post development discharge rates to the lake. Table 13 shows the 25 year/96 hour attenuation volume recovery.

**Table 5**

| <b>Basin 1<br/>Post Development Drainage Basin Data</b> |                         |                   |                              |                     |                                     |
|---------------------------------------------------------|-------------------------|-------------------|------------------------------|---------------------|-------------------------------------|
| <b>Basin Name</b>                                       | <b>Outfall Location</b> | <b>Area (Ac.)</b> | <b>Impervious Area (Ac.)</b> | <b>Curve Number</b> | <b>Time of Concentration (min.)</b> |
| 1 (Road)                                                | Pond 1                  | 8.22              | 7.12                         | 91.5                | 17.37                               |
| 1-1 (Offsite)                                           | Pond 1                  | 0.22              | 0                            | 39.0                | 28.19                               |
| 1-2 (Offsite)                                           | Pond 1                  | 0.26              | 0                            | 39.0                | 20.25                               |
| 1-3 (Offsite)                                           | Pond 1                  | 0.28              | 0.02                         | 43.2                | 25.54                               |
| 1-4 (Offsite)                                           | Pond 1                  | 1.24              | 0.04                         | 40.9                | 17.90                               |
| 1-5 (Offsite)<br>Interim<br>Condition                   | Unnamed Lake            | 54.24             | 0                            | 54.24               | 50.91                               |
| 1-6 (Pond 1)                                            | Pond 1                  | 3.03              | 0.82                         | 58.4                | 5.00                                |
| <b>Total</b>                                            |                         | <b>67.48</b>      | <b>8.00</b>                  |                     |                                     |



Table 6

| SJRWMD Routed Peak Discharge Volume |                                                         |                                                             |                                              |                                              |
|-------------------------------------|---------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------|----------------------------------------------|
| Basin                               | Pre-Development<br>25 Year/96<br>Hour Runoff<br>(ac-ft) | Post<br>Development<br>25 Year/96<br>Hour Runoff<br>(ac-ft) | Required<br>Attenuation<br>Volume<br>(ac-ft) | Retained<br>Attenuation<br>Volume<br>(ac-ft) |
| 1<br>(to unnamed<br>lake)           | 19.08                                                   | 20.70                                                       | 1.62                                         | 2.06                                         |
| 2<br>(to Regency<br>Hills)          | 1.40                                                    | 33.99                                                       | 33.99                                        | 33.99                                        |
| 3<br>(to Hartwood<br>Marsh swales)  | 1.38                                                    | 1.63                                                        | 0.26                                         | 0.25                                         |

Table 7

| Basin 1 Discharge and Peak Stage |                                       |                                                        |                                                        |                              |
|----------------------------------|---------------------------------------|--------------------------------------------------------|--------------------------------------------------------|------------------------------|
| Storm Event                      | Pre-Development<br>Discharge<br>(cfs) | Post<br>Development<br>Discharge to<br>Pond 1<br>(cfs) | Basin Outflow<br>Discharge to<br>Unnamed Lake<br>(cfs) | Pond 1<br>Peak Stage<br>(ft) |
| Mean Annual                      | 11.97                                 | 26.18                                                  | 2.67                                                   | 98.40                        |
| 10 yr/24 hr                      | 29.08                                 | 41.91                                                  | 21.94                                                  | 99.02                        |
| 25 yr/24 hr                      | 46.90                                 | 52.28                                                  | 37.58                                                  | 99.32                        |
| 100 yr/24 hr                     | 80.95                                 | 67.92                                                  | 66.58                                                  | 99.90                        |

4.2 Basin 2

In the post development condition, the basin area contributing to Pond 2 consists of the roadway (Sta. 138+50 to Sta. 152+39) and offsite basins directly adjacent to the road. Pond 2 is considered a separate basin. Pond 2 is located on the future First Baptist Church of Clermont property. The

County has had discussions with the property owner to coordinate joint use opportunities. The County has designed this pond to accommodate the runoff from the First Baptist church site assuming that the future development will be no more than 80% impervious. In addition, Pond 2 has been designed to include runoff from a section of the future South Hancock Road extension.

Water quality treatment and attenuation of the 25 year/96 hour runoff volume will be provided in Pond 2. Pond 2 is designed as a dry detention pond with no outfall.

Table 8 summarizes the post development drainage basin data. Table 6 shows the routed discharge volume for the 25 year/96 hour event. Table 9 shows the peak discharge into the pond and the peak stage for various storm events.

Tables 11 and 12 describe the pond details. Table 13 shows 25 year/96 hour attenuation volume recovery.

#### **4.3 Basin 3**

In the post development condition, the Basin 3 area consists of the roadway (Sta. 152+39 to Sta. 162+22) and offsite basins directly adjacent to the road. This runoff from this basin will ultimately be treated in a retention pond in the Hartwood Marsh Road Phase II project. In the interim condition, the runoff from this basin will discharge to the roadside swales. Ditch blocks spaced 25 feet apart in the swales on both side of the road will retain a portion of the runoff.

Table 10 summarizes the post development drainage basin data. Table 6 shows the routed discharge volume for the 25 year/96 hour event.

Table 8

| Basin 2<br>Post Development Drainage Basin Data |                  |              |                       |              |                              |
|-------------------------------------------------|------------------|--------------|-----------------------|--------------|------------------------------|
| Basin Name                                      | Outfall Location | Area (Ac.)   | Impervious Area (Ac.) | Curve Number | Time of Concentration (min.) |
| First Baptist Church                            | Pond 2           | 30.53        | 24.42                 | 86.2         | 14.38                        |
| 2 (Road)                                        | Pond 2           | 7.67         | 6.00                  | 85.2         | 17.26                        |
| 2-1 (Offsite)                                   | Pond 2           | 0.08         | 0                     | 39           | 10.20                        |
| 2-2 (Offsite)                                   | Pond 2           | 0.30         | 0.08                  | 54.7         | 9.24                         |
| 2-3 (Offsite)                                   | Pond 2           | 0.14         | 0.01                  | 43.2         | 8.50                         |
| 2-4 (Pond 2)                                    | Pond 2           | 6.34         | 1.96                  | 57.9         | 5.00                         |
| <b>Total</b>                                    |                  | <b>45.07</b> | <b>32.48</b>          |              |                              |

Table 9

| Pond 2 Peak Discharge and Stage |                                            |                        |
|---------------------------------|--------------------------------------------|------------------------|
| Storm Event                     | Post Development Discharge to Pond 2 (cfs) | Pond 2 Peak Stage (ft) |
| Mean Annual                     | 85.12                                      | 108.28                 |
| 10 yr/24 hr                     | 162.38                                     | 111.27                 |
| 25 yr/24 hr                     | 212.73                                     | 112.99                 |
| 100 yr/24 hr                    | 314.08                                     | 116.06                 |
| 25 yr/96 hr                     | 243.25                                     | 113.34                 |

**Table 10**

| <b>Basin 3</b>                              |                         |                   |                              |                     |                                     |
|---------------------------------------------|-------------------------|-------------------|------------------------------|---------------------|-------------------------------------|
| <b>Post Development Drainage Basin Data</b> |                         |                   |                              |                     |                                     |
| <b>Basin Name</b>                           | <b>Outfall Location</b> | <b>Area (Ac.)</b> | <b>Impervious Area (Ac.)</b> | <b>Curve Number</b> | <b>Time of Concentration (min.)</b> |
| 3 (Road)                                    | Hartwood Marsh Road     | 2.73              | 1.73                         | 64.1                | 5.91                                |
| 3-1 (Offsite)                               | Hartwood Marsh Road     | 0.02              | 0.01                         | 68.5                | 11.83                               |
| 3-2 (Offsite)                               | Hartwood Marsh Road     | 0.46              | 0                            | 5.79                | 3.09                                |
| <b>Total</b>                                |                         | <b>3.21</b>       | <b>1.74</b>                  |                     |                                     |

**Table 11**

| <b>Pond Details</b> |                       |                                                            |                    |                                                |
|---------------------|-----------------------|------------------------------------------------------------|--------------------|------------------------------------------------|
| <b>Pond</b>         | <b>Type of System</b> | <b>Pond Surface Area including Maintenance Berms (ac.)</b> | <b>Side Slopes</b> | <b>Pond Bottom Elevation/Top of Berm (ft.)</b> |
| 1                   | Dry                   | 1.80                                                       | 1:4                | 95.0 / 102.0                                   |
| 2                   | Dry                   | 4.76                                                       | 1:4                | 104.0 / 117.0                                  |

**Table 12**

| <b>Pond Control Structure</b> |                                                                                         |
|-------------------------------|-----------------------------------------------------------------------------------------|
| <b>Pond</b>                   | <b>Type of Structure</b>                                                                |
| 1                             | (1) Ditch bottom inlet Type C with grate set at the 25 year/96 hour attenuation volume. |

**Table 13**

| <b>25 Year/96 Hour Attenuation Volume Recovery</b> |                                   |                              |
|----------------------------------------------------|-----------------------------------|------------------------------|
| <b>Pond</b>                                        | <b>Attenuation Volume (ac-ft)</b> | <b>Recovery Time (hours)</b> |
| 1                                                  | 1.62                              | 89.1                         |
| 2                                                  | 33.99                             | 18                           |

#### **4.4 Water Quality**

Water quality treatment for Basin 1 is provided in dry detention Pond 1. The treatment for Basin 2 runoff is provided in dry detention Pond 2. The treatment volume is calculated using the contributing drainage basins to the road and pond. Offsite area that is bypassed around the pond is not included in the calculation. In Basin 2, the water quality treatment volume calculation assumes that the First Baptist Church site is developed and that it has 80% impervious area. In Basin 3, water quality treatment is provided in roadside swales utilizing ditch blocks.

The volume recovery is based on St. Johns River Water Management District criteria for the type of stormwater management system. The ponds are to recover the treatment volume in 72 hours which is accomplished through soil percolation. Tables 14, 15 and 16 summarize the water quality requirements for each basin.

Table 14

| Water Quality Treatment |                                                  |                       |                          |                               |                                   |                                   |                                  |                       |
|-------------------------|--------------------------------------------------|-----------------------|--------------------------|-------------------------------|-----------------------------------|-----------------------------------|----------------------------------|-----------------------|
| Basin                   | Total Basin Area Contributing to Pond/Swale (ac) | Impervious Area (ac.) | Type of Treatment System | Location of Treatment System  | Treatment Volume Required (ac-ft) | Treatment Volume Provided (ac-ft) | Stage in Detention Pond (ft)     | Recovery Time (hours) |
| 1                       | 13.24                                            | 7.18                  | Dry Detention            | Pond 1 on Hartwood Properties | 1.30                              | 1.30                              | 96.69                            | 51                    |
| 2                       | 45.07                                            | 30.52                 | Dry Detention            | Pond 2 on church site         | 3.18                              | 3.18                              | 105.12                           | 3                     |
| 3                       | 3.21                                             | 1.74                  | Dry Detention            | Roadside swales               | 0.32                              | 0.32                              | See plans for ditch block height | See Table 14          |

Table 15

| Basin 3 Water Quality Treatment – Left Swale |      |                      |                      |
|----------------------------------------------|------|----------------------|----------------------|
| Location                                     | Side | Volume Retained (cf) | Recover Time (hours) |
| 156+25 to 156+50                             | Left | 113.56               | 1                    |
| 156+50 to 156+75                             | Left | 120.88               | 1                    |
| 156+75 to 157+00                             | Left | 157.30               | 1                    |
| 157+00 to 157+25                             | Left | 230.79               | 1.5                  |
| 157+25 to 157+50                             | Left | 347.36               | 2                    |
| 157+50 to 157+75                             | Left | 378.62               | 2.25                 |
| 157+75 to 158+00                             | Left | 450.50               | 3                    |
| 158+00 to 158+25                             | Left | 271.35               | 2                    |
| 158+25 to 158+50                             | Left | 176.96               | 1.5                  |
| 158+50 to 158+75                             | Left | 335.26               | 2                    |
| 158+75 to 159+00                             | Left | 448.00               | 3                    |
| 159+00 to 159+25                             | Left | 493.10               | 3                    |
| 159+25 to 159+50                             | Left | 546.75               | 3                    |
| 159+50 to 159+75                             | Left | 610.79               | 3                    |
| 159+75 to 160+00                             | Left | 640.34               | 3                    |
| 160+00 to 160+25                             | Left | 745.83               | 3                    |
| 160+25 to 160+50                             | Left | 658.35               | 3                    |
| 160+50 to 160+75                             | Left | 638.25               | 2.3                  |
| 160+75 to 161+00                             | Left | 712.88               | 3                    |
| 161+00 to 161+25                             | Left | 696.25               | 2.3                  |
| 161+25 to 161+50                             | Left | 589.80               | 2.3                  |
| 161+50 to 161+75                             | Left | 427.00               | 1.7                  |
| 161+75 to 162+00                             | Left | 657.75               | 3                    |
|                                              |      | 10447.67 (0.240 af)  |                      |

Table 16

| Basin 3 Water Quality Treatment – Right Swale |       |                      |                      |
|-----------------------------------------------|-------|----------------------|----------------------|
| Location                                      | Side  | Volume Retained (cf) | Recover Time (hours) |
| 156+00 to 156+25                              | Right | 135.50               | 1.5                  |
| 156+25 to 156+50                              | Right | 197.60               | 1.5                  |
| 156+50 to 156+75                              | Right | 152.70               | 1.5                  |
| 156+75 to 157+00                              | Right | 129.50               | 1                    |
| 157+00 to 157+25                              | Right | 141.60               | 1.3                  |
| 157+25 to 157+50                              | Right | 197.31               | 1.5                  |
| 157+50 to 157+75                              | Right | 295.08               | 2                    |
| 157+75 to 158+00                              | Right | 348.48               | 2                    |
| 158+00 to 158+25                              | Right | 145.62               | 1.2                  |
| 158+25 to 158+50                              | Right | 41.23                | 0.6                  |
| 158+50 to 158+75                              | Right | 59.91                | 0.6                  |
| 158+75 to 159+00                              | Right | 71.84                | 0.6                  |
| 159+00 to 159+25                              | Right | 48.93                | 0.6                  |
| 159+25 to 159+50                              | Right | 59.43                | 0.6                  |
| 159+50 to 159+75                              | Right | 64.75                | 0.6                  |
| 159+75 to 160+00                              | Right | 48.88                | 0.6                  |
| 160+00 to 160+25                              | Right | 99.10                | 0.72                 |
| 160+25 to 160+50                              | Right | 113.91               | 1                    |
| 160+50 to 160+75                              | Right | 155.47               | 1                    |
| 160+75 to 161+00                              | Right | 116.08               | 1                    |
| 161+00 to 161+25                              | Right | 188.41               | 1.2                  |
| 161+25 to 161+50                              | Right | 175.56               | 1                    |
| 161+50 to 161+95                              | Right | 328.99               | 1.3                  |
|                                               |       | 3315.88 (0.076 af)   |                      |



***APPENDIX***  
***To Drainage Calculations***

APPENDIX

HARTWOOD MARSH ROAD – PHASE I  
 US 27 TO 1500 FEET EAST OF HANCOCK ROAD  
 DRAINAGE CALCULATIONS

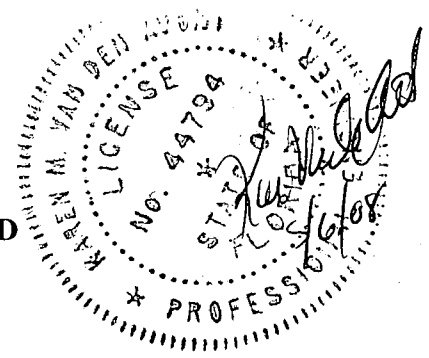


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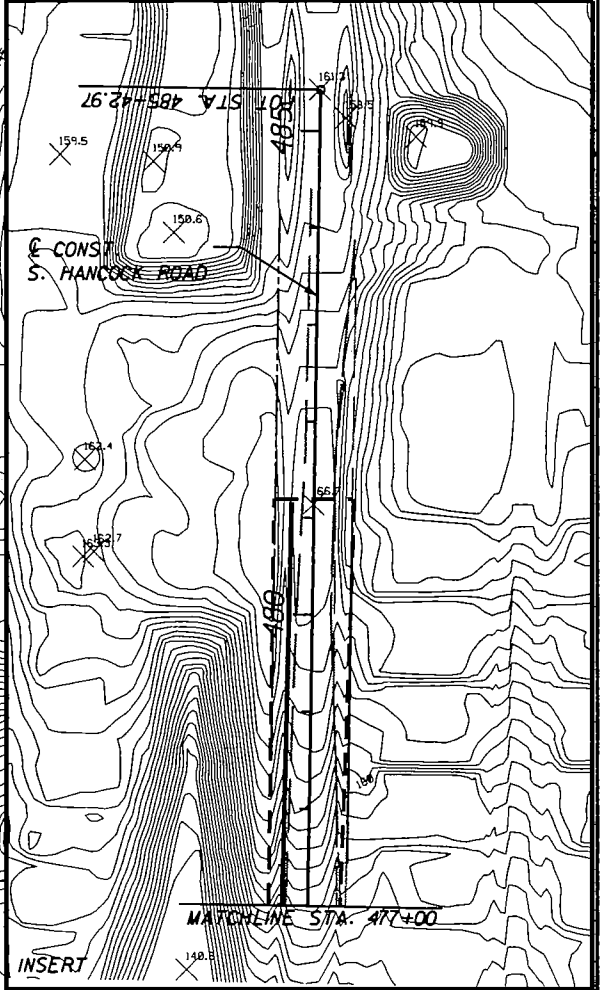
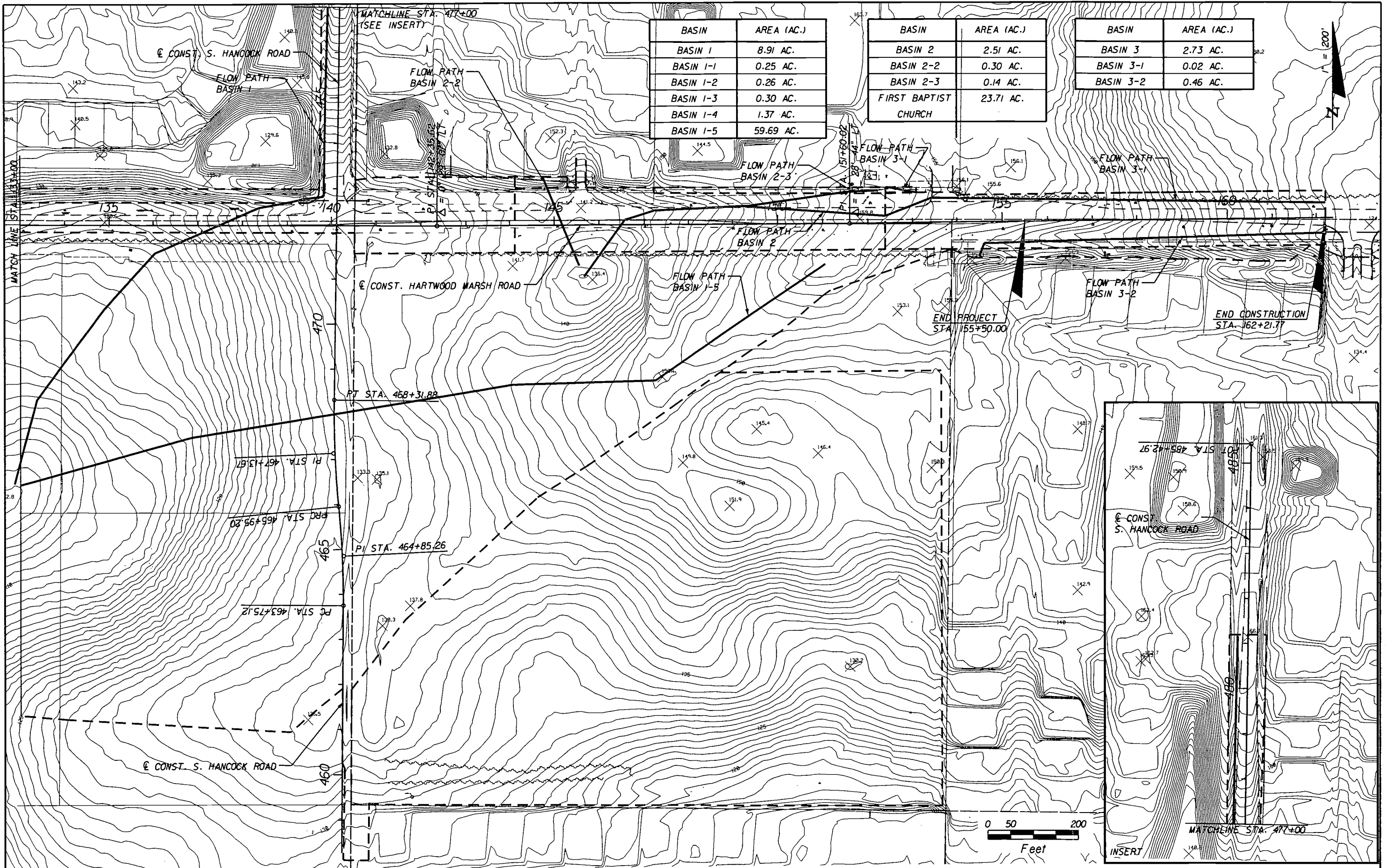
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| BASIN     | AREA (AC.) |
|-----------|------------|
| BASIN 1   | 8.91 AC.   |
| BASIN 1-1 | 0.25 AC.   |
| BASIN 1-2 | 0.26 AC.   |
| BASIN 1-3 | 0.30 AC.   |
| BASIN 1-4 | 1.37 AC.   |
| BASIN 1-5 | 59.69 AC.  |

| BASIN                | AREA (AC.) |
|----------------------|------------|
| BASIN 2              | 2.51 AC.   |
| BASIN 2-2            | 0.30 AC.   |
| BASIN 2-3            | 0.14 AC.   |
| FIRST BAPTIST CHURCH | 23.71 AC.  |

| BASIN     | AREA (AC.) |
|-----------|------------|
| BASIN 3   | 2.73 AC.   |
| BASIN 3-1 | 0.02 AC.   |
| BASIN 3-2 | 0.46 AC.   |



| REVISIONS |    | DESCRIPTION |
|-----------|----|-------------|
| DATE      | BY |             |
|           |    |             |

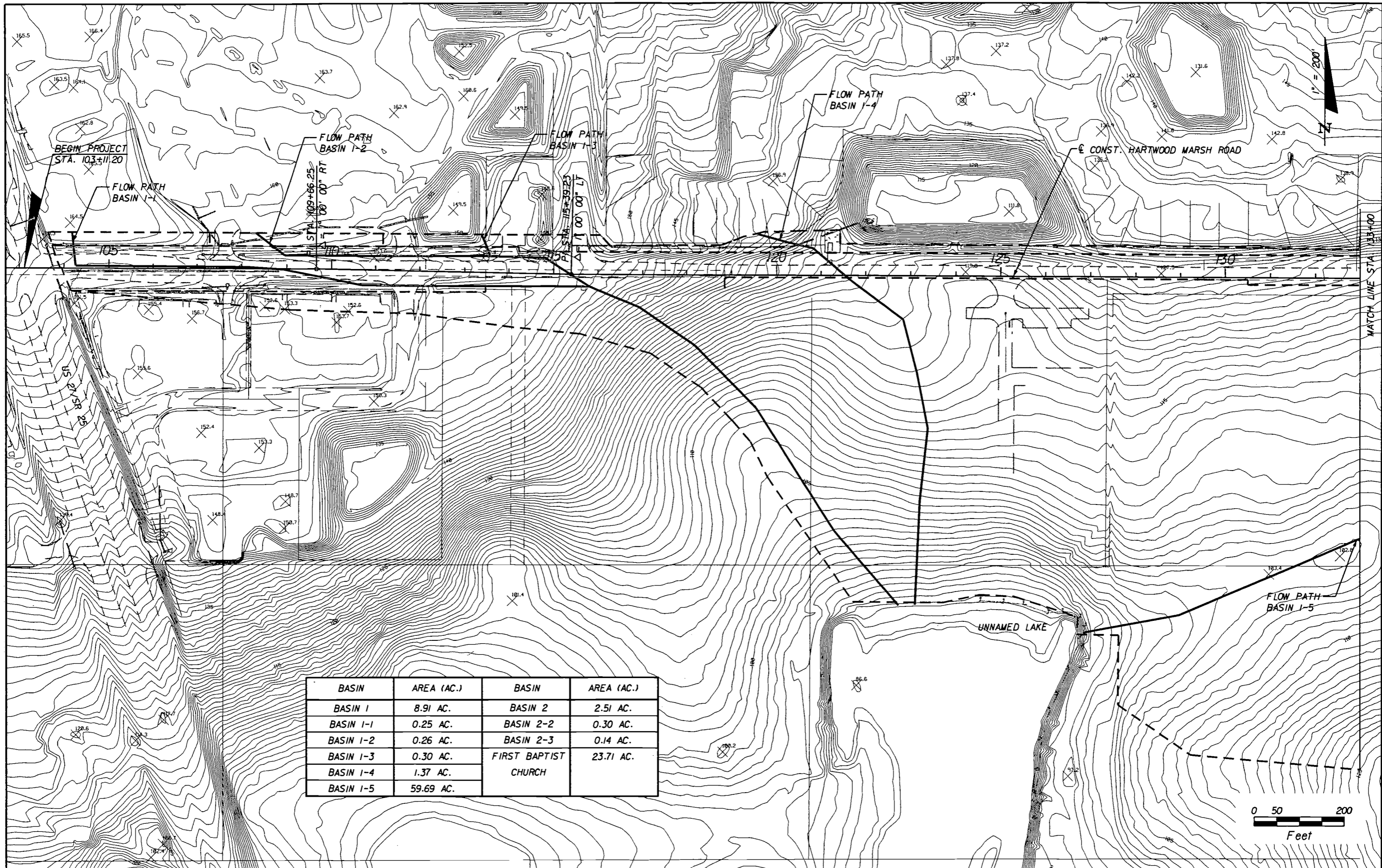
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 HNTB CORPORATION  
 300 PRIMA BLVD,  
 SUITE 200  
 LAKE MARY, FL 32746  
 (407) 805-0355  
 CERT. OF AUTH. NO. 6500  
 ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.  
 FL. REGISTRATION NO. 44794



**HARTWOOD MARSH ROAD - PHASE I**

**FLOW PATH PRE-DEVELOPMENT AREAS**

SHEET NO.



| REVISIONS |    |             |
|-----------|----|-------------|
| DATE      | BY | DESCRIPTION |
|           |    |             |

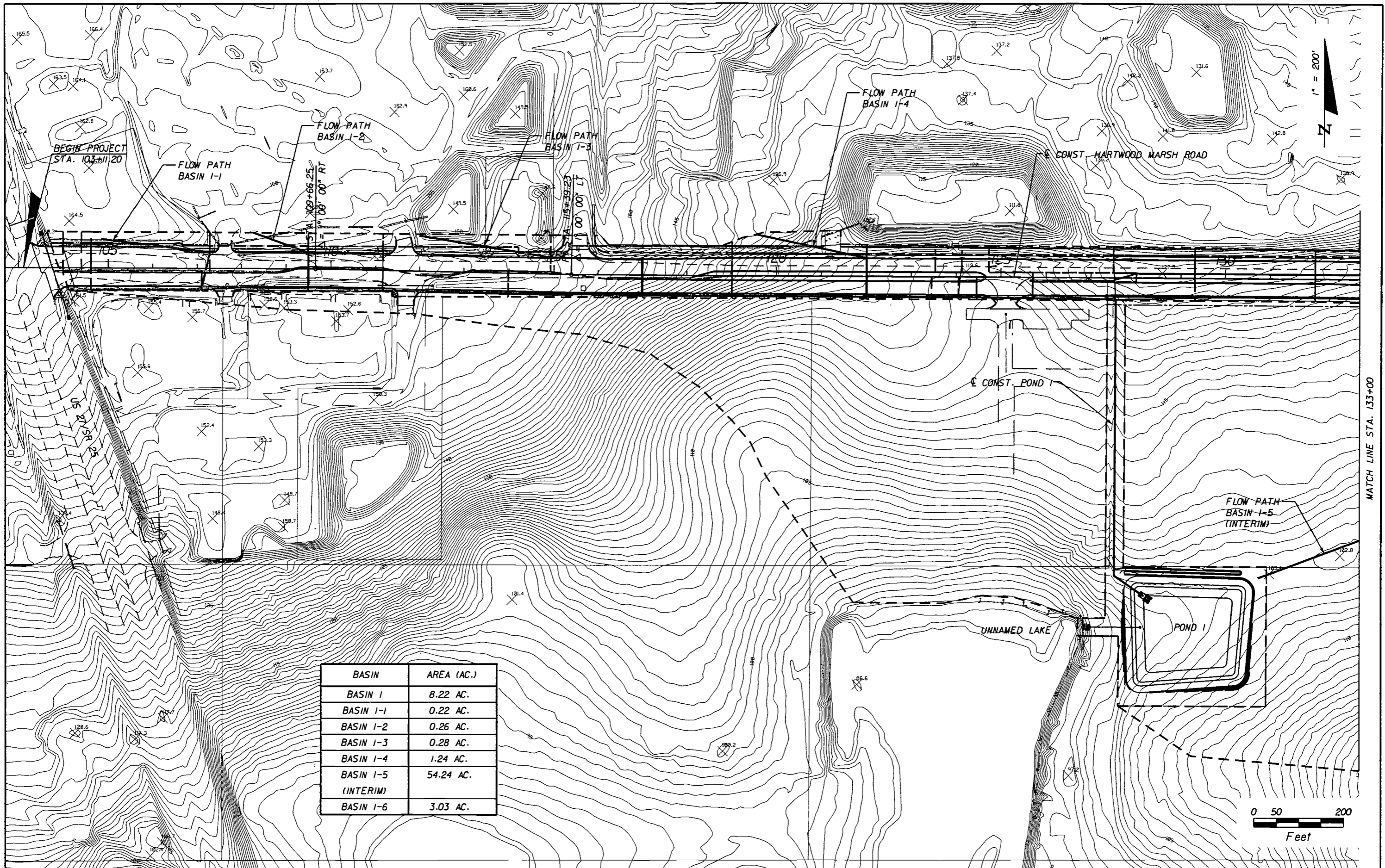
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 FL. REGISTRATION NO. 44794



**HARTWOOD MARSH ROAD - PHASE I**

**FLOW PATH PRE-DEVELOPMENT AREAS**

SHEET NO.



| BASIN               | AREA (AC.) |
|---------------------|------------|
| BASIN 1             | 8.22 AC.   |
| BASIN 1-1           | 0.22 AC.   |
| BASIN 1-2           | 0.26 AC.   |
| BASIN 1-3           | 0.28 AC.   |
| BASIN 1-4           | 1.24 AC.   |
| BASIN 1-5 (INTERIM) | 54.24 AC.  |
| BASIN 1-6           | 3.03 AC.   |

| REVISIONS |    |             |
|-----------|----|-------------|
| DATE      | BY | DESCRIPTION |
|           |    |             |

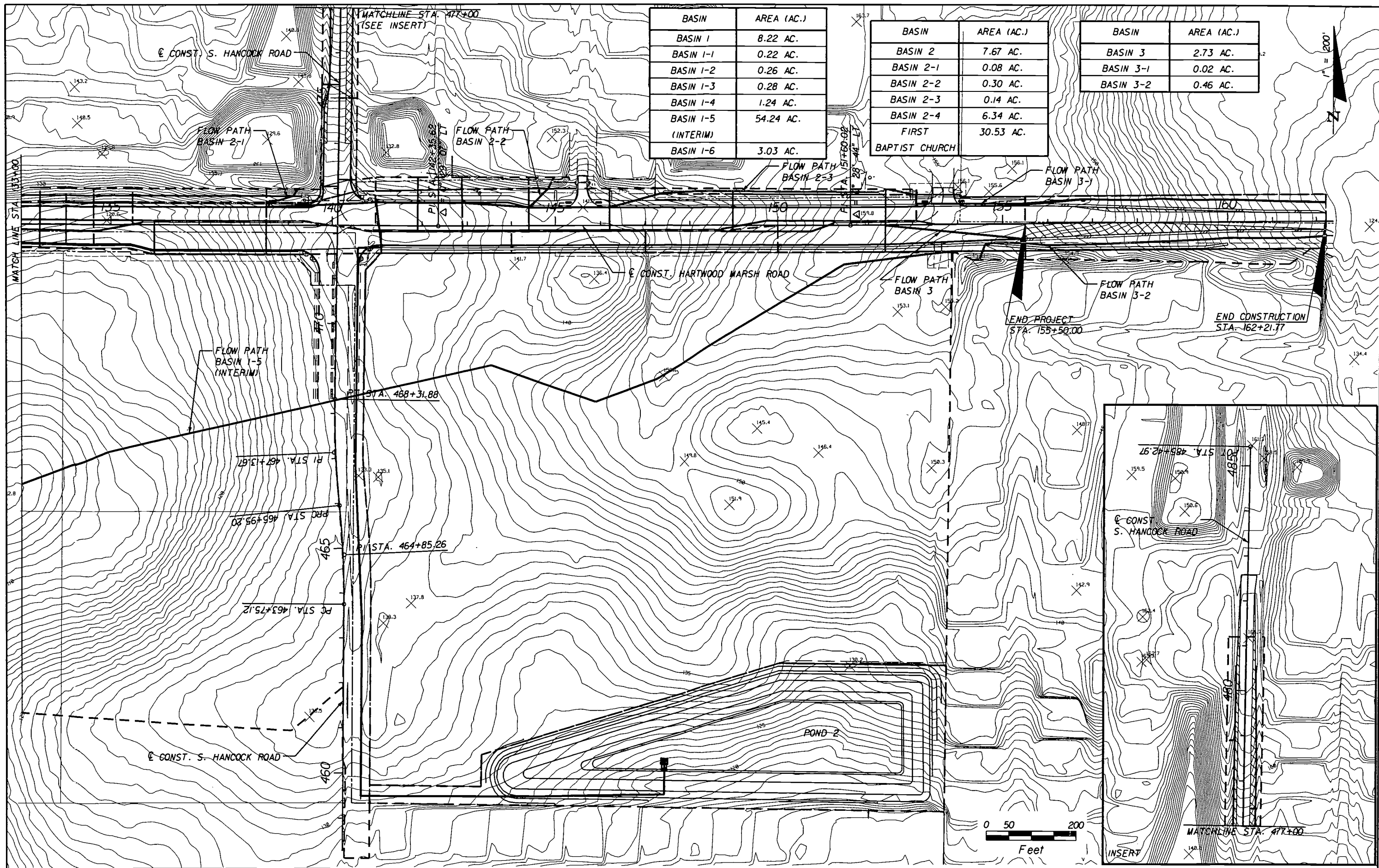
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 ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.  
 FL. REGISTRATION NO. 44794



**HARTWOOD MARSH  
ROAD - PHASE I**

**FLOW PATH  
POST DEVELOPMENT**

SHEET NO.



| BASIN     | AREA (AC.) |
|-----------|------------|
| BASIN 1   | 8.22 AC.   |
| BASIN 1-1 | 0.22 AC.   |
| BASIN 1-2 | 0.26 AC.   |
| BASIN 1-3 | 0.28 AC.   |
| BASIN 1-4 | 1.24 AC.   |
| BASIN 1-5 | 54.24 AC.  |
| (INTERIM) |            |
| BASIN 1-6 | 3.03 AC.   |

| BASIN                | AREA (AC.) |
|----------------------|------------|
| BASIN 2              | 7.67 AC.   |
| BASIN 2-1            | 0.08 AC.   |
| BASIN 2-2            | 0.30 AC.   |
| BASIN 2-3            | 0.14 AC.   |
| BASIN 2-4            | 6.34 AC.   |
| FIRST BAPTIST CHURCH | 30.53 AC.  |

| BASIN     | AREA (AC.) |
|-----------|------------|
| BASIN 3   | 2.73 AC.   |
| BASIN 3-1 | 0.02 AC.   |
| BASIN 3-2 | 0.46 AC.   |

| REVISIONS |    |             |
|-----------|----|-------------|
| DATE      | BY | DESCRIPTION |
|           |    |             |

**HNTB**  
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 (407) 805-0355  
 CERT. OF AUTH. NO. 6500  
 ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.  
 FL. REGISTRATION NO. 44794



**HARTWOOD MARSH  
ROAD - PHASE I**

**FLOW PATH  
POST DEVELOPMENT**

SHEET NO.  
**4**

**BASIN 1**



*Pre-Development Drainage Basin Data*

**BASIN BREAKDOWN**



DATE

MADE BY: MSF 18-Sep-07  
 CHCK BY: KMV 20-Sep-07

PROJECT: HARTWOOD MARSH ROAD

LOCATION: **BASIN 1 INTERIM**

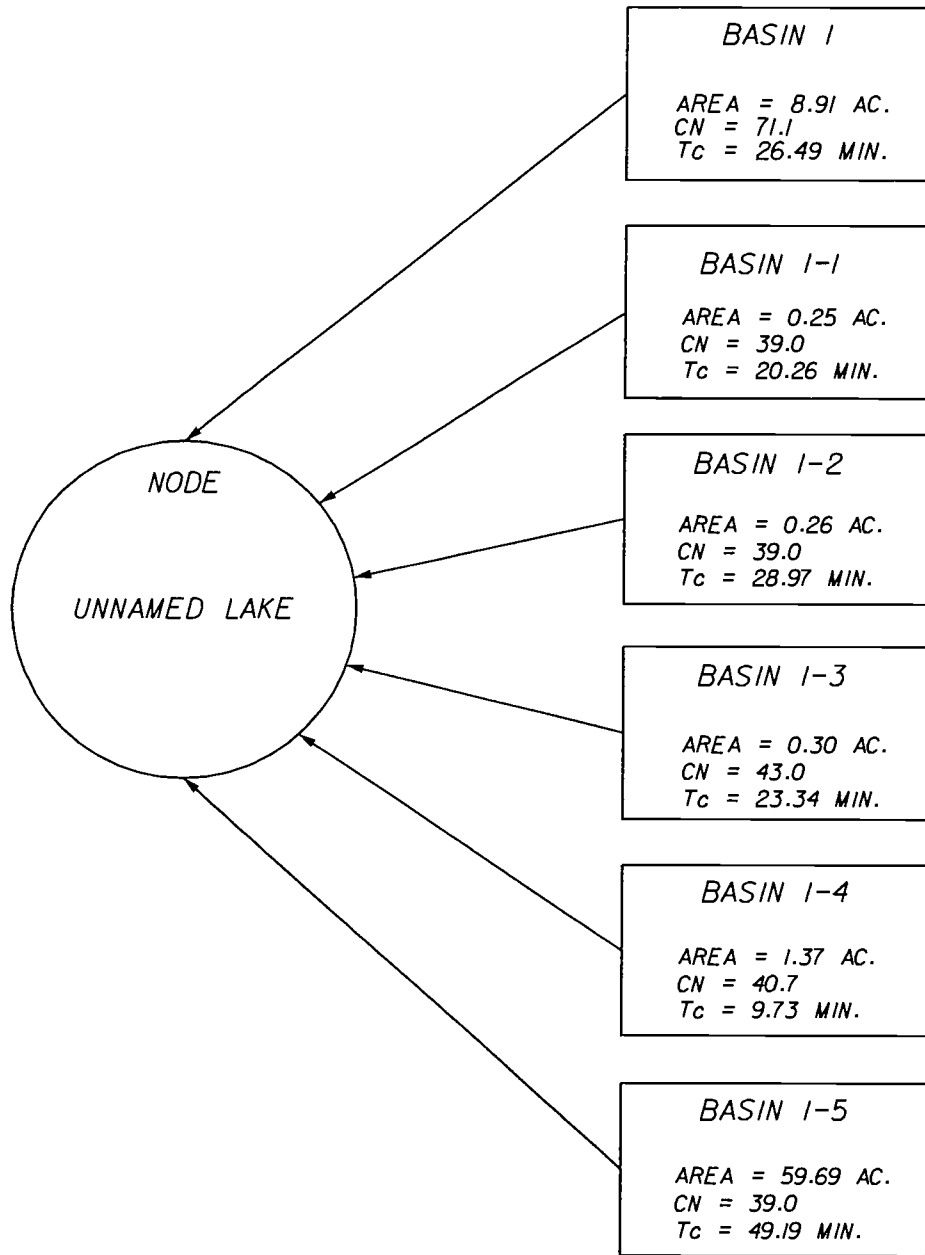
BASIN LIMITS: STA. 103+43 to STA. 138+50, CL CONST. HARTWOOD MARSH RD.

**EXISTING CONDITIONS:**



| LOCATION                  | STATION | To | STATION | BASIN WIDTH<br>(Ft.) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS                                        |
|---------------------------|---------|----|---------|----------------------|----------------------|-----------------------|-----------------------|------------------------------------------------|
| <b>ON-SITE:</b>           |         |    |         |                      |                      |                       |                       |                                                |
| BASIN 1                   | 103+43  | -  | 138+50  | 100 to 110           | 4.01                 | 4.89                  | 8.91                  | Discharge to Unnamed Lake, includes N. Hancock |
| <b>ON-SITE SUBTOTAL:</b>  |         |    |         |                      | <b>4.01</b>          | <b>4.89</b>           | <b>8.91</b>           |                                                |
| <b>OFF-SITE:</b>          |         |    |         |                      |                      |                       |                       |                                                |
| BASIN 1-1 (OFF-SITE)      | 103+80  | -  | 107+40  | -                    | 0.00                 | 0.25                  | 0.25                  | Discharge to Unnamed Lake                      |
| BASIN 1-2 (OFF-SITE)      | 107+90  | -  | 111+40  | -                    | 0.00                 | 0.26                  | 0.26                  | Discharge to Unnamed Lake                      |
| BASIN 1-3 (OFF-SITE)      | 111+40  | -  | 115+30  | -                    | 0.02                 | 0.28                  | 0.30                  | Discharge to Unnamed Lake                      |
| BASIN 1-4 (OFF-SITE)      | 116+00  | -  | 138+50  | -                    | 0.04                 | 1.33                  | 1.37                  | Discharge to Unnamed Lake                      |
| BASIN 1-5 (OFF-SITE)      |         |    |         |                      | 0.00                 | 59.69                 | 59.69                 | Discharge to Unnamed Lake                      |
| <b>OFF-SITE SUBTOTAL:</b> |         |    |         |                      | <b>0.06</b>          | <b>61.81</b>          | <b>61.87</b>          |                                                |
| <b>TOTAL:</b>             |         |    |         |                      | <b>4.07</b>          | <b>66.70</b>          | <b>70.78</b>          |                                                |

**PROPOSED CONDITIONS:**

| LOCATION                  | STATION | To | STATION | BASIN WIDTH<br>(Ft.) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS                                                                                         |
|---------------------------|---------|----|---------|----------------------|----------------------|-----------------------|-----------------------|-------------------------------------------------------------------------------------------------|
| <b>ON-SITE:</b>           |         |    |         |                      |                      |                       |                       |                                                                                                 |
| BASIN 1                   | 103+43  | -  | 138+50  | 100 to 110           | 7.12                 | 1.09                  | 8.22                  |                                                                                                 |
| BASIN 1-6 POND AREA       | -       | -  | -       | -                    | 0.82                 | 2.21                  | 3.03                  | Includes Pond Access Area, imp at water quality                                                 |
| <b>ON-SITE SUBTOTAL:</b>  |         |    |         |                      | <b>7.94</b>          | <b>3.31</b>           | <b>11.25</b>          |                                                                                                 |
| <b>OFF-SITE:</b>          |         |    |         |                      |                      |                       |                       |                                                                                                 |
| BASIN 1-1 (OFF-SITE)      | 103+80  | -  | 107+40  | -                    | 0.00                 | 0.22                  | 0.22                  | Runoff Conveyed to Pond                                                                         |
| BASIN 1-2 (OFF-SITE)      | 107+90  | -  | 111+40  | -                    | 0.00                 | 0.26                  | 0.26                  | Runoff Conveyed to Pond                                                                         |
| BASIN 1-3 (OFF-SITE)      | 111+40  | -  | 115+30  | -                    | 0.02                 | 0.26                  | 0.28                  | Runoff Conveyed to Pond                                                                         |
| BASIN 1-4 (OFF-SITE)      | 116+00  | -  | 138+50  | -                    | 0.04                 | 1.20                  | 1.24                  | Runoff Conveyed to Pond                                                                         |
| BASIN 1-5 (OFF-SITE)      |         |    |         |                      | 0.00                 | 54.24                 | 54.24                 | Diverted around pond, include interim runoff from what will be the future First Baptist Church. |
| <b>OFF-SITE SUBTOTAL:</b> |         |    |         |                      | <b>0.06</b>          | <b>56.18</b>          | <b>56.24</b>          |                                                                                                 |
| <b>TOTAL:</b>             |         |    |         |                      | <b>8.00</b>          | <b>59.48</b>          | <b>67.48</b>          |                                                                                                 |



BASIN 1

|                                                                                                                                                                                                                                                                                              |                                                                                                            |                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| LOCATION: LAKE COUNTY<br>SEC. 9 & 10, T23S, R26E<br>HARTWOOD MARSH ROAD RECONSTRUCTION<br>US 27 TO 1500 FT EAST OF S. HANCOCK RD                                                                                                                                                             | COUNTY: LAKE<br>STATE: FLORIDA<br>DATE: 04-08                                                              | DATUM: NAVD 88<br>PURPOSE: PRE-DEVELOPMENT<br>NODAL DIAGRAM |
|  HNTB CORPORATION<br>300 PRIMERA BLVD,<br>SUITE 200<br>LAKE MARY, FL 32746<br>(407) 805-0355<br>CERT. OF AUTH. NO. 6500<br>ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.<br>FL. REGISTRATION NO. 44794 |  LAKE COUNTY<br>FLORIDA | LAKE COUNTY<br>HARTWOOD MARSH ROAD                          |



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio) | CN       |          |          | Area<br>acres | Product of<br>CN x Area |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|---------------|-------------------------|
|                                                |                                                                                                                                           | Tab. 2-2 | Fig. 2-3 | Fig. 2-4 |               |                         |
|                                                | IMPERVIOUS AREA                                                                                                                           |          |          |          |               |                         |
|                                                | Exist Pavement (On-Site)                                                                                                                  | 98       |          |          | 4.01          | 393.46                  |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (On-Site)                                                                                                         | 49       |          |          | 4.89          | 239.80                  |
| Astatula Sand (A)                              | WOODS-GRASS (ORCHARD)<br>Propose Pond Site (Fair Conditon)                                                                                | 43       |          |          | 0.00          | 0.00                    |
| Totals =                                       |                                                                                                                                           |          |          |          | 8.91          | 633.26                  |

Use CN = 71.1

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-1

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious, unconnected /connected impervious area ratio.) | CN       |         |          | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------|----------|---------------|----------------------------|
|                                                |                                                                                                                                              | Tab. 2-2 | Eq. 2-3 | Fig. 2-4 |               |                            |
|                                                | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                 | 98       |         |          | 0.00          | 0.00                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                           | 39       |         |          | 0.25          | 9.70                       |
| Totals =                                       |                                                                                                                                              |          |         |          | 0.25          | 9.70                       |

Use CN = 39.0

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER



DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-2

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
|                                                | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                       | 98          |             |             | 0.00          | 0.00                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                 | 39          |             |             | 0.26          | 10.17                      |
| Totals =                                       |                                                                                                                                                    |             |             |             | 0.26          | 10.17                      |

Use CN = 39.0

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-3

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious;<br>unconnected / connected<br>impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab.<br>1-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                       | 98          |             |             | 0.02          | 1.96                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                 | 39          |             |             | 0.28          | 10.78                      |
| Totals =                                       |                                                                                                                                                    |             |             |             | 0.30          | 12.74                      |

Use CN = 43.0

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-4

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                       | 98          |             |             | 0.04          | 3.92                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                 | 39          |             |             | 1.33          | 52.05                      |
| Totals =                                       |                                                                                                                                                    |             |             |             | 1.37          | 55.97                      |

Use CN = 40.7

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986





RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN#5

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                       | 98          |             |             | 0.00          | 0.00                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                 | 39          |             |             | 59.69         | 2327.91                    |
| Totals =                                       |                                                                                                                                                    |             |             |             | 59.69         | 2327.91                    |

Use CN = 39.0

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

**HNTB**

DATE: 

|                 |           |
|-----------------|-----------|
| MADE BY: MSF    | 23-Apr-08 |
| CHECKED BY: KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: 

|       |
|-------|
| BASIN |
|-------|

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $Tt = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |                                                               |       |
|-------------|---------------------------------------------------------------|-------|
| SHORT GRASS | SMOOTH SURFACE                                                |       |
| 0.150       |                                                               |       |
| 300         | FT.                                                           |       |
| 4.70        | IN.                                                           |       |
| 0.0200      |                                                               |       |
| 0.3245      | HR. OR <table border="1"><tr><td>19:47</td></tr></table> MIN. | 19:47 |
| 19:47       |                                                               |       |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $Tt = L / (3600 * V)$

|         |                                                              |      |
|---------|--------------------------------------------------------------|------|
| UNPAVED | UNPAVED                                                      |      |
| 569     | 804                                                          |      |
| 0.0457  | 0.0378                                                       |      |
| 3.449   | 3.137                                                        |      |
| 0.046   | 0.07                                                         |      |
|         | HR. OR <table border="1"><tr><td>7:02</td></tr></table> MIN. | 7:02 |
| 7:02    |                                                              |      |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $Tt = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|      |  |                                                              |      |
|------|--|--------------------------------------------------------------|------|
|      |  | S.F.                                                         |      |
|      |  | L.F.                                                         |      |
|      |  | L.F.                                                         |      |
|      |  | FT./FT.                                                      |      |
|      |  | FT./SEC.                                                     |      |
|      |  | L.F.                                                         |      |
|      |  | HR. OR <table border="1"><tr><td>0:00</td></tr></table> MIN. | 0:00 |
| 0:00 |  |                                                              |      |

TOTAL Tc = 

|       |
|-------|
| 26:49 |
|-------|

 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS



DATE: 

|                 |           |
|-----------------|-----------|
| MADE BY: MSF    | 23-Apr-08 |
| CHECKED BY: KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: 

|           |
|-----------|
| BASIN 1-1 |
|-----------|

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $Tt = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

| SHORT GRASS | SMOOTH SURFACE |                                                              |      |
|-------------|----------------|--------------------------------------------------------------|------|
| 0.150       | 0.011          |                                                              |      |
| 50          | 250            | FT.                                                          |      |
| 4.70        | 4.70           | IN.                                                          |      |
| 0.060       | 0.00120        |                                                              |      |
| 0.050       | 0.107          | HR. OR <table border="1"><tr><td>9.40</td></tr></table> MIN. | 9.40 |
| 9.40        |                |                                                              |      |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $Tt = L / (3600 * V)$

| PAVED  | UNPAVED |                                                               |       |
|--------|---------|---------------------------------------------------------------|-------|
| 362    | 1598    | L.F.                                                          |       |
| 0.0149 | 0.0384  | FT./FT.                                                       |       |
| 2.478  | 3.160   | FT./SEC.                                                      |       |
| 0.04   | 0.14    | HR. OR <table border="1"><tr><td>10.86</td></tr></table> MIN. | 10.86 |
| 10.86  |         |                                                               |       |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $Tt = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|      |  |                                                              |      |
|------|--|--------------------------------------------------------------|------|
|      |  | S.F.                                                         |      |
|      |  | L.F.                                                         |      |
|      |  | L.F.                                                         |      |
|      |  | FT./FT.                                                      |      |
|      |  |                                                              |      |
|      |  | FT./SEC.                                                     |      |
|      |  | L.F.                                                         |      |
|      |  | HR. OR <table border="1"><tr><td>0.00</td></tr></table> MIN. | 0.00 |
| 0.00 |  |                                                              |      |

TOTAL Tc = 

|       |
|-------|
| 29.26 |
|-------|

 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

**HNTB**

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-2

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |                   |
|-------------|--|-------------------|
| SHORT GRASS |  |                   |
| 0.150       |  |                   |
| 300         |  | FT.               |
| 4.70        |  | IN.               |
| 0.022       |  |                   |
| 0.312       |  | HR. OR 18:74 MIN. |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|         |  |                   |
|---------|--|-------------------|
| UNPAVED |  |                   |
| 1794    |  | L.F.              |
| 0.0328  |  | FT./FT.           |
| 2.923   |  | FT./SEC.          |
| 0.17    |  | HR. OR 10:23 MIN. |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 * V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |                  |
|--|--|------------------|
|  |  | S.F.             |
|  |  | L.F.             |
|  |  | L.F.             |
|  |  | FT./FT.          |
|  |  | FT./SEC.         |
|  |  | L.F.             |
|  |  | HR. OR 0:00 MIN. |

TOTAL Tc = 17:28:97 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

**TIME OF CONCENTRATION CALCULATIONS**

**HNTB**

DATE: 

|                 |           |
|-----------------|-----------|
| MADE BY: MSF    | 23-Apr-08 |
| CHECKED BY: KMV | 24-Apr-08 |

PROJECT: **HARTWOOD MARSH ROAD**

LOCATION: 

|                  |
|------------------|
| <b>BASIN 1-3</b> |
|------------------|

UNDERLINE ONE: **EXISTING**      PROPOSED

UNDERLINE ONE: Tc      Tt Through subarea

**SHEET FLOW:**

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |        |            |
|-------------|--------|------------|
| SHORT GRASS |        |            |
| 0.150       |        |            |
| 300         | FT.    |            |
| 4.70        | IN.    |            |
| 0.024       |        |            |
| 0.300       | HR. OR | 18.00 MIN. |

**SHALLOW CONCENTRATED FLOW:**

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|         |          |           |
|---------|----------|-----------|
| UNPAVED |          |           |
| 1128    | L.F.     |           |
| 0.0476  | FT./FT.  |           |
| 3.520   | FT./SEC. |           |
| 0.09    | HR. OR   | 5.34 MIN. |

**CHANNEL FLOW:**

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |           |
|--|--|-----------|
|  |  | S.F.      |
|  |  | L.F.      |
|  |  | L.F.      |
|  |  | FT./FT.   |
|  |  | FT./SEC.  |
|  |  | L.F.      |
|  |  | HR. OR    |
|  |  | 0.00 MIN. |

TOTAL Tc = 

|       |
|-------|
| 23.34 |
|-------|

 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

**HNTB**

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-4

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

| SHORT GRASS | SMOOTH SURFACE |                  |
|-------------|----------------|------------------|
| 0.150       | 0.011          |                  |
| 119         | 751            | FT.              |
| 4.70        | 4.70           | IN.              |
| 0.101       | 0.02902        |                  |
| 0.081       | 0.008          | HR. OR 5.37 MIN. |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

| UNPAVED |  |                  |
|---------|--|------------------|
| 870     |  | L.F.             |
| 0.0425  |  | FT./ FT.         |
| 3.327   |  | FT./SEC.         |
| 0.07    |  | HR. OR 4.36 MIN. |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |                  |
|--|--|------------------|
|  |  | S.F.             |
|  |  | L.F.             |
|  |  | L.F.             |
|  |  | FT./FT.          |
|  |  | FT./SEC.         |
|  |  | L.F.             |
|  |  | HR. OR 0.00 MIN. |

TOTAL Tc = 9.73 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

**TIME OF CONCENTRATION CALCULATIONS**



DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-5

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |        |            |
|-------------|--------|------------|
| SHORT GRASS |        |            |
| 0.150       |        |            |
| 300         | FT.    |            |
| 4.70        | IN.    |            |
| 0.006       |        |            |
| 0.540       | HR. OR | 32.40 MIN. |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|         |          |            |
|---------|----------|------------|
| UNPAVED |          |            |
| 2580    | L.F.     |            |
| 0.0252  | FT./ FT. |            |
| 2.561   | FT./SEC. |            |
| 0.28    | HR. OR   | 16.79 MIN. |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw )
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, = (1.49 \* R ^0.667 \* S ^0.5) / n
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |           |
|--|--|-----------|
|  |  | S.F.      |
|  |  | L.F.      |
|  |  | L.F.      |
|  |  | FT./FT.   |
|  |  | FT./SEC.  |
|  |  | L.F.      |
|  |  | HR. OR    |
|  |  | 0.00 MIN. |

TOTAL Tc = 49.19 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Input

=====  
==== Basins =====  
=====

Name: BASIN 1  
Group: BASE  
Node: UNNAMED LK  
Type: SCS Unit Hydrograph  
Status: Onsite

Unit Hydrograph: Uh484  
Rainfall File: Sjrwm96  
Rainfall Amount(in): 11.000  
Area(ac): 8.910  
Curve Number: 71.10  
DCIA(%): 0.00

Peaking Factor: 484.0  
Storm Duration(hrs): 96.00  
Time of Conc(min): 26.49  
Time Shift(hrs): 0.00  
Max Allowable Q(cfs): 999999.000

Name: BASIN 1-1  
Group: BASE  
Node: UNNAMED LK  
Type: SCS Unit Hydrograph  
Status: Onsite

Unit Hydrograph: Uh484  
Rainfall File: Sjrwm96  
Rainfall Amount(in): 11.000  
Area(ac): 0.250  
Curve Number: 39.00  
DCIA(%): 0.00

Peaking Factor: 484.0  
Storm Duration(hrs): 96.00  
Time of Conc(min): 20.26  
Time Shift(hrs): 0.00  
Max Allowable Q(cfs): 999999.000

Name: BASIN 1-2  
Group: BASE  
Node: UNNAMED LK  
Type: SCS Unit Hydrograph  
Status: Onsite

Unit Hydrograph: Uh484  
Rainfall File: Sjrwm96  
Rainfall Amount(in): 11.000  
Area(ac): 0.260  
Curve Number: 39.00  
DCIA(%): 0.00

Peaking Factor: 484.0  
Storm Duration(hrs): 96.00  
Time of Conc(min): 28.97  
Time Shift(hrs): 0.00  
Max Allowable Q(cfs): 999999.000

Name: BASIN 1-3  
Group: BASE  
Node: UNNAMED LK  
Type: SCS Unit Hydrograph  
Status: Onsite

Unit Hydrograph: Uh484  
Rainfall File: Sjrwm96  
Rainfall Amount(in): 11.000  
Area(ac): 0.300  
Curve Number: 43.00  
DCIA(%): 0.00

Peaking Factor: 484.0  
Storm Duration(hrs): 96.00  
Time of Conc(min): 23.34  
Time Shift(hrs): 0.00  
Max Allowable Q(cfs): 999999.000

Name: BASIN 1-4  
Group: BASE  
Node: UNNAMED LK  
Type: SCS Unit Hydrograph  
Status: Onsite

Unit Hydrograph: Uh484  
Rainfall File: Sjrwm96  
Rainfall Amount(in): 11.000  
Area(ac): 1.370  
Curve Number: 40.70  
DCIA(%): 0.00

Peaking Factor: 484.0  
Storm Duration(hrs): 96.00  
Time of Conc(min): 9.73  
Time Shift(hrs): 0.00  
Max Allowable Q(cfs): 999999.000

Name: BASIN 1-5  
Group: BASE  
Node: UNNAMED LK  
Type: SCS Unit Hydrograph  
Status: Onsite

Unit Hydrograph: Uh484  
Rainfall File: Sjrwm96  
Rainfall Amount(in): 11.000  
Area(ac): 59.690  
Curve Number: 39.00  
DCIA(%): 0.00

Peaking Factor: 484.0  
Storm Duration(hrs): 96.00  
Time of Conc(min): 49.19  
Time Shift(hrs): 0.00  
Max Allowable Q(cfs): 999999.000



Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Input

=====  
Nodes  
=====

|                  |                       |                       |
|------------------|-----------------------|-----------------------|
| Name:            | Base Flow(cfs): 0.000 | Init Stage(ft): 0.000 |
| Group: BASE      |                       | Warn Stage(ft): 0.000 |
| Type: Stage/Area |                       |                       |

| Stage(ft) | Area(ac) |
|-----------|----------|
|-----------|----------|

=====  
Hydrology Simulations  
=====

Name: 100Y24H  
Filename: W:\JOBS\41561-1\Phase 1\41561100001\drainage\ROUTINGS\PRE\100Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 10.20

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.00          |
| 15.000    | 15.00          |
| 40.000    | 60.00          |

Name: 10Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\PRE\10Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 7.00

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.00          |
| 15.000    | 15.00          |
| 40.000    | 60.00          |

Name: 2.3Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\PRE\2.3Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 4.90

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.00          |
| 15.000    | 15.00          |
| 40.000    | 60.00          |

Name: 25Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\PRE\25Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 8.30

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.00          |
| 15.000    | 15.00          |
| 40.000    | 60.00          |

Name: 25Y96H  
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\PRE\25Y96H.R32

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Input

-----  
Override Defaults: No

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 55.000    | 60.00          |
| 62.000    | 15.00          |
| 120.000   | 60.00          |

=====  
==== Routing Simulations =====  
=====

Name: Hydrology Sim:  
Filename:

Execute: No            Restart: No            Patch: No  
Alternative: No

|                            |                            |
|----------------------------|----------------------------|
| Max Delta Z(ft): 0.00      | Delta Z Factor: 0.00000    |
| Time Step Optimizer: 0.000 |                            |
| Start Time(hrs): 0.000     | End Time(hrs): 0.00        |
| Min Calc Time(sec): 0.0000 | Max Calc Time(sec): 0.0000 |
| Boundary Stages:           | Boundary Flows:            |

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| -----     | -----          |
| Group     | Run            |
| -----     | -----          |
| BASE      | Yes            |

=====  
==== Boundary Conditions =====  
=====

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin   | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|---------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 2.114      | 0.000     | 0.001    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 28.00    | 0.834       | 0.063       | 0.002             | 0.002             | 34.840     | 0.001     | 0.017    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 29.00    | 0.897       | 0.063       | 0.005             | 0.004             | 128.311    | 0.004     | 0.035    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 30.00    | 0.963       | 0.065       | 0.011             | 0.005             | 284.212    | 0.009     | 0.052    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 31.00    | 1.028       | 0.065       | 0.018             | 0.007             | 499.114    | 0.015     | 0.068    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 32.00    | 1.093       | 0.065       | 0.027             | 0.009             | 770.352    | 0.024     | 0.083    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 33.00    | 1.159       | 0.065       | 0.037             | 0.010             | 1089.392   | 0.034     | 0.094    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 34.00    | 1.222       | 0.063       | 0.049             | 0.012             | 1452.333   | 0.045     | 0.107    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 35.00    | 1.285       | 0.063       | 0.062             | 0.013             | 1861.583   | 0.058     | 0.120    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 36.00    | 1.348       | 0.063       | 0.077             | 0.015             | 2315.288   | 0.072     | 0.132    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 37.00    | 1.411       | 0.063       | 0.093             | 0.016             | 2811.658   | 0.087     | 0.144    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 38.00    | 1.474       | 0.063       | 0.110             | 0.017             | 3348.994   | 0.104     | 0.155    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 39.00    | 1.538       | 0.063       | 0.128             | 0.018             | 3925.690   | 0.121     | 0.166    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 40.00    | 1.601       | 0.063       | 0.147             | 0.019             | 4540.255   | 0.140     | 0.176    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 41.00    | 1.664       | 0.063       | 0.169             | 0.021             | 5202.502   | 0.161     | 0.192    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 42.00    | 1.729       | 0.065       | 0.191             | 0.022             | 5912.238   | 0.183     | 0.202    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 43.00    | 1.795       | 0.065       | 0.214             | 0.023             | 6657.956   | 0.206     | 0.212    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 44.00    | 1.860       | 0.065       | 0.239             | 0.025             | 7438.146   | 0.230     | 0.221    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 45.00    | 1.925       | 0.065       | 0.264             | 0.025             | 8238.132   | 0.255     | 0.223    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 46.00    | 1.988       | 0.063       | 0.289             | 0.026             | 9055.662   | 0.280     | 0.231    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 47.00    | 2.052       | 0.063       | 0.316             | 0.027             | 9902.033   | 0.306     | 0.239    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 48.00    | 2.115       | 0.063       | 0.343             | 0.028             | 10776.901  | 0.333     | 0.247    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 49.00    | 2.178       | 0.063       | 0.381             | 0.038             | 11837.818  | 0.366     | 0.342    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 50.00    | 2.263       | 0.085       | 0.421             | 0.040             | 13095.011  | 0.405     | 0.356    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 51.00    | 2.348       | 0.085       | 0.469             | 0.048             | 14512.195  | 0.449     | 0.431    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 52.00    | 2.447       | 0.099       | 0.518             | 0.050             | 16094.594  | 0.498     | 0.448    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 53.00    | 2.546       | 0.099       | 0.582             | 0.064             | 17934.119  | 0.554     | 0.574    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 54.00    | 2.669       | 0.123       | 0.648             | 0.066             | 20042.146  | 0.620     | 0.597    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 55.00    | 2.792       | 0.123       | 0.734             | 0.086             | 22509.953  | 0.696     | 0.774    | 0.000        |

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Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin   | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|---------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1 | BASE  | 55.25    | 2.945       | 0.154       | 0.756             | 0.022             | 23210.506  | 0.718     | 0.783    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 55.50    | 2.984       | 0.038       | 0.778             | 0.022             | 23918.318  | 0.740     | 0.790    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 55.75    | 3.022       | 0.038       | 0.800             | 0.022             | 24632.703  | 0.762     | 0.797    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 56.00    | 3.061       | 0.038       | 0.824             | 0.023             | 25354.197  | 0.784     | 0.806    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 56.25    | 3.099       | 0.039       | 0.858             | 0.034             | 26148.494  | 0.808     | 0.959    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 56.50    | 3.158       | 0.058       | 0.893             | 0.035             | 27107.750  | 0.838     | 1.173    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 56.75    | 3.216       | 0.058       | 0.929             | 0.036             | 28195.318  | 0.872     | 1.244    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 57.00    | 3.275       | 0.058       | 0.964             | 0.036             | 29328.195  | 0.907     | 1.273    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 57.25    | 3.333       | 0.058       | 1.001             | 0.036             | 30482.156  | 0.942     | 1.291    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 57.50    | 3.391       | 0.058       | 1.038             | 0.037             | 31650.602  | 0.979     | 1.305    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 57.75    | 3.450       | 0.058       | 1.075             | 0.037             | 32831.656  | 1.015     | 1.319    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 58.00    | 3.508       | 0.058       | 1.113             | 0.039             | 34026.309  | 1.052     | 1.336    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 58.25    | 3.567       | 0.058       | 1.179             | 0.066             | 35389.898  | 1.094     | 1.695    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 58.50    | 3.670       | 0.103       | 1.247             | 0.068             | 37155.832  | 1.149     | 2.230    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 58.75    | 3.773       | 0.104       | 1.317             | 0.069             | 39244.766  | 1.213     | 2.412    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 59.00    | 3.877       | 0.104       | 1.390             | 0.073             | 41451.109  | 1.282     | 2.491    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 59.25    | 3.980       | 0.104       | 1.514             | 0.125             | 44013.008  | 1.361     | 3.202    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 59.50    | 4.164       | 0.184       | 1.679             | 0.165             | 47396.105  | 1.465     | 4.316    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 59.75    | 4.349       | 0.185       | 2.751             | 1.072             | 56586.617  | 1.750     | 16.108   | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 60.00    | 5.805       | 1.456       | 3.910             | 1.159             | 79359.406  | 2.454     | 34.498   | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 60.25    | 7.264       | 1.460       | 4.194             | 0.284             | 108158.266 | 3.344     | 29.499   | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 60.50    | 7.541       | 0.277       | 4.427             | 0.233             | 127914.141 | 3.955     | 14.403   | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 60.75    | 7.817       | 0.276       | 4.555             | 0.128             | 138268.344 | 4.275     | 8.606    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 61.00    | 7.959       | 0.142       | 4.677             | 0.122             | 144601.609 | 4.471     | 5.467    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 61.25    | 8.101       | 0.142       | 4.759             | 0.082             | 148904.828 | 4.604     | 4.095    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 61.50    | 8.193       | 0.092       | 4.840             | 0.081             | 152190.203 | 4.705     | 3.206    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 61.75    | 8.286       | 0.092       | 4.921             | 0.081             | 154966.813 | 4.791     | 2.965    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 62.00    | 8.378       | 0.092       | 5.000             | 0.080             | 157612.406 | 4.873     | 2.914    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 63.00    | 8.470       | 0.092       | 5.204             | 0.203             | 166142.141 | 5.137     | 1.824    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 64.00    | 8.699       | 0.229       | 5.406             | 0.202             | 172706.156 | 5.340     | 1.822    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 65.00    | 8.928       | 0.229       | 5.530             | 0.124             | 177985.922 | 5.503     | 1.111    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 66.00    | 9.067       | 0.139       | 5.654             | 0.123             | 181978.984 | 5.626     | 1.107    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 67.00    | 9.205       | 0.138       | 5.777             | 0.124             | 185971.172 | 5.750     | 1.110    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 68.00    | 9.343       | 0.138       | 5.901             | 0.124             | 189972.109 | 5.874     | 1.112    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 69.00    | 9.481       | 0.138       | 5.984             | 0.083             | 193317.266 | 5.977     | 0.746    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 70.00    | 9.573       | 0.092       | 6.067             | 0.083             | 195999.703 | 6.060     | 0.744    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 71.00    | 9.665       | 0.092       | 6.150             | 0.083             | 198679.203 | 6.143     | 0.744    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 72.00    | 9.757       | 0.092       | 6.233             | 0.083             | 201360.141 | 6.226     | 0.745    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 73.00    | 9.849       | 0.092       | 6.276             | 0.043             | 203404.781 | 6.289     | 0.391    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 74.00    | 9.897       | 0.048       | 6.319             | 0.043             | 204807.219 | 6.332     | 0.388    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 75.00    | 9.945       | 0.048       | 6.363             | 0.043             | 206205.203 | 6.376     | 0.388    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 76.00    | 9.993       | 0.048       | 6.406             | 0.043             | 207604.250 | 6.419     | 0.389    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 77.00    | 10.041      | 0.048       | 6.450             | 0.044             | 209010.016 | 6.462     | 0.392    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 78.00    | 10.089      | 0.048       | 6.493             | 0.044             | 210422.531 | 6.506     | 0.393    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 79.00    | 10.137      | 0.048       | 6.537             | 0.044             | 211836.125 | 6.550     | 0.393    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 80.00    | 10.185      | 0.048       | 6.581             | 0.044             | 213250.750 | 6.593     | 0.393    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 81.00    | 10.233      | 0.048       | 6.624             | 0.043             | 214660.703 | 6.637     | 0.390    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 82.00    | 10.281      | 0.048       | 6.668             | 0.044             | 216065.922 | 6.680     | 0.390    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 83.00    | 10.329      | 0.048       | 6.712             | 0.044             | 217472.063 | 6.724     | 0.391    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 84.00    | 10.377      | 0.048       | 6.755             | 0.044             | 218879.172 | 6.767     | 0.391    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 85.00    | 10.425      | 0.048       | 6.799             | 0.044             | 220287.234 | 6.811     | 0.391    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 86.00    | 10.473      | 0.048       | 6.842             | 0.044             | 221696.250 | 6.854     | 0.392    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 87.00    | 10.520      | 0.048       | 6.886             | 0.044             | 223106.203 | 6.898     | 0.392    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 88.00    | 10.568      | 0.048       | 6.930             | 0.044             | 224517.078 | 6.942     | 0.392    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 89.00    | 10.616      | 0.048       | 6.974             | 0.044             | 225934.594 | 6.986     | 0.395    | 0.000        |
| 25Y96H     | BASIN 1 | BASE  | 90.00    | 10.664      | 0.048       | 7.018             | 0.044             | 227358.797 | 7.030     | 0.396    | 0.000        |

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Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1   | BASE  | 91.00    | 10.712      | 0.048       | 7.062             | 0.044228783.953   | 7.074      | 0.396     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 92.00    | 10.761      | 0.048       | 7.106             | 0.044230210.016   | 7.118      | 0.396     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 93.00    | 10.809      | 0.048       | 7.150             | 0.044231631.234   | 7.162      | 0.393     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 94.00    | 10.857      | 0.048       | 7.194             | 0.044233047.563   | 7.205      | 0.394     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 95.00    | 10.904      | 0.048       | 7.238             | 0.044234464.703   | 7.249      | 0.394     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 96.00    | 10.952      | 0.048       | 7.279             | 0.042235873.703   | 7.293      | 0.389     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 97.00    | 11.000      | 0.048       | 7.279             | 0.000236578.000   | 7.315      | 0.002     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 98.00    | 11.000      | 0.000       | 7.279             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 99.00    | 11.000      | 0.000       | 0.000             | -7.279236582.078  | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 100.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 101.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 102.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 103.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 104.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 105.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 106.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 107.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 108.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 109.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 110.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 111.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 112.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 113.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 114.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 115.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 116.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 117.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 118.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 119.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1   | BASE  | 120.00   | 11.000      | 0.000       | 0.000             | 0.000236582.078   | 7.315      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |
| 25Y96H     | BASIN 1-1 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    |              |

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← MAX

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-1 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 51.00    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 52.00    | 2.447       | 0.099       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 53.00    | 2.546       | 0.099       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 54.00    | 2.669       | 0.123       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 55.00    | 2.792       | 0.123       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 55.25    | 2.945       | 0.154       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 55.50    | 2.984       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 55.75    | 3.022       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 56.00    | 3.061       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 56.25    | 3.099       | 0.039       | 0.000             | 0.000             | 0.005      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 56.50    | 3.158       | 0.058       | 0.000             | 0.000             | 0.116      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 56.75    | 3.216       | 0.058       | 0.001             | 0.001             | 0.505      | 0.001     | 0.001    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 57.00    | 3.275       | 0.058       | 0.003             | 0.001             | 1.265      | 0.001     | 0.001    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 57.25    | 3.333       | 0.058       | 0.004             | 0.002             | 2.406      | 0.003     | 0.001    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 57.50    | 3.391       | 0.058       | 0.006             | 0.002             | 3.928      | 0.004     | 0.002    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 57.75    | 3.450       | 0.058       | 0.009             | 0.003             | 5.826      | 0.006     | 0.002    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 58.00    | 3.508       | 0.058       | 0.012             | 0.003             | 8.099      | 0.009     | 0.003    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 58.25    | 3.567       | 0.058       | 0.018             | 0.006             | 11.380     | 0.013     | 0.005    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 58.50    | 3.670       | 0.103       | 0.026             | 0.007             | 16.408     | 0.018     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 58.75    | 3.773       | 0.104       | 0.034             | 0.009             | 22.979     | 0.025     | 0.008    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 59.00    | 3.877       | 0.104       | 0.044             | 0.010             | 30.736     | 0.034     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 59.25    | 3.980       | 0.104       | 0.064             | 0.020             | 41.725     | 0.046     | 0.015    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 59.50    | 4.164       | 0.184       | 0.096             | 0.032             | 58.547     | 0.065     | 0.022    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 59.75    | 4.349       | 0.185       | 0.391             | 0.295             | 139.250    | 0.153     | 0.157    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 60.00    | 5.805       | 1.456       | 0.849             | 0.457             | 377.549    | 0.416     | 0.372    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 60.25    | 7.264       | 1.460       | 0.971             | 0.122             | 669.508    | 0.738     | 0.276    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 60.50    | 7.541       | 0.277       | 1.080             | 0.109             | 855.534    | 0.943     | 0.137    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 60.75    | 7.817       | 0.276       | 1.140             | 0.060             | 956.575    | 1.054     | 0.088    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 61.00    | 7.959       | 0.142       | 1.199             | 0.059             | 1024.518   | 1.129     | 0.063    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 61.25    | 8.101       | 0.142       | 1.239             | 0.040             | 1075.458   | 1.185     | 0.050    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 61.50    | 8.193       | 0.092       | 1.279             | 0.040             | 1116.473   | 1.230     | 0.041    | 0.000        |

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Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-1 | BASE  | 61.75    | 8.286       | 0.092       | 1.319             | 0.040             | 1153.352   | 1.271     | 0.041    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 62.00    | 8.378       | 0.092       | 1.360             | 0.040             | 1189.942   | 1.311     | 0.041    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 63.00    | 8.470       | 0.092       | 1.463             | 0.103             | 1310.383   | 1.444     | 0.026    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 64.00    | 8.699       | 0.229       | 1.568             | 0.105             | 1405.644   | 1.549     | 0.027    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 65.00    | 8.928       | 0.229       | 1.634             | 0.066             | 1483.477   | 1.635     | 0.016    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 66.00    | 9.067       | 0.139       | 1.700             | 0.066             | 1543.152   | 1.700     | 0.017    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 67.00    | 9.205       | 0.138       | 1.767             | 0.067             | 1603.657   | 1.767     | 0.017    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 68.00    | 9.343       | 0.138       | 1.835             | 0.068             | 1664.938   | 1.835     | 0.017    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 69.00    | 9.481       | 0.138       | 1.881             | 0.046             | 1716.518   | 1.891     | 0.012    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 70.00    | 9.573       | 0.092       | 1.927             | 0.046             | 1758.209   | 1.937     | 0.012    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 71.00    | 9.665       | 0.092       | 1.973             | 0.046             | 1800.221   | 1.984     | 0.012    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 72.00    | 9.757       | 0.092       | 2.020             | 0.047             | 1842.520   | 2.030     | 0.012    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 73.00    | 9.849       | 0.092       | 2.045             | 0.025             | 1874.840   | 2.066     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 74.00    | 9.897       | 0.048       | 2.069             | 0.025             | 1897.085   | 2.090     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 75.00    | 9.945       | 0.048       | 2.094             | 0.025             | 1919.419   | 2.115     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 76.00    | 9.993       | 0.048       | 2.119             | 0.025             | 1941.842   | 2.140     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 77.00    | 10.041      | 0.048       | 2.144             | 0.025             | 1964.446   | 2.165     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 78.00    | 10.089      | 0.048       | 2.169             | 0.025             | 1987.231   | 2.190     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 79.00    | 10.137      | 0.048       | 2.194             | 0.025             | 2010.105   | 2.215     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 80.00    | 10.185      | 0.048       | 2.219             | 0.025             | 2033.067   | 2.240     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 81.00    | 10.233      | 0.048       | 2.245             | 0.025             | 2056.022   | 2.266     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 82.00    | 10.281      | 0.048       | 2.270             | 0.025             | 2078.971   | 2.291     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 83.00    | 10.329      | 0.048       | 2.296             | 0.025             | 2102.005   | 2.316     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 84.00    | 10.377      | 0.048       | 2.321             | 0.026             | 2125.123   | 2.342     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 85.00    | 10.425      | 0.048       | 2.347             | 0.026             | 2148.326   | 2.367     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 86.00    | 10.473      | 0.048       | 2.372             | 0.026             | 2171.612   | 2.393     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 87.00    | 10.520      | 0.048       | 2.398             | 0.026             | 2194.981   | 2.419     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 88.00    | 10.568      | 0.048       | 2.424             | 0.026             | 2218.433   | 2.445     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 89.00    | 10.616      | 0.048       | 2.450             | 0.026             | 2242.064   | 2.471     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 90.00    | 10.664      | 0.048       | 2.477             | 0.026             | 2265.873   | 2.497     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 91.00    | 10.712      | 0.048       | 2.503             | 0.026             | 2289.765   | 2.523     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 92.00    | 10.761      | 0.048       | 2.529             | 0.026             | 2313.738   | 2.550     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 93.00    | 10.809      | 0.048       | 2.556             | 0.026             | 2337.694   | 2.576     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 94.00    | 10.857      | 0.048       | 2.582             | 0.026             | 2361.633   | 2.602     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 95.00    | 10.904      | 0.048       | 2.609             | 0.027             | 2385.652   | 2.629     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 96.00    | 10.952      | 0.048       | 2.635             | 0.026             | 2409.688   | 2.655     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 97.00    | 11.000      | 0.048       | 2.635             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 98.00    | 11.000      | 0.000       | 2.635             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 99.00    | 11.000      | 0.000       | 0.000             | -2.635            | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 100.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 101.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 102.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 103.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 104.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 105.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 106.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 107.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 108.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 109.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 110.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 111.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 112.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 113.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 114.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 115.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 116.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |

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Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-1 | BASE  | 117.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 118.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 119.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-1 | BASE  | 120.00   | 11.000      | 0.000       | 0.000             | 0.000             | 2421.696   | 2.669     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 51.00    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |

←max

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Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-2 | BASE  | 52.00    | 2.447       | 0.099       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 53.00    | 2.546       | 0.099       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 54.00    | 2.669       | 0.123       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 55.00    | 2.792       | 0.123       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 55.25    | 2.945       | 0.154       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 55.50    | 2.984       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 55.75    | 3.022       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 56.00    | 3.061       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 56.25    | 3.099       | 0.039       | 0.000             | 0.000             | 0.003      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 56.50    | 3.158       | 0.058       | 0.000             | 0.000             | 0.069      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 56.75    | 3.216       | 0.058       | 0.001             | 0.001             | 0.351      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 57.00    | 3.275       | 0.058       | 0.003             | 0.001             | 0.974      | 0.001     | 0.001    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 57.25    | 3.333       | 0.058       | 0.004             | 0.002             | 1.982      | 0.002     | 0.001    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 57.50    | 3.391       | 0.058       | 0.006             | 0.002             | 3.383      | 0.004     | 0.002    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 57.75    | 3.450       | 0.058       | 0.009             | 0.003             | 5.177      | 0.005     | 0.002    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 58.00    | 3.508       | 0.058       | 0.012             | 0.003             | 7.360      | 0.008     | 0.003    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 58.25    | 3.567       | 0.058       | 0.018             | 0.006             | 10.282     | 0.011     | 0.004    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 58.50    | 3.670       | 0.103       | 0.026             | 0.007             | 14.719     | 0.016     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 58.75    | 3.773       | 0.104       | 0.034             | 0.009             | 20.850     | 0.022     | 0.008    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 59.00    | 3.877       | 0.104       | 0.045             | 0.010             | 28.331     | 0.030     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 59.25    | 3.980       | 0.104       | 0.064             | 0.020             | 38.197     | 0.040     | 0.013    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 59.50    | 4.164       | 0.184       | 0.098             | 0.034             | 53.138     | 0.056     | 0.020    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 59.75    | 4.349       | 0.185       | 0.392             | 0.294             | 105.840    | 0.112     | 0.097    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 60.00    | 5.805       | 1.456       | 0.863             | 0.471             | 283.449    | 0.300     | 0.298    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 60.25    | 7.264       | 1.460       | 0.971             | 0.108             | 568.059    | 0.602     | 0.335    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 60.50    | 7.541       | 0.277       | 1.079             | 0.108             | 803.140    | 0.851     | 0.188    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 60.75    | 7.817       | 0.276       | 1.140             | 0.061             | 941.992    | 0.998     | 0.121    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 61.00    | 7.959       | 0.142       | 1.198             | 0.058             | 1032.259   | 1.094     | 0.080    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 61.25    | 8.101       | 0.142       | 1.239             | 0.041             | 1095.391   | 1.161     | 0.060    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 61.50    | 8.193       | 0.092       | 1.279             | 0.040             | 1143.785   | 1.212     | 0.047    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 61.75    | 8.286       | 0.092       | 1.319             | 0.040             | 1184.410   | 1.255     | 0.043    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 62.00    | 8.378       | 0.092       | 1.360             | 0.040             | 1222.990   | 1.296     | 0.043    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 63.00    | 8.470       | 0.092       | 1.463             | 0.103             | 1348.768   | 1.429     | 0.027    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 64.00    | 8.699       | 0.229       | 1.569             | 0.106             | 1448.017   | 1.534     | 0.028    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 65.00    | 8.928       | 0.229       | 1.634             | 0.066             | 1529.113   | 1.620     | 0.017    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 66.00    | 9.067       | 0.139       | 1.700             | 0.066             | 1591.391   | 1.686     | 0.017    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 67.00    | 9.205       | 0.138       | 1.767             | 0.067             | 1654.219   | 1.753     | 0.018    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 68.00    | 9.343       | 0.138       | 1.835             | 0.068             | 1717.861   | 1.820     | 0.018    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 69.00    | 9.481       | 0.138       | 1.881             | 0.046             | 1771.608   | 1.877     | 0.012    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 70.00    | 9.573       | 0.092       | 1.927             | 0.046             | 1815.089   | 1.923     | 0.012    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 71.00    | 9.665       | 0.092       | 1.973             | 0.046             | 1858.740   | 1.969     | 0.012    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 72.00    | 9.757       | 0.092       | 2.020             | 0.046             | 1902.682   | 2.016     | 0.012    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 73.00    | 9.849       | 0.092       | 2.045             | 0.025             | 1936.426   | 2.052     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 74.00    | 9.897       | 0.048       | 2.069             | 0.025             | 1959.715   | 2.076     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 75.00    | 9.945       | 0.048       | 2.094             | 0.025             | 1982.931   | 2.101     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 76.00    | 9.993       | 0.048       | 2.119             | 0.025             | 2006.241   | 2.126     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 77.00    | 10.041      | 0.048       | 2.144             | 0.025             | 2029.737   | 2.151     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 78.00    | 10.089      | 0.048       | 2.169             | 0.025             | 2053.421   | 2.176     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 79.00    | 10.137      | 0.048       | 2.194             | 0.025             | 2077.199   | 2.201     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 80.00    | 10.185      | 0.048       | 2.219             | 0.025             | 2101.069   | 2.226     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 81.00    | 10.233      | 0.048       | 2.245             | 0.025             | 2124.934   | 2.251     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 82.00    | 10.281      | 0.048       | 2.270             | 0.025             | 2148.792   | 2.277     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 83.00    | 10.329      | 0.048       | 2.296             | 0.025             | 2172.737   | 2.302     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 84.00    | 10.377      | 0.048       | 2.321             | 0.026             | 2196.770   | 2.328     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 85.00    | 10.425      | 0.048       | 2.347             | 0.026             | 2220.891   | 2.353     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 86.00    | 10.473      | 0.048       | 2.372             | 0.026             | 2245.099   | 2.379     | 0.007    | 0.000        |

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Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-2 | BASE  | 87.00    | 10.520      | 0.048       | 2.398             | 0.026             | 2269.393   | 2.405     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 88.00    | 10.568      | 0.048       | 2.424             | 0.026             | 2293.773   | 2.430     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 89.00    | 10.616      | 0.048       | 2.450             | 0.026             | 2318.337   | 2.456     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 90.00    | 10.664      | 0.048       | 2.477             | 0.026             | 2343.087   | 2.483     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 91.00    | 10.712      | 0.048       | 2.503             | 0.026             | 2367.925   | 2.509     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 92.00    | 10.761      | 0.048       | 2.529             | 0.026             | 2392.847   | 2.535     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 93.00    | 10.809      | 0.048       | 2.556             | 0.026             | 2417.754   | 2.562     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 94.00    | 10.857      | 0.048       | 2.582             | 0.026             | 2442.643   | 2.588     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 95.00    | 10.904      | 0.048       | 2.609             | 0.027             | 2467.613   | 2.615     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 96.00    | 10.952      | 0.048       | 2.635             | 0.026             | 2492.620   | 2.641     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 97.00    | 11.000      | 0.048       | 2.635             | 0.000             | 2505.299   | 2.654     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 98.00    | 11.000      | 0.000       | 2.635             | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 99.00    | 11.000      | 0.000       | -0.000            | -2.635            | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 100.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 101.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 102.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 103.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 104.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 105.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 106.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 107.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 108.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 109.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 110.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 111.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 112.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 113.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 114.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 115.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 116.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 117.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 118.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 119.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-2 | BASE  | 120.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2505.476   | 2.655     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |

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← MAX

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

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| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-3 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 51.00    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 52.00    | 2.447       | 0.099       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 53.00    | 2.546       | 0.099       | 0.000             | 0.000             | 0.008      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 54.00    | 2.669       | 0.123       | 0.001             | 0.001             | 1.042      | 0.001     | 0.001    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 55.00    | 2.792       | 0.123       | 0.006             | 0.005             | 5.096      | 0.005     | 0.002    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 55.25    | 2.945       | 0.154       | 0.008             | 0.002             | 6.725      | 0.006     | 0.002    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 55.50    | 2.984       | 0.038       | 0.010             | 0.002             | 8.581      | 0.008     | 0.002    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 55.75    | 3.022       | 0.038       | 0.012             | 0.002             | 10.663     | 0.010     | 0.002    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 56.00    | 3.061       | 0.038       | 0.015             | 0.002             | 12.970     | 0.012     | 0.003    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 56.25    | 3.099       | 0.039       | 0.019             | 0.004             | 15.822     | 0.015     | 0.004    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 56.50    | 3.158       | 0.058       | 0.023             | 0.004             | 19.624     | 0.018     | 0.005    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 56.75    | 3.216       | 0.058       | 0.028             | 0.005             | 24.257     | 0.022     | 0.005    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 57.00    | 3.275       | 0.058       | 0.033             | 0.005             | 29.459     | 0.027     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 57.25    | 3.333       | 0.058       | 0.039             | 0.006             | 35.163     | 0.032     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 57.50    | 3.391       | 0.058       | 0.045             | 0.006             | 41.352     | 0.038     | 0.007    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 57.75    | 3.450       | 0.058       | 0.052             | 0.007             | 48.017     | 0.044     | 0.008    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 58.00    | 3.508       | 0.058       | 0.059             | 0.007             | 55.162     | 0.051     | 0.008    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 58.25    | 3.567       | 0.058       | 0.073             | 0.013             | 64.110     | 0.059     | 0.012    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 58.50    | 3.670       | 0.103       | 0.088             | 0.015             | 76.597     | 0.070     | 0.016    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 58.75    | 3.773       | 0.104       | 0.104             | 0.016             | 92.045     | 0.085     | 0.018    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 59.00    | 3.877       | 0.104       | 0.122             | 0.018             | 109.249    | 0.100     | 0.020    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 59.25    | 3.980       | 0.104       | 0.155             | 0.033             | 131.279    | 0.121     | 0.029    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 59.50    | 4.164       | 0.184       | 0.202             | 0.047             | 162.867    | 0.150     | 0.041    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 59.75    | 4.349       | 0.185       | 0.606             | 0.404             | 280.576    | 0.258     | 0.220    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 60.00    | 5.805       | 1.456       | 1.177             | 0.571             | 617.885    | 0.567     | 0.529    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 60.25    | 7.264       | 1.460       | 1.318             | 0.141             | 1057.545   | 0.971     | 0.448    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 60.50    | 7.541       | 0.277       | 1.445             | 0.128             | 1358.229   | 1.247     | 0.220    | 0.000        |

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-3 | BASE  | 60.75    | 7.817       | 0.276       | 1.518             | 0.072             | 1520.067   | 1.396     | 0.139    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 61.00    | 7.959       | 0.142       | 1.587             | 0.070             | 1625.353   | 1.493     | 0.095    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 61.25    | 8.101       | 0.142       | 1.634             | 0.047             | 1701.276   | 1.562     | 0.074    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 61.50    | 8.193       | 0.092       | 1.681             | 0.047             | 1761.459   | 1.618     | 0.060    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 61.75    | 8.286       | 0.092       | 1.728             | 0.047             | 1814.057   | 1.666     | 0.057    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 62.00    | 8.378       | 0.092       | 1.774             | 0.046             | 1865.422   | 1.713     | 0.057    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 63.00    | 8.470       | 0.092       | 1.895             | 0.121             | 2033.523   | 1.867     | 0.036    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 64.00    | 8.699       | 0.229       | 2.017             | 0.122             | 2165.844   | 1.989     | 0.037    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 65.00    | 8.928       | 0.229       | 2.092             | 0.075             | 2273.616   | 2.088     | 0.023    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 66.00    | 9.067       | 0.139       | 2.168             | 0.076             | 2355.959   | 2.163     | 0.023    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 67.00    | 9.205       | 0.138       | 2.245             | 0.077             | 2439.177   | 2.240     | 0.023    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 68.00    | 9.343       | 0.138       | 2.322             | 0.078             | 2523.305   | 2.317     | 0.023    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 69.00    | 9.481       | 0.138       | 2.375             | 0.052             | 2594.031   | 2.382     | 0.016    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 70.00    | 9.573       | 0.092       | 2.427             | 0.053             | 2651.079   | 2.434     | 0.016    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 71.00    | 9.665       | 0.092       | 2.480             | 0.053             | 2708.450   | 2.487     | 0.016    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 72.00    | 9.757       | 0.092       | 2.533             | 0.053             | 2766.137   | 2.540     | 0.016    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 73.00    | 9.849       | 0.092       | 2.561             | 0.028             | 2810.210   | 2.581     | 0.008    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 74.00    | 9.897       | 0.048       | 2.589             | 0.028             | 2840.525   | 2.608     | 0.008    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 75.00    | 9.945       | 0.048       | 2.617             | 0.028             | 2870.906   | 2.636     | 0.008    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 76.00    | 9.993       | 0.048       | 2.645             | 0.028             | 2901.387   | 2.664     | 0.008    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 77.00    | 10.041      | 0.048       | 2.673             | 0.028             | 2932.093   | 2.692     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 78.00    | 10.089      | 0.048       | 2.702             | 0.028             | 2963.023   | 2.721     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 79.00    | 10.137      | 0.048       | 2.730             | 0.029             | 2994.053   | 2.749     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 80.00    | 10.185      | 0.048       | 2.759             | 0.029             | 3025.182   | 2.778     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 81.00    | 10.233      | 0.048       | 2.787             | 0.029             | 3056.282   | 2.807     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 82.00    | 10.281      | 0.048       | 2.816             | 0.029             | 3087.353   | 2.835     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 83.00    | 10.329      | 0.048       | 2.845             | 0.029             | 3118.519   | 2.864     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 84.00    | 10.377      | 0.048       | 2.874             | 0.029             | 3149.780   | 2.892     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 85.00    | 10.425      | 0.048       | 2.902             | 0.029             | 3181.135   | 2.921     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 86.00    | 10.473      | 0.048       | 2.931             | 0.029             | 3212.584   | 2.950     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 87.00    | 10.520      | 0.048       | 2.960             | 0.029             | 3244.125   | 2.979     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 88.00    | 10.568      | 0.048       | 2.989             | 0.029             | 3275.759   | 3.008     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 89.00    | 10.616      | 0.048       | 3.019             | 0.029             | 3307.615   | 3.037     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 90.00    | 10.664      | 0.048       | 3.048             | 0.030             | 3339.691   | 3.067     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 91.00    | 10.712      | 0.048       | 3.078             | 0.030             | 3371.860   | 3.096     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 92.00    | 10.761      | 0.048       | 3.108             | 0.030             | 3404.120   | 3.126     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 93.00    | 10.809      | 0.048       | 3.137             | 0.030             | 3436.339   | 3.155     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 94.00    | 10.857      | 0.048       | 3.167             | 0.030             | 3468.517   | 3.185     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 95.00    | 10.904      | 0.048       | 3.197             | 0.030             | 3500.782   | 3.215     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 96.00    | 10.952      | 0.048       | 3.225             | 0.028             | 3532.904   | 3.244     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 97.00    | 11.000      | 0.048       | 3.225             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 98.00    | 11.000      | 0.000       | 3.225             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 99.00    | 11.000      | 0.000       | 0.000             | -3.225            | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 100.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 101.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 102.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 103.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 104.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 105.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 106.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 107.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 108.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 109.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 110.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 111.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 112.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |

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Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-3 | BASE  | 113.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 114.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 115.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 116.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 117.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 118.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 119.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-3 | BASE  | 120.00   | 11.000      | 0.000       | 0.000             | 0.000             | 3548.907   | 3.259     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |

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← MAX

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-4 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 51.00    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 52.00    | 2.447       | 0.099       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 53.00    | 2.546       | 0.099       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 54.00    | 2.669       | 0.123       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 55.00    | 2.792       | 0.123       | 0.000             | 0.000             | 0.681      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 55.25    | 2.945       | 0.154       | 0.000             | 0.000             | 1.505      | 0.000     | 0.001    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 55.50    | 2.984       | 0.038       | 0.001             | 0.000             | 3.309      | 0.001     | 0.003    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 55.75    | 3.022       | 0.038       | 0.001             | 0.001             | 6.102      | 0.001     | 0.004    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 56.00    | 3.061       | 0.038       | 0.002             | 0.001             | 9.879      | 0.002     | 0.005    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 56.25    | 3.099       | 0.039       | 0.004             | 0.002             | 16.110     | 0.003     | 0.009    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 56.50    | 3.158       | 0.058       | 0.006             | 0.002             | 25.479     | 0.005     | 0.012    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 56.75    | 3.216       | 0.058       | 0.009             | 0.003             | 37.113     | 0.007     | 0.014    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 57.00    | 3.275       | 0.058       | 0.012             | 0.003             | 50.920     | 0.010     | 0.017    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 57.25    | 3.333       | 0.058       | 0.015             | 0.003             | 66.874     | 0.013     | 0.019    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 57.50    | 3.391       | 0.058       | 0.019             | 0.004             | 84.951     | 0.017     | 0.021    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 57.75    | 3.450       | 0.058       | 0.023             | 0.004             | 105.127    | 0.021     | 0.024    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 58.00    | 3.508       | 0.058       | 0.028             | 0.005             | 127.401    | 0.026     | 0.026    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 58.25    | 3.567       | 0.058       | 0.037             | 0.009             | 161.573    | 0.032     | 0.050    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 58.50    | 3.670       | 0.103       | 0.048             | 0.011             | 210.334    | 0.042     | 0.058    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 58.75    | 3.773       | 0.104       | 0.060             | 0.012             | 265.920    | 0.053     | 0.065    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 59.00    | 3.877       | 0.104       | 0.073             | 0.013             | 327.659    | 0.066     | 0.072    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 59.25    | 3.980       | 0.104       | 0.099             | 0.026             | 423.275    | 0.085     | 0.140    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 59.50    | 4.164       | 0.184       | 0.130             | 0.031             | 561.104    | 0.113     | 0.166    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 59.75    | 4.349       | 0.185       | 0.479             | 0.348             | 1473.283   | 0.296     | 1.861    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 60.00    | 5.805       | 1.456       | 1.000             | 0.521             | 3601.683   | 0.724     | 2.869    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 60.25    | 7.264       | 1.460       | 1.115             | 0.115             | 5249.700   | 1.056     | 0.794    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 60.50    | 7.541       | 0.277       | 1.234             | 0.119             | 5903.256   | 1.187     | 0.659    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 60.75    | 7.817       | 0.276       | 1.298             | 0.064             | 6365.630   | 1.280     | 0.369    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 61.00    | 7.959       | 0.142       | 1.362             | 0.064             | 6691.026   | 1.345     | 0.354    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 61.25    | 8.101       | 0.142       | 1.404             | 0.043             | 6959.047   | 1.399     | 0.241    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 61.50    | 8.193       | 0.092       | 1.447             | 0.043             | 7173.898   | 1.443     | 0.236    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 61.75    | 8.286       | 0.092       | 1.490             | 0.043             | 7387.498   | 1.485     | 0.239    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 62.00    | 8.378       | 0.092       | 1.533             | 0.043             | 7603.145   | 1.529     | 0.241    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 63.00    | 8.470       | 0.092       | 1.644             | 0.111             | 8312.926   | 1.672     | 0.154    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 64.00    | 8.699       | 0.229       | 1.757             | 0.113             | 8872.718   | 1.784     | 0.157    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 65.00    | 8.928       | 0.229       | 1.827             | 0.070             | 9329.186   | 1.876     | 0.096    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 66.00    | 9.067       | 0.139       | 1.897             | 0.070             | 9678.094   | 1.946     | 0.098    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 67.00    | 9.205       | 0.138       | 1.968             | 0.071             | 10031.455  | 2.017     | 0.099    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 68.00    | 9.343       | 0.138       | 2.040             | 0.072             | 10389.041  | 2.089     | 0.100    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 69.00    | 9.481       | 0.138       | 2.089             | 0.049             | 10689.711  | 2.150     | 0.067    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 70.00    | 9.573       | 0.092       | 2.138             | 0.049             | 10932.373  | 2.198     | 0.068    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 71.00    | 9.665       | 0.092       | 2.187             | 0.049             | 11176.739  | 2.247     | 0.068    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 72.00    | 9.757       | 0.092       | 2.237             | 0.050             | 11422.775  | 2.297     | 0.069    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 73.00    | 9.849       | 0.092       | 2.263             | 0.026             | 11610.683  | 2.335     | 0.036    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 74.00    | 9.897       | 0.048       | 2.289             | 0.026             | 11739.805  | 2.361     | 0.036    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 75.00    | 9.945       | 0.048       | 2.315             | 0.026             | 11869.406  | 2.387     | 0.036    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 76.00    | 9.993       | 0.048       | 2.341             | 0.026             | 11999.482  | 2.413     | 0.036    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 77.00    | 10.041      | 0.048       | 2.367             | 0.027             | 12130.567  | 2.439     | 0.037    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 78.00    | 10.089      | 0.048       | 2.394             | 0.027             | 12262.660  | 2.466     | 0.037    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 79.00    | 10.137      | 0.048       | 2.421             | 0.027             | 12395.228  | 2.492     | 0.037    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 80.00    | 10.185      | 0.048       | 2.447             | 0.027             | 12528.264  | 2.519     | 0.037    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 81.00    | 10.233      | 0.048       | 2.474             | 0.027             | 12661.225  | 2.546     | 0.037    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 82.00    | 10.281      | 0.048       | 2.501             | 0.027             | 12794.104  | 2.573     | 0.037    | 0.000        |

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Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-4 | BASE  | 83.00    | 10.329      | 0.048       | 2.528             | 0.027             | 12927.438  | 2.599     | 0.037    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 84.00    | 10.377      | 0.048       | 2.555             | 0.027             | 13061.222  | 2.626     | 0.037    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 85.00    | 10.425      | 0.048       | 2.582             | 0.027             | 13195.454  | 2.653     | 0.037    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 86.00    | 10.473      | 0.048       | 2.609             | 0.027             | 13330.132  | 2.680     | 0.037    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 87.00    | 10.520      | 0.048       | 2.636             | 0.027             | 13465.252  | 2.708     | 0.038    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 88.00    | 10.568      | 0.048       | 2.663             | 0.027             | 13600.812  | 2.735     | 0.038    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 89.00    | 10.616      | 0.048       | 2.691             | 0.028             | 13737.365  | 2.762     | 0.038    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 90.00    | 10.664      | 0.048       | 2.719             | 0.028             | 13874.914  | 2.790     | 0.038    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 91.00    | 10.712      | 0.048       | 2.747             | 0.028             | 14012.901  | 2.818     | 0.038    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 92.00    | 10.761      | 0.048       | 2.774             | 0.028             | 14151.322  | 2.846     | 0.039    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 93.00    | 10.809      | 0.048       | 2.802             | 0.028             | 14289.611  | 2.873     | 0.038    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 94.00    | 10.857      | 0.048       | 2.830             | 0.028             | 14427.764  | 2.901     | 0.038    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 95.00    | 10.904      | 0.048       | 2.858             | 0.028             | 14566.336  | 2.929     | 0.039    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 96.00    | 10.952      | 0.048       | 2.885             | 0.027             | 14704.293  | 2.957     | 0.038    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 97.00    | 11.000      | 0.048       | 2.885             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 98.00    | 11.000      | 0.000       | 0.000             | -2.885            | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 99.00    | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 100.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 101.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 102.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 103.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 104.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 105.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 106.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 107.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 108.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 109.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 110.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 111.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 112.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 113.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 114.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 115.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 116.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 117.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 118.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 119.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-4 | BASE  | 120.00   | 11.000      | 0.000       | 0.000             | 0.000             | 14772.859  | 2.971     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |

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Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-5 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 51.00    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 52.00    | 2.447       | 0.099       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 53.00    | 2.546       | 0.099       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 54.00    | 2.669       | 0.123       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 55.00    | 2.792       | 0.123       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 55.25    | 2.945       | 0.154       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 55.50    | 2.984       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 55.75    | 3.022       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 56.00    | 3.061       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 56.25    | 3.099       | 0.039       | 0.000             | 0.000             | 0.307      | 0.000     | 0.001    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 56.50    | 3.158       | 0.058       | 0.000             | 0.000             | 5.737      | 0.000     | 0.011    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 56.75    | 3.216       | 0.058       | 0.001             | 0.001             | 34.226     | 0.000     | 0.052    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 57.00    | 3.275       | 0.058       | 0.003             | 0.001             | 112.829    | 0.001     | 0.123    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 57.25    | 3.333       | 0.058       | 0.004             | 0.002             | 262.616    | 0.001     | 0.210    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 57.50    | 3.391       | 0.058       | 0.006             | 0.002             | 494.321    | 0.002     | 0.305    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 57.75    | 3.450       | 0.058       | 0.009             | 0.003             | 812.584    | 0.004     | 0.402    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 58.00    | 3.508       | 0.058       | 0.012             | 0.003             | 1219.973   | 0.006     | 0.503    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 58.25    | 3.567       | 0.058       | 0.018             | 0.006             | 1742.480   | 0.008     | 0.658    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 58.50    | 3.670       | 0.103       | 0.026             | 0.007             | 2476.181   | 0.011     | 0.972    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 58.75    | 3.773       | 0.104       | 0.034             | 0.009             | 3523.333   | 0.016     | 1.355    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 59.00    | 3.877       | 0.104       | 0.045             | 0.010             | 4902.923   | 0.023     | 1.711    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 59.25    | 3.980       | 0.104       | 0.064             | 0.020             | 6669.907   | 0.031     | 2.216    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 59.50    | 4.164       | 0.184       | 0.108             | 0.044             | 9194.817   | 0.042     | 3.395    | 0.000        |

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Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 1-5 | BASE  | 59.75    | 4.349       | 0.185       | 0.395             | 0.287             | 15296.561  | 0.071     | 10.164   | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 60.00    | 5.805       | 1.456       | 0.850             | 0.455             | 34984.676  | 0.161     | 33.587   | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 60.25    | 7.264       | 1.460       | 0.971             | 0.122             | 76817.625  | 0.355     | 59.375   | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 60.50    | 7.541       | 0.277       | 1.076             | 0.105129532       | 859        | 0.598     | 57.770   | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 60.75    | 7.817       | 0.276       | 1.140             | 0.064174531       | 188        | 0.805     | 42.226   | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 61.00    | 7.959       | 0.142       | 1.199             | 0.059206851       | 688        | 0.955     | 29.597   | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 61.25    | 8.101       | 0.142       | 1.239             | 0.040229828       | 313        | 1.061     | 21.462   | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 61.50    | 8.193       | 0.092       | 1.279             | 0.040246708       | 031        | 1.139     | 16.048   | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 61.75    | 8.286       | 0.092       | 1.319             | 0.040259656       | 172        | 1.198     | 12.725   | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 62.00    | 8.378       | 0.092       | 1.359             | 0.040270348       | 313        | 1.248     | 11.035   | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 63.00    | 8.470       | 0.092       | 1.463             | 0.104302322       | 313        | 1.395     | 6.728    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 64.00    | 8.699       | 0.229       | 1.568             | 0.105325861       | 781        | 1.504     | 6.349    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 65.00    | 8.928       | 0.229       | 1.634             | 0.066344997       | 594        | 1.592     | 4.282    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 66.00    | 9.067       | 0.139       | 1.700             | 0.066359862       | 469        | 1.661     | 3.976    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 67.00    | 9.205       | 0.138       | 1.767             | 0.067374255       | 000        | 1.727     | 4.019    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 68.00    | 9.343       | 0.138       | 1.835             | 0.068388819       | 000        | 1.794     | 4.072    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 69.00    | 9.481       | 0.138       | 1.881             | 0.046401439       | 406        | 1.853     | 2.940    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 70.00    | 9.573       | 0.092       | 1.927             | 0.046411723       | 969        | 1.900     | 2.774    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 71.00    | 9.665       | 0.092       | 1.973             | 0.046421735       | 344        | 1.946     | 2.788    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 72.00    | 9.757       | 0.092       | 2.020             | 0.046431803       | 688        | 1.993     | 2.806    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 73.00    | 9.849       | 0.092       | 2.045             | 0.025439853       | 844        | 2.030     | 1.667    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 74.00    | 9.897       | 0.048       | 2.069             | 0.025445521       | 813        | 2.056     | 1.482    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 75.00    | 9.945       | 0.048       | 2.094             | 0.025450857       | 250        | 2.081     | 1.482    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 76.00    | 9.993       | 0.048       | 2.119             | 0.025456202       | 938        | 2.105     | 1.488    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 77.00    | 10.041      | 0.048       | 2.144             | 0.025461588       | 563        | 2.130     | 1.504    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 78.00    | 10.089      | 0.048       | 2.169             | 0.025467017       | 219        | 2.155     | 1.512    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 79.00    | 10.137      | 0.048       | 2.194             | 0.025472470       | 375        | 2.181     | 1.518    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 80.00    | 10.185      | 0.048       | 2.219             | 0.025477944       | 719        | 2.206     | 1.524    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 81.00    | 10.233      | 0.048       | 2.245             | 0.025483420       | 875        | 2.231     | 1.519    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 82.00    | 10.281      | 0.048       | 2.270             | 0.025488895       | 563        | 2.256     | 1.523    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 83.00    | 10.329      | 0.048       | 2.296             | 0.025494387       | 469        | 2.282     | 1.528    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 84.00    | 10.377      | 0.048       | 2.321             | 0.026499899       | 531        | 2.307     | 1.534    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 85.00    | 10.425      | 0.048       | 2.347             | 0.026505431       | 719        | 2.333     | 1.540    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 86.00    | 10.473      | 0.048       | 2.372             | 0.026510983       | 938        | 2.358     | 1.545    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 87.00    | 10.520      | 0.048       | 2.398             | 0.026516556       | 031        | 2.384     | 1.551    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 88.00    | 10.568      | 0.048       | 2.424             | 0.026522147       | 906        | 2.410     | 1.556    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 89.00    | 10.616      | 0.048       | 2.450             | 0.026527779       | 063        | 2.436     | 1.572    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 90.00    | 10.664      | 0.048       | 2.477             | 0.026533452       | 750        | 2.462     | 1.580    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 91.00    | 10.712      | 0.048       | 2.503             | 0.026539149       | 500        | 2.488     | 1.585    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 92.00    | 10.761      | 0.048       | 2.529             | 0.026544865       | 875        | 2.515     | 1.591    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 93.00    | 10.809      | 0.048       | 2.556             | 0.026550581       | 750        | 2.541     | 1.585    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 94.00    | 10.857      | 0.048       | 2.582             | 0.026556293       | 750        | 2.567     | 1.588    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 95.00    | 10.904      | 0.048       | 2.609             | 0.027562021       | 313        | 2.594     | 1.594    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 96.00    | 10.952      | 0.048       | 2.635             | 0.026567756       | 750        | 2.620     | 1.593    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 97.00    | 11.000      | 0.048       | 2.635             | 0.000571007       | 375        | 2.635     | 0.213    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 98.00    | 11.000      | 0.000       | 2.635             | 0.000571402       | 500        | 2.637     | 0.006    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 99.00    | 11.000      | 0.000       | 2.635             | 0.000571414       | 000        | 2.637     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 100.00   | 11.000      | 0.000       | -0.000            | -2.635571414      | 000        | 2.637     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 101.00   | 11.000      | 0.000       | -0.000            | 0.000571414       | 000        | 2.637     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 102.00   | 11.000      | 0.000       | -0.000            | 0.000571414       | 000        | 2.637     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 103.00   | 11.000      | 0.000       | -0.000            | 0.000571414       | 000        | 2.637     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 104.00   | 11.000      | 0.000       | -0.000            | 0.000571414       | 000        | 2.637     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 105.00   | 11.000      | 0.000       | -0.000            | 0.000571414       | 000        | 2.637     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 106.00   | 11.000      | 0.000       | -0.000            | 0.000571414       | 000        | 2.637     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 107.00   | 11.000      | 0.000       | -0.000            | 0.000571414       | 000        | 2.637     | 0.000    | 0.000        |
| 25Y96H     | BASIN 1-5 | BASE  | 108.00   | 11.000      | 0.000       | -0.000            | 0.000571414       | 000        | 2.637     | 0.000    | 0.000        |

3E

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time<br>hrs | Sum Rain<br>in | Inc Rain<br>in | SumExcess<br>Rain in | IncExcess<br>Rain in | Volume<br>ft3 | Volume<br>in | Rate<br>cfs | Velocity<br>fps |
|------------|-----------|-------|-------------|----------------|----------------|----------------------|----------------------|---------------|--------------|-------------|-----------------|
| 25Y96H     | BASIN 1-5 | BASE  | 109.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 110.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 111.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 112.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 113.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 114.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 115.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 116.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 117.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 118.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 119.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000           |
| 25Y96H     | BASIN 1-5 | BASE  | 120.00      | 11.000         | 0.000          | -0.000               | 0.000571414.000      | 2.637         | 0.000        | 0.000       | 0.000 ←max      |

6e

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Hydrology Time Series

| Simulation | Node       | Time hrs | Volume ft3 | Volume in | Rate cfs    |
|------------|------------|----------|------------|-----------|-------------|
| 100Y24H    | UNNAMED LK | 0.00     | 0.000      | 0.000     | 0.000       |
| 100Y24H    | UNNAMED LK | 1.00     | 0.000      | 0.000     | 0.000       |
| 100Y24H    | UNNAMED LK | 2.00     | 0.000      | 0.000     | 0.000       |
| 100Y24H    | UNNAMED LK | 3.00     | 0.000      | 0.000     | 0.000       |
| 100Y24H    | UNNAMED LK | 4.00     | 0.000      | 0.000     | 0.000       |
| 100Y24H    | UNNAMED LK | 5.00     | 0.000      | 0.000     | 0.000       |
| 100Y24H    | UNNAMED LK | 6.00     | 51.307     | 0.000     | 0.029       |
| 100Y24H    | UNNAMED LK | 7.00     | 468.092    | 0.002     | 0.203       |
| 100Y24H    | UNNAMED LK | 8.00     | 1607.705   | 0.006     | 0.430       |
| 100Y24H    | UNNAMED LK | 9.00     | 3858.702   | 0.015     | 0.820       |
| 100Y24H    | UNNAMED LK | 10.00    | 7773.052   | 0.030     | 1.354       |
| 100Y24H    | UNNAMED LK | 11.00    | 15118.174  | 0.059     | 2.726       |
| 100Y24H    | UNNAMED LK | 11.25    | 17714.572  | 0.069     | 3.043       |
| 100Y24H    | UNNAMED LK | 11.50    | 21134.416  | 0.082     | 4.556       |
| 100Y24H    | UNNAMED LK | 11.75    | 29975.977  | 0.117     | 15.092      |
| 100Y24H    | UNNAMED LK | 12.00    | 58516.637  | 0.228     | 48.332      |
| 100Y24H    | UNNAMED LK | 12.25    | 116695.141 | 0.454     | 80.953 ←max |
| 100Y24H    | UNNAMED LK | 12.50    | 189388.938 | 0.737     | 80.588      |
| 100Y24H    | UNNAMED LK | 12.75    | 253974.109 | 0.988     | 62.934      |
| 100Y24H    | UNNAMED LK | 13.00    | 302423.188 | 1.177     | 44.730      |
| 100Y24H    | UNNAMED LK | 13.25    | 337292.125 | 1.313     | 32.756      |
| 100Y24H    | UNNAMED LK | 13.50    | 363651.250 | 1.415     | 25.820      |
| 100Y24H    | UNNAMED LK | 13.75    | 385009.750 | 1.498     | 21.644      |
| 100Y24H    | UNNAMED LK | 14.00    | 403170.063 | 1.569     | 18.713      |
| 100Y24H    | UNNAMED LK | 14.25    | 419065.000 | 1.631     | 16.609      |
| 100Y24H    | UNNAMED LK | 14.50    | 433332.281 | 1.687     | 15.096      |
| 100Y24H    | UNNAMED LK | 14.75    | 446403.250 | 1.737     | 13.951      |
| 100Y24H    | UNNAMED LK | 15.00    | 458498.125 | 1.785     | 12.927      |
| 100Y24H    | UNNAMED LK | 16.00    | 500735.688 | 1.949     | 10.538      |
| 100Y24H    | UNNAMED LK | 17.00    | 535678.813 | 2.085     | 8.874       |
| 100Y24H    | UNNAMED LK | 18.00    | 565664.000 | 2.202     | 7.784       |
| 100Y24H    | UNNAMED LK | 19.00    | 592363.250 | 2.306     | 7.049       |
| 100Y24H    | UNNAMED LK | 20.00    | 617185.438 | 2.402     | 6.741       |
| 100Y24H    | UNNAMED LK | 21.00    | 639695.375 | 2.490     | 5.764       |
| 100Y24H    | UNNAMED LK | 22.00    | 660368.188 | 2.570     | 5.721       |
| 100Y24H    | UNNAMED LK | 23.00    | 680338.750 | 2.648     | 5.374       |
| 100Y24H    | UNNAMED LK | 24.00    | 698226.688 | 2.718     | 4.564       |
| 100Y24H    | UNNAMED LK | 25.00    | 707179.313 | 2.752     | 0.410       |
| 100Y24H    | UNNAMED LK | 26.00    | 707936.750 | 2.755     | 0.011       |
| 100Y24H    | UNNAMED LK | 27.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 28.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 29.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 30.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 31.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 32.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 33.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 34.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 35.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 36.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 37.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 38.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 39.00    | 707955.750 | 2.755     | 0.000       |
| 100Y24H    | UNNAMED LK | 40.00    | 707955.750 | 2.755     | 0.000       |
| 10Y24H     | UNNAMED LK | 0.00     | 0.000      | 0.000     | 0.000       |
| 10Y24H     | UNNAMED LK | 1.00     | 0.000      | 0.000     | 0.000       |
| 10Y24H     | UNNAMED LK | 2.00     | 0.000      | 0.000     | 0.000       |
| 10Y24H     | UNNAMED LK | 3.00     | 0.000      | 0.000     | 0.000       |
| 10Y24H     | UNNAMED LK | 4.00     | 0.000      | 0.000     | 0.000       |
| 10Y24H     | UNNAMED LK | 5.00     | 0.000      | 0.000     | 0.000       |
| 10Y24H     | UNNAMED LK | 6.00     | 0.000      | 0.000     | 0.000       |
| 10Y24H     | UNNAMED LK | 7.00     | 0.000      | 0.000     | 0.000       |
| 10Y24H     | UNNAMED LK | 8.00     | 87.653     | 0.000     | 0.049       |
| 10Y24H     | UNNAMED LK | 9.00     | 585.802    | 0.002     | 0.228       |
| 10Y24H     | UNNAMED LK | 10.00    | 1905.998   | 0.007     | 0.505       |
| 10Y24H     | UNNAMED LK | 11.00    | 4997.055   | 0.019     | 1.212       |
| 10Y24H     | UNNAMED LK | 11.25    | 6172.056   | 0.024     | 1.399       |
| 10Y24H     | UNNAMED LK | 11.50    | 7773.206   | 0.030     | 2.159       |
| 10Y24H     | UNNAMED LK | 11.75    | 11707.675  | 0.046     | 6.584       |
| 10Y24H     | UNNAMED LK | 12.00    | 23250.859  | 0.090     | 19.067      |
| 10Y24H     | UNNAMED LK | 12.25    | 44919.621  | 0.175     | 29.086 ←max |
| 10Y24H     | UNNAMED LK | 12.50    | 70195.000  | 0.273     | 27.082      |
| 10Y24H     | UNNAMED LK | 12.75    | 92153.031  | 0.359     | 21.714      |
| 10Y24H     | UNNAMED LK | 13.00    | 109251.172 | 0.425     | 16.282      |
| 10Y24H     | UNNAMED LK | 13.25    | 122250.219 | 0.476     | 12.605      |
| 10Y24H     | UNNAMED LK | 13.50    | 132638.000 | 0.516     | 10.479      |
| 10Y24H     | UNNAMED LK | 13.75    | 141470.500 | 0.551     | 9.149       |
| 10Y24H     | UNNAMED LK | 14.00    | 149247.016 | 0.581     | 8.133       |
| 10Y24H     | UNNAMED LK | 14.25    | 156235.188 | 0.608     | 7.397       |
| 10Y24H     | UNNAMED LK | 14.50    | 162632.813 | 0.633     | 6.820       |
| 10Y24H     | UNNAMED LK | 14.75    | 168563.188 | 0.656     | 6.358       |

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Hydrology Time Series

| Simulation | Node       | Time<br>hrs | Volume<br>ft3 | Volume<br>in | Rate<br>cfs  |
|------------|------------|-------------|---------------|--------------|--------------|
| 10Y24H     | UNNAMED LK | 15.00       | 174091.219    | 0.678        | 5.926        |
| 10Y24H     | UNNAMED LK | 16.00       | 193636.313    | 0.754        | 4.932        |
| 10Y24H     | UNNAMED LK | 17.00       | 210102.375    | 0.818        | 4.216        |
| 10Y24H     | UNNAMED LK | 18.00       | 224400.922    | 0.873        | 3.728        |
| 10Y24H     | UNNAMED LK | 19.00       | 237241.594    | 0.923        | 3.406        |
| 10Y24H     | UNNAMED LK | 20.00       | 249294.500    | 0.970        | 3.290        |
| 10Y24H     | UNNAMED LK | 21.00       | 260318.719    | 1.013        | 2.834        |
| 10Y24H     | UNNAMED LK | 22.00       | 270517.063    | 1.053        | 2.832        |
| 10Y24H     | UNNAMED LK | 23.00       | 280409.313    | 1.091        | 2.664        |
| 10Y24H     | UNNAMED LK | 24.00       | 289290.313    | 1.126        | 2.270        |
| 10Y24H     | UNNAMED LK | 25.00       | 293721.313    | 1.143        | 0.192        |
| 10Y24H     | UNNAMED LK | 26.00       | 294075.625    | 1.145        | 0.005        |
| 10Y24H     | UNNAMED LK | 27.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 28.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 29.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 30.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 31.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 32.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 33.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 34.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 35.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 36.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 37.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 38.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 39.00       | 294084.500    | 1.145        | 0.000        |
| 10Y24H     | UNNAMED LK | 40.00       | 294084.500    | 1.145        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 0.00        | 0.000         | 0.000        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 1.00        | 0.000         | 0.000        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 2.00        | 0.000         | 0.000        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 3.00        | 0.000         | 0.000        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 4.00        | 0.000         | 0.000        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 5.00        | 0.000         | 0.000        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 6.00        | 0.000         | 0.000        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 7.00        | 0.000         | 0.000        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 8.00        | 0.000         | 0.000        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 9.00        | 0.000         | 0.000        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 10.00       | 154.466       | 0.001        | 0.086        |
| 2.3Y24H    | UNNAMED LK | 11.00       | 1043.307      | 0.004        | 0.408        |
| 2.3Y24H    | UNNAMED LK | 11.25       | 1457.346      | 0.006        | 0.512        |
| 2.3Y24H    | UNNAMED LK | 11.50       | 2075.591      | 0.008        | 0.862        |
| 2.3Y24H    | UNNAMED LK | 11.75       | 3802.421      | 0.015        | 2.976        |
| 2.3Y24H    | UNNAMED LK | 12.00       | 9125.331      | 0.036        | 8.853        |
| 2.3Y24H    | UNNAMED LK | 12.25       | 18496.105     | 0.072        | 11.971 ← MAX |
| 2.3Y24H    | UNNAMED LK | 12.50       | 27591.904     | 0.107        | 8.242        |
| 2.3Y24H    | UNNAMED LK | 12.75       | 33707.066     | 0.131        | 5.347        |
| 2.3Y24H    | UNNAMED LK | 13.00       | 37910.922     | 0.148        | 3.995        |
| 2.3Y24H    | UNNAMED LK | 13.25       | 41213.957     | 0.160        | 3.345        |
| 2.3Y24H    | UNNAMED LK | 13.50       | 44097.828     | 0.172        | 3.063        |
| 2.3Y24H    | UNNAMED LK | 13.75       | 46772.945     | 0.182        | 2.881        |
| 2.3Y24H    | UNNAMED LK | 14.00       | 49278.316     | 0.192        | 2.686        |
| 2.3Y24H    | UNNAMED LK | 14.25       | 51634.375     | 0.201        | 2.550        |
| 2.3Y24H    | UNNAMED LK | 14.50       | 53874.207     | 0.210        | 2.428        |
| 2.3Y24H    | UNNAMED LK | 14.75       | 56006.719     | 0.218        | 2.311        |
| 2.3Y24H    | UNNAMED LK | 15.00       | 58029.422     | 0.226        | 2.184        |
| 2.3Y24H    | UNNAMED LK | 16.00       | 65386.793     | 0.254        | 1.904        |
| 2.3Y24H    | UNNAMED LK | 17.00       | 71836.656     | 0.280        | 1.679        |
| 2.3Y24H    | UNNAMED LK | 18.00       | 77577.305     | 0.302        | 1.510        |
| 2.3Y24H    | UNNAMED LK | 19.00       | 82821.211     | 0.322        | 1.404        |
| 2.3Y24H    | UNNAMED LK | 20.00       | 87838.125     | 0.342        | 1.384        |
| 2.3Y24H    | UNNAMED LK | 21.00       | 92504.102     | 0.360        | 1.209        |
| 2.3Y24H    | UNNAMED LK | 22.00       | 96880.539     | 0.377        | 1.223        |
| 2.3Y24H    | UNNAMED LK | 23.00       | 101156.953    | 0.394        | 1.153        |
| 2.3Y24H    | UNNAMED LK | 24.00       | 105010.953    | 0.409        | 0.988        |
| 2.3Y24H    | UNNAMED LK | 25.00       | 106921.117    | 0.416        | 0.073        |
| 2.3Y24H    | UNNAMED LK | 26.00       | 107056.008    | 0.417        | 0.002        |
| 2.3Y24H    | UNNAMED LK | 27.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 28.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 29.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 30.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 31.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 32.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 33.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 34.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 35.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 36.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 37.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 38.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 39.00       | 107059.359    | 0.417        | 0.000        |
| 2.3Y24H    | UNNAMED LK | 40.00       | 107059.359    | 0.417        | 0.000        |
| 25Y24H     | UNNAMED LK | 0.00        | 0.000         | 0.000        | 0.000        |

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Hydrology Time Series

| Simulation | Node       | Time<br>hrs | Volume<br>ft3 | Volume<br>in | Rate<br>cfs  |
|------------|------------|-------------|---------------|--------------|--------------|
| 25Y24H     | UNNAMED LK | 1.00        | 0.000         | 0.000        | 0.000        |
| 25Y24H     | UNNAMED LK | 2.00        | 0.000         | 0.000        | 0.000        |
| 25Y24H     | UNNAMED LK | 3.00        | 0.000         | 0.000        | 0.000        |
| 25Y24H     | UNNAMED LK | 4.00        | 0.000         | 0.000        | 0.000        |
| 25Y24H     | UNNAMED LK | 5.00        | 0.000         | 0.000        | 0.000        |
| 25Y24H     | UNNAMED LK | 6.00        | 0.000         | 0.000        | 0.000        |
| 25Y24H     | UNNAMED LK | 7.00        | 57.665        | 0.000        | 0.032        |
| 25Y24H     | UNNAMED LK | 8.00        | 449.884       | 0.002        | 0.186        |
| 25Y24H     | UNNAMED LK | 9.00        | 1589.753      | 0.006        | 0.447        |
| 25Y24H     | UNNAMED LK | 10.00       | 3882.249      | 0.015        | 0.826        |
| 25Y24H     | UNNAMED LK | 11.00       | 8601.611      | 0.033        | 1.796        |
| 25Y24H     | UNNAMED LK | 11.25       | 10325.725     | 0.040        | 2.036        |
| 25Y24H     | UNNAMED LK | 11.50       | 12625.660     | 0.049        | 3.075        |
| 25Y24H     | UNNAMED LK | 11.75       | 18207.875     | 0.071        | 9.330        |
| 25Y24H     | UNNAMED LK | 12.00       | 35299.414     | 0.137        | 28.652       |
| 25Y24H     | UNNAMED LK | 12.25       | 69298.688     | 0.270        | 46.902 ← max |
| 25Y24H     | UNNAMED LK | 12.50       | 111160.852    | 0.433        | 46.125       |
| 25Y24H     | UNNAMED LK | 12.75       | 148438.359    | 0.578        | 36.714       |
| 25Y24H     | UNNAMED LK | 13.00       | 177010.375    | 0.689        | 26.779       |
| 25Y24H     | UNNAMED LK | 13.25       | 198118.125    | 0.771        | 20.127       |
| 25Y24H     | UNNAMED LK | 13.50       | 214493.906    | 0.835        | 16.264       |
| 25Y24H     | UNNAMED LK | 13.75       | 228066.406    | 0.888        | 13.897       |
| 25Y24H     | UNNAMED LK | 14.00       | 239801.578    | 0.933        | 12.181       |
| 25Y24H     | UNNAMED LK | 14.25       | 250204.375    | 0.974        | 10.937       |
| 25Y24H     | UNNAMED LK | 14.50       | 259628.594    | 1.010        | 10.006       |
| 25Y24H     | UNNAMED LK | 14.75       | 268309.406    | 1.044        | 9.285        |
| 25Y24H     | UNNAMED LK | 15.00       | 276369.469    | 1.076        | 8.627        |
| 25Y24H     | UNNAMED LK | 16.00       | 304679.313    | 1.186        | 7.101        |
| 25Y24H     | UNNAMED LK | 17.00       | 328300.500    | 1.278        | 6.022        |
| 25Y24H     | UNNAMED LK | 18.00       | 348684.625    | 1.357        | 5.303        |
| 25Y24H     | UNNAMED LK | 19.00       | 366909.031    | 1.428        | 4.822        |
| 25Y24H     | UNNAMED LK | 20.00       | 383929.656    | 1.494        | 4.634        |
| 25Y24H     | UNNAMED LK | 21.00       | 399427.969    | 1.555        | 3.976        |
| 25Y24H     | UNNAMED LK | 22.00       | 413711.063    | 1.610        | 3.959        |
| 25Y24H     | UNNAMED LK | 23.00       | 427536.406    | 1.664        | 3.722        |
| 25Y24H     | UNNAMED LK | 24.00       | 439934.156    | 1.712        | 3.166        |
| 25Y24H     | UNNAMED LK | 25.00       | 446130.281    | 1.736        | 0.277        |
| 25Y24H     | UNNAMED LK | 26.00       | 446641.063    | 1.738        | 0.007        |
| 25Y24H     | UNNAMED LK | 27.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 28.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 29.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 30.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 31.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 32.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 33.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 34.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 35.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 36.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 37.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 38.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 39.00       | 446653.875    | 1.738        | 0.000        |
| 25Y24H     | UNNAMED LK | 40.00       | 446653.875    | 1.738        | 0.000        |
| 25Y96H     | UNNAMED LK | 0.00        | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 1.00        | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 2.00        | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 3.00        | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 4.00        | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 5.00        | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 6.00        | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 7.00        | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 8.00        | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 9.00        | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 10.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 11.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 12.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 13.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 14.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 15.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 16.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 17.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 18.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 19.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 20.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 21.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 22.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 23.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 24.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 25.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 26.00       | 0.000         | 0.000        | 0.000        |
| 25Y96H     | UNNAMED LK | 27.00       | 2.114         | 0.000        | 0.001        |

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Hydrology Time Series

| Simulation | Node       | Time<br>hrs | Volume<br>ft3 | Volume<br>in | Rate<br>cfs |
|------------|------------|-------------|---------------|--------------|-------------|
| 25Y96H     | UNNAMED LK | 28.00       | 34.840        | 0.000        | 0.017       |
| 25Y96H     | UNNAMED LK | 29.00       | 128.311       | 0.000        | 0.035       |
| 25Y96H     | UNNAMED LK | 30.00       | 284.212       | 0.001        | 0.052       |
| 25Y96H     | UNNAMED LK | 31.00       | 499.114       | 0.002        | 0.068       |
| 25Y96H     | UNNAMED LK | 32.00       | 770.352       | 0.003        | 0.083       |
| 25Y96H     | UNNAMED LK | 33.00       | 1089.392      | 0.004        | 0.094       |
| 25Y96H     | UNNAMED LK | 34.00       | 1452.333      | 0.006        | 0.107       |
| 25Y96H     | UNNAMED LK | 35.00       | 1861.583      | 0.007        | 0.120       |
| 25Y96H     | UNNAMED LK | 36.00       | 2315.288      | 0.009        | 0.132       |
| 25Y96H     | UNNAMED LK | 37.00       | 2811.658      | 0.011        | 0.144       |
| 25Y96H     | UNNAMED LK | 38.00       | 3348.994      | 0.013        | 0.155       |
| 25Y96H     | UNNAMED LK | 39.00       | 3925.690      | 0.015        | 0.166       |
| 25Y96H     | UNNAMED LK | 40.00       | 4540.255      | 0.018        | 0.176       |
| 25Y96H     | UNNAMED LK | 41.00       | 5202.502      | 0.020        | 0.192       |
| 25Y96H     | UNNAMED LK | 42.00       | 5912.238      | 0.023        | 0.202       |
| 25Y96H     | UNNAMED LK | 43.00       | 6657.956      | 0.026        | 0.212       |
| 25Y96H     | UNNAMED LK | 44.00       | 7438.146      | 0.029        | 0.221       |
| 25Y96H     | UNNAMED LK | 45.00       | 8238.132      | 0.032        | 0.223       |
| 25Y96H     | UNNAMED LK | 46.00       | 9055.662      | 0.035        | 0.231       |
| 25Y96H     | UNNAMED LK | 47.00       | 9902.033      | 0.039        | 0.239       |
| 25Y96H     | UNNAMED LK | 48.00       | 10776.901     | 0.042        | 0.247       |
| 25Y96H     | UNNAMED LK | 49.00       | 11837.818     | 0.046        | 0.342       |
| 25Y96H     | UNNAMED LK | 50.00       | 13095.011     | 0.051        | 0.356       |
| 25Y96H     | UNNAMED LK | 51.00       | 14512.195     | 0.056        | 0.431       |
| 25Y96H     | UNNAMED LK | 52.00       | 16094.594     | 0.063        | 0.448       |
| 25Y96H     | UNNAMED LK | 53.00       | 17934.127     | 0.070        | 0.574       |
| 25Y96H     | UNNAMED LK | 54.00       | 20043.188     | 0.078        | 0.598       |
| 25Y96H     | UNNAMED LK | 55.00       | 22515.729     | 0.088        | 0.776       |
| 25Y96H     | UNNAMED LK | 55.25       | 23218.736     | 0.090        | 0.786       |
| 25Y96H     | UNNAMED LK | 55.50       | 23930.209     | 0.093        | 0.795       |
| 25Y96H     | UNNAMED LK | 55.75       | 24649.467     | 0.096        | 0.803       |
| 25Y96H     | UNNAMED LK | 56.00       | 25377.047     | 0.099        | 0.813       |
| 25Y96H     | UNNAMED LK | 56.25       | 26180.742     | 0.102        | 0.973       |
| 25Y96H     | UNNAMED LK | 56.50       | 27158.773     | 0.106        | 1.201       |
| 25Y96H     | UNNAMED LK | 56.75       | 28291.773     | 0.110        | 1.317       |
| 25Y96H     | UNNAMED LK | 57.00       | 29523.645     | 0.115        | 1.421       |
| 25Y96H     | UNNAMED LK | 57.25       | 30851.197     | 0.120        | 1.530       |
| 25Y96H     | UNNAMED LK | 57.50       | 32278.535     | 0.126        | 1.642       |
| 25Y96H     | UNNAMED LK | 57.75       | 33808.379     | 0.132        | 1.757       |
| 25Y96H     | UNNAMED LK | 58.00       | 35444.301     | 0.138        | 1.878       |
| 25Y96H     | UNNAMED LK | 58.25       | 37379.723     | 0.145        | 2.423       |
| 25Y96H     | UNNAMED LK | 58.50       | 39950.066     | 0.155        | 3.289       |
| 25Y96H     | UNNAMED LK | 58.75       | 43169.895     | 0.168        | 3.866       |
| 25Y96H     | UNNAMED LK | 59.00       | 46850.008     | 0.182        | 4.312       |
| 25Y96H     | UNNAMED LK | 59.25       | 51317.391     | 0.200        | 5.616       |
| 25Y96H     | UNNAMED LK | 59.50       | 57426.578     | 0.224        | 7.960       |
| 25Y96H     | UNNAMED LK | 59.75       | 73882.125     | 0.288        | 28.608      |
| 25Y96H     | UNNAMED LK | 60.00       | 119224.641    | 0.464        | 72.154      |
| 25Y96H     | UNNAMED LK | 60.25       | 192520.719    | 0.749        | 90.727      |
| 25Y96H     | UNNAMED LK | 60.50       | 266367.156    | 1.037        | 73.377      |
| 25Y96H     | UNNAMED LK | 60.75       | 322583.781    | 1.256        | 51.549      |
| 25Y96H     | UNNAMED LK | 61.00       | 361826.469    | 1.408        | 35.657      |
| 25Y96H     | UNNAMED LK | 61.25       | 389564.313    | 1.516        | 25.983      |
| 25Y96H     | UNNAMED LK | 61.50       | 410093.844    | 1.596        | 19.638      |
| 25Y96H     | UNNAMED LK | 61.75       | 426162.313    | 1.659        | 16.070      |
| 25Y96H     | UNNAMED LK | 62.00       | 439842.188    | 1.712        | 14.330      |
| 25Y96H     | UNNAMED LK | 63.00       | 481470.063    | 1.874        | 8.796       |
| 25Y96H     | UNNAMED LK | 64.00       | 512460.156    | 1.995        | 8.420       |
| 25Y96H     | UNNAMED LK | 65.00       | 537598.875    | 2.092        | 5.546       |
| 25Y96H     | UNNAMED LK | 66.00       | 557010.063    | 2.168        | 5.238       |
| 25Y96H     | UNNAMED LK | 67.00       | 575954.688    | 2.242        | 5.286       |
| 25Y96H     | UNNAMED LK | 68.00       | 595086.250    | 2.316        | 5.342       |
| 25Y96H     | UNNAMED LK | 69.00       | 611528.500    | 2.380        | 3.792       |
| 25Y96H     | UNNAMED LK | 70.00       | 624880.438    | 2.432        | 3.625       |
| 25Y96H     | UNNAMED LK | 71.00       | 637958.688    | 2.483        | 3.640       |
| 25Y96H     | UNNAMED LK | 72.00       | 651097.938    | 2.534        | 3.659       |
| 25Y96H     | UNNAMED LK | 73.00       | 661490.750    | 2.575        | 2.115       |
| 25Y96H     | UNNAMED LK | 74.00       | 668766.125    | 2.603        | 1.927       |
| 25Y96H     | UNNAMED LK | 75.00       | 675705.125    | 2.630        | 1.928       |
| 25Y96H     | UNNAMED LK | 76.00       | 682656.125    | 2.657        | 1.934       |
| 25Y96H     | UNNAMED LK | 77.00       | 689655.438    | 2.684        | 1.954       |
| 25Y96H     | UNNAMED LK | 78.00       | 696706.063    | 2.712        | 1.963       |
| 25Y96H     | UNNAMED LK | 79.00       | 703783.125    | 2.739        | 1.969       |
| 25Y96H     | UNNAMED LK | 80.00       | 710883.063    | 2.767        | 1.975       |
| 25Y96H     | UNNAMED LK | 81.00       | 717980.000    | 2.794        | 1.967       |
| 25Y96H     | UNNAMED LK | 82.00       | 725070.750    | 2.822        | 1.972       |
| 25Y96H     | UNNAMED LK | 83.00       | 732180.250    | 2.850        | 1.978       |
| 25Y96H     | UNNAMED LK | 84.00       | 739311.625    | 2.877        | 1.984       |
| 25Y96H     | UNNAMED LK | 85.00       | 746464.750    | 2.905        | 1.990       |
| 25Y96H     | UNNAMED LK | 86.00       | 753639.625    | 2.933        | 1.996       |

←max

Hartwood Marsh Road  
Phase 1  
Basin 1  
Pre-Development  
Hydrology Time Series

| Simulation | Node       | Time<br>hrs | Volume<br>ft3 | Volume<br>in | Rate<br>cfs |
|------------|------------|-------------|---------------|--------------|-------------|
| 25Y96H     | UNNAMED LK | 87.00       | 760836.000    | 2.961        | 2.002       |
| 25Y96H     | UNNAMED LK | 88.00       | 768053.750    | 2.989        | 2.008       |
| 25Y96H     | UNNAMED LK | 89.00       | 775319.000    | 3.018        | 2.028       |
| 25Y96H     | UNNAMED LK | 90.00       | 782635.125    | 3.046        | 2.036       |
| 25Y96H     | UNNAMED LK | 91.00       | 789975.875    | 3.075        | 2.042       |
| 25Y96H     | UNNAMED LK | 92.00       | 797337.938    | 3.103        | 2.048       |
| 25Y96H     | UNNAMED LK | 93.00       | 804694.375    | 3.132        | 2.039       |
| 25Y96H     | UNNAMED LK | 94.00       | 812041.875    | 3.161        | 2.043       |
| 25Y96H     | UNNAMED LK | 95.00       | 819406.375    | 3.189        | 2.049       |
| 25Y96H     | UNNAMED LK | 96.00       | 826770.000    | 3.218        | 2.042       |
| 25Y96H     | UNNAMED LK | 97.00       | 830834.125    | 3.234        | 0.215       |
| 25Y96H     | UNNAMED LK | 98.00       | 831233.500    | 3.235        | 0.006       |
| 25Y96H     | UNNAMED LK | 99.00       | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 100.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 101.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 102.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 103.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 104.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 105.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 106.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 107.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 108.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 109.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 110.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 111.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 112.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 113.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 114.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 115.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 116.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 117.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 118.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 119.00      | 831245.000    | 3.235        | 0.000       |
| 25Y96H     | UNNAMED LK | 120.00      | 831245.000    | 3.235        | 0.000       |

*Post Development Drainage Basin Data*



**BASIN BREAKDOWN**



DATE

MADE BY: MSF 18-Sep-07  
 CHCK BY: KMV 20-Sep-07

PROJECT: HARTWOOD MARSH ROAD

LOCATION: **BASIN 1 INTERIM**

BASIN LIMITS: STA. 103+43 to STA. 138+50, CL CONST. HARTWOOD MARSH RD.

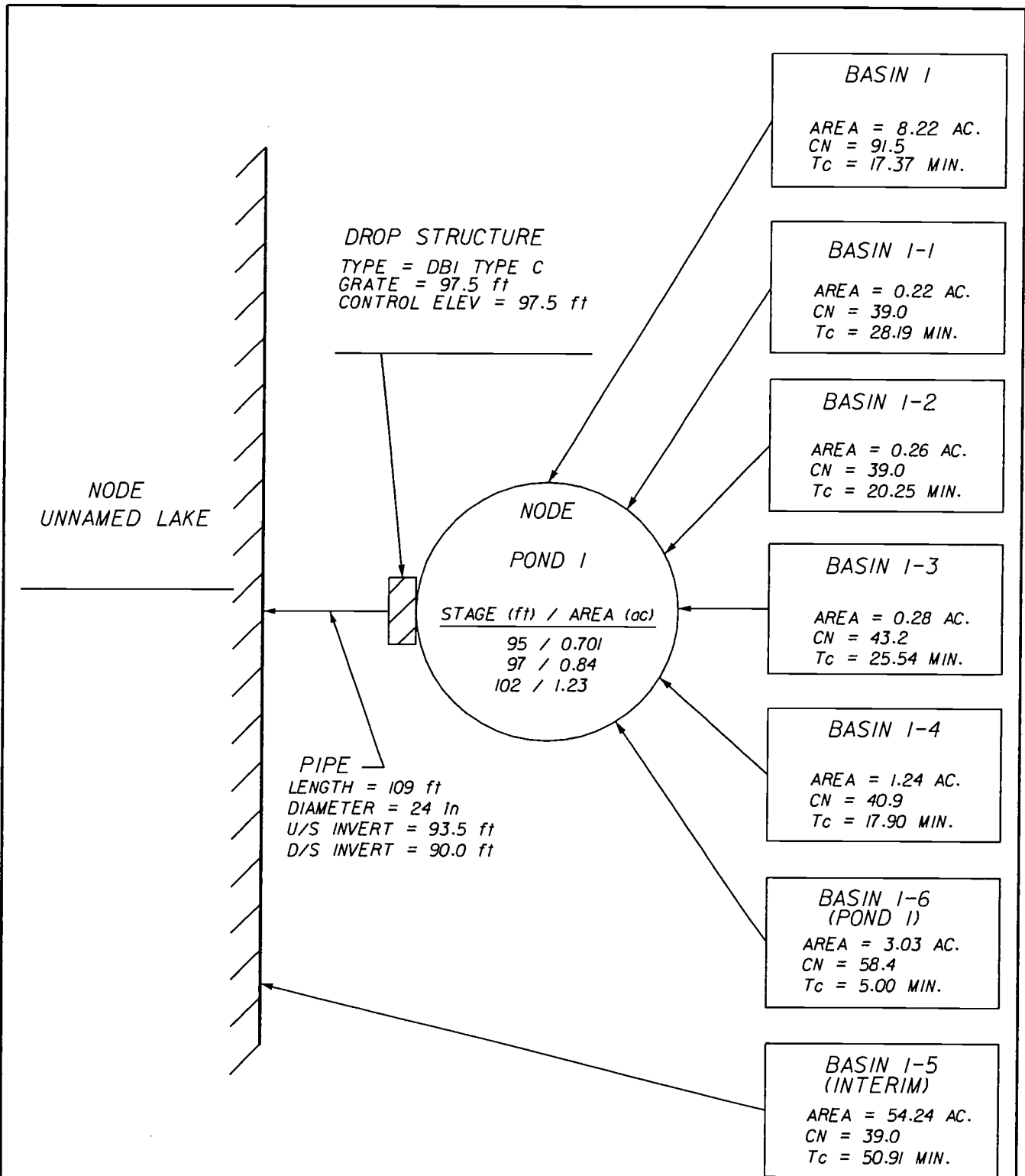
**EXISTING CONDITIONS:**

| LOCATION                  | STATION | To | STATION | BASIN WIDTH<br>(Ft.) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS                                        |
|---------------------------|---------|----|---------|----------------------|----------------------|-----------------------|-----------------------|------------------------------------------------|
| <i>ON-SITE:</i>           |         |    |         |                      |                      |                       |                       |                                                |
| BASIN 1                   | 103+43  | -  | 138+50  | 100 to 110           | 4.01                 | 4.89                  | 8.91                  | Discharge to Unnamed Lake, includes N. Hancock |
| <i>ON-SITE SUBTOTAL:</i>  |         |    |         |                      | <b>4.01</b>          | <b>4.89</b>           | <b>8.91</b>           |                                                |
| <i>OFF-SITE:</i>          |         |    |         |                      |                      |                       |                       |                                                |
| BASIN 1-1 (OFF-SITE)      | 103+80  | -  | 107+40  | -                    | 0.00                 | 0.25                  | 0.25                  | Discharge to Unnamed Lake                      |
| BASIN 1-2 (OFF-SITE)      | 107+90  | -  | 111+40  | -                    | 0.00                 | 0.26                  | 0.26                  | Discharge to Unnamed Lake                      |
| BASIN 1-3 (OFF-SITE)      | 111+40  | -  | 115+30  | -                    | 0.02                 | 0.28                  | 0.30                  | Discharge to Unnamed Lake                      |
| BASIN 1-4 (OFF-SITE)      | 116+00  | -  | 138+50  | -                    | 0.04                 | 1.33                  | 1.37                  | Discharge to Unnamed Lake                      |
| BASIN 1-5 (OFF-SITE)      |         |    |         |                      | 0.00                 | 59.69                 | 59.69                 | Discharge to Unnamed Lake                      |
| <i>OFF-SITE SUBTOTAL:</i> |         |    |         |                      | <b>0.06</b>          | <b>61.81</b>          | <b>61.87</b>          |                                                |
| <b>TOTAL:</b>             |         |    |         |                      | <b>4.07</b>          | <b>66.70</b>          | <b>70.78</b>          |                                                |

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**PROPOSED CONDITIONS:**

| LOCATION                  | STATION | To | STATION | BASIN WIDTH<br>(Ft.) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS                                                                                         |
|---------------------------|---------|----|---------|----------------------|----------------------|-----------------------|-----------------------|-------------------------------------------------------------------------------------------------|
| <i>ON-SITE:</i>           |         |    |         |                      |                      |                       |                       |                                                                                                 |
| BASIN 1                   | 103+43  | -  | 138+50  | 100 to 110           | 7.12                 | 1.09                  | 8.22                  |                                                                                                 |
| BASIN 1-6 POND AREA       | -       | -  | -       | -                    | 0.82                 | 2.21                  | 3.03                  | Includes Pond Access Area, imp at water quality                                                 |
| <i>ON-SITE SUBTOTAL:</i>  |         |    |         |                      | <b>7.94</b>          | <b>3.31</b>           | <b>11.25</b>          |                                                                                                 |
| <i>OFF-SITE:</i>          |         |    |         |                      |                      |                       |                       |                                                                                                 |
| BASIN 1-1 (OFF-SITE)      | 103+80  | -  | 107+40  | -                    | 0.00                 | 0.22                  | 0.22                  | Runoff Conveyed to Pond                                                                         |
| BASIN 1-2 (OFF-SITE)      | 107+90  | -  | 111+40  | -                    | 0.00                 | 0.26                  | 0.26                  | Runoff Conveyed to Pond                                                                         |
| BASIN 1-3 (OFF-SITE)      | 111+40  | -  | 115+30  | -                    | 0.02                 | 0.26                  | 0.28                  | Runoff Conveyed to Pond                                                                         |
| BASIN 1-4 (OFF-SITE)      | 116+00  | -  | 138+50  | -                    | 0.04                 | 1.20                  | 1.24                  | Runoff Conveyed to Pond                                                                         |
| BASIN 1-5 (OFF-SITE)      |         |    |         |                      | 0.00                 | 54.24                 | 54.24                 | Diverted around pond, include interim runoff from what will be the future First Baptist Church. |
| <i>OFF-SITE SUBTOTAL:</i> |         |    |         |                      | <b>0.06</b>          | <b>56.18</b>          | <b>56.24</b>          |                                                                                                 |
| <b>TOTAL:</b>             |         |    |         |                      | <b>8.00</b>          | <b>59.48</b>          | <b>67.48</b>          |                                                                                                 |



BASIN 1

LOCATION: LAKE COUNTY  
 SEC. 9 & 10, T23S, R26E  
 HARTWOOD MARSH ROAD RECONSTRUCTION  
 US 27 TO 1500 FT EAST OF S. HANCOCK RD

COUNTY: LAKE  
 STATE: FLORIDA  
 DATE: 04-08

DATUM: NAVD 88  
 PURPOSE: POST-DEVELOPMENT  
 NODAL DIAGRAM

**HNTB**  
 HNTB CORPORATION  
 300 PRIMERA BLVD,  
 SUITE 200  
 LAKE MARY, FL 32746  
 (407) 805-0355  
 CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.  
 FL. REGISTRATION NO. 44794



**LAKE COUNTY**  
 HARTWOOD MARSH ROAD



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN         |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA                                                                                                                                    |            |             |             |               |                            |
|                                                | Exist Pavement (On-Site)                                                                                                                           | 98         |             |             | 7.12          | 697.96                     |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (On-Site)                                                                                                                  | 49         |             |             | 1.09          | 53.62                      |
|                                                |                                                                                                                                                    |            |             |             |               |                            |
|                                                |                                                                                                                                                    |            |             |             |               |                            |
| Totals =                                       |                                                                                                                                                    |            |             |             | 8.22          | 751.57                     |

Use CN = 91.5

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-1

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN         |            |            | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab<br>2-2 | Fig<br>2-3 | Fig<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                       | 98         |            |            | 0.00          | 0.00                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                 | 39         |            |            | 0.22          | 8.50                       |
| Totals =                                       |                                                                                                                                                    |            |            |            | 0.22          | 8.50                       |

Use CN = 39.0

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-2

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition; percent impervious; unconnected / connected impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                           | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                              | 98          |             |             | 0.00          | 0.00                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                        | 39          |             |             | 0.26          | 10.17                      |
| Totals =                                       |                                                                                                                                           |             |             |             | 0.26          | 10.17                      |

Use CN = 39.0

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986



RUNOFF CURVE NUMBER

DATE:

|          |     |           |
|----------|-----|-----------|
| MADE BY: | MSF | 23-Apr-08 |
| CHKD BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 13

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio) | CN       |          |          | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|---------------|----------------------------|
|                                                |                                                                                                                                           | Tab. 2-2 | Fig. 2-3 | Fig. 2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                              | 98       |          |          | 0.02          | 1.96                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                        | 39       |          |          | 0.26          | 10.07                      |
| Totals =                                       |                                                                                                                                           |          |          |          | 0.28          | 12.03                      |

Use CN = 43.2

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-4

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio) | CN       |          |          | Area<br>acres | Product of<br>CN x Area |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|---------------|-------------------------|
|                                                |                                                                                                                                         | Tab. 2-2 | Fig. 2-3 | Fig. 2-4 |               |                         |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                            | 98       |          |          | 0.04          | 3.92                    |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                      | 39       |          |          | 1.20          | 46.77                   |
| Totals =                                       |                                                                                                                                         |          |          |          | 1.24          | 50.69                   |

Use CN = 40.9

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1.5

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio) | CN       |          |          | Area<br>acres | Product of CN x Area |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|---------------|----------------------|
|                                                |                                                                                                                                           | Tab. 2-2 | Fig. 2-3 | Fig. 2-4 |               |                      |
|                                                | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                              | 98       |          |          | 0.00          | 0.00                 |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                        | 39       |          |          | 54.24         | 2115.36              |
| Totals =                                       |                                                                                                                                           |          |          |          | 54.24         | 2115.36              |

Use CN = 39.0

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986





RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-6

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab.<br>2-2 | File<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Propose Pond Site at NWL                                                                                                        | 100         |             |             | 0.82          | 81.70                      |
| Astatula Sand (A)                              | WOODS-GRASS (ORCHARD)<br>Propose Pond Site (Fair Conditon)                                                                                         | 43          |             |             | 2.21          | 95.19                      |
| Totals =                                       |                                                                                                                                                    |             |             |             | 3.03          | 176.89                     |

Use CN = 58.4

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS



DATE: 23-Apr-08  
 MADE BY: MSF  
 CHECKED BY: KMV 24-Apr-08

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|  |  |                  |
|--|--|------------------|
|  |  |                  |
|  |  |                  |
|  |  | FT.              |
|  |  | IN.              |
|  |  |                  |
|  |  | HR. OR 0:00 MIN. |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|  |  |                  |
|--|--|------------------|
|  |  |                  |
|  |  | L.F.             |
|  |  | FT. / FT.        |
|  |  | FT./SEC.         |
|  |  | HR. OR 0:00 MIN. |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |                  |
|--|--|------------------|
|  |  | S.F.             |
|  |  | L.F.             |
|  |  | L.F.             |
|  |  | FT./FT.          |
|  |  |                  |
|  |  | FT./SEC.         |
|  |  | L.F.             |
|  |  | HR. OR 0:00 MIN. |

TOTAL Tc = 17:37 MIN.  
 (PER ASAD)

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: Urban Hydrology for Small Watersheds  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

## STORM SEWER HYDRAULICS

System: POND 1

| PROJECT                          |  |                                |  | CONDITIONS                    |  |                         |  |                         |        |        |        |
|----------------------------------|--|--------------------------------|--|-------------------------------|--|-------------------------|--|-------------------------|--------|--------|--------|
| Number: 41561-1                  |  | Organization: HNTB Corporation |  | Outfall Tailwater El: 99.02   |  | Storm Event - IDF Curve |  | Runoff Coeff. (default) |        |        |        |
| Description: Hartwood Marsh Road |  | Designed by: MSF               |  | Exit Loss at Outfall: 0.65    |  | Zone                    |  | Frequency               | Area 1 | Area 2 | Area 3 |
| County: Lake County              |  | Checked by:                    |  | Storm Sewer Control El: 99.67 |  | 7                       |  | 10                      | 0.95   | 0.20   | 0.30   |

HGL method: Standard FDOT (Jump HGL to pipe crown).

| FROM Station Type                   | TO Offset Brls Len          | Drainage Areas       |                      |                      |                      | Tc (min) | Travel Time (min) | Inten. (in/hr) | Total CA (ac) | Flow (cfs)           |                      |                                | Inlet Elevations |                        | Pipe Elevations            |                            | Fall (ft)    | Pipe Height Width (in) | HGL FL (%)       | Flow Type   | Velocity Actual Physical (fps) | Capacity (cfs) | Mann'g 'N' |
|-------------------------------------|-----------------------------|----------------------|----------------------|----------------------|----------------------|----------|-------------------|----------------|---------------|----------------------|----------------------|--------------------------------|------------------|------------------------|----------------------------|----------------------------|--------------|------------------------|------------------|-------------|--------------------------------|----------------|------------|
|                                     |                             | Area (A)             | Runoff Coeff (C)     | C*A (CA)             | Lcl JpStrm Tot CA    |          |                   |                |               | Qb Qfd Qdw           | S-Qb S-Qfd S-Qdw     | CIA TOTAL                      | Inlet Clear.     | HGL Min HGL Jnc Loss   | HGL Crown Line             | HGL Flow Line              |              |                        |                  |             |                                |                |            |
| <b>S-100</b><br>104+00<br>CI-6-B    | <b>S-101</b><br>-47.75<br>1 | 0.08<br>0.00<br>0.04 | 0.95<br>0.20<br>0.30 | 0.07<br>0.00<br>0.01 | 0.09<br>0.03<br>0.12 | 10.31    | 0.74              | 7.33           | 0.12          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 0.91<br>0.91<br><b>0.91</b>    | 161.16<br>2.95   | 158.21<br>0.00         | 158.21<br>158.60<br>157.10 | 158.20<br>158.20<br>156.70 | 0.01<br>0.40 | 18.00                  | 0.0064<br>0.4522 | Full        | 0.51<br>4.33                   | 7.65           | 0.0120     |
| <b>S-101</b><br>104+24.89<br>CI-5-A | <b>S-103</b><br>40.25<br>1  | 0.05<br>0.00<br>0.00 | 0.95<br>0.20<br>0.30 | 0.04<br>0.00<br>0.00 | 0.04<br>0.12<br>0.17 | 11.05    | 1.16              | 7.16           | 0.17          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 1.23<br>1.23<br><b>1.23</b>    | 160.75<br>3.50   | 157.25<br>0.00<br>0.20 | 157.04<br>158.20<br>156.70 | 155.70<br>155.70<br>154.20 | 1.34<br>2.50 | 18.00                  | 0.4742<br>0.8829 | Partial sub | 4.06<br>6.05                   | 10.69          | 0.0120     |
| <b>S-102</b><br>104+40<br>CI-5-B    | <b>S-100</b><br>-47.75<br>1 | 0.03<br>0.00<br>0.01 | 0.95<br>0.20<br>0.30 | 0.02<br>0.00<br>0.00 | 0.03<br>0.00<br>0.03 | 10.00    | 0.31              | 7.41           | 0.03          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 0.24<br>0.24<br><b>0.24</b>    | 161.27<br>2.67   | 158.60<br>0.00         | 158.60<br>158.70<br>157.20 | 158.60<br>158.60<br>157.10 | 0.00<br>0.10 | 18.00                  | 0.0005<br>0.2702 | Full        | 0.14<br>3.35                   | 5.92           | 0.0120     |
| <b>S-103</b><br>107+11.04<br>CI-5-A | <b>S-106</b><br>40.25<br>1  | 0.21<br>0.01<br>0.00 | 0.95<br>0.20<br>0.30 | 0.20<br>0.00<br>0.00 | 0.21<br>0.57<br>0.78 | 12.21    | 0.50              | 6.91           | 0.78          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 5.44<br>5.44<br><b>5.44</b>    | 158.96<br>3.56   | 155.40<br>0.00<br>0.58 | 154.82<br>155.70<br>154.20 | 152.79<br>151.50<br>150.00 | 2.03<br>0.40 | 18.00                  | 0.8619<br>1.7800 | Partial sub | 7.90<br>8.59                   | 15.18          | 0.0120     |
| <b>S-104</b><br>107+28.60<br>CI-5-B | <b>S-103</b><br>-35.75<br>1 | 0.37<br>0.01<br>0.16 | 0.95<br>0.20<br>0.30 | 0.35<br>0.00<br>0.04 | 0.40<br>0.00<br>0.40 | 10.00    | 0.63              | 7.41           | 0.40          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 3.00<br>3.00<br><b>3.00</b>    | 158.34<br>2.54   | 155.80<br>0.00<br>0.04 | 155.75<br>155.80<br>154.30 | 155.70<br>155.70<br>154.20 | 0.05<br>0.10 | 18.00                  | 0.0696<br>0.1333 | Full        | 1.70<br>2.35                   | 4.16           | 0.0120     |
| <b>S-105</b><br>109+50.00<br>CI-5-B | <b>S-106</b><br>-35.75<br>1 | 0.25<br>0.03<br>0.15 | 0.95<br>0.20<br>0.30 | 0.24<br>0.00<br>0.04 | 0.29<br>0.00<br>0.29 | 10.00    | 0.61              | 7.41           | 0.29          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 2.17<br>2.17<br><b>2.17</b>    | 154.17<br>1.33   | 152.84<br>0.00<br>0.02 | 152.81<br>151.60<br>150.10 | 152.79<br>151.50<br>150.00 | 0.03<br>0.10 | 18.00                  | 0.0365<br>0.1370 | Full        | 1.23<br>2.38                   | 4.21           | 0.0120     |
| <b>S-106</b><br>109+50.00<br>CI-5-B | <b>S-108</b><br>40.25<br>1  | 0.23<br>0.00<br>0.00 | 0.95<br>0.20<br>0.30 | 0.22<br>0.00<br>0.00 | 0.22<br>1.08<br>1.30 | 12.71    | 0.54              | 6.82           | 1.30          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 8.87<br>8.87<br><b>8.87</b>    | 154.17<br>1.38   | 152.79<br>0.00<br>0.39 | 152.39<br>151.50<br>150.00 | 151.41<br>150.30<br>148.80 | 0.99<br>1.20 | 18.00                  | 0.6081<br>0.7390 | Full        | 5.02<br>5.54                   | 9.78           | 0.0120     |
| <b>S-107</b><br>111+15.76<br>CI-5-B | <b>S-108</b><br>-35.75<br>1 | 0.14<br>0.03<br>0.11 | 0.95<br>0.20<br>0.30 | 0.13<br>0.00<br>0.03 | 0.17<br>0.00<br>0.17 | 10.00    | 0.61              | 7.41           | 0.17          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 1.29<br>1.29<br><b>1.29</b>    | 153.07<br>1.65   | 151.42<br>0.00<br>0.01 | 151.42<br>150.50<br>149.00 | 151.41<br>150.30<br>148.80 | 0.01<br>0.20 | 18.00                  | 0.0128<br>0.2740 | Full        | 0.73<br>3.37                   | 5.96           | 0.0120     |
| <b>S-108</b><br>111+16.08<br>CI-5-A | <b>S-109</b><br>40.25<br>1  | 0.20<br>0.00<br>0.00 | 0.95<br>0.20<br>0.30 | 0.19<br>0.00<br>0.00 | 0.19<br>1.47<br>1.66 | 13.25    | 0.74              | 6.71           | 1.66          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 11.19<br>11.19<br><b>11.19</b> | 153.07<br>1.66   | 151.41<br>0.00<br>0.37 | 151.03<br>150.30<br>148.80 | 148.32<br>147.90<br>146.40 | 2.72<br>2.40 | 18.00                  | 0.9666<br>0.8543 | Full        | 6.33<br>5.95                   | 10.52          | 0.0120     |
| <b>S-109</b><br>114+00.00<br>CI-5-A | <b>S-112</b><br>40.25<br>1  | 0.30<br>0.03<br>0.00 | 0.95<br>0.20<br>0.30 | 0.28<br>0.00<br>0.00 | 0.29<br>1.66<br>1.96 | 13.99    | 0.44              | 6.58           | 1.96          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 12.91<br>12.91<br><b>12.91</b> | 150.77<br>2.45   | 148.32<br>0.00<br>0.99 | 147.32<br>147.90<br>146.40 | 141.83<br>140.10<br>138.60 | 5.50<br>7.80 | 18.00                  | 1.8462<br>2.6202 | Partial sub | 11.30<br>10.42                 | 18.42          | 0.0120     |
| <b>S-110</b><br>114+92.27<br>CI-5-B | <b>S-111</b><br>-35.75<br>1 | 0.39<br>0.07<br>0.25 | 0.95<br>0.20<br>0.30 | 0.37<br>0.01<br>0.07 | 0.46<br>0.00<br>0.46 | 10.00    | 0.41              | 7.41           | 0.46          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 3.44<br>3.44<br><b>3.44</b>    | 148.98<br>2.67   | 146.31<br>0.00<br>1.09 | 145.22<br>146.30<br>144.80 | 142.14<br>140.20<br>138.70 | 3.08<br>6.10 | 18.00                  | 1.5102<br>2.9887 | Partial sub | 8.36<br>11.13                  | 19.67          | 0.0120     |
| <b>S-111</b><br>117+00.00<br>CI-5-B | <b>S-112</b><br>-35.75<br>1 | 0.31<br>0.01<br>0.06 | 0.95<br>0.20<br>0.30 | 0.29<br>0.00<br>0.01 | 0.31<br>0.46<br>0.78 | 10.41    | 0.38              | 7.31           | 0.78          | 0.00<br>0.00<br>0.00 | 0.00<br>0.00<br>0.00 | 5.72<br>5.72<br><b>5.72</b>    | 142.70<br>0.56   | 142.14<br>0.00<br>0.13 | 142.01<br>140.20<br>138.70 | 141.83<br>140.10<br>138.60 | 0.18<br>0.10 | 18.00                  | 0.2523<br>0.1370 | Full        | 3.23<br>2.38                   | 4.21           | 0.0120     |

Units: ENGLISH

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 Portions of ASAD were developed by Kenneth J. Leeming, P.E. at International Engineering Consultants, Inc.

T60v11.RPT 7/17/2007

### STORM SEWER HYDRAULICS

System: POND 1

| PROJECT                          |                                |  |  | CONDITIONS                   |                         |           |                         |        |        |
|----------------------------------|--------------------------------|--|--|------------------------------|-------------------------|-----------|-------------------------|--------|--------|
| Number: 41561-1                  | Organization: HNTB Corporation |  |  | Outfall Tailwater El: 99.02  | Storm Event - IDF Curve |           | Runoff Coeff. (default) |        |        |
| Description: Hartwood Marsh Road | Designed by: MSF               |  |  | Exit Loss at Outfall: 0.65   | Zone                    | Frequency | Area 1                  | Area 2 | Area 3 |
| County: Lake County              | Checked by:                    |  |  | Storm Sewer Control El 99.67 | 7                       | 10        | 0.95                    | 0.20   | 0.30   |

HGL method: Standard FDOT (Jump HGL to pipe crown).

| FROM Station Type | TO Offset Brls Len | Drainage Areas |                  |          |                   | Tc (min) | Travel Time (min) | Inten. (in/hr) | Total CA (ac) | Flow (cfs) |                  |           | Inlet Elevations |                      | Pipe Elevations          |       | Fall (ft) | Pipe Height Width (in) | HGL (%) FL | Flow Type | Velocity Actual Physical (fps) | Capacity (cfs) | Mann'g 'N' |             |       |       |        |
|-------------------|--------------------|----------------|------------------|----------|-------------------|----------|-------------------|----------------|---------------|------------|------------------|-----------|------------------|----------------------|--------------------------|-------|-----------|------------------------|------------|-----------|--------------------------------|----------------|------------|-------------|-------|-------|--------|
|                   |                    | Area (A)       | Runoff Coeff (C) | C*A (CA) | Lcl JpStrm Tot CA |          |                   |                |               | Qb Qfd Qdw | S-Qb S-Qfd S-Qdw | CIA TOTAL | Inlet Clear.     | HGL Min HGL Jnc Loss | HGL Crown Line Flow Line |       |           |                        |            |           |                                |                |            |             |       |       |        |
| <b>S-112</b>      | <b>S-114</b>       | 117+00.00      | 40.25            | 1        | 197.00            | 0.30     | 0.95              | 0.29           | 0.29          | 14.42      | 0.21             | 6.50      | 3.04             | 0.00                 | 0.00                     | 19.78 | 142.70    | 141.83                 | 139.63     | 132.39    | 7.23                           | 18.00          | 3.6724     | Partial sub | 15.37 | 24.32 | 0.0120 |
| CI-5-A            |                    |                |                  |          |                   | 0.03     | 0.20              | 0.00           | 2.74          |            |                  |           |                  | 0.00                 | 0.00                     | 19.78 | 0.87      | 2.20                   | 140.10     | 131.10    | 9.00                           | 18.00          | 4.5685     |             | 13.76 |       |        |
| <b>S-113</b>      | <b>S-114</b>       | 119+00.00      | -39.75           | 1        | 77.00             | 0.22     | 0.95              | 0.21           | 0.24          | 10.00      | 0.64             | 7.41      | 0.24             | 0.00                 | 0.00                     | 1.81  | 133.78    | 132.43                 | 132.41     | 132.39    | 0.02                           | 18.00          | 0.0252     | Full        | 1.02  | 4.10  | 0.0120 |
| CI-5-B            |                    |                |                  |          |                   | 0.03     | 0.20              | 0.00           | 0.00          |            |                  |           |                  | 0.00                 | 0.00                     | 1.81  | 1.35      | 0.02                   | 131.20     | 131.10    | 0.10                           | 18.00          | 0.1299     |             | 2.32  |       |        |
| <b>S-114</b>      | <b>S-116</b>       | 119+00.00      | 40.25            | 1        | 297.00            | 0.17     | 0.95              | 0.16           | 0.16          | 14.64      | 0.39             | 6.47      | 3.45             | 0.00                 | 0.00                     | 22.34 | 133.99    | 132.39                 | 130.90     | 119.45    | 11.45                          | 18.00          | 3.8543     | Full        | 12.64 | 24.53 | 0.0120 |
| CI-5-A            |                    |                |                  |          |                   | 0.02     | 0.20              | 0.00           | 3.28          |            |                  |           |                  | 0.00                 | 0.00                     | 22.34 | 1.60      | 1.49                   | 131.10     | 117.30    | 13.80                          | 18.00          | 4.6465     |             | 13.88 |       |        |
| <b>S-115</b>      | <b>S-116</b>       | 122+00.00      | -40.25           | 1        | 77.50             | 0.27     | 0.95              | 0.26           | 0.36          | 10.00      | 0.65             | 7.41      | 0.36             | 0.00                 | 0.00                     | 2.67  | 121.84    | 119.53                 | 119.49     | 119.45    | 0.04                           | 18.00          | 0.0550     | Full        | 1.51  | 10.01 | 0.0120 |
| CI-5-B            |                    |                |                  |          |                   | 0.06     | 0.20              | 0.01           | 0.00          |            |                  |           |                  | 0.00                 | 0.00                     | 2.67  | 2.31      | 0.04                   | 119.30     | 118.70    | 0.60                           | 18.00          | 0.7742     |             | 5.67  |       |        |
| <b>S-116</b>      | <b>S-118</b>       | 122+00.00      | 40.25            | 1        | 142.00            | 0.26     | 0.95              | 0.24           | 0.26          | 15.03      | 0.28             | 6.40      | 4.08             | 0.00                 | 0.00                     | 26.12 | 121.26    | 119.45                 | 118.81     | 117.19    | 1.61                           | 24.00          | 1.1357     | Full        | 8.31  | 27.59 | 0.0120 |
| CI-5-A            |                    |                |                  |          |                   | 0.08     | 0.20              | 0.01           | 3.81          |            |                  |           |                  | 0.00                 | 0.00                     | 26.12 | 1.81      | 0.64                   | 117.30     | 115.50    | 1.80                           | 24.00          | 1.2676     |             | 8.78  |       |        |
| <b>S-117</b>      | <b>S-119</b>       | 123+53.00      | -40.25           | 1        | 57.00             | 0.13     | 0.95              | 0.13           | 0.14          | 10.00      | 0.47             | 7.41      | 0.14             | 0.00                 | 0.00                     | 1.04  | 119.54    | 116.91                 | 116.91     | 116.90    | 0.00                           | 18.00          | 0.0084     | Full        | 0.59  | 15.81 | 0.0120 |
| CI-5-A            |                    |                |                  |          |                   | 0.03     | 0.20              | 0.00           | 0.00          |            |                  |           |                  | 0.00                 | 0.00                     | 1.04  | 2.63      | 0.01                   | 116.10     | 115.00    | 1.10                           | 18.00          | 1.9298     |             | 8.95  |       |        |
| <b>S-118</b>      | <b>S-120</b>       | 123+45.00      | 40.25            | 1        | 56.00             | 0.12     | 0.95              | 0.12           | 0.12          | 15.31      | 0.17             | 6.36      | 4.20             | 0.00                 | 0.00                     | 26.75 | 118.61    | 117.19                 | 116.96     | 116.76    | 0.20                           | 30.00          | 0.3625     | Full        | 5.45  | 77.42 | 0.0120 |
| CI-5-A            |                    |                |                  |          |                   | 0.03     | 0.20              | 0.00           | 4.08          |            |                  |           |                  | 0.00                 | 0.00                     | 26.75 | 1.42      | 0.23                   | 116.00     | 114.30    | 1.70                           | 30.00          | 3.0357     |             | 15.77 |       |        |
| <b>S-119</b>      | <b>S-120</b>       | 124+13         | -40.25           | 1        | 76.90             | 0.11     | 0.95              | 0.10           | 0.12          | 10.48      | 0.59             | 7.29      | 0.52             | 0.00                 | 0.00                     | 3.85  | 119.38    | 116.90                 | 116.85     | 116.76    | 0.09                           | 18.00          | 0.1146     | Full        | 2.18  | 16.92 | 0.0120 |
| CI-6-A            |                    |                |                  |          |                   | 0.02     | 0.20              | 0.00           | 0.40          |            |                  |           |                  | 0.00                 | 0.00                     | 3.85  | 2.48      | 0.05                   | 115.00     | 113.30    | 1.70                           | 18.00          | 2.2108     |             | 9.57  |       |        |
| <b>S-120</b>      | <b>S-121</b>       | 124+05.00      | 40.25            | 1        | 35.54             | 0.08     | 0.95              | 0.08           | 0.08          | 15.49      | 0.14             | 6.33      | 4.82             | 0.00                 | 0.00                     | 30.55 | 118.18    | 116.76                 | 116.59     | 116.52    | 0.06                           | 36.00          | 0.1787     | Full        | 4.32  | 38.33 | 0.0120 |
| CI-6-J            |                    |                |                  |          |                   | 0.02     | 0.20              | 0.00           | 4.73          |            |                  |           |                  | 0.00                 | 0.00                     | 30.55 | 1.42      | 0.17                   | 114.80     | 114.70    | 0.10                           | 36.00          | 0.2814     |             | 5.42  |       |        |
| <b>S-121</b>      | <b>S-123</b>       | 124+45.54      | 40.25            | 1        | 119.98            | 0.16     | 0.95              | 0.15           | 0.15          | 15.62      | 0.45             | 6.31      | 4.98             | 0.00                 | 0.00                     | 31.41 | 118.24    | 116.52                 | 116.37     | 116.14    | 0.23                           | 36.00          | 0.1889     | Full        | 4.44  | 20.86 | 0.0120 |
| CI-5-J            |                    |                |                  |          |                   | 0.00     | 0.20              | 0.00           | 4.82          |            |                  |           |                  | 0.00                 | 0.00                     | 31.41 | 1.72      | 0.15                   | 114.70     | 114.60    | 0.10                           | 36.00          | 0.0833     |             | 2.95  |       |        |
| <b>S-122</b>      | <b>S-119</b>       | 124+73.00      | -40.25           | 1        | 57.00             | 0.23     | 0.95              | 0.22           | 0.26          | 10.00      | 0.47             | 7.41      | 0.26             | 0.00                 | 0.00                     | 1.94  | 119.64    | 116.94                 | 116.92     | 116.90    | 0.02                           | 18.00          | 0.0290     | Full        | 1.10  | 11.68 | 0.0120 |
| CI-5-A            |                    |                |                  |          |                   | 0.01     | 0.20              | 0.00           | 0.00          |            |                  |           |                  | 0.00                 | 0.00                     | 1.94  | 2.70      | 0.02                   | 115.60     | 115.00    | 0.60                           | 18.00          | 1.0526     |             | 6.61  |       |        |
| <b>S-123</b>      | <b>S-125</b>       | 125+70.52      | 40.25            | 1        | 179.62            | 0.32     | 0.95              | 0.30           | 0.31          | 16.07      | 0.63             | 6.24      | 5.38             | 0.00                 | 0.00                     | 33.60 | 119.59    | 116.14                 | 115.97     | 115.58    | 0.39                           | 36.00          | 0.2162     | Full        | 4.75  | 17.05 | 0.0120 |
| CI-5-J            |                    |                |                  |          |                   | 0.04     | 0.20              | 0.00           | 5.07          |            |                  |           |                  | 0.00                 | 0.00                     | 33.60 | 3.45      | 0.18                   | 114.60     | 114.50    | 0.10                           | 36.00          | 0.0557     |             | 2.41  |       |        |

Units: ENGLISH

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**STORM SEWER HYDRAULICS**  
System: POND 1

|                                  |  |                                |  |                               |  |  |                         |  |                         |        |                   |        |  |  |  |
|----------------------------------|--|--------------------------------|--|-------------------------------|--|--|-------------------------|--|-------------------------|--------|-------------------|--------|--|--|--|
| <b>PROJECT</b>                   |  |                                |  |                               |  |  |                         |  |                         |        | <b>CONDITIONS</b> |        |  |  |  |
| Number: 41561-1                  |  | Organization: HNTB Corporation |  | Outfall Tailwater El: 99.02   |  |  | Storm Event - IDF Curve |  | Runoff Coeff. (default) |        |                   |        |  |  |  |
| Description: Hartwood Marsh Road |  | Designed by: MSF               |  | Exit Loss at Outfall: 0.65    |  |  | Zone                    |  | Frequency               | Area 1 | Area 2            | Area 3 |  |  |  |
| County: Lake County              |  | Checked by:                    |  | Storm Sewer Control El: 99.67 |  |  | 7                       |  | 10                      | 0.95   | 0.20              | 0.30   |  |  |  |

**HGL method: Standard FDOT (Jump HGL to pipe crown).**

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| FROM Station Type | TO Offset Brls Len | Drainage Areas |      |        |        | Tc (min) | Travel Time (min) | Inten. (in/hr) | Total CA (ac) | Flow (cfs) |       |              |        | Inlet Elevations |           | Pipe Elevations |        | Fall (ft) | Pipe Height Width (in) | HGL (%) FL (%) | Flow Type   | Velocity Actual Physical (fps) | Capacity (cfs) | Mann'g 'N' |  |
|-------------------|--------------------|----------------|------|--------|--------|----------|-------------------|----------------|---------------|------------|-------|--------------|--------|------------------|-----------|-----------------|--------|-----------|------------------------|----------------|-------------|--------------------------------|----------------|------------|--|
|                   |                    | Area Coeff     | C*A  | Lcl CA | JpStrm |          |                   |                |               | Qb         | S-Qb  | Qfd          | S-Qfd  | CIA              | Inlet     | HGL             | HGL    |           |                        |                |             |                                |                |            |  |
|                   |                    | (A)            | (C)  | (CA)   | Tot CA |          |                   |                |               | Qdw        | S-Qdw | TOTAL        | Clear. | Jnc Loss         | Flow Line | Crown Line      |        |           |                        |                |             |                                |                |            |  |
|                   |                    |                |      |        |        |          |                   |                |               |            |       |              |        |                  |           |                 |        |           |                        |                |             |                                |                |            |  |
| <b>S-123A</b>     | <b>S-123</b>       | 0.09           | 0.95 | 0.09   | 0.09   |          |                   |                |               | 0.00       | 0.00  |              |        | 121.03           | 116.15    | 116.14          | 116.14 | 0.00      | 18.00                  | 0.0036         | Full        | 0.39                           |                |            |  |
| 125+70.52         | 7.50               | 0.01           | 0.20 | 0.00   | 0.00   | 10.00    | 0.25              | 7.41           | 0.09          | 0.00       | 0.00  | 0.69         |        |                  | 0.00      |                 |        |           |                        |                |             | 17.31                          | 0.0120         |            |  |
| CI-7              | 1 30.25            | 0.00           | 0.30 | 0.00   | 0.09   |          |                   |                |               | 0.00       | 0.00  | <b>0.69</b>  | 4.88   | 0.00             | 113.80    | 113.10          | 0.70   | 18.00     | 2.3141                 |                | 9.80        |                                |                |            |  |
| <b>S-124</b>      | <b>S-125</b>       | 0.16           | 0.95 | 0.15   | 0.18   |          |                   |                |               | 0.00       | 0.00  |              |        | 125.23           | 118.67    | 118.33          | 117.33 | 1.00      | 18.00                  | 1.1920         | Partial sub | 4.63                           |                |            |  |
| 127+50.00         | -40.25             | 0.03           | 0.20 | 0.00   | 0.00   | 10.00    | 0.30              | 7.41           | 0.18          | 0.00       | 0.00  | 1.36         |        |                  | 0.00      |                 |        |           |                        |                |             | 12.42                          | 0.0120         |            |  |
| CI-5-A            | 1 83.89            | 0.07           | 0.30 | 0.02   | 0.18   |          |                   |                |               | 0.00       | 0.00  | <b>1.36</b>  | 6.56   | 0.33             | 118.00    | 117.00          | 1.00   | 18.00     | 1.1920                 |                | 7.03        |                                |                |            |  |
| <b>S-125</b>      | <b>S-126</b>       | 0.00           | 0.95 | 0.00   | 0.00   |          |                   |                |               | 0.00       | 0.00  |              |        | 125.06           | 115.58    | 113.04          | 110.68 | 2.36      | 36.00                  | 0.7995         | Partial sub | 12.79                          |                |            |  |
| 127+55.00         | 47.50              | 0.00           | 0.20 | 0.00   | 7.58   | 16.70    | 0.38              | 6.14           | 7.58          | 0.00       | 0.00  | 46.60        |        |                  | 0.00      |                 |        |           |                        |                |             | 89.24                          | 0.0120         |            |  |
| MH-7-J            | 1 295.00           | 0.00           | 0.30 | 0.00   | 7.58   |          |                   |                |               | 0.00       | 0.00  | <b>46.60</b> | 9.48   | 2.54             | 111.50    | 107.00          | 4.50   | 36.00     | 1.5254                 |                | 12.63       |                                |                |            |  |
| <b>S-126</b>      | <b>S-127</b>       | 0.00           | 0.95 | 0.00   | 0.00   |          |                   |                |               | 0.00       | 0.00  |              |        | 114.44           | 110.68    | 108.18          | 100.34 | 7.84      | 36.00                  | 2.5447         | Partial sub | 17.93                          |                |            |  |
| 13+47.50          | -5.00              | 0.00           | 0.20 | 0.00   | 7.58   | 17.09    | 0.29              | 6.09           | 7.58          | 0.00       | 0.00  | 46.18        |        |                  | 0.00      |                 |        |           |                        |                |             | 141.39                         | 0.0120         |            |  |
| MH-7-J            | 1 308.18           | 0.00           | 0.30 | 0.00   | 7.58   |          |                   |                |               | 0.00       | 0.00  | <b>46.18</b> | 3.76   | 2.50             | 107.00    | 95.20           | 11.80  | 36.00     | 3.8289                 |                | 20.00       |                                |                |            |  |
| <b>S-127</b>      | <b>S-127A</b>      | 0.00           | 0.95 | 0.00   | 0.00   |          |                   |                |               | 0.00       | 0.00  |              |        | 102.46           | 100.34    | 99.94           | 99.67  | 0.27      | 36.00                  | 0.4031         | Full        | 6.49                           |                |            |  |
| 16+60.68          | -5.00              | 0.00           | 0.20 | 0.00   | 7.58   | 17.37    | 0.00              | 6.05           | 7.58          | 0.00       | 0.00  | 45.87        |        |                  | 0.00      |                 |        |           |                        |                |             | 39.65                          | 0.0120         |            |  |
| MH-7-J            | 1 66.42            | 0.00           | 0.30 | 0.00   | 7.58   |          |                   |                |               | 0.00       | 0.00  | <b>45.87</b> | 2.12   | 0.39             | 95.20     | 95.00           | 0.20   | 36.00     | 0.3011                 |                | 5.61        |                                |                |            |  |
| <b>S-130</b>      | <b>S-125</b>       | 0.00           | 0.95 | 0.00   | 0.00   |          |                   |                |               | 0.00       | 0.00  |              |        | 126.94           | 119.87    | 119.73          | 119.00 | 0.73      | 24.00                  | 0.3023         | Full        | 4.29                           |                |            |  |
| 130+00.00         | 43.50              | 0.00           | 0.20 | 0.00   | 2.01   | 13.41    | 0.94              | 6.68           | 2.01          | 0.00       | 0.00  | 13.47        |        |                  | 0.00      |                 |        |           |                        |                |             | 7.06                           | 0.0120         |            |  |
| MH-7              | 1 241.03           | 0.00           | 0.30 | 0.00   | 2.01   |          |                   |                |               | 0.00       | 0.00  | <b>13.47</b> | 7.07   | 0.14             | 117.20    | 117.00          | 0.20   | 24.00     | 0.0830                 |                | 2.25        |                                |                |            |  |
| <b>S-131</b>      | <b>S-132</b>       | 0.24           | 0.95 | 0.23   | 0.27   |          |                   |                |               | 0.00       | 0.00  |              |        | 123.94           | 120.72    | 120.70          | 120.67 | 0.02      | 18.00                  | 0.0323         | Full        | 1.16                           |                |            |  |
| 132+00.00         | -40.25             | 0.06           | 0.20 | 0.01   | 0.00   | 10.00    | 0.65              | 7.41           | 0.27          | 0.00       | 0.00  | 2.04         |        |                  | 0.00      |                 |        |           |                        |                |             | 4.09                           | 0.0120         |            |  |
| CI-5-A            | 1 77.50            | 0.09           | 0.30 | 0.03   | 0.27   |          |                   |                |               | 0.00       | 0.00  | <b>2.04</b>  | 3.22   | 0.02             | 117.40    | 117.30          | 0.10   | 18.00     | 0.1290                 |                | 2.31        |                                |                |            |  |
| <b>S-132</b>      | <b>S-130</b>       | 0.22           | 0.95 | 0.21   | 0.23   |          |                   |                |               | 0.00       | 0.00  |              |        | 123.94           | 120.67    | 120.49          | 119.87 | 0.62      | 24.00                  | 0.3153         | Full        | 4.38                           |                |            |  |
| 132+00.00         | 40.25              | 0.08           | 0.20 | 0.01   | 1.78   | 12.66    | 0.75              | 6.83           | 2.01          | 0.00       | 0.00  | 13.76        |        |                  | 0.00      |                 |        |           |                        |                |             | 5.52                           | 0.0120         |            |  |
| CI-5-A            | 1 197.03           | 0.00           | 0.30 | 0.00   | 2.01   |          |                   |                |               | 0.00       | 0.00  | <b>13.76</b> | 3.27   | 0.18             | 117.30    | 117.20          | 0.10   | 24.00     | 0.0508                 |                | 1.76        |                                |                |            |  |
| <b>S-133</b>      | <b>S-135</b>       | 0.13           | 0.95 | 0.12   | 0.14   |          |                   |                |               | 0.00       | 0.00  |              |        | 122.06           | 121.44    | 121.43          | 121.43 | 0.01      | 18.00                  | 0.0093         | Full        | 0.62                           |                |            |  |
| 133+41.00         | -40.25             | 0.03           | 0.20 | 0.00   | 0.00   | 10.00    | 0.47              | 7.41           | 0.14          | 0.00       | 0.00  | 1.10         |        |                  | 0.00      |                 |        |           |                        |                |             | 6.80                           | 0.0120         |            |  |
| CI-5-B            | 1 56.00            | 0.06           | 0.30 | 0.01   | 0.14   |          |                   |                |               | 0.00       | 0.00  | <b>1.10</b>  | 0.62   | 0.01             | 118.00    | 117.80          | 0.20   | 18.00     | 0.3571                 |                | 3.85        |                                |                |            |  |
| <b>S-134</b>      | <b>S-132</b>       | 0.12           | 0.95 | 0.11   | 0.12   |          |                   |                |               | 0.00       | 0.00  |              |        | 122.06           | 121.01    | 120.93          | 120.67 | 0.25      | 24.00                  | 0.1842         | Full        | 3.35                           |                |            |  |
| 133+41.00         | 42.44              | 0.04           | 0.20 | 0.00   | 1.38   | 11.97    | 0.69              | 6.96           | 1.51          | 0.00       | 0.00  | 10.52        |        |                  | 0.00      |                 |        |           |                        |                |             | 6.60                           | 0.0120         |            |  |
| CI-5-A            | 1 138.02           | 0.00           | 0.30 | 0.00   | 1.51   |          |                   |                |               | 0.00       | 0.00  | <b>10.52</b> | 1.05   | 0.09             | 117.40    | 117.30          | 0.10   | 24.00     | 0.0725                 |                | 2.10        |                                |                |            |  |
| <b>S-135</b>      | <b>S-136</b>       | 0.10           | 0.95 | 0.10   | 0.13   |          |                   |                |               | 0.00       | 0.00  |              |        | 121.86           | 121.43    | 121.35          | 121.19 | 0.16      | 18.00                  | 0.1973         | Full        | 2.86                           |                |            |  |
| 134+00.00         | -40.25             | 0.02           | 0.20 | 0.00   | 0.57   | 11.20    | 0.47              | 7.13           | 0.70          | 0.00       | 0.00  | 5.05         |        |                  | 0.00      |                 |        |           |                        |                |             | 4.00                           | 0.0120         |            |  |
| CI-6-B            | 1 80.91            | 0.08           | 0.30 | 0.02   | 0.70   |          |                   |                |               | 0.00       | 0.00  | <b>5.05</b>  | 0.43   | 0.08             | 117.80    | 117.70          | 0.10   | 18.00     | 0.1236                 |                | 2.26        |                                |                |            |  |
| <b>S-136</b>      | <b>S-134</b>       | 0.10           | 0.95 | 0.10   | 0.12   |          |                   |                |               | 0.00       | 0.00  |              |        | 121.86           | 121.19    | 121.10          | 121.01 | 0.09      | 24.00                  | 0.1577         | Full        | 3.10                           |                |            |  |
| 134+00.00         | 43.66              | 0.04           | 0.20 | 0.00   | 1.25   | 11.67    | 0.30              | 7.03           | 1.38          | 0.00       | 0.00  | 9.73         |        |                  | 0.00      |                 |        |           |                        |                |             | 17.94                          | 0.0120         |            |  |
| CI-6-A            | 1 56.01            | 0.06           | 0.30 | 0.01   | 1.38   |          |                   |                |               | 0.00       | 0.00  | <b>9.73</b>  | 0.67   | 0.09             | 117.70    | 117.40          | 0.30   | 24.00     | 0.5356                 |                | 5.71        |                                |                |            |  |

Units: ENGLISH

**STORM SEWER HYDRAULICS**  
System: POND 1

| PROJECT                          |  |                                |  | CONDITIONS                    |  |                         |           |                         |        |        |
|----------------------------------|--|--------------------------------|--|-------------------------------|--|-------------------------|-----------|-------------------------|--------|--------|
| Number: 41561-1                  |  | Organization: HNTB Corporation |  | Outfall Tailwater El: 99.02   |  | Storm Event - IDF Curve |           | Runoff Coeff. (default) |        |        |
| Description: Hartwood Marsh Road |  | Designed by: MSF               |  | Exit Loss at Outfall: 0.65    |  | Zone                    | Frequency | Area 1                  | Area 2 | Area 3 |
| County: Lake County              |  | Checked by:                    |  | Storm Sewer Control El: 99.67 |  | 7                       | 10        | 0.95                    | 0.20   | 0.30   |

**HGL method: Standard FDOT (Jump HGL to pipe crown).**

| FROM Station Type | TO Offset Brls Len | Drainage Areas |            |          |               | Tc (min) | Travel Time (min) | Inten. (in/hr) | Total CA (ac) | Flow (cfs) |            |             | Inlet Elevations |                      | Pipe Elevations |               | Fall (ft) | Pipe Height Width (in) | HGL (%) FL (%) | Flow Type | Velocity Actual Physical (fps) | Capacity (cfs) | Mann'g 'N' |        |  |  |      |       |        |  |      |  |  |
|-------------------|--------------------|----------------|------------|----------|---------------|----------|-------------------|----------------|---------------|------------|------------|-------------|------------------|----------------------|-----------------|---------------|-----------|------------------------|----------------|-----------|--------------------------------|----------------|------------|--------|--|--|------|-------|--------|--|------|--|--|
|                   |                    | Area (A)       | Runoff (C) | C*A (CA) | Lcl CA JpStrm |          |                   |                |               | Qb Qfd     | S-Qb S-Qfd | CIA TOTAL   | Inlet Clear.     | HGL Min HGL Jnc Loss | HGL Crown Line  | HGL Flow Line |           |                        |                |           |                                |                |            |        |  |  |      |       |        |  |      |  |  |
| <b>S-137</b>      | <b>S-135</b>       | 0.08           | 0.95       | 0.07     | 0.10          | 10.72    | 0.48              | 7.24           | 0.42          | 0.00       | 0.00       |             | 122.06           | 121.49               | 121.47          | 121.43        | 0.04      | 18.00                  | 0.0736         | Full      | 1.75                           | 6.68           | 0.0120     |        |  |  |      |       |        |  |      |  |  |
| 134+61.00         | -40.25             | 0.02           | 0.20       | 0.00     | 0.32          |          |                   |                |               | 0.00       | 0.00       | 3.09        | 0.00             | 0.00                 |                 | 119.50        |           |                        |                |           |                                |                |            | 119.30 |  |  |      |       |        |  |      |  |  |
| CI-5-B            | 1 58.00            | 0.06           | 0.30       | 0.01     | 0.42          |          |                   |                |               | 0.00       | 0.00       | <b>3.09</b> | 0.57             | 0.02                 |                 | 118.00        |           |                        |                |           |                                |                |            | 117.80 |  |  | 0.20 | 18.00 | 0.3448 |  | 3.78 |  |  |
| <b>S-138</b>      | <b>S-136</b>       | 0.16           | 0.95       | 0.15     | 0.15          | 11.11    | 0.44              | 7.15           | 0.54          | 0.00       | 0.00       |             | 122.06           | 121.30               | 121.26          | 121.19        | 0.07      | 18.00                  | 0.1190         | Full      | 2.22                           | 8.18           | 0.0120     |        |  |  |      |       |        |  |      |  |  |
| 134+61.00         | 43.75              | 0.02           | 0.20       | 0.00     | 0.39          |          |                   |                |               | 0.00       | 0.00       | 3.93        | 0.00             | 0.00                 |                 | 119.50        |           |                        |                |           |                                |                |            | 119.20 |  |  |      |       |        |  |      |  |  |
| CI-5-A            | 1 58.00            | 0.00           | 0.30       | 0.00     | 0.54          |          |                   |                |               | 0.00       | 0.00       | <b>3.93</b> | 0.76             | 0.04                 |                 | 118.00        |           |                        |                |           |                                |                |            | 117.70 |  |  | 0.30 | 18.00 | 0.5172 |  | 4.63 |  |  |
| <b>S-139</b>      | <b>S-137</b>       | 0.27           | 0.95       | 0.26     | 0.32          | 10.00    | 0.72              | 7.41           | 0.32          | 0.00       | 0.00       |             | 123.07           | 121.56               | 121.53          | 121.49        | 0.04      | 18.00                  | 0.0450         | Full      | 1.37                           | 12.27          | 0.0120     |        |  |  |      |       |        |  |      |  |  |
| 135+50.00         | -40.25             | 0.00           | 0.20       | 0.00     | 0.00          |          |                   |                |               | 0.00       | 0.00       | 2.41        | 0.00             | 0.00                 |                 | 120.50        |           |                        |                |           |                                |                |            | 119.50 |  |  |      |       |        |  |      |  |  |
| CI-5-B            | 1 86.00            | 0.21           | 0.30       | 0.06     | 0.32          |          |                   |                |               | 0.00       | 0.00       | <b>2.41</b> | 1.51             | 0.03                 |                 | 119.00        |           |                        |                |           |                                |                |            | 118.00 |  |  | 1.00 | 18.00 | 1.1628 |  | 6.94 |  |  |
| <b>S-140</b>      | <b>S-138</b>       | 0.00           | 0.95       | 0.00     | 0.00          | 10.40    | 0.72              | 7.31           | 0.39          | 0.00       | 0.00       |             | 123.48           | 121.37               | 121.35          | 121.30        | 0.05      | 18.00                  | 0.0632         | Full      | 1.62                           | 15.51          | 0.0120     |        |  |  |      |       |        |  |      |  |  |
| 135+50.00         | 47.50              | 0.00           | 0.20       | 0.00     | 0.39          |          |                   |                |               | 0.00       | 0.00       | 2.86        | 0.00             | 0.00                 |                 | 121.10        |           |                        |                |           |                                |                |            | 119.50 |  |  |      |       |        |  |      |  |  |
| MH-7              | 1 86.08            | 0.00           | 0.30       | 0.00     | 0.39          |          |                   |                |               | 0.00       | 0.00       | <b>2.86</b> | 2.11             | 0.02                 |                 | 119.60        |           |                        |                |           |                                |                |            | 118.00 |  |  | 1.60 | 18.00 | 1.8588 |  | 8.78 |  |  |
| <b>S-141</b>      | <b>S-140</b>       | 0.40           | 0.95       | 0.38     | 0.39          | 10.00    | 0.40              | 7.41           | 0.39          | 0.00       | 0.00       |             | 123.77           | 121.45               | 121.40          | 121.37        | 0.03      | 18.00                  | 0.0649         | Full      | 1.64                           | 5.21           | 0.0120     |        |  |  |      |       |        |  |      |  |  |
| 136+00.00         | 55.75              | 0.02           | 0.20       | 0.00     | 0.00          |          |                   |                |               | 0.00       | 0.00       | 2.90        | 0.00             | 0.00                 |                 | 121.20        |           |                        |                |           |                                |                |            | 121.10 |  |  |      |       |        |  |      |  |  |
| CI-5-A            | 1 47.68            | 0.00           | 0.30       | 0.00     | 0.39          |          |                   |                |               | 0.00       | 0.00       | <b>2.90</b> | 2.32             | 0.04                 |                 | 119.70        |           |                        |                |           |                                |                |            | 119.60 |  |  | 0.10 | 18.00 | 0.2097 |  | 2.95 |  |  |

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Units: ENGLISH

TIME OF CONCENTRATION CALCULATIONS



DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-1

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |                   |
|-------------|--|-------------------|
| SHORT GRASS |  |                   |
| 0.150       |  |                   |
| 247         |  | FT.               |
| 4.70        |  | IN.               |
| 0.011       |  |                   |
| 0.348       |  | HR. OR 20.87 MIN. |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|  |  |             |
|--|--|-------------|
|  |  |             |
|  |  | L.F.        |
|  |  | FT. / FT.   |
|  |  | FT./SEC.    |
|  |  | HR. OR MIN. |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |             |
|--|--|-------------|
|  |  | S.F.        |
|  |  | L.F.        |
|  |  | L.F.        |
|  |  | FT./FT.     |
|  |  | FT./SEC.    |
|  |  | L.F.        |
|  |  | HR. OR MIN. |

Pipe flow from S-104 to pond See ASAD

TOTAL Tc = 28.19 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: Urban Hydrology for Small Watersheds  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS



DATE:

MADE BY: MSF 23-Apr-08  
 CHECKED BY: KMV 24-Apr-08

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 12

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $Tt = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |        |
|-------------|--------|
| SHORT GRASS |        |
| 0.150       |        |
| 205         | FT.    |
| 4.70        | IN.    |
| 0.026       |        |
| 0.215       | HR. OR |

12.93 MIN.

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $Tt = L / (3600 * V)$

|  |          |
|--|----------|
|  |          |
|  | L.F.     |
|  | FT./ FT. |
|  | FT./SEC. |
|  | HR. OR   |

0.00 MIN.

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $Tt = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |          |
|--|----------|
|  | S.F.     |
|  | L.F.     |
|  | L.F.     |
|  | FT./FT.  |
|  | FT./SEC. |
|  | L.F.     |
|  | HR. OR   |

Pipe flow from S-105 to pond  
 See ASAD  
 7.32 MIN.

TOTAL Tc = 20.25 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: Urban Hydrology for Small Watersheds  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986



TIME OF CONCENTRATION CALCULATIONS



DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION : BASIN 13

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE:  $T_c$   $T_t$  Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |                   |
|-------------|--|-------------------|
| SHORT GRASS |  |                   |
| 0.150       |  |                   |
| 296         |  | FT.               |
| 4.70        |  | IN.               |
| 0.025       |  |                   |
| 0.304       |  | HR. OR 18.22 MIN. |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|  |  |                  |
|--|--|------------------|
|  |  |                  |
|  |  | L.F.             |
|  |  | FT. / FT.        |
|  |  | FT. / SEC.       |
|  |  | HR. OR 0.00 MIN. |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea  $T_c$  or  $T_t$  (add  $T_t$  in steps 6, 11, and 19)

|  |  |                  |
|--|--|------------------|
|  |  | S.F.             |
|  |  | L.F.             |
|  |  | L.F.             |
|  |  | FT. / FT.        |
|  |  | FT. / SEC.       |
|  |  | L.F.             |
|  |  | HR. OR 7.32 MIN. |

Pipe flow from S-110 to pond  
See ASAD

TOTAL  $T_c = 25.54$  MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

**HNTB**

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 1-4

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $Tt = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |                   |
|-------------|--|-------------------|
| SHORT GRASS |  |                   |
| 0.150       |  |                   |
| 248         |  | FT.               |
| 4.70        |  | IN.               |
| 0.063       |  |                   |
| 0.176       |  | HR. OR 10:58 MIN. |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $Tt = L / (3600 * V)$

|  |  |                  |
|--|--|------------------|
|  |  |                  |
|  |  | L.F.             |
|  |  | FT. / FT.        |
|  |  | FT./SEC.         |
|  |  | HR. OR 0:00 MIN. |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $Tt = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |          |                              |
|--|--|----------|------------------------------|
|  |  | S.F.     |                              |
|  |  | L.F.     |                              |
|  |  | L.F.     |                              |
|  |  | FT./FT.  |                              |
|  |  | FT./SEC. | Pipe flow from S-115 to pond |
|  |  | L.F.     | See ASAD                     |
|  |  | HR. OR   | 7:52 MIN.                    |

TOTAL Tc = 17:90 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: Urban Hydrology for Small Watersheds  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS



DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 18-Sep-07 |
| CHECKED BY: | KMV | 20-Sep-07 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 15 Interim

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |        |            |
|-------------|--------|------------|
| SHORT GRASS |        |            |
| 0.150       |        |            |
| 300         | FT.    |            |
| 4.70        | IN.    |            |
| 0.006       |        |            |
| 0.540       | HR. OR | 32.40 MIN. |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|         |          |            |
|---------|----------|------------|
| UNPAVED |          |            |
| 2845    | L.F.     |            |
| 0.0228  | FT./FT.  |            |
| 2.561   | FT./SEC. |            |
| 0.31    | HR. OR   | 18.52 MIN. |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |          |           |
|--|----------|-----------|
|  | S.F.     |           |
|  | L.F.     |           |
|  | L.F.     |           |
|  | FT./FT.  |           |
|  | FT./SEC. |           |
|  | L.F.     |           |
|  | HR. OR   | 0.00 MIN. |

TOTAL Tc = 50.91 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

## TIME OF CONCENTRATION CALCULATIONS

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

**PROJECT:** HARTWOOD MARSH ROAD

**LOCATION :** BASIN 1-6

**UNDERLINE ONE:**    EXISTING                      PROPOSED

**UNDERLINE ONE:**    T<sub>c</sub>                      T<sub>t</sub> Through subarea

**SHEET FLOW:**

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |        |
|-------------|--------|
| SHORT GRASS |        |
|             | FT.    |
|             | IN.    |
|             | HR. OR |

0.00 MIN.

**SHALLOW CONCENTRATED FLOW:**

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|  |          |
|--|----------|
|  |          |
|  | L.F.     |
|  | FT./ FT. |
|  | FT./SEC. |
|  | HR. OR   |

0.00 MIN.

**CHANNEL FLOW:**

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, P<sub>w</sub>
- 14 HYDRAULIC RADIUS, R = (A / P<sub>w</sub>)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea T<sub>c</sub> or T<sub>t</sub> (add T<sub>t</sub> in steps 6, 11, and 19)

|  |          |
|--|----------|
|  |          |
|  | S.F.     |
|  | L.F.     |
|  | L.F.     |
|  | FT./FT.  |
|  | FT./SEC. |
|  | L.F.     |
|  | HR. OR   |

0.00 MIN.

TOTAL T<sub>c</sub> = 5.00 MIN.

Assume 5 min for pond

**Reference:**                      *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Input

=====  
Basins =====  
=====

Name: BASIN 1                      Node: POND 1                      Status: Onsite  
Group: BASE                        Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484                      Peaking Factor: 484.0  
Rainfall File: Sjrwm96                      Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.000                      Time of Conc(min): 17.37  
Area(ac): 8.220                              Time Shift(hrs): 0.00  
Curve Number: 91.50                      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 1-1                      Node: POND 1                      Status: Onsite  
Group: BASE                        Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484                      Peaking Factor: 484.0  
Rainfall File: Sjrwm96                      Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.000                      Time of Conc(min): 28.19  
Area(ac): 0.220                              Time Shift(hrs): 0.00  
Curve Number: 39.00                      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 1-2                      Node: POND 1                      Status: Onsite  
Group: BASE                        Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484                      Peaking Factor: 484.0  
Rainfall File: Sjrwm96                      Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.000                      Time of Conc(min): 20.25  
Area(ac): 0.260                              Time Shift(hrs): 0.00  
Curve Number: 39.00                      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 1-3                      Node: POND 1                      Status: Onsite  
Group: BASE                        Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484                      Peaking Factor: 484.0  
Rainfall File: Sjrwm96                      Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.000                      Time of Conc(min): 25.54  
Area(ac): 0.280                              Time Shift(hrs): 0.00  
Curve Number: 43.20                      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 1-4                      Node: POND 1                      Status: Onsite  
Group: BASE                        Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484                      Peaking Factor: 484.0  
Rainfall File: Sjrwm96                      Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.000                      Time of Conc(min): 17.90  
Area(ac): 1.240                              Time Shift(hrs): 0.00  
Curve Number: 40.90                      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 1-5                      Node: UNNAMED LK                      Status: Onsite  
Group: BASE                        Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484                      Peaking Factor: 484.0  
Rainfall File: Sjrwm96                      Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.000                      Time of Conc(min): 50.91  
Area(ac): 54.240                              Time Shift(hrs): 0.00  
Curve Number: 39.00                      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

This area is the interim condition. A portion of this area will discharge to the First Baptist Church Pond 2 when it is

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Input

```

-----
Name: BASIN 1-6          Node: POND 1          Status: Onsite
Group: BASE              Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484          Peaking Factor: 484.0
Rainfall File: Sjrwm96         Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.000    Time of Conc(min): 5.00
Area(ac): 3.030                Time Shift(hrs): 0.00
Curve Number: 58.40            Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00
  
```

Detention Pond 1

```

=====
Node
=====
  
```

```

Name: POND 1          Base Flow(cfs): 0.000    Init Stage(ft): 95.000
Group: BASE          Type: Stage/Area          Warn Stage(ft): 102.000
  
```

| Stage(ft) | Area(ac) |
|-----------|----------|
| 95.000    | 0.7010   |
| 97.000    | 0.8400   |
| 102.000   | 1.2310   |

```

-----
Name: UNNAMED LK      Base Flow(cfs): 0.000    Init Stage(ft): 91.000
Group: BASE          Type: Time/Stage          Warn Stage(ft): 100.000
  
```

| Time(hrs) | Stage(ft) |
|-----------|-----------|
| 0.00      | 91.000    |
| 120.00    | 99.000    |
| 150.00    | 98.000    |

```

=====
Drop Structures
=====
  
```

```

Name: POND 1          From Node: POND 1      Length(ft): 109.00
Group: BASE          To Node: UNNAMED LK    Count: 1

UPSTREAM          DOWNSTREAM          Friction Equation: Average Conveyance
Geometry: Circular Circular          Solution Algorithm: Automatic
Span(in): 24.00   24.00          Flow: Both
Rise(in): 24.00   24.00          Entrance Loss Coef: 0.500
Invert(ft): 93.500 90.000          Exit Loss Coef: 1.000
Manning's N: 0.012000 0.012000          Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000 0.000          Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000 0.000          Solution Incs: 10
  
```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:  
Circular CMP: Mitered to slope

\*\*\* Weir 1 of 1 for Drop Structure POND 1 \*\*\*

|                       |                          |       |
|-----------------------|--------------------------|-------|
| Count: 1              | Bottom Clip(in): 0.000   | TABLE |
| Type: Horizontal      | Top Clip(in): 0.000      |       |
| Flow: Both            | Weir Disc Coef: 3.200    |       |
| Geometry: Rectangular | Orifice Disc Coef: 0.600 |       |
| Span(in): 36.00       | Invert(ft): 97.500       |       |
| Rise(in): 28.00       | Control Elev(ft): 97.500 |       |

```

=====
Hydrology Simulations
=====
  
```

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Input

Name: 100Y24H  
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\POST\100Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 10.20

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 11.000    | 60.00 |          |
| 16.000    | 15.00 |          |
| 40.000    | 60.00 |          |

Name: 10Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\10Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 7.00

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 11.000    | 60.00 |          |
| 16.000    | 15.00 |          |
| 40.000    | 60.00 |          |

Name: 2.3Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 4.90

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 11.000    | 60.00 |          |
| 16.000    | 15.00 |          |
| 40.000    | 60.00 |          |

Name: 25Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 8.30

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 11.000    | 60.00 |          |
| 16.000    | 15.00 |          |
| 40.000    | 60.00 |          |

Name: 25Y96H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y96H.R32

Override Defaults: No

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 50.000    | 60.00 |          |
| 62.000    | 15.00 |          |
| 120.000   | 60.00 |          |

==== Routing Simulations =====

Name: 100Y24H Hydrology Sim: 100Y24H  
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\POST\100Y24H.I32

Execute: Yes Restart: No Patch: No  
Alternative: No

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Input

---

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.01000  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 40.00  
Min Calc Time(sec): 0.5000                Max Calc Time(sec): 60.0000  
Boundary Stages: 100 YEAR                Boundary Flows:

Time(hrs)            Print Inc(min)  
-----  
11.000              60.000  
15.000              15.000  
40.000              60.000

Group                Run  
-----  
BASE                Yes

---

Name: 10Y24H                      Hydrology Sim: 10Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\10Y24H.I32

Execute: Yes                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.01000  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 40.00  
Min Calc Time(sec): 0.5000                Max Calc Time(sec): 60.0000  
Boundary Stages: 10 YEAR                Boundary Flows:

Time(hrs)            Print Inc(min)  
-----  
11.000              60.000  
15.000              15.000  
40.000              60.000

Group                Run  
-----  
BASE                Yes

---

Name: 2.3Y24H                      Hydrology Sim: 2.3Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.I32

Execute: Yes                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.01000  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 40.00  
Min Calc Time(sec): 0.5000                Max Calc Time(sec): 60.0000  
Boundary Stages: MEAN ANNUAL            Boundary Flows:

Time(hrs)            Print Inc(min)  
-----  
11.000              60.000  
15.000              15.000  
40.000              60.000

Group                Run  
-----  
BASE                Yes

---

Name: 25Y24H                      Hydrology Sim: 25Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y24H.I32

Execute: Yes                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.01000  
Time Step Optimizer: 10.000



Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Input

Start Time(hrs): 0.000                      End Time(hrs): 40.00  
Min Calc Time(sec): 0.5000                  Max Calc Time(sec): 60.0000  
Boundary Stages: 25 YEAR                    Boundary Flows:

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 11.000    |       | 60.000   |
| 15.000    |       | 15.000   |
| 40.000    |       | 60.000   |

| Group | Run |
|-------|-----|
| BASE  | Yes |

-----  
Name: 25Y96H                      Hydrology Sim: 25Y96H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y96H.I32

Execute: Yes                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.01000  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 97.00  
Min Calc Time(sec): 0.5000                  Max Calc Time(sec): 60.0000  
Boundary Stages: 25 YR-96 HR                  Boundary Flows:

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 55.000    |       | 60.000   |
| 62.000    |       | 15.000   |
| 97.000    |       | 60.000   |

| Group | Run |
|-------|-----|
| BASE  | Yes |

==== Boundary Conditions =====

Name: 25 YR-96 HR                      Node: UNNAMED LK                      Type: Stage  
-----  
Time(hrs)                      Stage(ft)  
-----  
0.000                      91.000  
120.000                      100.000  
150.000                      99.200

Name: 100 YEAR                      Node: UNNAMED LK                      Type: Stage  
-----  
Time(hrs)                      Stage(ft)  
-----  
0.000                      91.000  
15.000                      99.800  
40.000                      99.200

Name: 25 YEAR                      Node: UNNAMED LK                      Type: Stage  
-----  
Time(hrs)                      Stage(ft)  
-----  
0.000                      91.000  
15.000                      99.300  
40.000                      98.500

Name: MEAN ANNUAL                      Node: UNNAMED LK                      Type: Stage  
-----  
Time(hrs)                      Stage(ft)  
-----  
0.000                      91.000  
15.000                      98.400  
40.000                      97.500

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Input

---

-----  
Name: 10 YEAR                      Node: UNNAMED LK                      Type: Stage

| Time (hrs) | Stage (ft) |
|------------|------------|
| 0.000      | 91.000     |
| 15.000     | 99.000     |
| 40.000     | 98.600     |

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin   | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |
|------------|---------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|
| 25Y96H     | BASIN 1 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1 | BASE  | 8.00     | 0.188       | 0.027       | 0.001             | 0.001             | 18.834     | 0.001     |
| 25Y96H     | BASIN 1 | BASE  | 9.00     | 0.215       | 0.027       | 0.003             | 0.002             | 77.170     | 0.003     |
| 25Y96H     | BASIN 1 | BASE  | 10.00    | 0.242       | 0.027       | 0.007             | 0.004             | 175.482    | 0.006     |
| 25Y96H     | BASIN 1 | BASE  | 11.00    | 0.268       | 0.027       | 0.012             | 0.005             | 310.542    | 0.010     |
| 25Y96H     | BASIN 1 | BASE  | 12.00    | 0.295       | 0.027       | 0.017             | 0.006             | 479.545    | 0.016     |
| 25Y96H     | BASIN 1 | BASE  | 13.00    | 0.322       | 0.027       | 0.024             | 0.007             | 679.965    | 0.023     |
| 25Y96H     | BASIN 1 | BASE  | 14.00    | 0.349       | 0.027       | 0.032             | 0.008             | 909.521    | 0.030     |
| 25Y96H     | BASIN 1 | BASE  | 15.00    | 0.376       | 0.027       | 0.041             | 0.009             | 1166.148   | 0.039     |
| 25Y96H     | BASIN 1 | BASE  | 16.00    | 0.403       | 0.027       | 0.051             | 0.010             | 1447.968   | 0.049     |
| 25Y96H     | BASIN 1 | BASE  | 17.00    | 0.430       | 0.027       | 0.061             | 0.010             | 1751.974   | 0.059     |
| 25Y96H     | BASIN 1 | BASE  | 18.00    | 0.457       | 0.027       | 0.072             | 0.011             | 2076.457   | 0.070     |
| 25Y96H     | BASIN 1 | BASE  | 19.00    | 0.483       | 0.027       | 0.084             | 0.012             | 2421.154   | 0.081     |
| 25Y96H     | BASIN 1 | BASE  | 20.00    | 0.510       | 0.027       | 0.096             | 0.012             | 2784.795   | 0.093     |
| 25Y96H     | BASIN 1 | BASE  | 21.00    | 0.537       | 0.027       | 0.109             | 0.013             | 3167.800   | 0.106     |
| 25Y96H     | BASIN 1 | BASE  | 22.00    | 0.564       | 0.027       | 0.123             | 0.014             | 3569.213   | 0.120     |
| 25Y96H     | BASIN 1 | BASE  | 23.00    | 0.591       | 0.027       | 0.137             | 0.014             | 3986.574   | 0.134     |
| 25Y96H     | BASIN 1 | BASE  | 24.00    | 0.618       | 0.027       | 0.152             | 0.015             | 4419.724   | 0.148     |
| 25Y96H     | BASIN 1 | BASE  | 25.00    | 0.645       | 0.027       | 0.188             | 0.036             | 5188.143   | 0.174     |
| 25Y96H     | BASIN 1 | BASE  | 26.00    | 0.708       | 0.063       | 0.226             | 0.038             | 6316.266   | 0.212     |
| 25Y96H     | BASIN 1 | BASE  | 27.00    | 0.771       | 0.063       | 0.267             | 0.040             | 7505.518   | 0.252     |
| 25Y96H     | BASIN 1 | BASE  | 28.00    | 0.834       | 0.063       | 0.309             | 0.042             | 8748.830   | 0.293     |
| 25Y96H     | BASIN 1 | BASE  | 29.00    | 0.897       | 0.063       | 0.354             | 0.045             | 10062.242  | 0.337     |
| 25Y96H     | BASIN 1 | BASE  | 30.00    | 0.963       | 0.065       | 0.400             | 0.047             | 11441.750  | 0.383     |
| 25Y96H     | BASIN 1 | BASE  | 31.00    | 1.028       | 0.065       | 0.448             | 0.048             | 12861.840  | 0.431     |
| 25Y96H     | BASIN 1 | BASE  | 32.00    | 1.093       | 0.065       | 0.498             | 0.049             | 14318.265  | 0.480     |
| 25Y96H     | BASIN 1 | BASE  | 33.00    | 1.159       | 0.065       | 0.546             | 0.049             | 15783.080  | 0.529     |
| 25Y96H     | BASIN 1 | BASE  | 34.00    | 1.222       | 0.063       | 0.596             | 0.050             | 17252.311  | 0.578     |
| 25Y96H     | BASIN 1 | BASE  | 35.00    | 1.285       | 0.063       | 0.646             | 0.050             | 18746.754  | 0.628     |
| 25Y96H     | BASIN 1 | BASE  | 36.00    | 1.348       | 0.063       | 0.697             | 0.051             | 20264.174  | 0.679     |
| 25Y96H     | BASIN 1 | BASE  | 37.00    | 1.411       | 0.063       | 0.749             | 0.052             | 21802.594  | 0.731     |
| 25Y96H     | BASIN 1 | BASE  | 38.00    | 1.474       | 0.063       | 0.801             | 0.052             | 23360.254  | 0.783     |
| 25Y96H     | BASIN 1 | BASE  | 39.00    | 1.538       | 0.063       | 0.854             | 0.053             | 24935.590  | 0.836     |
| 25Y96H     | BASIN 1 | BASE  | 40.00    | 1.601       | 0.063       | 0.908             | 0.054             | 26527.271  | 0.889     |
| 25Y96H     | BASIN 1 | BASE  | 41.00    | 1.664       | 0.063       | 0.964             | 0.056             | 28160.707  | 0.944     |
| 25Y96H     | BASIN 1 | BASE  | 42.00    | 1.729       | 0.065       | 1.020             | 0.056             | 29835.117  | 1.000     |
| 25Y96H     | BASIN 1 | BASE  | 43.00    | 1.795       | 0.065       | 1.077             | 0.057             | 31523.195  | 1.056     |
| 25Y96H     | BASIN 1 | BASE  | 44.00    | 1.860       | 0.065       | 1.134             | 0.057             | 33223.871  | 1.113     |
| 25Y96H     | BASIN 1 | BASE  | 45.00    | 1.925       | 0.065       | 1.190             | 0.056             | 34908.793  | 1.170     |
| 25Y96H     | BASIN 1 | BASE  | 46.00    | 1.988       | 0.063       | 1.246             | 0.056             | 36576.875  | 1.226     |
| 25Y96H     | BASIN 1 | BASE  | 47.00    | 2.052       | 0.063       | 1.302             | 0.056             | 38254.523  | 1.282     |
| 25Y96H     | BASIN 1 | BASE  | 48.00    | 2.115       | 0.063       | 1.359             | 0.057             | 39942.191  | 1.339     |
| 25Y96H     | BASIN 1 | BASE  | 49.00    | 2.178       | 0.063       | 1.435             | 0.076             | 41930.438  | 1.405     |
| 25Y96H     | BASIN 1 | BASE  | 50.00    | 2.263       | 0.085       | 1.512             | 0.077             | 44221.297  | 1.482     |
| 25Y96H     | BASIN 1 | BASE  | 50.25    | 2.348       | 0.085       | 1.535             | 0.022             | 44828.055  | 1.502     |
| 25Y96H     | BASIN 1 | BASE  | 50.50    | 2.373       | 0.025       | 1.557             | 0.023             | 45482.434  | 1.524     |
| 25Y96H     | BASIN 1 | BASE  | 50.75    | 2.397       | 0.025       | 1.580             | 0.023             | 46154.566  | 1.547     |
| 25Y96H     | BASIN 1 | BASE  | 51.00    | 2.422       | 0.025       | 1.603             | 0.023             | 46829.621  | 1.569     |
| 25Y96H     | BASIN 1 | BASE  | 51.25    | 2.447       | 0.025       | 1.625             | 0.023             | 47505.777  | 1.592     |
| 25Y96H     | BASIN 1 | BASE  | 51.50    | 2.472       | 0.025       | 1.648             | 0.023             | 48182.906  | 1.615     |
| 25Y96H     | BASIN 1 | BASE  | 51.75    | 2.497       | 0.025       | 1.671             | 0.023             | 48860.988  | 1.638     |
| 25Y96H     | BASIN 1 | BASE  | 52.00    | 2.521       | 0.025       | 1.694             | 0.023             | 49540.164  | 1.660     |
| 25Y96H     | BASIN 1 | BASE  | 52.25    | 2.546       | 0.025       | 1.722             | 0.028             | 50271.652  | 1.685     |
| 25Y96H     | BASIN 1 | BASE  | 52.50    | 2.577       | 0.031       | 1.750             | 0.028             | 51081.734  | 1.712     |
| 25Y96H     | BASIN 1 | BASE  | 52.75    | 2.608       | 0.031       | 1.779             | 0.028             | 51922.496  | 1.740     |
| 25Y96H     | BASIN 1 | BASE  | 53.00    | 2.638       | 0.031       | 1.807             | 0.028             | 52767.867  | 1.768     |
| 25Y96H     | BASIN 1 | BASE  | 53.25    | 2.669       | 0.031       | 1.836             | 0.028             | 53614.688  | 1.797     |
| 25Y96H     | BASIN 1 | BASE  | 53.50    | 2.700       | 0.031       | 1.864             | 0.028             | 54462.727  | 1.825     |
| 25Y96H     | BASIN 1 | BASE  | 53.75    | 2.730       | 0.031       | 1.893             | 0.029             | 55311.953  | 1.854     |
| 25Y96H     | BASIN 1 | BASE  | 54.00    | 2.761       | 0.031       | 1.921             | 0.029             | 56162.336  | 1.882     |
| 25Y96H     | BASIN 1 | BASE  | 54.25    | 2.792       | 0.031       | 1.957             | 0.036             | 57083.039  | 1.913     |
| 25Y96H     | BASIN 1 | BASE  | 54.50    | 2.830       | 0.038       | 1.993             | 0.036             | 58107.934  | 1.947     |
| 25Y96H     | BASIN 1 | BASE  | 54.75    | 2.869       | 0.038       | 2.029             | 0.036             | 59172.055  | 1.983     |
| 25Y96H     | BASIN 1 | BASE  | 55.00    | 2.907       | 0.038       | 2.065             | 0.036             | 60241.984  | 2.019     |
| 25Y96H     | BASIN 1 | BASE  | 55.25    | 2.945       | 0.038       | 2.101             | 0.036             | 61313.715  | 2.055     |
| 25Y96H     | BASIN 1 | BASE  | 55.50    | 2.984       | 0.038       | 2.137             | 0.036             | 62386.953  | 2.091     |
| 25Y96H     | BASIN 1 | BASE  | 55.75    | 3.022       | 0.038       | 2.173             | 0.036             | 63461.656  | 2.127     |
| 25Y96H     | BASIN 1 | BASE  | 56.00    | 3.061       | 0.038       | 2.210             | 0.037             | 64538.699  | 2.163     |
| 25Y96H     | BASIN 1 | BASE  | 56.25    | 3.099       | 0.039       | 2.264             | 0.055             | 65800.289  | 2.205     |
| 25Y96H     | BASIN 1 | BASE  | 56.50    | 3.158       | 0.058       | 2.319             | 0.055             | 67332.398  | 2.257     |
| 25Y96H     | BASIN 1 | BASE  | 56.75    | 3.216       | 0.058       | 2.375             | 0.055             | 68963.813  | 2.311     |
| 25Y96H     | BASIN 1 | BASE  | 57.00    | 3.275       | 0.058       | 2.430             | 0.055             | 70608.938  | 2.366     |
| 25Y96H     | BASIN 1 | BASE  | 57.25    | 3.333       | 0.058       | 2.485             | 0.055             | 72257.359  | 2.422     |

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Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25Yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |    |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----|
| 25Y96H     | BASIN 1   | BASE  | 57.50    | 3.391       | 0.058       | 2.541             | 0.055             | 73908.367  | 2.477     | 1  |
| 25Y96H     | BASIN 1   | BASE  | 57.75    | 3.450       | 0.058       | 2.596             | 0.056             | 75561.844  | 2.532     | 1  |
| 25Y96H     | BASIN 1   | BASE  | 58.00    | 3.508       | 0.058       | 2.653             | 0.057             | 77219.445  | 2.588     | 1  |
| 25Y96H     | BASIN 1   | BASE  | 58.25    | 3.567       | 0.058       | 2.750             | 0.097             | 79287.711  | 2.657     | 2  |
| 25Y96H     | BASIN 1   | BASE  | 58.50    | 3.670       | 0.103       | 2.849             | 0.099             | 81974.109  | 2.747     | 3  |
| 25Y96H     | BASIN 1   | BASE  | 58.75    | 3.773       | 0.104       | 2.949             | 0.099             | 84898.969  | 2.845     | 3  |
| 25Y96H     | BASIN 1   | BASE  | 59.00    | 3.877       | 0.104       | 3.051             | 0.102             | 87860.281  | 2.945     | 3  |
| 25Y96H     | BASIN 1   | BASE  | 59.25    | 3.980       | 0.104       | 3.225             | 0.174             | 91573.633  | 3.069     | 4  |
| 25Y96H     | BASIN 1   | BASE  | 59.50    | 4.164       | 0.184       | 3.449             | 0.224             | 96472.586  | 3.233     | 5  |
| 25Y96H     | BASIN 1   | BASE  | 59.75    | 4.349       | 0.185       | 4.822             | 1.372             | 113696.531 | 3.810     | 32 |
| 25Y96H     | BASIN 1   | BASE  | 60.00    | 5.805       | 1.456       | 6.213             | 1.391             | 148756.250 | 4.985     | 45 |
| 25Y96H     | BASIN 1   | BASE  | 60.25    | 7.264       | 1.460       | 6.530             | 0.317             | 179431.953 | 6.013     | 22 |
| 25Y96H     | BASIN 1   | BASE  | 60.50    | 7.541       | 0.277       | 6.798             | 0.268             | 194362.141 | 6.514     | 10 |
| 25Y96H     | BASIN 1   | BASE  | 60.75    | 7.817       | 0.276       | 6.944             | 0.145             | 201952.797 | 6.768     | 6  |
| 25Y96H     | BASIN 1   | BASE  | 61.00    | 7.959       | 0.142       | 7.082             | 0.139             | 206952.719 | 6.936     | 4  |
| 25Y96H     | BASIN 1   | BASE  | 61.25    | 8.101       | 0.142       | 7.175             | 0.093             | 210744.047 | 7.063     | 3  |
| 25Y96H     | BASIN 1   | BASE  | 61.50    | 8.193       | 0.092       | 7.266             | 0.091             | 213754.484 | 7.164     | 3  |
| 25Y96H     | BASIN 1   | BASE  | 61.75    | 8.286       | 0.092       | 7.358             | 0.091             | 216505.484 | 7.256     | 3  |
| 25Y96H     | BASIN 1   | BASE  | 62.00    | 8.378       | 0.092       | 7.448             | 0.090             | 219226.344 | 7.347     | 3  |
| 25Y96H     | BASIN 1   | BASE  | 63.00    | 8.470       | 0.092       | 7.675             | 0.228             | 228043.094 | 7.643     | 1  |
| 25Y96H     | BASIN 1   | BASE  | 64.00    | 8.699       | 0.229       | 7.902             | 0.227             | 234805.516 | 7.869     | 1  |
| 25Y96H     | BASIN 1   | BASE  | 65.00    | 8.928       | 0.229       | 8.040             | 0.138             | 240228.469 | 8.051     | 1  |
| 25Y96H     | BASIN 1   | BASE  | 66.00    | 9.067       | 0.139       | 8.177             | 0.137             | 244312.125 | 8.188     | 1  |
| 25Y96H     | BASIN 1   | BASE  | 67.00    | 9.205       | 0.138       | 8.314             | 0.137             | 248396.797 | 8.325     | 1  |
| 25Y96H     | BASIN 1   | BASE  | 68.00    | 9.343       | 0.138       | 8.451             | 0.137             | 252479.703 | 8.462     | 1  |
| 25Y96H     | BASIN 1   | BASE  | 69.00    | 9.481       | 0.138       | 8.542             | 0.092             | 255881.172 | 8.576     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 70.00    | 9.573       | 0.092       | 8.634             | 0.091             | 258603.656 | 8.667     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 71.00    | 9.665       | 0.092       | 8.725             | 0.091             | 261324.938 | 8.758     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 72.00    | 9.757       | 0.092       | 8.816             | 0.091             | 264042.813 | 8.849     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 73.00    | 9.849       | 0.092       | 8.864             | 0.048             | 266107.688 | 8.918     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 74.00    | 9.897       | 0.048       | 8.911             | 0.047             | 267521.594 | 8.966     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 75.00    | 9.945       | 0.048       | 8.958             | 0.047             | 268935.594 | 9.013     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 76.00    | 9.993       | 0.048       | 9.006             | 0.047             | 270349.688 | 9.060     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 77.00    | 10.041      | 0.048       | 9.054             | 0.048             | 271769.656 | 9.108     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 78.00    | 10.089      | 0.048       | 9.102             | 0.048             | 273195.500 | 9.156     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 79.00    | 10.137      | 0.048       | 9.149             | 0.048             | 274621.438 | 9.204     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 80.00    | 10.185      | 0.048       | 9.197             | 0.048             | 276047.438 | 9.251     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 81.00    | 10.233      | 0.048       | 9.245             | 0.047             | 277467.750 | 9.299     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 82.00    | 10.281      | 0.048       | 9.292             | 0.047             | 278882.406 | 9.346     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 83.00    | 10.329      | 0.048       | 9.340             | 0.047             | 280297.156 | 9.394     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 84.00    | 10.377      | 0.048       | 9.387             | 0.047             | 281711.969 | 9.441     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 85.00    | 10.425      | 0.048       | 9.435             | 0.047             | 283126.875 | 9.489     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 86.00    | 10.473      | 0.048       | 9.482             | 0.047             | 284541.875 | 9.536     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 87.00    | 10.520      | 0.048       | 9.530             | 0.047             | 285956.938 | 9.583     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 88.00    | 10.568      | 0.048       | 9.577             | 0.047             | 287372.094 | 9.631     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 89.00    | 10.616      | 0.048       | 9.625             | 0.048             | 288793.125 | 9.679     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 90.00    | 10.664      | 0.048       | 9.673             | 0.048             | 290220.000 | 9.726     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 91.00    | 10.712      | 0.048       | 9.721             | 0.048             | 291646.938 | 9.774     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 92.00    | 10.761      | 0.048       | 9.769             | 0.048             | 293073.938 | 9.822     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 93.00    | 10.809      | 0.048       | 9.816             | 0.048             | 294495.250 | 9.870     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 94.00    | 10.857      | 0.048       | 9.864             | 0.048             | 295910.875 | 9.917     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 95.00    | 10.904      | 0.048       | 9.911             | 0.048             | 297326.563 | 9.964     | 0  |
| 25Y96H     | BASIN 1   | BASE  | 96.00    | 10.952      | 0.048       | 9.959             | 0.047             | 298741.188 | 10.012    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 97.00    | 11.000      | 0.048       | 9.959             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 98.00    | 11.000      | 0.000       | 0.000             | -9.959            | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 99.00    | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 100.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 101.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 102.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 103.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 104.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 105.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 106.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 107.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 108.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 109.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 110.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 111.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 112.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 113.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 114.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 115.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 116.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 117.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 118.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 119.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1   | BASE  | 120.00   | 11.000      | 0.000       | 0.000             | 0.000             | 299447.938 | 10.036    | 0  |
| 25Y96H     | BASIN 1-1 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-1 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-1 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |

← max

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Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin     | Group | Time<br>hrs | Sum Rain<br>in | Inc Rain<br>in | SumExcess<br>Rain in | IncExcess<br>Rain in | Volume<br>ft3 | Volume<br>in |   |
|------------|-----------|-------|-------------|----------------|----------------|----------------------|----------------------|---------------|--------------|---|
| 25Y96H     | BASIN 1-1 | BASE  | 3.00        | 0.054          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 4.00        | 0.081          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 5.00        | 0.108          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 6.00        | 0.134          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 7.00        | 0.161          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 8.00        | 0.188          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 9.00        | 0.215          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 10.00       | 0.242          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 11.00       | 0.268          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 12.00       | 0.295          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 13.00       | 0.322          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 14.00       | 0.349          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 15.00       | 0.376          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 16.00       | 0.403          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 17.00       | 0.430          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 18.00       | 0.457          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 19.00       | 0.483          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 20.00       | 0.510          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 21.00       | 0.537          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 22.00       | 0.564          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 23.00       | 0.591          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 24.00       | 0.618          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 25.00       | 0.645          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 26.00       | 0.708          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 27.00       | 0.771          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 28.00       | 0.834          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 29.00       | 0.897          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 30.00       | 0.963          | 0.065          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 31.00       | 1.028          | 0.065          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 32.00       | 1.093          | 0.065          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 33.00       | 1.159          | 0.065          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 34.00       | 1.222          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 35.00       | 1.285          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 36.00       | 1.348          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 37.00       | 1.411          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 38.00       | 1.474          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 39.00       | 1.538          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 40.00       | 1.601          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 41.00       | 1.664          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 42.00       | 1.729          | 0.065          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 43.00       | 1.795          | 0.065          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 44.00       | 1.860          | 0.065          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 45.00       | 1.925          | 0.065          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 46.00       | 1.988          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 47.00       | 2.052          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 48.00       | 2.115          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 49.00       | 2.178          | 0.063          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 50.00       | 2.263          | 0.085          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 50.25       | 2.348          | 0.085          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 50.50       | 2.373          | 0.025          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 50.75       | 2.397          | 0.025          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 51.00       | 2.422          | 0.025          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 51.25       | 2.447          | 0.025          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 51.50       | 2.472          | 0.025          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 51.75       | 2.497          | 0.025          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 52.00       | 2.521          | 0.025          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 52.25       | 2.546          | 0.025          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 52.50       | 2.577          | 0.031          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 52.75       | 2.608          | 0.031          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 53.00       | 2.638          | 0.031          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 53.25       | 2.669          | 0.031          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 53.50       | 2.700          | 0.031          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 53.75       | 2.730          | 0.031          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 54.00       | 2.761          | 0.031          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 54.25       | 2.792          | 0.031          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 54.50       | 2.830          | 0.038          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 54.75       | 2.869          | 0.038          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 55.00       | 2.907          | 0.038          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 55.25       | 2.945          | 0.038          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 55.50       | 2.984          | 0.038          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 55.75       | 3.022          | 0.038          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 56.00       | 3.061          | 0.038          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 56.25       | 3.099          | 0.039          | 0.000                | 0.000                | 0.002         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 56.50       | 3.158          | 0.058          | 0.000                | 0.000                | 0.060         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 56.75       | 3.216          | 0.058          | 0.001                | 0.001                | 0.306         | 0.000        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 57.00       | 3.275          | 0.058          | 0.003                | 0.001                | 0.845         | 0.001        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 57.25       | 3.333          | 0.058          | 0.004                | 0.002                | 1.711         | 0.002        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 57.50       | 3.391          | 0.058          | 0.006                | 0.002                | 2.911         | 0.004        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 57.75       | 3.450          | 0.058          | 0.009                | 0.003                | 4.442         | 0.006        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 58.00       | 3.508          | 0.058          | 0.012                | 0.003                | 6.304         | 0.008        | 0 |

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin     | Group | Time<br>hrs | Sum Rain<br>in | Inc Rain<br>in | SumExcess<br>Rain in | IncExcess<br>Rain in | Volume<br>ft3 | Volume<br>in |   |
|------------|-----------|-------|-------------|----------------|----------------|----------------------|----------------------|---------------|--------------|---|
| 25Y96H     | BASIN 1-1 | BASE  | 58.25       | 3.567          | 0.058          | 0.018                | 0.006                | 8.806         | 0.011        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 58.50       | 3.670          | 0.103          | 0.026                | 0.007                | 12.615        | 0.016        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 58.75       | 3.773          | 0.104          | 0.034                | 0.009                | 17.858        | 0.022        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 59.00       | 3.877          | 0.104          | 0.044                | 0.010                | 24.228        | 0.030        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 59.25       | 3.980          | 0.104          | 0.064                | 0.020                | 32.661        | 0.041        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 59.50       | 4.164          | 0.184          | 0.094                | 0.030                | 45.398        | 0.057        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 59.75       | 4.349          | 0.185          | 0.392                | 0.297                | 91.637        | 0.115        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 60.00       | 5.805          | 1.456          | 0.849                | 0.457                | 246.180       | 0.308        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 60.25       | 7.264          | 1.460          | 0.971                | 0.123                | 489.092       | 0.612        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 60.50       | 7.541          | 0.277          | 1.079                | 0.108                | 686.081       | 0.859        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 60.75       | 7.817          | 0.276          | 1.140                | 0.061                | 801.235       | 1.003        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 61.00       | 7.959          | 0.142          | 1.199                | 0.059                | 876.026       | 1.097        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 61.25       | 8.101          | 0.142          | 1.239                | 0.040                | 928.444       | 1.163        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 61.50       | 8.193          | 0.092          | 1.279                | 0.040                | 968.837       | 1.213        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 61.75       | 8.286          | 0.092          | 1.319                | 0.040                | 1002.965      | 1.256        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 62.00       | 8.378          | 0.092          | 1.359                | 0.040                | 1035.521      | 1.297        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 63.00       | 8.470          | 0.092          | 1.463                | 0.104                | 1141.803      | 1.430        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 64.00       | 8.699          | 0.229          | 1.568                | 0.105                | 1225.733      | 1.535        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 65.00       | 8.928          | 0.229          | 1.634                | 0.066                | 1294.310      | 1.621        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 66.00       | 9.067          | 0.139          | 1.700                | 0.066                | 1346.974      | 1.687        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 67.00       | 9.205          | 0.138          | 1.767                | 0.067                | 1400.143      | 1.753        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 68.00       | 9.343          | 0.138          | 1.835                | 0.068                | 1453.995      | 1.821        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 69.00       | 9.481          | 0.138          | 1.881                | 0.046                | 1499.449      | 1.878        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 70.00       | 9.573          | 0.092          | 1.927                | 0.046                | 1536.224      | 1.924        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 71.00       | 9.665          | 0.092          | 1.973                | 0.046                | 1573.163      | 1.970        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 72.00       | 9.757          | 0.092          | 2.020                | 0.046                | 1610.349      | 2.016        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 73.00       | 9.849          | 0.092          | 2.045                | 0.025                | 1638.884      | 2.052        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 74.00       | 9.897          | 0.048          | 2.069                | 0.025                | 1658.570      | 2.077        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 75.00       | 9.945          | 0.048          | 2.094                | 0.025                | 1678.216      | 2.101        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 76.00       | 9.993          | 0.048          | 2.119                | 0.025                | 1697.940      | 2.126        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 77.00       | 10.041         | 0.048          | 2.144                | 0.025                | 1717.823      | 2.151        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 78.00       | 10.089         | 0.048          | 2.169                | 0.025                | 1737.864      | 2.176        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 79.00       | 10.137         | 0.048          | 2.194                | 0.025                | 1757.985      | 2.201        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 80.00       | 10.185         | 0.048          | 2.219                | 0.025                | 1778.183      | 2.227        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 81.00       | 10.233         | 0.048          | 2.245                | 0.025                | 1798.377      | 2.252        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 82.00       | 10.281         | 0.048          | 2.270                | 0.025                | 1818.565      | 2.277        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 83.00       | 10.329         | 0.048          | 2.296                | 0.025                | 1838.827      | 2.303        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 84.00       | 10.377         | 0.048          | 2.321                | 0.026                | 1859.164      | 2.328        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 85.00       | 10.425         | 0.048          | 2.347                | 0.026                | 1879.574      | 2.354        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 86.00       | 10.473         | 0.048          | 2.372                | 0.026                | 1900.058      | 2.379        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 87.00       | 10.520         | 0.048          | 2.398                | 0.026                | 1920.616      | 2.405        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 88.00       | 10.568         | 0.048          | 2.424                | 0.026                | 1941.246      | 2.431        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 89.00       | 10.616         | 0.048          | 2.450                | 0.026                | 1962.032      | 2.457        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 90.00       | 10.664         | 0.048          | 2.477                | 0.026                | 1982.975      | 2.483        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 91.00       | 10.712         | 0.048          | 2.503                | 0.026                | 2003.992      | 2.509        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 92.00       | 10.761         | 0.048          | 2.529                | 0.026                | 2025.081      | 2.536        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 93.00       | 10.809         | 0.048          | 2.556                | 0.026                | 2046.156      | 2.562        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 94.00       | 10.857         | 0.048          | 2.582                | 0.026                | 2067.217      | 2.589        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 95.00       | 10.904         | 0.048          | 2.609                | 0.027                | 2088.346      | 2.615        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 96.00       | 10.952         | 0.048          | 2.635                | 0.026                | 2109.465      | 2.641        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 97.00       | 11.000         | 0.048          | 2.635                | 0.000                | 2120.116      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 98.00       | 11.000         | 0.000          | 2.635                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 99.00       | 11.000         | 0.000          | 0.000                | -2.635               | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 100.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 101.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 102.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 103.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 104.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 105.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 106.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 107.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 108.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 109.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 110.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 111.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 112.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 113.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 114.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 115.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 116.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 117.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 118.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 119.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-1 | BASE  | 120.00      | 11.000         | 0.000          | 0.000                | 0.000                | 2120.230      | 2.655        | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 0.00        | 0.000          | 0.000          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 1.00        | 0.000          | 0.000          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 2.00        | 0.027          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 3.00        | 0.054          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 4.00        | 0.081          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 5.00        | 0.108          | 0.027          | 0.000                | 0.000                | 0.000         | 0.000        | 0 |

MAX ←

75

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |   |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|---|
| 25Y96H     | BASIN 1-2 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 50.25    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 50.50    | 2.373       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 50.75    | 2.397       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 51.00    | 2.422       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 51.25    | 2.447       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 51.50    | 2.472       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 51.75    | 2.497       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 52.00    | 2.521       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 52.25    | 2.546       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 52.50    | 2.577       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 52.75    | 2.608       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 53.00    | 2.638       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 53.25    | 2.669       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 53.50    | 2.700       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 53.75    | 2.730       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 54.00    | 2.761       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 54.25    | 2.792       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 54.50    | 2.830       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 54.75    | 2.869       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 55.00    | 2.907       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 55.25    | 2.945       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 55.50    | 2.984       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 55.75    | 3.022       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 56.00    | 3.061       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 56.25    | 3.099       | 0.039       | 0.000             | 0.000             | 0.005      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 56.50    | 3.158       | 0.058       | 0.000             | 0.000             | 0.120      | 0.000     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 56.75    | 3.216       | 0.058       | 0.001             | 0.001             | 0.525      | 0.001     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 57.00    | 3.275       | 0.058       | 0.003             | 0.001             | 1.315      | 0.001     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 57.25    | 3.333       | 0.058       | 0.004             | 0.002             | 2.503      | 0.003     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 57.50    | 3.391       | 0.058       | 0.006             | 0.002             | 4.086      | 0.004     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 57.75    | 3.450       | 0.058       | 0.009             | 0.003             | 6.060      | 0.006     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 58.00    | 3.508       | 0.058       | 0.012             | 0.003             | 8.420      | 0.009     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 58.25    | 3.567       | 0.058       | 0.018             | 0.006             | 11.832     | 0.013     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 58.50    | 3.670       | 0.103       | 0.026             | 0.007             | 17.065     | 0.018     | 0 |
| 25Y96H     | BASIN 1-2 | BASE  | 58.75    | 3.773       | 0.104       | 0.034             | 0.009             | 23.901     | 0.025     | 0 |

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |        |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|--------|
| 25Y96H     | BASIN 1-2 | BASE  | 59.00    | 3.877       | 0.104       | 0.044             | 0.010             | 31.963     | 0.034     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 59.25    | 3.980       | 0.104       | 0.064             | 0.020             | 43.390     | 0.046     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 59.50    | 4.164       | 0.184       | 0.095             | 0.030             | 60.844     | 0.064     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 59.75    | 4.349       | 0.185       | 0.391             | 0.297             | 144.879    | 0.154     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 60.00    | 5.805       | 1.456       | 0.847             | 0.455             | 392.815    | 0.416     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 60.25    | 7.264       | 1.460       | 0.971             | 0.124             | 696.168    | 0.738     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 60.50    | 7.541       | 0.277       | 1.079             | 0.108             | 889.440    | 0.942     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 60.75    | 7.817       | 0.276       | 1.140             | 0.061             | 994.508    | 1.054     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 61.00    | 7.959       | 0.142       | 1.199             | 0.059             | 1065.116   | 1.129     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 61.25    | 8.101       | 0.142       | 1.239             | 0.040             | 1118.100   | 1.185     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 61.50    | 8.193       | 0.092       | 1.279             | 0.040             | 1160.769   | 1.230     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 61.75    | 8.286       | 0.092       | 1.319             | 0.040             | 1199.137   | 1.271     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 62.00    | 8.378       | 0.092       | 1.359             | 0.040             | 1237.183   | 1.311     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 63.00    | 8.470       | 0.092       | 1.463             | 0.104             | 1362.405   | 1.444     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 64.00    | 8.699       | 0.229       | 1.569             | 0.106             | 1461.486   | 1.549     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 65.00    | 8.928       | 0.229       | 1.634             | 0.066             | 1542.443   | 1.634     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 66.00    | 9.067       | 0.139       | 1.700             | 0.066             | 1604.505   | 1.700     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 67.00    | 9.205       | 0.138       | 1.767             | 0.067             | 1667.432   | 1.767     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 68.00    | 9.343       | 0.138       | 1.835             | 0.068             | 1731.184   | 1.834     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 69.00    | 9.481       | 0.138       | 1.881             | 0.046             | 1784.849   | 1.891     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 70.00    | 9.573       | 0.092       | 1.927             | 0.046             | 1828.207   | 1.937     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 71.00    | 9.665       | 0.092       | 1.973             | 0.046             | 1871.900   | 1.983     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 72.00    | 9.757       | 0.092       | 2.020             | 0.047             | 1915.915   | 2.030     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 73.00    | 9.849       | 0.092       | 2.045             | 0.025             | 1949.551   | 2.066     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 74.00    | 9.897       | 0.048       | 2.069             | 0.025             | 1972.685   | 2.090     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 75.00    | 9.945       | 0.048       | 2.094             | 0.025             | 1995.913   | 2.115     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 76.00    | 9.993       | 0.048       | 2.119             | 0.025             | 2019.233   | 2.139     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 77.00    | 10.041      | 0.048       | 2.144             | 0.025             | 2042.741   | 2.164     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 78.00    | 10.089      | 0.048       | 2.169             | 0.025             | 2066.437   | 2.189     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 79.00    | 10.137      | 0.048       | 2.194             | 0.025             | 2090.226   | 2.215     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 80.00    | 10.185      | 0.048       | 2.219             | 0.025             | 2114.106   | 2.240     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 81.00    | 10.233      | 0.048       | 2.245             | 0.025             | 2137.979   | 2.265     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 82.00    | 10.281      | 0.048       | 2.270             | 0.025             | 2161.846   | 2.291     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 83.00    | 10.329      | 0.048       | 2.296             | 0.025             | 2185.801   | 2.316     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 84.00    | 10.377      | 0.048       | 2.321             | 0.026             | 2209.844   | 2.341     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 85.00    | 10.425      | 0.048       | 2.347             | 0.026             | 2233.975   | 2.367     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 86.00    | 10.473      | 0.048       | 2.372             | 0.026             | 2258.192   | 2.393     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 87.00    | 10.520      | 0.048       | 2.398             | 0.026             | 2282.496   | 2.418     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 88.00    | 10.568      | 0.048       | 2.424             | 0.026             | 2306.886   | 2.444     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 89.00    | 10.616      | 0.048       | 2.450             | 0.026             | 2331.462   | 2.470     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 90.00    | 10.664      | 0.048       | 2.477             | 0.026             | 2356.224   | 2.497     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 91.00    | 10.712      | 0.048       | 2.503             | 0.026             | 2381.071   | 2.523     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 92.00    | 10.761      | 0.048       | 2.529             | 0.026             | 2406.003   | 2.549     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 93.00    | 10.809      | 0.048       | 2.556             | 0.026             | 2430.918   | 2.576     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 94.00    | 10.857      | 0.048       | 2.582             | 0.026             | 2455.815   | 2.602     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 95.00    | 10.904      | 0.048       | 2.609             | 0.027             | 2480.794   | 2.629     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 96.00    | 10.952      | 0.048       | 2.635             | 0.026             | 2505.782   | 2.655     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 97.00    | 11.000      | 0.048       | 2.635             | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 98.00    | 11.000      | 0.000       | 2.635             | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 99.00    | 11.000      | 0.000       | -0.000            | -2.635            | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 100.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 101.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 102.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 103.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 104.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 105.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 106.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 107.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 108.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 109.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 110.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 111.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 112.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 113.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 114.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 115.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 116.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 117.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 118.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 119.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-2 | BASE  | 120.00   | 11.000      | 0.000       | -0.000            | 0.000             | 2518.260   | 2.668     | 0      |
| 25Y96H     | BASIN 1-3 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | ←MAX 0 |
| 25Y96H     | BASIN 1-3 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0      |
| 25Y96H     | BASIN 1-3 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0      |
| 25Y96H     | BASIN 1-3 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0      |
| 25Y96H     | BASIN 1-3 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0      |
| 25Y96H     | BASIN 1-3 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0      |
| 25Y96H     | BASIN 1-3 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0      |
| 25Y96H     | BASIN 1-3 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0      |
| 25Y96H     | BASIN 1-3 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0      |



Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|
| 25Y96H     | BASIN 1-3 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 50.25    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 50.50    | 2.373       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 50.75    | 2.397       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 51.00    | 2.422       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 51.25    | 2.447       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 51.50    | 2.472       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 51.75    | 2.497       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 52.00    | 2.521       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 52.25    | 2.546       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 52.50    | 2.577       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 52.75    | 2.608       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 53.00    | 2.638       | 0.031       | 0.000             | 0.000             | 0.019      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 53.25    | 2.669       | 0.031       | 0.000             | 0.000             | 0.109      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 53.50    | 2.700       | 0.031       | 0.001             | 0.000             | 0.323      | 0.000     |
| 25Y96H     | BASIN 1-3 | BASE  | 53.75    | 2.730       | 0.031       | 0.001             | 0.001             | 0.675      | 0.001     |
| 25Y96H     | BASIN 1-3 | BASE  | 54.00    | 2.761       | 0.031       | 0.002             | 0.001             | 1.169      | 0.001     |
| 25Y96H     | BASIN 1-3 | BASE  | 54.25    | 2.792       | 0.031       | 0.003             | 0.001             | 1.844      | 0.002     |
| 25Y96H     | BASIN 1-3 | BASE  | 54.50    | 2.830       | 0.038       | 0.004             | 0.001             | 2.769      | 0.003     |
| 25Y96H     | BASIN 1-3 | BASE  | 54.75    | 2.869       | 0.038       | 0.006             | 0.001             | 3.951      | 0.004     |
| 25Y96H     | BASIN 1-3 | BASE  | 55.00    | 2.907       | 0.038       | 0.007             | 0.002             | 5.361      | 0.005     |
| 25Y96H     | BASIN 1-3 | BASE  | 55.25    | 2.945       | 0.038       | 0.009             | 0.002             | 6.988      | 0.007     |
| 25Y96H     | BASIN 1-3 | BASE  | 55.50    | 2.984       | 0.038       | 0.011             | 0.002             | 8.828      | 0.009     |
| 25Y96H     | BASIN 1-3 | BASE  | 55.75    | 3.022       | 0.038       | 0.014             | 0.002             | 10.880     | 0.011     |
| 25Y96H     | BASIN 1-3 | BASE  | 56.00    | 3.061       | 0.038       | 0.016             | 0.003             | 13.143     | 0.013     |
| 25Y96H     | BASIN 1-3 | BASE  | 56.25    | 3.099       | 0.039       | 0.020             | 0.004             | 15.884     | 0.016     |
| 25Y96H     | BASIN 1-3 | BASE  | 56.50    | 3.158       | 0.058       | 0.025             | 0.005             | 19.507     | 0.019     |
| 25Y96H     | BASIN 1-3 | BASE  | 56.75    | 3.216       | 0.058       | 0.030             | 0.005             | 23.949     | 0.024     |
| 25Y96H     | BASIN 1-3 | BASE  | 57.00    | 3.275       | 0.058       | 0.036             | 0.006             | 28.946     | 0.028     |
| 25Y96H     | BASIN 1-3 | BASE  | 57.25    | 3.333       | 0.058       | 0.042             | 0.006             | 34.423     | 0.034     |
| 25Y96H     | BASIN 1-3 | BASE  | 57.50    | 3.391       | 0.058       | 0.048             | 0.006             | 40.356     | 0.040     |
| 25Y96H     | BASIN 1-3 | BASE  | 57.75    | 3.450       | 0.058       | 0.055             | 0.007             | 46.736     | 0.046     |
| 25Y96H     | BASIN 1-3 | BASE  | 58.00    | 3.508       | 0.058       | 0.062             | 0.007             | 53.557     | 0.053     |
| 25Y96H     | BASIN 1-3 | BASE  | 58.25    | 3.567       | 0.058       | 0.076             | 0.014             | 61.909     | 0.061     |
| 25Y96H     | BASIN 1-3 | BASE  | 58.50    | 3.670       | 0.103       | 0.091             | 0.015             | 73.495     | 0.072     |
| 25Y96H     | BASIN 1-3 | BASE  | 58.75    | 3.773       | 0.104       | 0.108             | 0.017             | 87.998     | 0.087     |
| 25Y96H     | BASIN 1-3 | BASE  | 59.00    | 3.877       | 0.104       | 0.127             | 0.019             | 104.243    | 0.103     |
| 25Y96H     | BASIN 1-3 | BASE  | 59.25    | 3.980       | 0.104       | 0.160             | 0.034             | 124.621    | 0.123     |
| 25Y96H     | BASIN 1-3 | BASE  | 59.50    | 4.164       | 0.184       | 0.214             | 0.054             | 153.836    | 0.151     |

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25Yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |      |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|------|
| 25Y96H     | BASIN 1-3 | BASE  | 59.75    | 4.349       | 0.185       | 0.618             | 0.404             | 253.979    | 0.250     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 60.00    | 5.805       | 1.456       | 1.189             | 0.571             | 548.104    | 0.539     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 60.25    | 7.264       | 1.460       | 1.336             | 0.146             | 956.966    | 0.942     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 60.50    | 7.541       | 0.277       | 1.468             | 0.132             | 1254.941   | 1.235     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 60.75    | 7.817       | 0.276       | 1.537             | 0.070             | 1419.012   | 1.396     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 61.00    | 7.959       | 0.142       | 1.607             | 0.070             | 1524.782   | 1.500     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 61.25    | 8.101       | 0.142       | 1.654             | 0.047             | 1599.386   | 1.574     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 61.50    | 8.193       | 0.092       | 1.701             | 0.047             | 1657.713   | 1.631     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 61.75    | 8.286       | 0.092       | 1.749             | 0.047             | 1707.869   | 1.680     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 62.00    | 8.378       | 0.092       | 1.795             | 0.047             | 1756.297   | 1.728     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 63.00    | 8.470       | 0.092       | 1.917             | 0.121             | 1914.445   | 1.884     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 64.00    | 8.699       | 0.229       | 2.039             | 0.123             | 2038.745   | 2.006     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 65.00    | 8.928       | 0.229       | 2.116             | 0.076             | 2139.954   | 2.105     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 66.00    | 9.067       | 0.139       | 2.192             | 0.076             | 2217.361   | 2.182     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 67.00    | 9.205       | 0.138       | 2.269             | 0.077             | 2295.481   | 2.258     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 68.00    | 9.343       | 0.138       | 2.347             | 0.078             | 2374.437   | 2.336     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 69.00    | 9.481       | 0.138       | 2.400             | 0.053             | 2440.863   | 2.401     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 70.00    | 9.573       | 0.092       | 2.453             | 0.053             | 2494.460   | 2.454     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 71.00    | 9.665       | 0.092       | 2.506             | 0.053             | 2548.306   | 2.507     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 72.00    | 9.757       | 0.092       | 2.559             | 0.053             | 2602.432   | 2.560     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 73.00    | 9.849       | 0.092       | 2.587             | 0.028             | 2643.832   | 2.601     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 74.00    | 9.897       | 0.048       | 2.615             | 0.028             | 2672.334   | 2.629     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 75.00    | 9.945       | 0.048       | 2.643             | 0.028             | 2700.846   | 2.657     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 76.00    | 9.993       | 0.048       | 2.671             | 0.028             | 2729.451   | 2.685     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 77.00    | 10.041      | 0.048       | 2.700             | 0.029             | 2758.265   | 2.714     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 78.00    | 10.089      | 0.048       | 2.729             | 0.029             | 2787.289   | 2.742     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 79.00    | 10.137      | 0.048       | 2.757             | 0.029             | 2816.407   | 2.771     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 80.00    | 10.185      | 0.048       | 2.786             | 0.029             | 2845.616   | 2.800     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 81.00    | 10.233      | 0.048       | 2.815             | 0.029             | 2874.799   | 2.828     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 82.00    | 10.281      | 0.048       | 2.844             | 0.029             | 2903.953   | 2.857     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 83.00    | 10.329      | 0.048       | 2.872             | 0.029             | 2933.195   | 2.886     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 84.00    | 10.377      | 0.048       | 2.901             | 0.029             | 2962.525   | 2.915     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 85.00    | 10.425      | 0.048       | 2.930             | 0.029             | 2991.943   | 2.944     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 86.00    | 10.473      | 0.048       | 2.959             | 0.029             | 3021.448   | 2.973     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 87.00    | 10.520      | 0.048       | 2.989             | 0.029             | 3051.039   | 3.002     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 88.00    | 10.568      | 0.048       | 3.018             | 0.029             | 3080.716   | 3.031     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 89.00    | 10.616      | 0.048       | 3.047             | 0.030             | 3110.599   | 3.060     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 90.00    | 10.664      | 0.048       | 3.077             | 0.030             | 3140.690   | 3.090     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 91.00    | 10.712      | 0.048       | 3.107             | 0.030             | 3170.866   | 3.120     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 92.00    | 10.761      | 0.048       | 3.137             | 0.030             | 3201.127   | 3.149     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 93.00    | 10.809      | 0.048       | 3.166             | 0.030             | 3231.350   | 3.179     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 94.00    | 10.857      | 0.048       | 3.196             | 0.030             | 3261.533   | 3.209     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 95.00    | 10.904      | 0.048       | 3.226             | 0.030             | 3291.797   | 3.239     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 96.00    | 10.952      | 0.048       | 3.255             | 0.029             | 3322.026   | 3.268     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 97.00    | 11.000      | 0.048       | 3.255             | 0.000             | 3337.178   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 98.00    | 11.000      | 0.000       | 3.255             | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 99.00    | 11.000      | 0.000       | -0.000            | -3.255            | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 100.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 101.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 102.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 103.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 104.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 105.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 106.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 107.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 108.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 109.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 110.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 111.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 112.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 113.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 114.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 115.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 116.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 117.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 118.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 119.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-3 | BASE  | 120.00   | 11.000      | 0.000       | -0.000            | 0.000             | 3337.253   | 3.283     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | ←MAX |
| 25Y96H     | BASIN 1-4 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |
| 25Y96H     | BASIN 1-4 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0    |

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Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|
| 25Y96H     | BASIN 1-4 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 50.25    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 50.50    | 2.373       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 50.75    | 2.397       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 51.00    | 2.422       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 51.25    | 2.447       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 51.50    | 2.472       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 51.75    | 2.497       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 52.00    | 2.521       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 52.25    | 2.546       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 52.50    | 2.577       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 52.75    | 2.608       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 53.00    | 2.638       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 53.25    | 2.669       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 53.50    | 2.700       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 53.75    | 2.730       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 54.00    | 2.761       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 54.25    | 2.792       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 54.50    | 2.830       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 54.75    | 2.869       | 0.038       | 0.000             | 0.000             | 0.010      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 55.00    | 2.907       | 0.038       | 0.000             | 0.000             | 0.281      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 55.25    | 2.945       | 0.038       | 0.001             | 0.000             | 1.229      | 0.000     |
| 25Y96H     | BASIN 1-4 | BASE  | 55.50    | 2.984       | 0.038       | 0.001             | 0.001             | 3.054      | 0.001     |
| 25Y96H     | BASIN 1-4 | BASE  | 55.75    | 3.022       | 0.038       | 0.002             | 0.001             | 5.777      | 0.001     |
| 25Y96H     | BASIN 1-4 | BASE  | 56.00    | 3.061       | 0.038       | 0.003             | 0.001             | 9.397      | 0.002     |
| 25Y96H     | BASIN 1-4 | BASE  | 56.25    | 3.099       | 0.039       | 0.005             | 0.002             | 14.844     | 0.003     |
| 25Y96H     | BASIN 1-4 | BASE  | 56.50    | 3.158       | 0.058       | 0.007             | 0.002             | 22.999     | 0.005     |
| 25Y96H     | BASIN 1-4 | BASE  | 56.75    | 3.216       | 0.058       | 0.010             | 0.003             | 33.524     | 0.007     |
| 25Y96H     | BASIN 1-4 | BASE  | 57.00    | 3.275       | 0.058       | 0.013             | 0.003             | 46.077     | 0.010     |
| 25Y96H     | BASIN 1-4 | BASE  | 57.25    | 3.333       | 0.058       | 0.017             | 0.004             | 60.594     | 0.013     |
| 25Y96H     | BASIN 1-4 | BASE  | 57.50    | 3.391       | 0.058       | 0.021             | 0.004             | 77.047     | 0.017     |
| 25Y96H     | BASIN 1-4 | BASE  | 57.75    | 3.450       | 0.058       | 0.025             | 0.004             | 95.413     | 0.021     |
| 25Y96H     | BASIN 1-4 | BASE  | 58.00    | 3.508       | 0.058       | 0.030             | 0.005             | 115.686    | 0.026     |
| 25Y96H     | BASIN 1-4 | BASE  | 58.25    | 3.567       | 0.058       | 0.040             | 0.010             | 143.708    | 0.032     |
| 25Y96H     | BASIN 1-4 | BASE  | 58.50    | 3.670       | 0.103       | 0.051             | 0.011             | 184.111    | 0.041     |
| 25Y96H     | BASIN 1-4 | BASE  | 58.75    | 3.773       | 0.104       | 0.063             | 0.012             | 233.269    | 0.052     |
| 25Y96H     | BASIN 1-4 | BASE  | 59.00    | 3.877       | 0.104       | 0.077             | 0.014             | 288.458    | 0.064     |
| 25Y96H     | BASIN 1-4 | BASE  | 59.25    | 3.980       | 0.104       | 0.103             | 0.026             | 365.657    | 0.081     |
| 25Y96H     | BASIN 1-4 | BASE  | 59.50    | 4.164       | 0.184       | 0.138             | 0.035             | 478.584    | 0.106     |
| 25Y96H     | BASIN 1-4 | BASE  | 59.75    | 4.349       | 0.185       | 0.489             | 0.352             | 1032.964   | 0.229     |
| 25Y96H     | BASIN 1-4 | BASE  | 60.00    | 5.805       | 1.456       | 0.998             | 0.508             | 2522.039   | 0.560     |
| 25Y96H     | BASIN 1-4 | BASE  | 60.25    | 7.264       | 1.460       | 1.133             | 0.135             | 4132.830   | 0.918     |

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|
| 25Y96H     | BASIN 1-4 | BASE  | 60.50    | 7.541       | 0.277       | 1.253             | 0.120             | 5054.477   | 1.123     |
| 25Y96H     | BASIN 1-4 | BASE  | 60.75    | 7.817       | 0.276       | 1.317             | 0.064             | 5559.140   | 1.235     |
| 25Y96H     | BASIN 1-4 | BASE  | 61.00    | 7.959       | 0.142       | 1.380             | 0.064             | 5903.738   | 1.312     |
| 25Y96H     | BASIN 1-4 | BASE  | 61.25    | 8.101       | 0.142       | 1.424             | 0.043             | 6168.825   | 1.370     |
| 25Y96H     | BASIN 1-4 | BASE  | 61.50    | 8.193       | 0.092       | 1.467             | 0.043             | 6382.441   | 1.418     |
| 25Y96H     | BASIN 1-4 | BASE  | 61.75    | 8.286       | 0.092       | 1.511             | 0.044             | 6578.876   | 1.462     |
| 25Y96H     | BASIN 1-4 | BASE  | 62.00    | 8.378       | 0.092       | 1.554             | 0.043             | 6774.906   | 1.505     |
| 25Y96H     | BASIN 1-4 | BASE  | 63.00    | 8.470       | 0.092       | 1.666             | 0.112             | 7419.977   | 1.648     |
| 25Y96H     | BASIN 1-4 | BASE  | 64.00    | 8.699       | 0.229       | 1.779             | 0.114             | 7929.106   | 1.762     |
| 25Y96H     | BASIN 1-4 | BASE  | 65.00    | 8.928       | 0.229       | 1.850             | 0.070             | 8344.383   | 1.854     |
| 25Y96H     | BASIN 1-4 | BASE  | 66.00    | 9.067       | 0.139       | 1.920             | 0.071             | 8661.965   | 1.924     |
| 25Y96H     | BASIN 1-4 | BASE  | 67.00    | 9.205       | 0.138       | 1.992             | 0.072             | 8983.575   | 1.996     |
| 25Y96H     | BASIN 1-4 | BASE  | 68.00    | 9.343       | 0.138       | 2.065             | 0.072             | 9308.894   | 2.068     |
| 25Y96H     | BASIN 1-4 | BASE  | 69.00    | 9.481       | 0.138       | 2.114             | 0.049             | 9582.443   | 2.129     |
| 25Y96H     | BASIN 1-4 | BASE  | 70.00    | 9.573       | 0.092       | 2.163             | 0.049             | 9803.351   | 2.178     |
| 25Y96H     | BASIN 1-4 | BASE  | 71.00    | 9.665       | 0.092       | 2.212             | 0.050             | 10025.797  | 2.227     |
| 25Y96H     | BASIN 1-4 | BASE  | 72.00    | 9.757       | 0.092       | 2.262             | 0.050             | 10249.685  | 2.277     |
| 25Y96H     | BASIN 1-4 | BASE  | 73.00    | 9.849       | 0.092       | 2.288             | 0.026             | 10420.676  | 2.315     |
| 25Y96H     | BASIN 1-4 | BASE  | 74.00    | 9.897       | 0.048       | 2.315             | 0.026             | 10538.244  | 2.341     |
| 25Y96H     | BASIN 1-4 | BASE  | 75.00    | 9.945       | 0.048       | 2.341             | 0.026             | 10656.245  | 2.367     |
| 25Y96H     | BASIN 1-4 | BASE  | 76.00    | 9.993       | 0.048       | 2.367             | 0.026             | 10774.677  | 2.394     |
| 25Y96H     | BASIN 1-4 | BASE  | 77.00    | 10.041      | 0.048       | 2.394             | 0.027             | 10894.021  | 2.420     |
| 25Y96H     | BASIN 1-4 | BASE  | 78.00    | 10.089      | 0.048       | 2.421             | 0.027             | 11014.280  | 2.447     |
| 25Y96H     | BASIN 1-4 | BASE  | 79.00    | 10.137      | 0.048       | 2.447             | 0.027             | 11134.967  | 2.474     |
| 25Y96H     | BASIN 1-4 | BASE  | 80.00    | 10.185      | 0.048       | 2.474             | 0.027             | 11256.076  | 2.501     |
| 25Y96H     | BASIN 1-4 | BASE  | 81.00    | 10.233      | 0.048       | 2.501             | 0.027             | 11377.113  | 2.528     |
| 25Y96H     | BASIN 1-4 | BASE  | 82.00    | 10.281      | 0.048       | 2.528             | 0.027             | 11498.073  | 2.554     |
| 25Y96H     | BASIN 1-4 | BASE  | 83.00    | 10.329      | 0.048       | 2.555             | 0.027             | 11619.443  | 2.581     |
| 25Y96H     | BASIN 1-4 | BASE  | 84.00    | 10.377      | 0.048       | 2.582             | 0.027             | 11741.221  | 2.608     |
| 25Y96H     | BASIN 1-4 | BASE  | 85.00    | 10.425      | 0.048       | 2.610             | 0.027             | 11863.402  | 2.636     |
| 25Y96H     | BASIN 1-4 | BASE  | 86.00    | 10.473      | 0.048       | 2.637             | 0.027             | 11985.986  | 2.663     |
| 25Y96H     | BASIN 1-4 | BASE  | 87.00    | 10.520      | 0.048       | 2.664             | 0.027             | 12108.969  | 2.690     |
| 25Y96H     | BASIN 1-4 | BASE  | 88.00    | 10.568      | 0.048       | 2.692             | 0.027             | 12232.350  | 2.718     |
| 25Y96H     | BASIN 1-4 | BASE  | 89.00    | 10.616      | 0.048       | 2.719             | 0.028             | 12356.632  | 2.745     |
| 25Y96H     | BASIN 1-4 | BASE  | 90.00    | 10.664      | 0.048       | 2.747             | 0.028             | 12481.814  | 2.773     |
| 25Y96H     | BASIN 1-4 | BASE  | 91.00    | 10.712      | 0.048       | 2.775             | 0.028             | 12607.393  | 2.801     |
| 25Y96H     | BASIN 1-4 | BASE  | 92.00    | 10.761      | 0.048       | 2.803             | 0.028             | 12733.362  | 2.829     |
| 25Y96H     | BASIN 1-4 | BASE  | 93.00    | 10.809      | 0.048       | 2.831             | 0.028             | 12859.209  | 2.857     |
| 25Y96H     | BASIN 1-4 | BASE  | 94.00    | 10.857      | 0.048       | 2.859             | 0.028             | 12984.928  | 2.885     |
| 25Y96H     | BASIN 1-4 | BASE  | 95.00    | 10.904      | 0.048       | 2.887             | 0.028             | 13111.025  | 2.913     |
| 25Y96H     | BASIN 1-4 | BASE  | 96.00    | 10.952      | 0.048       | 2.915             | 0.028             | 13237.055  | 2.941     |
| 25Y96H     | BASIN 1-4 | BASE  | 97.00    | 11.000      | 0.048       | 2.915             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 98.00    | 11.000      | 0.000       | 0.000             | -2.915            | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 99.00    | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 100.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 101.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 102.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 103.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 104.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 105.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 106.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 107.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 108.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 109.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 110.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 111.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 112.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 113.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 114.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 115.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 116.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 117.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 118.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 119.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-4 | BASE  | 120.00   | 11.000      | 0.000       | 0.000             | 0.000             | 13299.940  | 2.955     |
| 25Y96H     | BASIN 1-5 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |

← max

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|
| 25Y96H     | BASIN 1-5 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 50.25    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 50.50    | 2.373       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 50.75    | 2.397       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 51.00    | 2.422       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 51.25    | 2.447       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 51.50    | 2.472       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 51.75    | 2.497       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 52.00    | 2.521       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 52.25    | 2.546       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 52.50    | 2.577       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 52.75    | 2.608       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 53.00    | 2.638       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 53.25    | 2.669       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 53.50    | 2.700       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 53.75    | 2.730       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 54.00    | 2.761       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 54.25    | 2.792       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 54.50    | 2.830       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 54.75    | 2.869       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 55.00    | 2.907       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 55.25    | 2.945       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 55.50    | 2.984       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 55.75    | 3.022       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 56.00    | 3.061       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 56.25    | 3.099       | 0.039       | 0.000             | 0.000             | 0.261      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 56.50    | 3.158       | 0.058       | 0.001             | 0.000             | 5.055      | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 56.75    | 3.216       | 0.058       | 0.001             | 0.001             | 29.681     | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 57.00    | 3.275       | 0.058       | 0.003             | 0.001             | 97.608     | 0.000     |
| 25Y96H     | BASIN 1-5 | BASE  | 57.25    | 3.333       | 0.058       | 0.004             | 0.002             | 228.372    | 0.001     |
| 25Y96H     | BASIN 1-5 | BASE  | 57.50    | 3.391       | 0.058       | 0.006             | 0.002             | 432.639    | 0.002     |
| 25Y96H     | BASIN 1-5 | BASE  | 57.75    | 3.450       | 0.058       | 0.009             | 0.003             | 715.039    | 0.004     |
| 25Y96H     | BASIN 1-5 | BASE  | 58.00    | 3.508       | 0.058       | 0.012             | 0.003             | 1078.036   | 0.005     |
| 25Y96H     | BASIN 1-5 | BASE  | 58.25    | 3.567       | 0.058       | 0.018             | 0.006             | 1543.672   | 0.008     |
| 25Y96H     | BASIN 1-5 | BASE  | 58.50    | 3.670       | 0.103       | 0.026             | 0.007             | 2194.288   | 0.011     |
| 25Y96H     | BASIN 1-5 | BASE  | 58.75    | 3.773       | 0.104       | 0.034             | 0.009             | 3122.208   | 0.016     |
| 25Y96H     | BASIN 1-5 | BASE  | 59.00    | 3.877       | 0.104       | 0.045             | 0.011             | 4351.258   | 0.022     |
| 25Y96H     | BASIN 1-5 | BASE  | 59.25    | 3.980       | 0.104       | 0.064             | 0.019             | 5933.164   | 0.030     |
| 25Y96H     | BASIN 1-5 | BASE  | 59.50    | 4.164       | 0.184       | 0.092             | 0.028             | 8126.566   | 0.041     |
| 25Y96H     | BASIN 1-5 | BASE  | 59.75    | 4.349       | 0.185       | 0.393             | 0.301             | 13221.001  | 0.067     |
| 25Y96H     | BASIN 1-5 | BASE  | 60.00    | 5.805       | 1.456       | 0.820             | 0.427             | 29954.340  | 0.152     |
| 25Y96H     | BASIN 1-5 | BASE  | 60.25    | 7.264       | 1.460       | 0.971             | 0.151             | 66047.656  | 0.335     |
| 25Y96H     | BASIN 1-5 | BASE  | 60.50    | 7.541       | 0.277       | 1.077             | 0.106             | 112802.547 | 0.573     |
| 25Y96H     | BASIN 1-5 | BASE  | 60.75    | 7.817       | 0.276       | 1.140             | 0.063             | 154186.203 | 0.783     |
| 25Y96H     | BASIN 1-5 | BASE  | 61.00    | 7.959       | 0.142       | 1.198             | 0.058             | 184517.328 | 0.937     |

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |    |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----|
| 25Y96H     | BASIN 1-5 | BASE  | 61.25    | 8.101       | 0.142       | 1.239             | 0.041206167       | 500        | 1.047     | 20 |
| 25Y96H     | BASIN 1-5 | BASE  | 61.50    | 8.193       | 0.092       | 1.279             | 0.040222064       | 969        | 1.128     | 15 |
| 25Y96H     | BASIN 1-5 | BASE  | 61.75    | 8.286       | 0.092       | 1.319             | 0.040234230       | 625        | 1.190     | 11 |
| 25Y96H     | BASIN 1-5 | BASE  | 62.00    | 8.378       | 0.092       | 1.360             | 0.040244218       | 594        | 1.240     | 10 |
| 25Y96H     | BASIN 1-5 | BASE  | 63.00    | 8.470       | 0.092       | 1.463             | 0.103273779       | 250        | 1.391     | 6  |
| 25Y96H     | BASIN 1-5 | BASE  | 64.00    | 8.699       | 0.229       | 1.568             | 0.105295263       | 344        | 1.500     | 5  |
| 25Y96H     | BASIN 1-5 | BASE  | 65.00    | 8.928       | 0.229       | 1.634             | 0.066312719       | 719        | 1.588     | 3  |
| 25Y96H     | BASIN 1-5 | BASE  | 66.00    | 9.067       | 0.139       | 1.700             | 0.066326293       | 188        | 1.657     | 3  |
| 25Y96H     | BASIN 1-5 | BASE  | 67.00    | 9.205       | 0.138       | 1.767             | 0.067339374       | 531        | 1.724     | 3  |
| 25Y96H     | BASIN 1-5 | BASE  | 68.00    | 9.343       | 0.138       | 1.835             | 0.068352605       | 250        | 1.791     | 3  |
| 25Y96H     | BASIN 1-5 | BASE  | 69.00    | 9.481       | 0.138       | 1.881             | 0.046364103       | 281        | 1.849     | 2  |
| 25Y96H     | BASIN 1-5 | BASE  | 70.00    | 9.573       | 0.092       | 1.927             | 0.046373483       | 031        | 1.897     | 2  |
| 25Y96H     | BASIN 1-5 | BASE  | 71.00    | 9.665       | 0.092       | 1.973             | 0.046382582       | 344        | 1.943     | 2  |
| 25Y96H     | BASIN 1-5 | BASE  | 72.00    | 9.757       | 0.092       | 2.019             | 0.046391728       | 781        | 1.990     | 2  |
| 25Y96H     | BASIN 1-5 | BASE  | 73.00    | 9.849       | 0.092       | 2.045             | 0.025399077       | 938        | 2.027     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 74.00    | 9.897       | 0.048       | 2.069             | 0.025404267       | 844        | 2.053     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 75.00    | 9.945       | 0.048       | 2.094             | 0.025409119       | 531        | 2.078     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 76.00    | 9.993       | 0.048       | 2.119             | 0.025413976       | 698        | 2.103     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 77.00    | 10.041      | 0.048       | 2.144             | 0.025418869       | 813        | 2.127     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 78.00    | 10.089      | 0.048       | 2.169             | 0.025423802       | 031        | 2.152     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 79.00    | 10.137      | 0.048       | 2.194             | 0.025428756       | 813        | 2.178     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 80.00    | 10.185      | 0.048       | 2.219             | 0.025433730       | 875        | 2.203     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 81.00    | 10.233      | 0.048       | 2.245             | 0.025438706       | 906        | 2.228     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 82.00    | 10.281      | 0.048       | 2.270             | 0.025443681       | 625        | 2.253     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 83.00    | 10.329      | 0.048       | 2.296             | 0.025448671       | 688        | 2.279     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 84.00    | 10.377      | 0.048       | 2.321             | 0.026453680       | 063        | 2.304     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 85.00    | 10.425      | 0.048       | 2.347             | 0.026458706       | 719        | 2.330     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 86.00    | 10.473      | 0.048       | 2.372             | 0.026463751       | 563        | 2.355     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 87.00    | 10.520      | 0.048       | 2.398             | 0.026468814       | 500        | 2.381     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 88.00    | 10.568      | 0.048       | 2.424             | 0.026473895       | 406        | 2.407     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 89.00    | 10.616      | 0.048       | 2.450             | 0.026479011       | 688        | 2.433     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 90.00    | 10.664      | 0.048       | 2.477             | 0.026484166       | 563        | 2.459     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 91.00    | 10.712      | 0.048       | 2.503             | 0.026489342       | 719        | 2.485     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 92.00    | 10.761      | 0.048       | 2.529             | 0.026494536       | 750        | 2.512     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 93.00    | 10.809      | 0.048       | 2.556             | 0.026499730       | 656        | 2.538     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 94.00    | 10.857      | 0.048       | 2.582             | 0.026504921       | 031        | 2.564     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 95.00    | 10.904      | 0.048       | 2.609             | 0.027510125       | 281        | 2.591     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 96.00    | 10.952      | 0.048       | 2.634             | 0.025515323       | 750        | 2.617     | 1  |
| 25Y96H     | BASIN 1-5 | BASE  | 97.00    | 11.000      | 0.048       | 2.634             | 0.000518262       | 281        | 2.632     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 98.00    | 11.000      | 0.000       | 2.634             | 0.000518620       | 875        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 99.00    | 11.000      | 0.000       | 2.634             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 100.00   | 11.000      | 0.000       | 0.000             | -2.634518633      | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 101.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 102.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 103.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 104.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 105.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 106.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 107.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 108.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 109.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 110.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 111.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 112.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 113.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 114.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 115.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 116.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 117.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 118.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 119.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-5 | BASE  | 120.00   | 11.000      | 0.000       | 0.000             | 0.000518633       | 063        | 2.634     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |

← max

Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |    |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----|
| 25Y96H     | BASIN 1-6 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 4.409      | 0.000     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 38.00    | 1.474       | 0.063       | 0.002             | 0.001             | 19.194     | 0.002     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 39.00    | 1.538       | 0.063       | 0.004             | 0.002             | 45.744     | 0.004     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 40.00    | 1.601       | 0.063       | 0.008             | 0.004             | 83.767     | 0.008     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 41.00    | 1.664       | 0.063       | 0.013             | 0.005             | 134.038    | 0.012     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 42.00    | 1.729       | 0.065       | 0.018             | 0.006             | 196.627    | 0.018     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 43.00    | 1.795       | 0.065       | 0.025             | 0.007             | 270.527    | 0.025     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 44.00    | 1.860       | 0.065       | 0.033             | 0.008             | 355.440    | 0.032     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 45.00    | 1.925       | 0.065       | 0.041             | 0.008             | 449.333    | 0.041     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 46.00    | 1.988       | 0.063       | 0.051             | 0.009             | 551.624    | 0.050     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 47.00    | 2.052       | 0.063       | 0.061             | 0.010             | 663.495    | 0.060     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 48.00    | 2.115       | 0.063       | 0.072             | 0.011             | 784.748    | 0.071     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 49.00    | 2.178       | 0.063       | 0.088             | 0.016             | 940.116    | 0.085     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 50.00    | 2.263       | 0.085       | 0.106             | 0.018             | 1132.876   | 0.103     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 50.25    | 2.348       | 0.085       | 0.111             | 0.005             | 1187.912   | 0.108     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 50.50    | 2.373       | 0.025       | 0.117             | 0.006             | 1248.464   | 0.114     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 50.75    | 2.397       | 0.025       | 0.123             | 0.006             | 1310.313   | 0.119     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 51.00    | 2.422       | 0.025       | 0.128             | 0.006             | 1373.446   | 0.125     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 51.25    | 2.447       | 0.025       | 0.134             | 0.006             | 1437.851   | 0.131     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 51.50    | 2.472       | 0.025       | 0.140             | 0.006             | 1503.517   | 0.137     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 51.75    | 2.497       | 0.025       | 0.146             | 0.006             | 1570.432   | 0.143     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 52.00    | 2.521       | 0.025       | 0.153             | 0.006             | 1638.594   | 0.149     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 52.25    | 2.546       | 0.025       | 0.160             | 0.008             | 1716.441   | 0.156     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 52.50    | 2.577       | 0.031       | 0.168             | 0.008             | 1804.271   | 0.164     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 52.75    | 2.608       | 0.031       | 0.177             | 0.008             | 1893.943   | 0.172     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 53.00    | 2.638       | 0.031       | 0.185             | 0.008             | 1985.434   | 0.181     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 53.25    | 2.669       | 0.031       | 0.194             | 0.009             | 2078.725   | 0.189     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 53.50    | 2.700       | 0.031       | 0.202             | 0.009             | 2173.796   | 0.198     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 53.75    | 2.730       | 0.031       | 0.211             | 0.009             | 2270.628   | 0.206     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 54.00    | 2.761       | 0.031       | 0.220             | 0.009             | 2369.222   | 0.215     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 54.25    | 2.792       | 0.031       | 0.232             | 0.011             | 2482.436   | 0.226     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 54.50    | 2.830       | 0.038       | 0.243             | 0.012             | 2610.707   | 0.237     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 54.75    | 2.869       | 0.038       | 0.255             | 0.012             | 2741.604   | 0.249     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 55.00    | 2.907       | 0.038       | 0.268             | 0.012             | 2875.094   | 0.261     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 55.25    | 2.945       | 0.038       | 0.280             | 0.012             | 3011.140   | 0.274     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 55.50    | 2.984       | 0.038       | 0.293             | 0.013             | 3149.709   | 0.286     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 55.75    | 3.022       | 0.038       | 0.306             | 0.013             | 3290.769   | 0.299     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 56.00    | 3.061       | 0.038       | 0.319             | 0.013             | 3434.473   | 0.312     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 56.25    | 3.099       | 0.039       | 0.339             | 0.020             | 3619.536   | 0.329     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 56.50    | 3.158       | 0.058       | 0.360             | 0.021             | 3847.271   | 0.350     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 56.75    | 3.216       | 0.058       | 0.381             | 0.021             | 4080.399   | 0.371     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 57.00    | 3.275       | 0.058       | 0.403             | 0.022             | 4318.813   | 0.393     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 57.25    | 3.333       | 0.058       | 0.426             | 0.022             | 4562.414   | 0.415     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 57.50    | 3.391       | 0.058       | 0.448             | 0.023             | 4811.100   | 0.437     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 57.75    | 3.450       | 0.058       | 0.471             | 0.023             | 5064.774   | 0.460     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 58.00    | 3.508       | 0.058       | 0.495             | 0.024             | 5323.459   | 0.484     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 58.25    | 3.567       | 0.058       | 0.538             | 0.043             | 5692.080   | 0.518     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 58.50    | 3.670       | 0.103       | 0.582             | 0.044             | 6175.315   | 0.561     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 58.75    | 3.773       | 0.104       | 0.628             | 0.046             | 6672.751   | 0.607     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 59.00    | 3.877       | 0.104       | 0.675             | 0.047             | 7184.222   | 0.653     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 59.25    | 3.980       | 0.104       | 0.761             | 0.086             | 7923.078   | 0.720     | 1  |
| 25Y96H     | BASIN 1-6 | BASE  | 59.50    | 4.164       | 0.184       | 0.854             | 0.093             | 8907.397   | 0.810     | 1  |
| 25Y96H     | BASIN 1-6 | BASE  | 59.75    | 4.349       | 0.185       | 1.668             | 0.814             | 14135.086  | 1.285     | 10 |
| 25Y96H     | BASIN 1-6 | BASE  | 60.00    | 5.805       | 1.456       | 2.626             | 0.959             | 24294.150  | 2.209     | 12 |
| 25Y96H     | BASIN 1-6 | BASE  | 60.25    | 7.264       | 1.460       | 2.826             | 0.199             | 30804.586  | 2.801     | 2  |
| 25Y96H     | BASIN 1-6 | BASE  | 60.50    | 7.541       | 0.277       | 3.023             | 0.198             | 32970.262  | 2.998     | 2  |
| 25Y96H     | BASIN 1-6 | BASE  | 60.75    | 7.817       | 0.276       | 3.126             | 0.103             | 34628.688  | 3.148     | 1  |
| 25Y96H     | BASIN 1-6 | BASE  | 61.00    | 7.959       | 0.142       | 3.230             | 0.104             | 35766.797  | 3.252     | 1  |
| 25Y96H     | BASIN 1-6 | BASE  | 61.25    | 8.101       | 0.142       | 3.298             | 0.068             | 36710.887  | 3.338     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 61.50    | 8.193       | 0.092       | 3.366             | 0.068             | 37458.770  | 3.406     | 0  |
| 25Y96H     | BASIN 1-6 | BASE  | 61.75    | 8.286       | 0.092       | 3.435             | 0.068             | 38210.141  | 3.474     | 0  |

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Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Basin Tme Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in |       |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|-------|
| 25Y96H     | BASIN 1-6 | BASE  | 62.00    | 8.378       | 0.092       | 3.503             | 0.068             | 38964.219  | 3.543     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 63.00    | 8.470       | 0.092       | 3.675             | 0.172             | 41424.207  | 3.766     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 64.00    | 8.699       | 0.229       | 3.849             | 0.174             | 43333.098  | 3.940     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 65.00    | 8.928       | 0.229       | 3.955             | 0.106             | 44874.551  | 4.080     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 66.00    | 9.067       | 0.139       | 4.062             | 0.106             | 46042.695  | 4.186     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 67.00    | 9.205       | 0.138       | 4.168             | 0.107             | 47217.293  | 4.293     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 68.00    | 9.343       | 0.138       | 4.276             | 0.107             | 48397.180  | 4.400     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 69.00    | 9.481       | 0.138       | 4.348             | 0.072             | 49383.895  | 4.490     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 70.00    | 9.573       | 0.092       | 4.420             | 0.072             | 50176.641  | 4.562     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 71.00    | 9.665       | 0.092       | 4.492             | 0.072             | 50971.531  | 4.634     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 72.00    | 9.757       | 0.092       | 4.565             | 0.073             | 51768.121  | 4.707     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 73.00    | 9.849       | 0.092       | 4.603             | 0.038             | 52374.641  | 4.762     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 74.00    | 9.897       | 0.048       | 4.641             | 0.038             | 52790.551  | 4.800     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 75.00    | 9.945       | 0.048       | 4.679             | 0.038             | 53207.125  | 4.837     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 76.00    | 9.993       | 0.048       | 4.717             | 0.038             | 53624.363  | 4.875     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 77.00    | 10.041      | 0.048       | 4.755             | 0.038             | 54043.965  | 4.914     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 78.00    | 10.089      | 0.048       | 4.793             | 0.038             | 54465.926  | 4.952     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 79.00    | 10.137      | 0.048       | 4.832             | 0.038             | 54888.539  | 4.990     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 80.00    | 10.185      | 0.048       | 4.870             | 0.039             | 55311.793  | 5.029     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 81.00    | 10.233      | 0.048       | 4.909             | 0.038             | 55733.965  | 5.067     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 82.00    | 10.281      | 0.048       | 4.947             | 0.038             | 56155.055  | 5.106     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 83.00    | 10.329      | 0.048       | 4.985             | 0.038             | 56576.766  | 5.144     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 84.00    | 10.377      | 0.048       | 5.024             | 0.038             | 56999.090  | 5.182     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 85.00    | 10.425      | 0.048       | 5.062             | 0.039             | 57422.023  | 5.221     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 86.00    | 10.473      | 0.048       | 5.101             | 0.039             | 57845.559  | 5.259     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 87.00    | 10.520      | 0.048       | 5.140             | 0.039             | 58269.691  | 5.298     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 88.00    | 10.568      | 0.048       | 5.178             | 0.039             | 58694.418  | 5.336     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 89.00    | 10.616      | 0.048       | 5.217             | 0.039             | 59121.473  | 5.375     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 90.00    | 10.664      | 0.048       | 5.256             | 0.039             | 59550.852  | 5.414     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 91.00    | 10.712      | 0.048       | 5.295             | 0.039             | 59980.816  | 5.453     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 92.00    | 10.761      | 0.048       | 5.335             | 0.039             | 60411.355  | 5.492     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 93.00    | 10.809      | 0.048       | 5.374             | 0.039             | 60840.719  | 5.532     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 94.00    | 10.857      | 0.048       | 5.413             | 0.039             | 61268.910  | 5.570     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 95.00    | 10.904      | 0.048       | 5.452             | 0.039             | 61697.660  | 5.609     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 96.00    | 10.952      | 0.048       | 5.491             | 0.039             | 62126.266  | 5.648     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 97.00    | 11.000      | 0.048       | 5.491             | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 98.00    | 11.000      | 0.000       | -0.000            | -5.491            | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 99.00    | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 100.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 101.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 102.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 103.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 104.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 105.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 106.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 107.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 108.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 109.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 110.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 111.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 112.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 113.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 114.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 115.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 116.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 117.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 118.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 119.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | 0     |
| 25Y96H     | BASIN 1-6 | BASE  | 120.00   | 11.000      | 0.000       | -0.000            | 0.000             | 62340.355  | 5.668     | ← MAX |



Hartwood Marsh Road  
Phase I  
Basin 1  
Post Development  
Node Min/Max

| Name       | Group | Simulation | Max Time<br>Stage<br>hrs | Max<br>Stage<br>ft | Warning<br>Stage<br>ft | Max Delta<br>Stage<br>ft | Max Surf<br>Area<br>ft2 | Max Time<br>Inflow<br>hrs | Max<br>Inflow<br>cfs | Max Time<br>Outflow<br>hrs | Max<br>Outflow<br>cfs |
|------------|-------|------------|--------------------------|--------------------|------------------------|--------------------------|-------------------------|---------------------------|----------------------|----------------------------|-----------------------|
| POND 1     | BASE  | 100Y24H    | 12.63                    | 99.898             | 102.000                | 0.0100                   | 46464                   | 12.00                     | 67.917               | 12.48                      | 17.410                |
| UNNAMED LK | BASE  | 100Y24H    | 15.01                    | 99.800             | 100.000                | 0.0098                   | 0                       | 12.50                     | 66.576               | 0.00                       | 0.000                 |
| POND 1     | BASE  | 10Y24H     | 15.60                    | 99.018             | 102.000                | 0.0100                   | 43466                   | 12.00                     | 41.914               | 12.46                      | 10.728                |
| UNNAMED LK | BASE  | 10Y24H     | 15.01                    | 99.000             | 100.000                | 0.0089                   | 0                       | 12.65                     | 21.944               | 0.00                       | 0.000                 |
| POND 1     | BASE  | 2.3Y24H    | 15.44                    | 98.400             | 102.000                | 0.0100                   | 41359                   | 12.00                     | 26.184               | 15.83                      | 1.701                 |
| UNNAMED LK | BASE  | 2.3Y24H    | 15.01                    | 98.400             | 100.000                | 0.0082                   | 0                       | 15.74                     | 2.665                | 0.00                       | 0.000                 |
| POND 1     | BASE  | 25Y24H     | 15.57                    | 99.322             | 102.000                | 0.0100                   | 44500                   | 12.00                     | 52.282               | 12.47                      | 13.520                |
| UNNAMED LK | BASE  | 25Y24H     | 15.00                    | 99.300             | 100.000                | 0.0092                   | 0                       | 12.51                     | 37.584               | 0.00                       | 0.000                 |
| POND 1     | BASE  | 25Y96H     | 60.26                    | 99.152             | 102.000                | -0.0100                  | 43920                   | 60.00                     | 60.946               | 60.25                      | 26.790                |
| UNNAMED LK | BASE  | 25Y96H     | 97.01                    | 98.275             | 100.000                | 0.0013                   | 0                       | 60.50                     | 78.723               | 0.00                       | 0.000                 |

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*Water Quality Treatment and Recovery*  
*Calculations*

**POLLUTION ABATEMENT VOLUME**

**HNTB**

|          |      |           |
|----------|------|-----------|
|          | DATE |           |
| MADE BY: | MSF  | 18-Sep-07 |
| CHCK BY: | KMV  | 20-Sep-07 |

**PROJECT: HARTWOOD MARSH ROAD**

**LOCATION: BASIN 1 AFTER FIRST BAPTIST CHURCH IS CONSTRUCTED**

BASIN LIMITS: STA.  to STA , CL CONST. HARTWOOD MARSH RD.

TOTAL TREATMENT AREA:  AC. Basin 1, 1-1, 1-2, 1-3 and 1-4; inc. Pond  
 IMPERVIOUS AREA:  AC. exc.. Pond impervious

UNDERLINE ONE: RETENTION DETENTION  
 UNDERLINE ONE: DRY WET  
 UNDERLINE ONE: ONLINE OFFLINE

**REQUIRED TREATMENT VOLUME:**

1) COMPUTE FIRST 0.5 INCH OF RUNOFF FROM PROJECT:  

$$(0.5"/12) \times 13.24 \text{ AC.} = \text{0.55 AF}$$

2) COMPUTE 1.25 INCHES TIMES IMPERVIOUS AREA:  

$$(1.25"/12) \times 7.18 \text{ AC.} = \text{0.75 AF}$$

**CONTROLLING CRITERIA:**

**REQUIRED TREATMENT VOLUME:**  AF

3) ADDITIONAL 0.5" INCH FOR ON-LINE RETENTION:  

$$0.55 \text{ AF} + 0.75 \text{ AF} = \text{1.30 AF}$$

**TOTAL REQUIRED TREATMENT VOLUME:**  AF

**STAGE / STORAGE CALCULATIONS**



DATE

|          |     |           |
|----------|-----|-----------|
| MADE BY: | MSF | 23-Apr-08 |
| CHCK BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

POND: 1

| Boring | Existing Ground Elevation | Depth to Encountered Water Surface | Estimated Encountered Water Elevation | Seasonal High Water Surface | Seasonal High Water Elevation | Normal High Water Elevation |
|--------|---------------------------|------------------------------------|---------------------------------------|-----------------------------|-------------------------------|-----------------------------|
| AB-P1  | 101.23                    | 9.0                                | 92.2                                  | 9                           | 92.23                         | 92.23                       |
| AB-P2  | 102.85                    | 11.0                               | 91.9                                  | 11                          | 91.85                         | 91.85                       |

Note: Above information per pond boring profiles: Ardaman & Associates, August 2007  
Per Ardaman report encountered water elevation equals seasonal high water elevation.

AVERAGE ELEVATION (FT)                      92.04 ft.                      92.04 ft.                      92.04 ft.

AVG. SHWT ELEVATION: 92.0 Ft. (NAVD)

AVG. GROUND WATER TABLE ELEVATION: 92.0 Ft. (NAVD)

POND CONTROL ELEVATION 95.0 Ft. (NAVD)

Lake County criteria is pond bottom needs to be 3 feet above seasonal high water elevation

| STAGE<br>Ft. (NAVD) | AREA<br>AC. | AVERAGE AREA<br>AC. | INCREMENTAL VOL.<br>AF | CUMULATIVE VOL.<br>AF |
|---------------------|-------------|---------------------|------------------------|-----------------------|
| 95.0                | 0.701       |                     | 0.00                   | 0.00                  |
|                     |             | 0.77                |                        |                       |
| 97.0                | 0.839       |                     | 1.54                   | 1.54                  |
|                     |             | 1.04                |                        |                       |
| 102.0               | 1.231       |                     | 5.18                   | 6.72                  |
|                     |             |                     |                        |                       |

REQUIRED TREATMENT VOLUME: 1.30 AF

REQUIRED WEIR ELEVATION: 96.69 Ft.

Check for required attenuation volume elevation because closed basin

PROPOSED WEIR ELEVATION: 96.69 Ft.

PROVIDED TREATMENT VOLUME: 1.30 AF

PERCOLATION RATE: 24 Ft./Day or 12 Inches/Hr.      Boring AB-P2

FACTOR OF SAFETY: 2 = 6 Inches/Hr. = 12 Ft./Day



STAGE / STORAGE CALCULATIONS

|          |      |           |
|----------|------|-----------|
|          | DATE |           |
| MADE BY: | MSF  | 23-Apr-08 |
| CHCK BY: | KMV  | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

POND: 1

Attenuation Volume For 25 Year/96 Hour Storm Event

Volumes from AdICPR

| Basin        | Pre-development<br>CF | Post Development<br>CF |
|--------------|-----------------------|------------------------|
| 1            | 236,582               | 299,448                |
| 1-1          | 2,422                 | 2,120                  |
| 1-2          | 2,505                 | 2,518                  |
| 1-3          | 3,549                 | 3,337                  |
| 1-4          | 14,773                | 13,300                 |
| 1-5          | 571,414               | 518,633                |
| 1-6          | 0                     | 62,340                 |
| <b>TOTAL</b> | <b>831,245</b>        | <b>901,696</b>         |

REQUIRED ATTENUATION VOLUME: 70,451 CF

REQUIRED ATTENUATION VOLUME: 1.62 AF

REQUIRED WEIR ELEVATION: 97.07 Ft.

ACTUAL WEIR ELEVATION 97.50 Ft.

PONDS Version 3.3.0223  
Retention Pond Recovery - Refined Method  
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Devo Seereeram, Ph.D., P.E.

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**Project Data**

Project Name: Hartwood Marsh Road Phase 1  
Simulation Description: Pond 1 Water Quality Recovery  
Project Number: 41561  
Engineer : KMV  
Supervising Engineer:  
Date: 04-30-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 85.00  
Water Table Elevation, [WT] (ft datum): 92.00  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 12.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 12.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 35615.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 206.0  
Equivalent Pond Width, [W] (ft): 166.0  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 95.00               | 30517.0                    |
| 97.00               | 36587.0                    |
| 102.00              | 53613.0                    |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 56624

Initial ground water level (ft datum) default, 92.00

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.100                                        | 1.750                                        | 2.400                                        | 3.300                                        |
| 0.250                                        | 2.000                                        | 2.500                                        | 3.400                                        |
| 0.500                                        | 2.100                                        | 3.000                                        | 3.500                                        |
| 1.000                                        | 2.200                                        | 3.100                                        |                                              |
| 1.500                                        | 2.300                                        | 3.200                                        |                                              |

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**Retention Pond Recovery - Refined Method**  
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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 9437.3330                        | 0.0000                    | 92.000                     | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 9437.3330                        | 0.0000                    | 96.709                     | 4.94617                                | 0.00000                                 | 56624.0                                     | 29.7                                              | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 95.586                     | 2.75614                                | 0.00000                                 | 56624.0                                     | 38231.8                                           | 0.0                                            | U/S       |
| 6.000                | 0.0000                           | 0.0000                    | 95.484                     | 0.21655                                | 0.00000                                 | 56624.0                                     | 41493.5                                           | 0.0                                            | S         |
| 12.000               | 0.0000                           | 0.0000                    | 95.377                     | 0.14007                                | 0.00000                                 | 56624.0                                     | 44906.5                                           | 0.0                                            | S         |
| 24.000               | 0.0000                           | 0.0000                    | 95.234                     | 0.09183                                | 0.00000                                 | 56624.0                                     | 49407.1                                           | 0.0                                            | S         |
| 36.000               | 0.0000                           | 0.0000                    | 95.123                     | 0.07365                                | 0.00000                                 | 56624.0                                     | 52840.3                                           | 0.0                                            | S         |
| 42.000               | 0.0000                           | 0.0000                    | 95.074                     | 0.06743                                | 0.00000                                 | 56624.0                                     | 54368.1                                           | 0.0                                            | S         |
| 48.000               | 0.0000                           | 0.0000                    | 95.029                     | 0.06242                                | 0.00000                                 | 56624.0                                     | 55753.1                                           | 0.0                                            | S         |
| 50.400               | 0.0000                           | 0.0000                    | 95.011                     | 0.05040                                | 0.00000                                 | 56624.0                                     | 56286.6                                           | 0.0                                            | S         |
| 52.800               | 0.0000                           | 0.0000                    | 94.984                     | 0.01953                                | 0.00000                                 | 56624.0                                     | 56624.0                                           | 0.0                                            | S         |
| 55.200               | 0.0000                           | 0.0000                    | 94.940                     | 0.00000                                | 0.00000                                 | 56624.0                                     | 56624.0                                           | 0.0                                            | S         |
| 57.600               | 0.0000                           | 0.0000                    | 94.899                     | 0.00000                                | 0.00000                                 | 56624.0                                     | 56624.0                                           | 0.0                                            | S         |
| 60.000               | 0.0000                           | 0.0000                    | 94.861                     | 0.00000                                | 0.00000                                 | 56624.0                                     | 56624.0                                           | 0.0                                            | S         |
| 72.000               | 0.0000                           | 0.0000                    | 94.703                     | 0.00000                                | 0.00000                                 | 56624.0                                     | 56624.0                                           | 0.0                                            | S         |
| 74.400               | 0.0000                           | 0.0000                    | 94.673                     | 0.00000                                | 0.00000                                 | 56624.0                                     | 56624.0                                           | 0.0                                            | S         |
| 76.800               | 0.0000                           | 0.0000                    | 94.644                     | 0.00000                                | 0.00000                                 | 56624.0                                     | 56624.0                                           | 0.0                                            | S         |
| 79.200               | 0.0000                           | 0.0000                    | 94.616                     | 0.00000                                | 0.00000                                 | 56624.0                                     | 56624.0                                           | 0.0                                            | S         |
| 81.600               | 0.0000                           | 0.0000                    | 94.590                     | 0.00000                                | 0.00000                                 | 56624.0                                     | 56624.0                                           | 0.0                                            | S         |
| 84.000               | 0.0000                           | 0.0000                    | 94.564                     | ---                                    | ---                                     | 56624.0                                     | 56624.0                                           | 0.0                                            | N.A.      |

*Recovery  
51.4 hours*



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**Retention Pond Recovery - Refined Method**  
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**Project Data**

Project Name: Hartwood Marsh Road Phase 1  
Simulation Description: Pond 1 25 Year/96 Hour Attenuation  
Project Number: 41561  
Engineer : KMV  
Supervising Engineer:  
Date: 04-30-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 85.00  
Water Table Elevation, [WT] (ft datum): 92.00  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 12.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 12.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 36786.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 214.0  
Equivalent Pond Width, [W] (ft): 191.0  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 95.00               | 30517.0                    |
| 97.00               | 36587.0                    |
| 102.00              | 53613.0                    |

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**Scenario Input Data**

*Scenario 1 :: 25 year/96 hour attenuation*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 70451

Initial ground water level (ft datum) default, 92.00

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.100                         | 2.100                         | 3.200                         | 7.000                         | 14.000                        |
| 0.250                         | 2.200                         | 3.300                         | 8.000                         | 15.000                        |
| 0.500                         | 2.300                         | 3.400                         | 9.000                         | 16.000                        |
| 1.000                         | 2.400                         | 3.500                         | 10.000                        |                               |
| 1.500                         | 2.500                         | 4.000                         | 11.000                        |                               |
| 1.750                         | 3.000                         | 5.000                         | 12.000                        |                               |
| 2.000                         | 3.100                         | 6.000                         | 13.000                        |                               |

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**Detailed Results** :: Scenario 1 :: 25 year/96 hour attenuation

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 11741.8300                       | 0.0000                    | 92.000                     | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 11741.8300                       | 0.0000                    | 97.090                     | 5.10891                                | 0.00000                                 | 70451.0                                     | 30.7                                              | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 95.924                     | 2.96441                                | 0.00000                                 | 70451.0                                     | 40944.3                                           | 0.0                                            | U/S       |
| 6.000                | 0.0000                           | 0.0000                    | 95.807                     | 0.25877                                | 0.00000                                 | 70451.0                                     | 44847.5                                           | 0.0                                            | S         |
| 12.000               | 0.0000                           | 0.0000                    | 95.683                     | 0.16646                                | 0.00000                                 | 70451.0                                     | 48910.4                                           | 0.0                                            | S         |
| 24.000               | 0.0000                           | 0.0000                    | 95.518                     | 0.10834                                | 0.00000                                 | 70451.0                                     | 54232.7                                           | 0.0                                            | S         |
| 36.000               | 0.0000                           | 0.0000                    | 95.392                     | 0.08646                                | 0.00000                                 | 70451.0                                     | 58270.5                                           | 0.0                                            | S         |
| 42.000               | 0.0000                           | 0.0000                    | 95.335                     | 0.07899                                | 0.00000                                 | 70451.0                                     | 60062.5                                           | 0.0                                            | S         |
| 48.000               | 0.0000                           | 0.0000                    | 95.283                     | 0.07299                                | 0.00000                                 | 70451.0                                     | 61683.0                                           | 0.0                                            | S         |
| 50.400               | 0.0000                           | 0.0000                    | 95.263                     | 0.07089                                | 0.00000                                 | 70451.0                                     | 62306.6                                           | 0.0                                            | S         |
| 52.800               | 0.0000                           | 0.0000                    | 95.244                     | 0.06843                                | 0.00000                                 | 70451.0                                     | 62908.0                                           | 0.0                                            | S         |
| 55.200               | 0.0000                           | 0.0000                    | 95.226                     | 0.06618                                | 0.00000                                 | 70451.0                                     | 63489.1                                           | 0.0                                            | S         |
| 57.600               | 0.0000                           | 0.0000                    | 95.208                     | 0.06411                                | 0.00000                                 | 70451.0                                     | 64051.6                                           | 0.0                                            | S         |
| 60.000               | 0.0000                           | 0.0000                    | 95.190                     | 0.06189                                | 0.00000                                 | 70451.0                                     | 64597.0                                           | 0.0                                            | S         |
| 72.000               | 0.0000                           | 0.0000                    | 95.112                     | 0.05460                                | 0.00000                                 | 70451.0                                     | 67005.7                                           | 0.0                                            | S         |
| 74.400               | 0.0000                           | 0.0000                    | 95.097                     | 0.05372                                | 0.00000                                 | 70451.0                                     | 67475.5                                           | 0.0                                            | S         |
| 76.800               | 0.0000                           | 0.0000                    | 95.082                     | 0.05245                                | 0.00000                                 | 70451.0                                     | 67934.0                                           | 0.0                                            | S         |
| 79.200               | 0.0000                           | 0.0000                    | 95.068                     | 0.05126                                | 0.00000                                 | 70451.0                                     | 68381.9                                           | 0.0                                            | S         |
| 81.600               | 0.0000                           | 0.0000                    | 95.053                     | 0.05012                                | 0.00000                                 | 70451.0                                     | 68819.7                                           | 0.0                                            | S         |
| 84.000               | 0.0000                           | 0.0000                    | 95.039                     | 0.04595                                | 0.00000                                 | 70451.0                                     | 69248.0                                           | 0.0                                            | S         |
| 96.000               | 0.0000                           | 0.0000                    | 94.947                     | 0.01856                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 120.000              | 0.0000                           | 0.0000                    | 94.728                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 144.000              | 0.0000                           | 0.0000                    | 94.551                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 168.000              | 0.0000                           | 0.0000                    | 94.403                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 192.000              | 0.0000                           | 0.0000                    | 94.277                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 216.000              | 0.0000                           | 0.0000                    | 94.168                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 240.000              | 0.0000                           | 0.0000                    | 94.071                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 264.000              | 0.0000                           | 0.0000                    | 93.984                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 288.000              | 0.0000                           | 0.0000                    | 93.907                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 312.000              | 0.0000                           | 0.0000                    | 93.836                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 336.000              | 0.0000                           | 0.0000                    | 93.772                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 360.000              | 0.0000                           | 0.0000                    | 93.713                     | 0.00000                                | 0.00000                                 | 70451.0                                     | 70451.0                                           | 0.0                                            | S         |
| 384.000              | 0.0000                           | 0.0000                    | 93.658                     | ---                                    | ---                                     | 70451.0                                     | 70451.0                                           | 0.0                                            | N.A.      |

Recovery  
89.1 hours

*Pond 1 Bypass Ditch Calculations*

(Phase I)

|                                 |                 |             |
|---------------------------------|-----------------|-------------|
| Calculations For Hartwood marsh | Job No. 41561-1 | Sheet No. 1 |
| Made by msf                     | Date 3-17-08    |             |
| Checked by                      | Date            |             |
| Backchecked by                  | Date            |             |



Diversion Ditch around Pond 1

$$Q = CiA$$

$$C = 0.20$$

$$A = 6.10 \text{ ac}$$

$$t_e = 22.86 \text{ min (from TR-55)}$$

$$i = 5.8 \text{ in/hr (for 25 yr, 22.86 min)}$$

$$Q = CiA$$

$$= (0.20)(5.8 \text{ in/hr})(6.10 \text{ ac})$$

$$= 7.08 \text{ cfs}$$

ok

# Worksheet 3: Time of Concentration ( $T_c$ ) or travel time ( $T_t$ )

|                                           |           |                 |
|-------------------------------------------|-----------|-----------------|
| Project<br>Hartwood Marsh Road (Phase F)  | By<br>MSF | Date<br>3-17-08 |
| Location<br>Diversion Ditch around Pond 1 | Checked   | Date            |

Check one:  Present  Developed

Check one:   $T_c$    $T_t$  through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

### Shallow flow (Applicable to $T_c$ only)

|                                                                           | Segment ID  |               |
|---------------------------------------------------------------------------|-------------|---------------|
| 1. Surface description (table 3-1) .....                                  | A-B         |               |
| 2. Manning's roughness coefficient, n (table 3-1) .....                   | short grass |               |
| 3. Flow length, L (total L + 300 ft) .....                                | 0.15        |               |
| 4. Two-year 24-hour rainfall, $P_2$ .....                                 | 300         |               |
| 5. Land slope, s .....                                                    | 4.70        |               |
| 6. $T_t = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute $T_t$ ..... | 0.0183      |               |
|                                                                           | 0.336       | + [ ] = 0.336 |

### Shallow concentrated flow

|                                                  | Segment ID |               |
|--------------------------------------------------|------------|---------------|
| 7. Surface description (paved or unpaved) .....  | B-C        |               |
| 8. Flow length, L .....                          | unpaved    |               |
| 9. Watercourse slope, s .....                    | 508        |               |
| 10. Average velocity, V (figure 3-1) .....       | 0.0479     |               |
| 11. $T_t = \frac{L}{3600 V}$ Compute $T_t$ ..... | 3.53       |               |
|                                                  | 0.045      | + [ ] = 0.045 |

### Channel flow

|                                                                                  | Segment ID |  |
|----------------------------------------------------------------------------------|------------|--|
| 12. Cross sectional flow area, a .....                                           |            |  |
| 13. Wetted perimeter, $p_w$ .....                                                |            |  |
| 14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r .....                        |            |  |
| 15. Channel slope, s .....                                                       |            |  |
| 16. Manning's roughness coefficient, n .....                                     |            |  |
| 17. $V = \frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V .....                         |            |  |
| 18. Flow length, L .....                                                         |            |  |
| 19. $T_t = \frac{L}{3600 V}$ Compute $T_t$ .....                                 |            |  |
| 20. Watershed or subarea $T_c$ or $T_t$ (add $T_t$ in steps 6, 11, and 19) ..... |            |  |

Hr 0.381  
= 22.86 min.

FHWA Urban Drainage Design Program, HY-22  
HYDRAULIC PARAMETERS OF OPEN CHANNELS

Trapezoidal, Rectangular, or Triangular X-Section  
Date: 03/18/2008

Project No. :41561-1  
Project Name.:Hartwood Marsh Road--Phase I  
Computed by :msf

Project Description  
Diversion Ditch around Pond 1

INPUT PARAMETERS

---

|                                       |        |
|---------------------------------------|--------|
| 1. Channel Slope (ft/ft)              | 0.0019 |
| 2. Channel Bottom Width (ft)          | 4.00   |
| 3. Left Side Slope (Horizontal to 1)  | 2.00   |
| 4. Right Side Slope (Horizontal to 1) | 2.00   |
| 5. Manning's Coefficient              | 0.042  |
| 6. Discharge (cfs)                    | 7.08   |
| 7. Depth of Flow (ft)                 | 0.98   |

OUTPUT RESULTS

---

|                           |      |
|---------------------------|------|
| Cross Section Area (Sqft) | 5.84 |
| Average Velocity (ft/sec) | 1.21 |
| Top Width (ft)            | 7.92 |
| Hydraulic Radius (ft)     | 0.70 |
| Froude Number             | 0.25 |

$y > y_c$   
 $V < V_c$   
∴ subcritical flow

FHWA Urban Drainage Design Program, HY-22  
HYDRAULIC PARAMETERS OF OPEN CHANNELS

Trapezoidal, Rectangular, or Triangular X-Section  
Date: 03/18/2008

Project No. :41561-1  
Project Name.:Hartwood Marsh Road--Phase I  
Computed by :msf

Project Description  
Diversion Ditch around Pond 1

INPUT PARAMETERS

---

|                                       |        |
|---------------------------------------|--------|
| 1. Channel Slope (ft/ft)              | 0.0019 |
| 2. Channel Bottom Width (ft)          | 4.00   |
| 3. Left Side Slope (Horizontal to 1)  | 2.00   |
| 4. Right Side Slope (Horizontal to 1) | 2.00   |
| 5. Manning's Coefficient              | 0.060  |
| 6. Discharge (cfs)                    | 7.08   |
| 7. Depth of Flow (ft)                 | 1.18   |

OUTPUT RESULTS

---

|                           |      |
|---------------------------|------|
| Cross Section Area (Sqft) | 7.50 |
| Average Velocity (ft/sec) | 0.94 |
| Top Width (ft)            | 8.72 |
| Hydraulic Radius (ft)     | 0.81 |
| Froude Number             | 0.18 |



FHWA Urban Drainage Design Program, HY-22  
Critical Depth for Open Channels

TRAPEZOIDAL ANALYSIS  
Date: 03/18/2008

Project No. :41561-1  
Project Name.:Hartwood Marsh Road--Phase I  
Computed by :msf

Project Description  
Diversion Ditch around Pond 1

INPUT PARAMETERS

---

|                                       |       |
|---------------------------------------|-------|
| 1. Discharge (cfs)                    | 7.08  |
| 2. Manning's Coefficient              | 0.042 |
| 3. Channel Bottom Width (ft)          | 4.0   |
| 4. Left Side Slope (Horizontal to 1)  | 2.00  |
| 5. Right Side Slope (Horizontal to 1) | 2.00  |

OUTPUT RESULTS

---

|                            |       |
|----------------------------|-------|
| Critical Depth (ft)        | 0.43  |
| Critical Area (ft**2)      | 2.07  |
| Critical Velocity (ft/sec) | 3.43  |
| Critical Slope (ft/ft)     | 0.038 |

**BASIN 2**

*Pre-Development Drainage Basin Data*

**BASIN BREAKDOWN**

**HNTB**

DATE  
 MADE BY: MSF 23-Apr-08  
 CHCK BY: KMV 24-Apr-08

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 2

BASIN LIMITS: STA. 138+50.00 to STA. 152+39, CL CONST. HARTWOOD MARSH

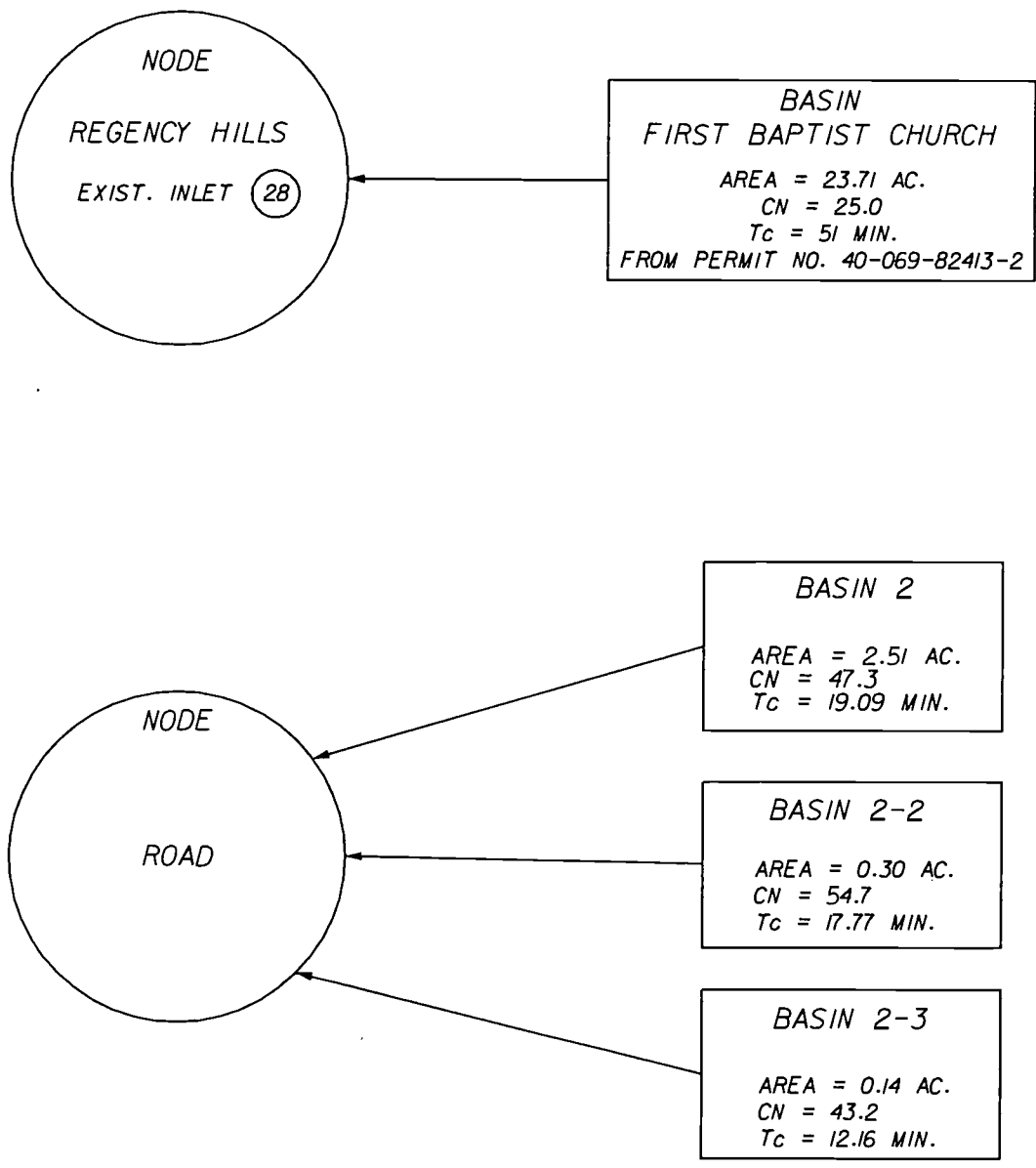
EXISTING CONDITIONS:

| LOCATION                            | STATION | To | STATION | BASIN WIDTH<br>(Ft.) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS                                       |
|-------------------------------------|---------|----|---------|----------------------|----------------------|-----------------------|-----------------------|-----------------------------------------------|
| <i>OFF-SITE TO REGENCY HILLS:</i>   |         |    |         |                      |                      |                       |                       |                                               |
| FIRST BAPTIST CHURCH                | 140+70  | -  | 153+90  | -                    | 0.00                 | 23.71                 | 23.710                | From Permit No. 40-169-82413-2 Basin Church-2 |
| <i>OFF-SITE SUBTOTAL:</i>           |         |    |         |                      | 0.00                 | 23.71                 | 23.710                |                                               |
| <i>ONSITE TO ROAD RIGHT OF WAY:</i> |         |    |         |                      |                      |                       |                       |                                               |
| BASIN 2                             | 138+50  | -  | 152+39  | 100 to 140           | 0.64                 | 1.87                  | 2.511                 |                                               |
| BASIN 2-2 (OFF-SITE)                | 140+50  | -  | 145+30  | -                    | 0.08                 | 0.22                  | 0.301                 |                                               |
| BASIN 2-3 (OFF-SITE)                | 147+20  | -  | 152+39  | -                    | 0.01                 | 0.13                  | 0.141                 |                                               |
| <i>ON-SITE SUBTOTAL:</i>            |         |    |         |                      | 0.73                 | 2.23                  | 2.953                 |                                               |
| <b>TOTAL DRAINAGE AREA:</b>         |         |    |         |                      | <b>0.73</b>          | <b>23.71</b>          | <b>26.65</b>          |                                               |


PROPOSED CONDITIONS:

| LOCATION                    | STATION   | To | STATION | BASIN WIDTH<br>(Ft.) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS                                                 |
|-----------------------------|-----------|----|---------|----------------------|----------------------|-----------------------|-----------------------|---------------------------------------------------------|
| <i>ON-SITE TO POND:</i>     |           |    |         |                      |                      |                       |                       |                                                         |
| BASIN 2                     | 138+50.00 | -  | 152+39  | 100 to 140           | 6.00                 | 1.67                  | 7.674                 | Includes Future S. Hancock Road Extension               |
| BASIN 2-4 (POND AREA)       | -         | -  | -       | -                    | 1.96                 | 4.38                  | 6.340                 | Impervious at water quality                             |
| <i>ON-SITE SUBTOTAL:</i>    |           |    |         |                      | 7.96                 | 6.05                  | 14.014                |                                                         |
| <i>OFF-SITE TO ROAD:</i>    |           |    |         |                      |                      |                       |                       |                                                         |
| BASIN 2-1 (OFF-SITE)        | 138+50    | -  | 139+70  | -                    | 0.00                 | 0.08                  | 0.081                 | Runoff Conveyed to Pond                                 |
| BASIN 2-2 (OFF-SITE)        | 140+50    | -  | 145+30  | -                    | 0.08                 | 0.22                  | 0.301                 | Runoff Conveyed to Pond                                 |
| BASIN 2-3 (OFF-SITE)        | 147+20    | -  | 152+39  | -                    | 0.01                 | 0.13                  | 0.141                 | Runoff Conveyed to Pond                                 |
| <i>OFF-SITE SUBTOTAL:</i>   |           |    |         |                      | 0.09                 | 0.43                  | 0.523                 |                                                         |
| <i>SUBTOTAL:</i>            |           |    |         |                      | 8.05                 | 6.48                  | 14.537                |                                                         |
| FIRST BAPTIST CHURCH        | 140+70    | -  | 153+90  | -                    | 24.42                | 6.11                  | 30.530                | Joint-Use of Pond 2- Assume 80% impervious; in Clermont |
| <b>TOTAL DRAINAGE AREA:</b> |           |    |         |                      | <b>33.48</b>         | <b>12.59</b>          | <b>45.067</b>         |                                                         |

501



BASIN 2

|                                                                                                                                                                                                                         |                                                                                                                      |                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| LOCATION: LAKE COUNTY<br>SEC. 9 & 10, T23S, R26E<br>HARTWOOD MARSH ROAD RECONSTRUCTION<br>US 27 TO 1500 FT EAST OF S. HANCOCK RD                                                                                        | COUNTY: LAKE<br>STATE: FLORIDA<br>DATE: 04-08                                                                        | DATUM: NAVD 88<br>PURPOSE: PRE-DEVELOPMENT<br>NODAL DIAGRAM |
| <b>HNTB</b><br>HNTB CORPORATION<br>300 PRIMERA BLVD,<br>SUITE 200<br>LAKE MARY, FL 32746<br>(407) 805-0355<br>CERT. OF AUTH. NO. 6500<br>ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.<br>FL. REGISTRATION NO. 44794 | <br><b>LAKE COUNTY</b><br>FLORIDA | <b>LAKE COUNTY</b><br>HARTWOOD MARSH ROAD                   |



RUNOFF CURVE NUMBER

DATE:

|          |     |           |
|----------|-----|-----------|
| MADE BY: | MSF | 23-Apr-08 |
| CHKD BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 2

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>( Appendix A ) | Cover Description<br>( Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio ) | CN       |          |          | Area acres | Product of CN x Area |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|------------|----------------------|
|                                                  |                                                                                                                                             | Tab. 2-2 | Fig. 2-3 | Fig. 2-4 |            |                      |
|                                                  | IMPERVIOUS AREA<br>Proposed Pavement (On-Site)                                                                                              | 98       |          |          | 0.64       | 62.43                |
| Lakeland Sand (A)                                | GRASS<br>Good Condition (On-Site)                                                                                                           | 30       |          |          | 1.87       | 56.21                |
| Totals =                                         |                                                                                                                                             |          |          |          | 2.51       | 118.64               |

Use CN = 47.3

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

LOCATION: FIRST BAPTIST CHURCH OF CLERMONT

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>( Appendix A ) | Cover Description<br>( Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio ) | CN       |          |          | Area acres | Product of CN x Area |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|------------|----------------------|
|                                                  |                                                                                                                                             | Tab. 2-2 | Fig. 2-3 | Fig. 2-4 |            |                      |
|                                                  | IMPERVIOUS AREA<br>Proposed Pavement (On-Site)                                                                                              | 98       |          |          | 0.00       | 0.00                 |
| Lakeland Sand (A)                                | GRASS<br>Good Condition (On-Site)                                                                                                           | 25       |          |          | 23.71      | 592.75               |
| Totals =                                         |                                                                                                                                             |          |          |          | 23.71      | 592.75               |

Taken from Basin Church-2 in Regency Hills Permit 40-069-82413-2

Use CN = 25.0

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 2-2

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
|                                                | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                       | 98          |             |             | 0.08          | 7.84                       |
| Lakeland Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                 | 39          |             |             | 0.22          | 8.62                       |
| Totals =                                       |                                                                                                                                                    |             |             |             | 0.30          | 16.46                      |

Use CN = 54.7

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

LOCATION: BASIN 2-3

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
|                                                | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                       | 98          |             |             | 0.01          | 0.98                       |
| Lakeland Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                 | 39          |             |             | 0.13          | 5.10                       |
| Totals =                                       |                                                                                                                                                    |             |             |             | 0.14          | 6.08                       |

Use CN = 43.2

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

## TIME OF CONCENTRATION CALCULATIONS

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT:           **HARTWOOD MARSH ROAD**

LOCATION:           BASIN 2

UNDERLINE ONE:   **EXISTING**                   **PROPOSED**

UNDERLINE ONE:    **T<sub>c</sub>**                           **T<sub>t</sub> Through subarea**

**SHEET FLOW:**

|   |                                                                                        |        |  |                                                                               |
|---|----------------------------------------------------------------------------------------|--------|--|-------------------------------------------------------------------------------|
| 1 | SURFACE DESCRIPTION                                                                    | SHORT  |  |                                                                               |
| 2 | MANNING'S COEFFICIENT, n                                                               | GRASS  |  |                                                                               |
| 3 | FLOW LENGTH, L, (< 300')                                                               | 0.150  |  |                                                                               |
| 4 | 2 YR/ 24 HR RAINFALL, P                                                                | 300    |  | FT.                                                                           |
| 5 | LAND SLOPE, S                                                                          | 4.70   |  | IN.                                                                           |
| 6 | T <sub>t</sub> = (0.007 (nL) <sup>0.8</sup> ) / (P <sup>0.5</sup> * S <sup>0.4</sup> ) | 0.0300 |  |                                                                               |
|   |                                                                                        | 0.2759 |  | HR. OR <span style="border: 1px solid black; padding: 2px;">16.55</span> MIN. |

**SHALLOW CONCENTRATED FLOW:**

|    |                                        |         |  |                                                                              |
|----|----------------------------------------|---------|--|------------------------------------------------------------------------------|
| 7  | SURFACE DESCRIPTION (PAVED OR UNPAVED) | UNPAVED |  |                                                                              |
| 8  | FLOW LENGTH, L                         | 438     |  | L.F.                                                                         |
| 9  | WATERCOURSE SLOPE, S                   | 0.0320  |  | FT./ FT.                                                                     |
| 10 | AVERAGE VELOCITY, V                    | 2.885   |  | FT./SEC.                                                                     |
| 11 | T <sub>t</sub> = L / (3600 * V)        | 0.042   |  | HR. OR <span style="border: 1px solid black; padding: 2px;">2.53</span> MIN. |

**CHANNEL FLOW:**

|    |                                                                                                   |  |  |                                                                              |
|----|---------------------------------------------------------------------------------------------------|--|--|------------------------------------------------------------------------------|
| 12 | CROSS-SECTIONAL FLOW AREA, A                                                                      |  |  | S.F.                                                                         |
| 13 | WETTED PERIMETER, P <sub>w</sub>                                                                  |  |  | L.F.                                                                         |
| 14 | HYDRAULIC RADIUS, R = (A / P <sub>w</sub> )                                                       |  |  | L.F.                                                                         |
| 15 | CHANNEL SLOPE, S                                                                                  |  |  | FT./FT.                                                                      |
| 16 | MANNING'S ROUGHNESS COEFFICIENT, n                                                                |  |  |                                                                              |
| 17 | VELOCITY, V, = (1.49 * R <sup>0.667</sup> * S <sup>0.5</sup> ) / n                                |  |  | FT./SEC.                                                                     |
| 18 | FLOW LENGTH, L                                                                                    |  |  | L.F.                                                                         |
| 19 | T <sub>t</sub> = L / (3600 V)                                                                     |  |  | HR. OR <span style="border: 1px solid black; padding: 2px;">0.00</span> MIN. |
| 20 | Watershed or subarea T <sub>c</sub> or T <sub>t</sub> (add T <sub>t</sub> in steps 6, 11, and 19) |  |  |                                                                              |

TOTAL T<sub>c</sub> = 19.09 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference:           *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986



## TIME OF CONCENTRATION CALCULATIONS

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT:           **HARTWOOD MARSH ROAD**

LOCATION:           BASIN 2-2

UNDERLINE ONE:   **EXISTING**                   **PROPOSED**

UNDERLINE ONE:    **Tc**                           **Tt Through subarea**

**SHEET FLOW:**

- 1    SURFACE DESCRIPTION
- 2    MANNING'S COEFFICIENT, n
- 3    FLOW LENGTH, L, (< 300')
- 4    2 YR/ 24 HR RAINFALL, P
- 5    LAND SLOPE, S
- 6     $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |
|-------------|--|
| SHORT GRASS |  |
| 0.150       |  |
| 280         |  |
| 4.70        |  |
| 0.0321      |  |
| 0.2540      |  |

FT.  
IN.  
HR. OR 15.24 MIN.

**SHALLOW CONCENTRATED FLOW:**

- 7    SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8    FLOW LENGTH, L
- 9    WATERCOURSE SLOPE, S
- 10   AVERAGE VELOCITY, V
- 11    $T_t = L / (3600 * V)$

|         |  |
|---------|--|
| UNPAVED |  |
| 438     |  |
| 0.0320  |  |
| 2.885   |  |
| 0.042   |  |

L.F.  
FT./FT.  
FT./SEC.  
HR. OR 2.53 MIN.

**CHANNEL FLOW:**

- 12   CROSS-SECTIONAL FLOW AREA, A
- 13   WETTED PERIMETER, Pw
- 14   HYDRAULIC RADIUS, R = (A / Pw)
- 15   CHANNEL SLOPE, S
- 16   MANNING'S ROUGHNESS COEFFICIENT, n
- 17   VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18   FLOW LENGTH, L
- 19    $T_t = L / (3600 V)$
- 20   Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |
|--|--|
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

S.F.  
L.F.  
L.F.  
FT./FT.  
FT./SEC.  
L.F.  
HR. OR  MIN.

TOTAL   Tc = 17.77 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference:           *Urban Hydrology for Small Watersheds*  
                           Technical Release 55, Soil Conservation Service  
                           U.S. Department of Agriculture, June 1986

## TIME OF CONCENTRATION CALCULATIONS

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

**PROJECT:**            **HARTWOOD MARSH ROAD**

**LOCATION :**            BASIN 23

**UNDERLINE ONE:**    EXISTING                    **PROPOSED**

**UNDERLINE ONE:**    Tc                                **Tt Through subarea**

**SHEET FLOW:**

- 1    SURFACE DESCRIPTION
- 2    MANNING'S COEFFICIENT, n
- 3    FLOW LENGTH, L, (< 300')
- 4    2 YR/ 24 HR RAINFALL, P
- 5    LAND SLOPE, S
- 6     $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |                                                                              |
|-------------|------------------------------------------------------------------------------|
| SHORT GRASS |                                                                              |
| 0.240       |                                                                              |
| 63          | FT.                                                                          |
| 4.70        | IN.                                                                          |
| 0.0952      |                                                                              |
| 0.0726      | HR. OR <span style="border: 1px solid black; padding: 2px;">4.36</span> MIN. |

**SHALLOW CONCENTRATED FLOW:**

- 7    SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8    FLOW LENGTH, L
- 9    WATERCOURSE SLOPE, S
- 10   AVERAGE VELOCITY, V
- 11    $T_t = L / (3600 * V)$

|         |                                                                              |
|---------|------------------------------------------------------------------------------|
| UNPAVED |                                                                              |
| 180     |                                                                              |
| 0.0333  | L.F.                                                                         |
| 2.946   | FT./FT.                                                                      |
| 0.017   | FT./SEC.                                                                     |
|         | HR. OR <span style="border: 1px solid black; padding: 2px;">1.02</span> MIN. |

**CHANNEL FLOW:**

- 12   CROSS-SECTIONAL FLOW AREA, A
- 13   WETTED PERIMETER, Pw
- 14   HYDRAULIC RADIUS, R = (A / Pw)
- 15   CHANNEL SLOPE, S
- 16   MANNING'S ROUGHNESS COEFFICIENT, n
- 17   VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18   FLOW LENGTH, L
- 19    $T_t = L / (3600 V)$
- 20   Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |                                                                              |
|--|--|------------------------------------------------------------------------------|
|  |  | S.F.                                                                         |
|  |  | L.F.                                                                         |
|  |  | L.F.                                                                         |
|  |  | FT./FT.                                                                      |
|  |  | FT./SEC.                                                                     |
|  |  | L.F.                                                                         |
|  |  | HR. OR <span style="border: 1px solid black; padding: 2px;">6.78</span> MIN. |

TOTAL    Tc =    12.16 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

**Reference:**            *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

## TIME OF CONCENTRATION CALCULATIONS

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION : 1ST BAPTIST CHURCH

Assumes developed condition

UNDERLINE ONE: EXISTING                      PROPOSED

UNDERLINE ONE:        Tc                      Tt Through subarea

**SHEET FLOW:**

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|  |                                                                              |
|--|------------------------------------------------------------------------------|
|  |                                                                              |
|  |                                                                              |
|  | FT.                                                                          |
|  | IN.                                                                          |
|  |                                                                              |
|  | HR. OR <span style="border: 1px solid black; padding: 2px;">0.00</span> MIN. |

**SHALLOW CONCENTRATED FLOW:**

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|  |                                                                              |
|--|------------------------------------------------------------------------------|
|  |                                                                              |
|  |                                                                              |
|  | L.F.                                                                         |
|  | FT. / FT.                                                                    |
|  | FT./SEC.                                                                     |
|  | HR. OR <span style="border: 1px solid black; padding: 2px;">0.00</span> MIN. |

**CHANNEL FLOW:**

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |                                                                              |
|--|------------------------------------------------------------------------------|
|  |                                                                              |
|  |                                                                              |
|  | S.F.                                                                         |
|  | L.F.                                                                         |
|  | L.F.                                                                         |
|  | FT./FT.                                                                      |
|  | FT./SEC.                                                                     |
|  | L.F.                                                                         |
|  | HR. OR <span style="border: 1px solid black; padding: 2px;">0.00</span> MIN. |

TOTAL Tc = 51:00 MIN.  
 From Permit 40-069-82413-2  
 (IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

*Post Development Drainage Basin Data*

**BASIN BREAKDOWN**

**HNTB**

DATE  
 MADE BY: MSF 23-Apr-08  
 CHCK BY: KMV 24-Apr-08

PROJECT: **HARTWOOD MARSH ROAD**

LOCATION: **BASIN 2**

BASIN LIMITS: STA. **138+50.00** to STA. **152+39**, CL CONST. HARTWOOD MARSH

**EXISTING CONDITIONS:**

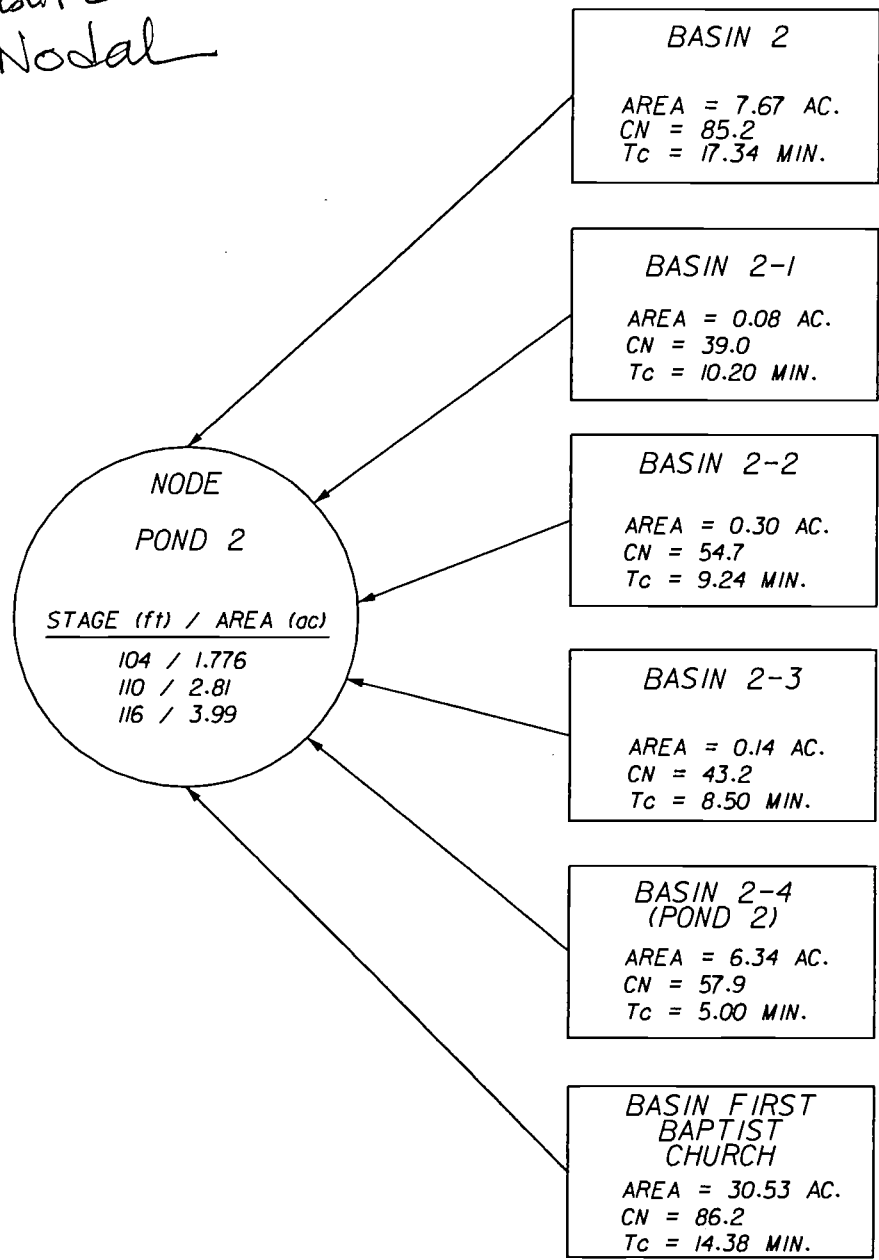
| LOCATION                            | STATION | To | STATION | BASIN WIDTH<br>(Ft.) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS                                       |
|-------------------------------------|---------|----|---------|----------------------|----------------------|-----------------------|-----------------------|-----------------------------------------------|
| <i>OFF-SITE TO REGENCY HILLS:</i>   |         |    |         |                      |                      |                       |                       |                                               |
| FIRST BAPTIST CHURCH                | 140+70  | -  | 153+90  | -                    | 0.00                 | 23.71                 | 23.710                | From Permit No. 40-169-82413-2 Basin Church-2 |
| <i>OFF-SITE SUBTOTAL:</i>           |         |    |         |                      | 0.00                 | 23.71                 | 23.710                |                                               |
| <i>ONSITE TO ROAD RIGHT OF WAY:</i> |         |    |         |                      |                      |                       |                       |                                               |
| BASIN 2                             | 138+50  | -  | 152+39  | 100 to 140           | 0.64                 | 1.87                  | 2.511                 |                                               |
| BASIN 2-2 (OFF-SITE)                | 140+50  | -  | 145+30  | -                    | 0.08                 | 0.22                  | 0.301                 |                                               |
| BASIN 2-3 (OFF-SITE)                | 147+20  | -  | 152+39  | -                    | 0.01                 | 0.13                  | 0.141                 |                                               |
| <i>ON-SITE SUBTOTAL:</i>            |         |    |         |                      | 0.73                 | 2.23                  | 2.953                 |                                               |
| <b>TOTAL DRAINAGE AREA:</b>         |         |    |         |                      | <b>0.73</b>          | <b>23.71</b>          | <b>26.66</b>          |                                               |

**PROPOSED CONDITIONS:**

| LOCATION                    | STATION   | To | STATION | BASIN WIDTH<br>(Ft.) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS                                                 |
|-----------------------------|-----------|----|---------|----------------------|----------------------|-----------------------|-----------------------|---------------------------------------------------------|
| <i>ON-SITE TO POND:</i>     |           |    |         |                      |                      |                       |                       |                                                         |
| BASIN 2                     | 138+50.00 | -  | 152+39  | 100 to 140           | 6.00                 | 1.67                  | 7.674                 | Includes Future S. Hancock Road Extension               |
| BASIN 2-4 (POND AREA)       | -         | -  | -       | -                    | 1.96                 | 4.38                  | 6.340                 | Impervious at water quality                             |
| <i>ON-SITE SUBTOTAL:</i>    |           |    |         |                      | 7.96                 | 6.05                  | 14.014                |                                                         |
| <i>OFF-SITE TO ROAD:</i>    |           |    |         |                      |                      |                       |                       |                                                         |
| BASIN 2-1 (OFF-SITE)        | 138+50    | -  | 139+70  | -                    | 0.00                 | 0.08                  | 0.081                 | Runoff Conveyed to Pond                                 |
| BASIN 2-2 (OFF-SITE)        | 140+50    | -  | 145+30  | -                    | 0.08                 | 0.22                  | 0.301                 | Runoff Conveyed to Pond                                 |
| BASIN 2-3 (OFF-SITE)        | 147+20    | -  | 152+39  | -                    | 0.01                 | 0.13                  | 0.141                 | Runoff Conveyed to Pond                                 |
| <i>OFF-SITE SUBTOTAL:</i>   |           |    |         |                      | 0.09                 | 0.43                  | 0.523                 |                                                         |
| <i>SUBTOTAL:</i>            |           |    |         |                      | 8.05                 | 6.48                  | 14.537                |                                                         |
| FIRST BAPTIST CHURCH        | 140+70    | -  | 153+90  | -                    | 24.42                | 6.11                  | 30.530                | Joint-Use of Pond 2- Assume 80% impervious; in Clermont |
| <b>TOTAL DRAINAGE AREA:</b> |           |    |         |                      | <b>32.48</b>         | <b>13.59</b>          | <b>45.067</b>         |                                                         |

11

Basin 2 Post Nodal



BASIN 2

|                                                                                                                                  |                                               |                                                              |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------|
| LOCATION: LAKE COUNTY<br>SEC. 9 & 10, T23S, R26E<br>HARTWOOD MARSH ROAD RECONSTRUCTION<br>US 27 TO 1500 FT EAST OF S. HANCOCK RD | COUNTY: LAKE<br>STATE: FLORIDA<br>DATE: 04-08 | DATUM: NAVD 88<br>PURPOSE: POST-DEVELOPMENT<br>NODAL DIAGRAM |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------|

|                                                                                                                                       |                                                                                                                      |                                           |
|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| <b>HNTB</b><br>HNTB CORPORATION<br>300 PRIMERA BLVD,<br>SUITE 200<br>LAKE MARY, FL 32746<br>(407) 805-0355<br>CERT. OF AUTH. NO. 6500 | <br><b>LAKE COUNTY</b><br>FLORIDA | <b>LAKE COUNTY</b><br>HARTWOOD MARSH ROAD |
| ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.<br>FL. REGISTRATION NO. 44794                                                        |                                                                                                                      |                                           |

# HNTB

## RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: **BASIN 2**

UNDERLINE ONE:      EXISTING      PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition; percent impervious; unconnected / connected impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                           | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Proposed Pavement (On-Site)                                                                                            | 98          |             |             | 6.00          | 588.45                     |
| Lakeland Sand (A)                              | GRASS<br>Good Condition (On-Site)                                                                                                         | 39          |             |             | 1.67          | 65.11                      |
| Totals =                                       |                                                                                                                                           |             |             |             | 7.67          | 653.55                     |

Use CN = **85.2**

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

LOCATION: **FIRST BAPTIST CHURCH OF CLERMONT**

UNDERLINE ONE:      EXISTING      PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition; percent impervious; unconnected / connected impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                           | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Proposed Pavement                                                                                                      | 98          |             |             | 24.42         | 2393.58                    |
| Lakeland Sand (A)                              | GRASS<br>Good Condition                                                                                                                   | 39          |             |             | 6.11          | 238.14                     |
| Totals =                                       |                                                                                                                                           |             |             |             | 30.53         | 2631.71                    |

Use CN = **86.2**

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

Did not account  
for Pond Area

Curve number  
Basin 2

# HNTB

## RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 2-1

UNDERLINE ONE:      EXISTING      PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio.) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                     | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                        | 98          |             |             | 0.00          | 0.00                       |
| Lakeland Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                  | 39          |             |             | 0.08          | 3.16                       |
| Totals =                                       |                                                                                                                                                     |             |             |             | 0.08          | 3.16                       |

Use CN = 39.0

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

LOCATION: BASIN 2-2

UNDERLINE ONE:      EXISTING      PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio.) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                     | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                        | 98          |             |             | 0.08          | 7.84                       |
| Lakeland Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                  | 39          |             |             | 0.22          | 8.62                       |
| Totals =                                       |                                                                                                                                                     |             |             |             | 0.30          | 16.46                      |

Use CN = 54.7

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986





**RUNOFF CURVE NUMBER**

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 2-3

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN       |          |          | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab. 2-2 | Fig. 2-3 | Fig. 2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                       | 98       |          |          | 0.01          | 0.98                       |
| Lakeland Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                 | 39       |          |          | 0.13          | 5.10                       |
| Totals =                                       |                                                                                                                                                    |          |          |          | 0.14          | 6.08                       |

Use CN = 43.2

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 2-4

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN       |          |          | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab. 2-2 | Fig. 2-3 | Fig. 2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Propose Pond Site at Water Qual                                                                                                 | 100      |          |          | 1.96          | 196.00                     |
| Lakeland Sand (A)                              | GRASS<br>Proposed Pond Site (Good condition)                                                                                                       | 39       |          |          | 4.38          | 170.81                     |
| Totals =                                       |                                                                                                                                                    |          |          |          | 6.34          | 366.81                     |

Use CN = 57.9

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

**TIME OF CONCENTRATION CALCULATIONS**



DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 2

UNDERLINE ONE: EXISTING                      PROPOSED

UNDERLINE ONE:     Tc                              Tt Through subarea

**SHEET FLOW:**

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

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FT.  
IN.  
HR. OR 0:00 MIN.

**SHALLOW CONCENTRATED FLOW:**

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

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L.F.  
FT./FT.  
FT./SEC.  
HR. OR 0:00 MIN.

**CHANNEL FLOW:**

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

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S.F.  
L.F.  
L.F.  
FT./FT.  
FT./SEC.  
L.F.  
HR. OR 0:00 MIN.

TOTAL Tc = 17:34 MIN.  
PER ASAD

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

**STORM SEWER HYDRAULICS**

System: POND 2

| PROJECT                          |  |                                |  | CONDITIONS                     |  |                         |           |                         |        |        |
|----------------------------------|--|--------------------------------|--|--------------------------------|--|-------------------------|-----------|-------------------------|--------|--------|
| Number: 41561-1                  |  | Organization: HNTB Corporation |  | Outfall Tailwater El: 111.27   |  | Storm Event - IDF Curve |           | Runoff Coeff. (default) |        |        |
| Description: Hartwood Marsh Road |  | Designed by: MSF               |  | Exit Loss at Outfall: 0.34     |  | Zone                    | Frequency | Area 1                  | Area 2 | Area 3 |
| County: Lake County              |  | Checked by:                    |  | Storm Sewer Control El: 111.61 |  | 7                       | 10        | 0.95                    | 0.20   | 0.30   |

HGL method: Standard FDOT (Jump HGL to pipe crown).

| FROM Station Type | TO Offset Brls Len | Drainage Areas |                  |          |               | Tc (min) | Travel Time (min) | Inten. (in/hr) | Total CA (ac) | Flow (cfs) |                  |           | Inlet Elevations |                      | Pipe Elevations |               | Fall (ft) | Pipe Height Width (in) | HGL (%) FL (%) | Flow Type | Velocity Actual Physical (fps) | Capacity (cfs) | Mann'g 'N' |             |       |       |        |
|-------------------|--------------------|----------------|------------------|----------|---------------|----------|-------------------|----------------|---------------|------------|------------------|-----------|------------------|----------------------|-----------------|---------------|-----------|------------------------|----------------|-----------|--------------------------------|----------------|------------|-------------|-------|-------|--------|
|                   |                    | Area (A)       | Runoff Coeff (C) | C*A (CA) | Lcl JpStrm CA |          |                   |                |               | Qb Qfd Qdw | S-Qb S-Qfd S-Qdw | CIA TOTAL | Inlet Clear.     | HGL Min HGL Jnc Loss | HGL Crown Line  | HGL Flow Line |           |                        |                |           |                                |                |            |             |       |       |        |
| <b>S-200</b>      | <b>S-202</b>       | 138+50.00      | -40.25           | 1        | 215.42        | 0.31     | 0.95              | 0.30           | 0.32          | 10.00      | 1.80             | 7.41      | 0.32             | 0.00                 | 0.00            | 2.44          | 131.58    | 131.01                 | 130.99         | 130.89    | 0.10                           | 18.00          | 0.0459     | Full        | 1.38  | 2.45  | 0.0120 |
| CI-5-B            |                    |                |                  |          |               | 0.08     | 0.30              | 0.02           | 0.32          |            |                  |           |                  | 0.00                 | 0.00            | 2.44          | 0.57      | 0.03                   | 128.40         | 128.30    | 0.10                           | 18.00          | 0.0464     |             | 1.39  |       |        |
| <b>S-201</b>      | <b>S-203</b>       | 138+50.00      | 55.75            | 1        | 202.83        | 0.37     | 0.95              | 0.35           | 0.35          | 10.00      | 1.69             | 7.41      | 0.35             | 0.00                 | 0.00            | 2.66          | 131.58    | 130.04                 | 130.01         | 129.90    | 0.11                           | 18.00          | 0.0545     | Full        | 1.50  | 4.38  | 0.0120 |
| CI-5-B            |                    |                |                  |          |               | 0.00     | 0.20              | 0.00           | 0.00          |            |                  |           |                  | 0.00                 | 0.00            | 2.66          | 1.54      | 0.04                   | 129.00         | 128.70    | 0.30                           | 18.00          | 0.1479     |             | 2.48  |       |        |
| <b>S-202</b>      | <b>S-204</b>       | 140+68.21      | -49.93           | 1        | 26.26         | 0.00     | 0.95              | 0.00           | 0.00          | 11.80      | 0.16             | 7.00      | 1.26             | 0.00                 | 0.00            | 8.87          | 135.66    | 130.89                 | 130.80         | 130.77    | 0.03                           | 24.00          | 0.1308     | Full        | 2.82  | 15.12 | 0.0120 |
| MH-7              |                    |                |                  |          |               | 0.00     | 0.20              | 0.00           | 1.26          |            |                  |           |                  | 0.00                 | 0.00            | 8.87          | 4.77      | 0.09                   | 128.80         | 128.70    | 0.10                           | 24.00          | 0.3808     |             | 4.81  |       |        |
| <b>S-203</b>      | <b>S-222</b>       | 140+56.76      | 50.44            | 1        | 163.31        | 0.00     | 0.95              | 0.00           | 0.00          | 12.46      | 0.63             | 6.87      | 4.45             | 0.00                 | 0.00            | 30.58         | 135.51    | 129.90                 | 129.69         | 129.40    | 0.29                           | 36.00          | 0.1791     | Full        | 4.33  | 17.88 | 0.0120 |
| MH-7-J            |                    |                |                  |          |               | 0.00     | 0.20              | 0.00           | 4.45          |            |                  |           |                  | 0.00                 | 0.00            | 30.58         | 5.61      | 0.20                   | 129.50         | 129.40    | 0.10                           | 36.00          | 0.0612     |             | 2.53  |       |        |
| <b>S-204</b>      | <b>S-205</b>       | 140+97.38      | -52.25           | 1        | 93.75         | 0.17     | 0.95              | 0.16           | 0.18          | 11.95      | 0.36             | 6.97      | 3.03             | 0.00                 | 0.00            | 21.15         | 135.85    | 130.77                 | 130.56         | 130.35    | 0.21                           | 30.00          | 0.2265     | Full        | 4.31  | 14.51 | 0.0120 |
| CI-5-B            |                    |                |                  |          |               | 0.02     | 0.20              | 0.00           | 2.84          |            |                  |           |                  | 0.00                 | 0.00            | 21.15         | 5.08      | 0.20                   | 129.20         | 129.10    | 0.10                           | 30.00          | 0.1067     |             | 2.96  |       |        |
| <b>S-205</b>      | <b>S-203</b>       | 141+09.42      | 43.75            | 1        | 49.08         | 0.25     | 0.95              | 0.24           | 0.25          | 12.31      | 0.14             | 6.89      | 4.09             | 0.00                 | 0.00            | 28.23         | 136.14    | 130.35                 | 130.09         | 129.90    | 0.20                           | 30.00          | 0.4036     | Full        | 5.75  | 20.06 | 0.0120 |
| CI-5-B            |                    |                |                  |          |               | 0.06     | 0.20              | 0.01           | 3.83          |            |                  |           |                  | 0.00                 | 0.00            | 28.23         | 5.79      | 0.26                   | 129.10         | 129.00    | 0.10                           | 30.00          | 0.2037     |             | 4.09  |       |        |
| <b>S-206</b>      | <b>S-204</b>       | 141+90.00      | -52.25           | 1        | 89.62         | 0.17     | 0.95              | 0.16           | 0.19          | 11.49      | 0.24             | 7.07      | 1.58             | 0.00                 | 0.00            | 11.18         | 136.36    | 134.48                 | 134.16         | 133.30    | 0.86                           | 18.00          | 0.9646     | Full        | 6.32  | 8.50  | 0.0120 |
| CI-5-B            |                    |                |                  |          |               | 0.03     | 0.20              | 0.00           | 1.39          |            |                  |           |                  | 0.00                 | 0.00            | 11.18         | 1.88      | 0.31                   | 133.80         | 133.30    | 0.50                           | 18.00          | 0.5579     |             | 4.81  |       |        |
| <b>S-207</b>      | <b>S-206</b>       | 142+90.00      | -52.25           | 1        | 96.56         | 0.25     | 0.95              | 0.24           | 0.28          | 11.20      | 0.29             | 7.13      | 1.39             | 0.00                 | 0.00            | 9.92          | 137.13    | 135.45                 | 135.21         | 134.48    | 0.73                           | 18.00          | 0.7598     | Full        | 5.61  | 10.36 | 0.0120 |
| CI-5-B            |                    |                |                  |          |               | 0.07     | 0.20              | 0.01           | 1.10          |            |                  |           |                  | 0.00                 | 0.00            | 9.92          | 1.68      | 0.24                   | 134.60         | 133.80    | 0.80                           | 18.00          | 0.8285     |             | 5.86  |       |        |
| <b>S-208</b>      | <b>S-205</b>       | 144+00.00      | 43.75            | 1        | 287.95        | 0.26     | 0.95              | 0.24           | 0.26          | 11.30      | 0.76             | 7.11      | 0.80             | 0.00                 | 0.00            | 5.71          | 138.85    | 135.87                 | 135.56         | 132.86    | 2.70                           | 18.00          | 0.9377     | Partial sub | 6.30  | 11.02 | 0.0120 |
| CI-5-B            |                    |                |                  |          |               | 0.06     | 0.20              | 0.01           | 0.54          |            |                  |           |                  | 0.00                 | 0.00            | 5.71          | 2.98      | 0.31                   | 136.30         | 133.60    | 2.70                           | 18.00          | 0.9377     |             | 6.24  |       |        |
| <b>S-209</b>      | <b>S-207</b>       | 144+45.39      | -40.25           | 1        | 152.85        | 0.29     | 0.95              | 0.27           | 0.31          | 10.90      | 0.30             | 7.20      | 1.10             | 0.00                 | 0.00            | 7.98          | 139.66    | 136.95                 | 136.39         | 135.45    | 0.94                           | 18.00          | 0.6130     | Partial sub | 8.44  | 14.55 | 0.0120 |
| CI-5-B            |                    |                |                  |          |               | 0.09     | 0.20              | 0.01           | 0.79          |            |                  |           |                  | 0.00                 | 0.00            | 7.98          | 2.71      | 0.55                   | 137.10         | 134.60    | 2.50                           | 18.00          | 1.6356     |             | 8.24  |       |        |
| <b>S-212</b>      | <b>S-209</b>       | 146+20.42      | -40.25           | 1        | 172.03        | 0.40     | 0.95              | 0.38           | 0.43          | 10.57      | 0.33             | 7.27      | 0.79             | 0.00                 | 0.00            | 5.78          | 143.45    | 140.59                 | 140.00         | 137.10    | 2.90                           | 18.00          | 1.6878     | Partial sub | 8.69  | 16.91 | 0.0120 |
| CI-5-B            |                    |                |                  |          |               | 0.14     | 0.20              | 0.02           | 0.36          |            |                  |           |                  | 0.00                 | 0.00            | 5.78          | 2.86      | 0.59                   | 140.90         | 137.10    | 3.80                           | 18.00          | 2.2089     |             | 9.57  |       |        |
| <b>S-213</b>      | <b>S-208</b>       | 147+00.00      | 43.75            | 1        | 297.00        | 0.26     | 0.95              | 0.25           | 0.26          | 10.69      | 0.61             | 7.24      | 0.54             | 0.00                 | 0.00            | 3.92          | 146.28    | 143.29                 | 142.77         | 136.30    | 6.47                           | 18.00          | 2.1800     | Partial sub | 8.17  | 18.08 | 0.0120 |
| CI-5-B            |                    |                |                  |          |               | 0.08     | 0.20              | 0.01           | 0.27          |            |                  |           |                  | 0.00                 | 0.00            | 3.92          | 2.99      | 0.52                   | 143.80         | 136.30    | 7.50                           | 18.00          | 2.5253     |             | 10.23 |       |        |

120

Units: ENGLISH

### STORM SEWER HYDRAULICS

System: POND 2

| PROJECT                          |  |                                |  | CONDITIONS                     |  |                         |           |                         |        |        |
|----------------------------------|--|--------------------------------|--|--------------------------------|--|-------------------------|-----------|-------------------------|--------|--------|
| Number: 41561-1                  |  | Organization: HNTB Corporation |  | Outfall Tailwater El: 111.27   |  | Storm Event - IDF Curve |           | Runoff Coeff. (default) |        |        |
| Description: Hartwood Marsh Road |  | Designed by: MSF               |  | Exit Loss at Outfall: 0.34     |  | Zone                    | Frequency | Area 1                  | Area 2 | Area 3 |
| County: Lake County              |  | Checked by:                    |  | Storm Sewer Control El: 111.61 |  | 7                       | 10        | 0.95                    | 0.20   | 0.30   |

HGL method: Standard FDOT (Jump HGL to pipe crown).

| FROM Station Type | TO Offset Brls Len | Drainage Areas |                  |          |                   | Tc (min) | Travel Time (min) | Inten. (in/hr) | Total CA (ac) | Flow (cfs) |                  |              | Inlet Elevations |                      | Pipe Elevations          |        | Fall (ft) | Pipe Height Width (in) | HGL (%) FL | Flow Type   | Velocity Actual Physical (fps) | Capacity (cfs) | Mann'g 'N' |        |  |  |        |       |
|-------------------|--------------------|----------------|------------------|----------|-------------------|----------|-------------------|----------------|---------------|------------|------------------|--------------|------------------|----------------------|--------------------------|--------|-----------|------------------------|------------|-------------|--------------------------------|----------------|------------|--------|--|--|--------|-------|
|                   |                    | Area (A)       | Runoff Coeff (C) | C*A (CA) | Lcl JpStrm Tot CA |          |                   |                |               | Qb Qfd Qdw | S-Qb S-Qfd S-Qdw | CIA TOTAL    | Inlet Clear.     | HGL Min HGL Jnc Loss | HGL Crown Line Flow Line |        |           |                        |            |             |                                |                |            |        |  |  |        |       |
| <b>S-214</b>      | <b>S-212</b>       | 0.33           | 0.95             | 0.32     | 0.36              | 10.00    | 0.57              | 7.41           | 0.36          | 0.00       | 0.00             |              | 152.77           | 150.09               | 149.06                   | 140.90 | 8.16      | 18.00                  | 2.9515     | Partial sub | 8.11                           | 20.87          | 0.0120     |        |  |  |        |       |
| 149+00.00         | -40.25             | 0.17           | 0.20             | 0.03     | 0.00              |          |                   |                |               | 0.00       | 0.00             | 2.68         | 0.00             | 0.00                 |                          | 150.20 |           |                        |            |             |                                |                |            | 140.90 |  |  | 3.3625 | 11.81 |
| CI-5-B            | 1 276.58           | 0.01           | 0.30             | 0.00     | 0.36              |          |                   |                |               | 0.00       | 0.00             | <b>2.68</b>  | 2.68             | 1.02                 |                          | 148.70 |           |                        |            |             |                                |                |            | 139.40 |  |  |        |       |
| <b>S-215</b>      | <b>S-213</b>       | 0.27           | 0.95             | 0.25     | 0.27              | 10.00    | 0.69              | 7.41           | 0.27          | 0.00       | 0.00             |              | 155.22           | 152.33               | 151.53                   | 143.80 | 7.73      | 18.00                  | 2.6011     | Partial sub | 7.18                           | 19.70          | 0.0120     |        |  |  |        |       |
| 150+00.00         | 43.75              | 0.08           | 0.20             | 0.01     | 0.00              |          |                   |                |               | 0.00       | 0.00             | 2.03         | 0.00             | 0.00                 |                          | 152.70 |           |                        |            |             |                                |                |            | 143.80 |  |  |        |       |
| CI-5-B            | 1 297.00           | 0.00           | 0.30             | 0.00     | 0.27              |          |                   |                |               | 0.00       | 0.00             | <b>2.03</b>  | 2.89             | 0.80                 |                          | 151.20 |           |                        |            |             |                                |                |            | 142.30 |  |  |        |       |
| <b>S-216</b>      | <b>S-217</b>       | 0.00           | 0.95             | 0.00     | 0.00              | 15.66    | 1.36              | 6.30           | 4.45          | 1.88       | 6.20             |              | 131.73           | 121.18               | 120.89                   | 120.00 | 0.89      | 36.00                  | 0.2248     | Full        | 4.85                           | 52.69          | 0.0120     |        |  |  |        |       |
| 459+50.00         | 40.25              | 0.00           | 0.20             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | 28.06        | 0.00             | 0.00                 |                          | 122.10 |           |                        |            |             |                                |                |            | 120.00 |  |  |        |       |
| MH-7-J            | 1 394.86           | 0.00           | 0.30             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | <b>34.26</b> | 10.55            | 0.29                 |                          | 119.10 |           |                        |            |             |                                |                |            | 117.00 |  |  |        |       |
| <b>S-217</b>      | <b>S-217A</b>      | 0.00           | 0.95             | 0.00     | 0.00              | 17.02    | 0.32              | 6.10           | 4.45          | 0.00       | 6.20             |              | 126.58           | 119.66               | 118.10                   | 113.00 | 5.10      | 36.00                  | 1.8554     | Partial sub | 14.14                          | 115.27         | 0.0120     |        |  |  |        |       |
| 24+40.00          | 48.80              | 0.00           | 0.20             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | 27.16        | 0.00             | 0.00                 |                          | 120.00 |           |                        |            |             |                                |                |            | 113.00 |  |  |        |       |
| MH-7-J            | 1 275.07           | 0.00           | 0.30             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | <b>33.36</b> | 6.92             | 1.55                 |                          | 117.00 |           |                        |            |             |                                |                |            | 110.00 |  |  |        |       |
| <b>S-217A</b>     | <b>S-217B</b>      | 0.00           | 0.95             | 0.00     | 0.00              | 17.34    | 0.00              | 6.05           | 4.45          | 0.00       | 6.20             |              | 116.50           | 111.99               | 111.72                   | 111.61 | 0.10      | 36.00                  | 0.2105     | Full        | 4.69                           | 230.89         | 0.0120     |        |  |  |        |       |
| 27+20.00          | 42.40              | 0.00           | 0.20             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | 26.95        | 0.00             | 0.00                 |                          | 113.00 |           |                        |            |             |                                |                |            | 108.00 |  |  |        |       |
| MH-7-J            | 1 48.97            | 0.00           | 0.30             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | <b>33.15</b> | 4.51             | 0.27                 |                          | 110.00 |           |                        |            |             |                                |                |            | 105.00 |  |  |        |       |
| <b>S-218</b>      | <b>S-216</b>       | 0.00           | 0.95             | 0.00     | 0.00              | 14.89    | 0.77              | 6.42           | 4.45          | 0.28       | 4.32             |              | 135.62           | 123.68               | 123.13                   | 122.10 | 1.03      | 36.00                  | 0.2682     | Partial sub | 8.38                           | 57.05          | 0.0120     |        |  |  |        |       |
| 463+40.00         | 44.50              | 0.00           | 0.20             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | 28.61        | 0.00             | 0.00                 |                          | 124.50 |           |                        |            |             |                                |                |            | 122.10 |  |  |        |       |
| MH-7-J            | 1 385.02           | 0.00           | 0.30             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | <b>32.93</b> | 11.94            | 0.55                 |                          | 121.50 |           |                        |            |             |                                |                |            | 119.10 |  |  |        |       |
| <b>S-219</b>      | <b>S-218</b>       | 0.00           | 0.95             | 0.00     | 0.00              | 14.22    | 0.67              | 6.54           | 4.45          | 1.37       | 4.04             |              | 134.62           | 125.79               | 125.24                   | 124.50 | 0.74      | 36.00                  | 0.2193     | Partial sub | 8.38                           | 56.98          | 0.0120     |        |  |  |        |       |
| 466+80.00         | 42.33              | 0.00           | 0.20             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | 29.12        | 0.00             | 0.00                 |                          | 126.60 |           |                        |            |             |                                |                |            | 124.50 |  |  |        |       |
| MH-7-J            | 1 337.67           | 0.00           | 0.30             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | <b>33.16</b> | 8.83             | 0.55                 |                          | 123.60 |           |                        |            |             |                                |                |            | 121.50 |  |  |        |       |
| <b>S-220</b>      | <b>S-219</b>       | 0.00           | 0.95             | 0.00     | 0.00              | 13.99    | 0.23              | 6.58           | 4.45          | 0.61       | 2.67             |              | 134.82           | 126.88               | 126.72                   | 126.60 | 0.12      | 36.00                  | 0.1957     | Full        | 4.52                           | 57.67          | 0.0120     |        |  |  |        |       |
| 467+49.16         | 46.14              | 0.00           | 0.20             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | 29.30        | 0.00             | 0.00                 |                          | 127.00 |           |                        |            |             |                                |                |            | 126.60 |  |  |        |       |
| MH-7-J            | 1 62.80            | 0.00           | 0.30             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | <b>31.97</b> | 7.94             | 0.16                 |                          | 124.00 |           |                        |            |             |                                |                |            | 123.60 |  |  |        |       |
| <b>S-221</b>      | <b>S-220</b>       | 0.00           | 0.95             | 0.00     | 0.00              | 13.82    | 0.17              | 6.61           | 4.45          | 1.13       | 2.06             |              | 134.98           | 127.24               | 127.08                   | 127.00 | 0.08      | 36.00                  | 0.1899     | Full        | 4.45                           | 96.65          | 0.0120     |        |  |  |        |       |
| 468+00.00         | 47.50              | 0.00           | 0.20             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | 29.43        | 0.00             | 0.00                 |                          | 127.80 |           |                        |            |             |                                |                |            | 127.00 |  |  |        |       |
| MH-7-J            | 1 44.71            | 0.00           | 0.30             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | <b>31.49</b> | 7.74             | 0.15                 |                          | 124.80 |           |                        |            |             |                                |                |            | 124.00 |  |  |        |       |
| <b>S-222</b>      | <b>S-221</b>       | 0.00           | 0.95             | 0.00     | 0.00              | 13.08    | 0.74              | 6.74           | 4.45          | 0.93       | 0.93             |              | 135.58           | 128.31               | 128.16                   | 127.80 | 0.36      | 36.00                  | 0.1836     | Full        | 4.38                           | 65.57          | 0.0120     |        |  |  |        |       |
| 470+00.00         | 47.75              | 0.00           | 0.20             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | 30.03        | 0.00             | 0.00                 |                          | 129.40 |           |                        |            |             |                                |                |            | 127.80 |  |  |        |       |
| MH-7-J            | 1 194.27           | 0.00           | 0.30             | 0.00     | 4.45              |          |                   |                |               | 0.00       | 0.00             | <b>30.96</b> | 7.27             | 0.15                 |                          | 126.40 |           |                        |            |             |                                |                |            | 124.80 |  |  |        |       |
| <b>S-223</b>      | <b>S-224</b>       | 0.18           | 0.95             | 0.17     | 0.17              | 10.00    | 0.55              | 7.41           | 0.17          | 0.00       | 0.00             |              | 134.15           | 131.21               | 131.21                   | 131.20 | 0.01      | 18.00                  | 0.0130     | Full        | 0.73                           | 25.50          | 0.0120     |        |  |  |        |       |
| 473+05            | -39.00             | 0.00           | 0.20             | 0.00     | 0.00              |          |                   |                |               | 0.00       | 0.00             | 1.30         | 0.00             | 0.00                 |                          | 131.70 |           |                        |            |             |                                |                |            | 128.40 |  |  |        |       |
| CI-6-A            | 1 65.74            | 0.00           | 0.30             | 0.00     | 0.17              |          |                   |                |               | 0.00       | 0.00             | <b>1.30</b>  | 2.94             | 0.01                 |                          | 130.20 |           |                        |            |             |                                |                |            | 126.90 |  |  |        |       |
| <b>S-224</b>      | <b>S-202</b>       | 0.17           | 0.95             | 0.16     | 0.17              | 10.72    | 0.24              | 7.24           | 0.93          | 0.00       | 0.00             |              | 134.30           | 131.20               | 131.08                   | 130.89 | 0.20      | 18.00                  | 0.3554     | Full        | 3.84                           | 4.84           | 0.0120     |        |  |  |        |       |
| 473+20.00         | 28.08              | 0.01           | 0.20             | 0.00     | 0.75              |          |                   |                |               | 0.00       | 0.00             | 6.78         | 0.00             | 0.00                 |                          | 128.40 |           |                        |            |             |                                |                |            | 128.30 |  |  |        |       |
| CI-6-B            | 1 55.27            | 0.02           | 0.30             | 0.00     | 0.93              |          |                   |                |               | 0.00       | 0.00             | <b>6.78</b>  | 3.10             | 0.11                 |                          | 126.90 |           |                        |            |             |                                |                |            | 126.80 |  |  |        |       |

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Units: ENGLISH

**STORM SEWER HYDRAULICS**  
System: POND 2

| PROJECT                          |  |                                |  | CONDITIONS                     |  |                         |           |                         |        |        |
|----------------------------------|--|--------------------------------|--|--------------------------------|--|-------------------------|-----------|-------------------------|--------|--------|
| Number: 41561-1                  |  | Organization: HNTB Corporation |  | Outfall Tailwater El: 111.27   |  | Storm Event - IDF Curve |           | Runoff Coeff. (default) |        |        |
| Description: Hartwood Marsh Road |  | Designed by: MSF               |  | Exit Loss at Outfall: 0.34     |  | Zone                    | Frequency | Area 1                  | Area 2 | Area 3 |
| County: Lake County              |  | Checked by:                    |  | Storm Sewer Control El: 111.61 |  | 7                       | 10        | 0.95                    | 0.20   | 0.30   |

**HGL method: Standard FDOT (Jump HGL to pipe crown).**

| FROM Station Type | TO Offset Brls Len | Drainage Areas |                  |          |                      | Tc (min) | Travel Time (min) | Inten. (in/hr) | Total CA (ac) | Flow (cfs) |            |             | Inlet Elevations |                      | Pipe Elevations          |        | Fall (ft) | Pipe Height Width (in) | HGL (%) FL (%) | Flow Type   | Velocity Actual Physical (fps) | Capacity (cfs) | Mann'g 'N' |       |  |  |  |
|-------------------|--------------------|----------------|------------------|----------|----------------------|----------|-------------------|----------------|---------------|------------|------------|-------------|------------------|----------------------|--------------------------|--------|-----------|------------------------|----------------|-------------|--------------------------------|----------------|------------|-------|--|--|--|
|                   |                    | Area (A)       | Runoff Coeff (C) | C*A (CA) | Lcl CA JpStrm Tot CA |          |                   |                |               | Qb Qfd     | S-Qb S-Qfd | CIA TOTAL   | Inlet Clear.     | HGL Min HGL Jnc Loss | HGL Crown Line Flow Line |        |           |                        |                |             |                                |                |            |       |  |  |  |
| <b>S-225</b>      | <b>S-226</b>       | 0.22           | 0.95             | 0.21     | 0.27                 | 10.00    | 0.46              | 7.41           | 0.27          | 0.00       | 0.00       |             | 146.18           | 141.84               | 141.82                   | 141.80 | 0.02      | 18.00                  | 0.0326         | Full        | 1.16                           | 4.84           | 0.0120     |       |  |  |  |
| 475+29.08         | -22.79             | 0.31           | 0.20             | 0.06     | 0.00                 |          |                   |                |               | 0.00       | 0.00       | 2.06        | 0.00             | 0.00                 |                          | 4.34   | 0.02      | 141.90                 | 141.80         |             |                                |                |            |       |  |  |  |
| CI-5-B            | 1 55.31            | 0.00           | 0.30             | 0.00     | 0.27                 |          |                   |                |               | 0.00       | 0.00       | <b>2.06</b> | 4.34             | 0.02                 |                          | 140.40 | 140.30    | 0.10                   | 18.00          | 0.1808      |                                |                |            | 2.74  |  |  |  |
| <b>S-226</b>      | <b>S-224</b>       | 0.16           | 0.95             | 0.15     | 0.15                 | 10.46    | 0.26              | 7.30           | 0.58          | 0.00       | 0.00       |             | 144.30           | 141.68               | 140.70                   | 131.80 | 8.90      | 18.00                  | 5.0290         | Partial sub | 11.21                          | 27.05          | 0.0120     |       |  |  |  |
| 475+00.00         | 27.75              | 0.02           | 0.20             | 0.00     | 0.42                 |          |                   |                |               | 0.00       | 0.00       | 4.26        | 0.00             | 0.00                 |                          | 141.80 | 131.80    |                        |                |             |                                |                |            |       |  |  |  |
| CI-5-B            | 1 177.00           | 0.00           | 0.30             | 0.00     | 0.58                 |          |                   |                |               | 0.00       | 0.00       | <b>4.26</b> | 2.62             | 0.98                 |                          | 140.30 | 130.30    | 10.00                  | 18.00          | 5.6497      |                                |                |            | 15.31 |  |  |  |
| <b>S-227</b>      | <b>S-226</b>       | 0.09           | 0.95             | 0.09     | 0.14                 | 10.00    | 0.43              | 7.41           | 0.14          | 0.00       | 0.00       |             | 155.81           | 152.89               | 152.01                   | 141.80 | 10.21     | 18.00                  | 5.1802         | Partial sub | 7.56                           | 27.49          | 0.0120     |       |  |  |  |
| 477+00.00         | 27.75              | 0.28           | 0.20             | 0.05     | 0.00                 |          |                   |                |               | 0.00       | 0.00       | 1.10        | 0.00             | 0.00                 |                          | 153.30 | 141.80    |                        |                |             |                                |                |            |       |  |  |  |
| CI-5-B            | 1 197.00           | 0.00           | 0.30             | 0.00     | 0.14                 |          |                   |                |               | 0.00       | 0.00       | <b>1.10</b> | 2.92             | 0.89                 |                          | 151.80 | 140.30    | 11.50                  | 18.00          | 5.8376      |                                |                |            | 15.56 |  |  |  |

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Units: ENGLISH

## TIME OF CONCENTRATION CALCULATIONS

# HNTB

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

**PROJECT:** HARTWOOD MARSH ROAD

**LOCATION :** 1ST BAPTIST CHURCH

Assumes developed condition

**UNDERLINE ONE:** EXISTING      PROPOSED

**UNDERLINE ONE:** Tc      Tt Through subarea

**SHEET FLOW:**

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|                |  |                  |
|----------------|--|------------------|
| SMOOTH SURFACE |  |                  |
| 0.011          |  |                  |
| 300            |  | FT.              |
| 4.70           |  | IN.              |
| 0.0200         |  |                  |
| 0.0401         |  | HR. OR 2.41 MIN. |

**SHALLOW CONCENTRATED FLOW:**

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|        |  |                  |
|--------|--|------------------|
| PAVED  |  |                  |
| 200    |  | L.F.             |
| 0.0100 |  | FT./FT.          |
| 1.613  |  | FT./SEC.         |
| 0.034  |  | HR. OR 2.07 MIN. |

**CHANNEL FLOW:**

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|          |  |                  |
|----------|--|------------------|
| 24" PIPE |  |                  |
| 3.14     |  | S.F.             |
| 6.28     |  | L.F.             |
| 0.50     |  | L.F.             |
| 0.002    |  | FT./FT.          |
| 0.012    |  |                  |
| 3.029    |  | FT./SEC.         |
| 1800     |  | L.F.             |
| 0.17     |  | HR. OR 9.91 MIN. |

TOTAL Tc = 14.38 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

**Reference:** Urban Hydrology for Small Watersheds  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

## TIME OF CONCENTRATION CALCULATIONS

# HNTB

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT:                    HARTWOOD MARSH ROAD

LOCATION :                    BASIN#21

UNDERLINE ONE:    EXISTING                    PROPOSED

UNDERLINE ONE:        Tc                                    Tt Through subarea

**SHEET FLOW:**

- 1    SURFACE DESCRIPTION
- 2    MANNING'S COEFFICIENT, n
- 3    FLOW LENGTH, L, (< 300')
- 4    2 YR/ 24 HR RAINFALL, P
- 5    LAND SLOPE, S
- 6     $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |                                                                              |
|-------------|------------------------------------------------------------------------------|
| SHORT GRASS |                                                                              |
| 0.150       |                                                                              |
| 41          | FT.                                                                          |
| 4.70        | IN.                                                                          |
| 0.0541      |                                                                              |
| 0.0443      | HR. OR <span style="border: 1px solid black; padding: 2px;">2.66</span> MIN. |

**SHALLOW CONCENTRATED FLOW:**

- 7    SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8    FLOW LENGTH, L
- 9    WATERCOURSE SLOPE, S
- 10   AVERAGE VELOCITY, V
- 11    $T_t = L / (3600 * V)$

|       |                                                                              |
|-------|------------------------------------------------------------------------------|
| PAVED |                                                                              |
|       | L.F.                                                                         |
|       | FT./ FT.                                                                     |
|       | FT./SEC.                                                                     |
|       | HR. OR <span style="border: 1px solid black; padding: 2px;">0.00</span> MIN. |

**CHANNEL FLOW:**

- 12   CROSS-SECTIONAL FLOW AREA, A
- 13   WETTED PERIMETER, Pw
- 14   HYDRAULIC RADIUS, R = (A / Pw)
- 15   CHANNEL SLOPE, S
- 16   MANNING'S ROUGHNESS COEFFICIENT, n
- 17   VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18   FLOW LENGTH, L
- 19    $T_t = L / (3600 V)$
- 20   Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |                                                                              |                         |
|--|------------------------------------------------------------------------------|-------------------------|
|  | S.F.                                                                         |                         |
|  | L.F.                                                                         |                         |
|  | L.F.                                                                         | Pipe flow from S-200    |
|  | FT./FT.                                                                      | to pond (Hartwood Marsh |
|  |                                                                              | Rd ASAD)                |
|  | FT./SEC.                                                                     |                         |
|  | L.F.                                                                         |                         |
|  | HR. OR <span style="border: 1px solid black; padding: 2px;">7.54</span> MIN. |                         |

TOTAL    Tc =    10.20 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference:                    *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

**TIME OF CONCENTRATION CALCULATIONS**



DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION : BASIN 2-2

UNDERLINE ONE: EXISTING                      PROPOSED

UNDERLINE ONE:     Tc                      Tt Through subarea

**SHEET FLOW:**

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |                                                                              |
|-------------|--|------------------------------------------------------------------------------|
| SHORT GRASS |  |                                                                              |
| 0.150       |  |                                                                              |
| .68         |  | FT.                                                                          |
| 4.70        |  | IN.                                                                          |
| 0.0688      |  |                                                                              |
| 0.0604      |  | HR. OR <span style="border: 1px solid black; padding: 2px;">3.62</span> MIN. |

**SHALLOW CONCENTRATED FLOW:**

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|       |  |                                                                          |
|-------|--|--------------------------------------------------------------------------|
| PAVED |  |                                                                          |
|       |  | L.F.                                                                     |
|       |  | FT./ FT.                                                                 |
|       |  | FT./SEC.                                                                 |
|       |  | HR. OR <span style="border: 1px solid black; padding: 2px;"></span> MIN. |

**CHANNEL FLOW:**

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |          |                                                                       |
|--|--|----------|-----------------------------------------------------------------------|
|  |  | S.F.     |                                                                       |
|  |  | L.F.     |                                                                       |
|  |  | L.F.     |                                                                       |
|  |  | FT./FT.  | Pipe flow from S-204 to pond (Hartwood Marsh Rd ASAD)                 |
|  |  | FT./SEC. |                                                                       |
|  |  | L.F.     |                                                                       |
|  |  | HR. OR   | <span style="border: 1px solid black; padding: 2px;">5.62</span> MIN. |

TOTAL Tc = 9.24 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986



**TIME OF CONCENTRATION CALCULATIONS**



DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 23-Apr-08 |
| CHECKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 2-3

UNDERLINE ONE: EXISTING                      PROPOSED

UNDERLINE ONE:     T<sub>c</sub>                      T<sub>t</sub> Through subarea

**SHEET FLOW:**

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |
|-------------|--|
| SHORT GRASS |  |
| 0.240       |  |
| 41          |  |
| 4.70        |  |
| 0.4137      |  |
| 0.0286      |  |

FT.  
IN.  
HR. OR 1.72 MIN.

**SHALLOW CONCENTRATED FLOW:**

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|       |  |
|-------|--|
| PAVED |  |
|       |  |
|       |  |
|       |  |
|       |  |

L.F.  
FT./FT.  
FT./SEC.  
HR. OR 0.00 MIN.

**CHANNEL FLOW:**

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, P<sub>w</sub>
- 14 HYDRAULIC RADIUS, R = (A / P<sub>w</sub>)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, = (1.49 \* R<sup>0.667</sup> \* S<sup>0.5</sup>) / n
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea T<sub>c</sub> or T<sub>t</sub> (add T<sub>t</sub> in steps 6, 11, and 19)

|  |  |
|--|--|
|  |  |
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|  |  |
|  |  |
|  |  |

S.F.  
L.F.  
L.F.  
FT./FT.     Pipe flow from S-212  
to pond (Hartwood Marsh  
Rd ASAD)  
FT./SEC.  
L.F.  
HR. OR 6.78 MIN.

TOTAL T<sub>c</sub> = 8.50 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

## TIME OF CONCENTRATION CALCULATIONS

DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 20-Sep-07 |
| CHECKED BY: | KMV | 22-Sep-07 |

PROJECT:           **HARTWOOD MARSH ROAD**

LOCATION :           BASIN 2-4

UNDERLINE ONE:   **EXISTING**                    PROPOSED

UNDERLINE ONE:    Tc                                Tt Through subarea

**SHEET FLOW:**

- 1    SURFACE DESCRIPTION
- 2    MANNING'S COEFFICIENT, n
- 3    FLOW LENGTH, L, (< 300')
- 4    2 YR/ 24 HR RAINFALL, P
- 5    LAND SLOPE, S
- 6     $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |
|-------------|--|
| SHORT GRASS |  |
|             |  |
|             |  |
|             |  |
|             |  |
|             |  |
|             |  |

FT.  
IN.  
HR. OR 0:00 MIN.

**SHALLOW CONCENTRATED FLOW:**

- 7    SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8    FLOW LENGTH, L
- 9    WATERCOURSE SLOPE, S
- 10  AVERAGE VELOCITY, V
- 11   $T_t = L / (3600 * V)$

|       |  |
|-------|--|
| PAVED |  |
|       |  |
|       |  |
|       |  |
|       |  |
|       |  |

AT S-212  
L.F.  
FT./FT.  
FT./SEC.  
HR. OR 10:57 MIN.

**CHANNEL FLOW:**

- 12  CROSS-SECTIONAL FLOW AREA, A
- 13  WETTED PERIMETER, Pw
- 14  HYDRAULIC RADIUS, R = (A / Pw)
- 15  CHANNEL SLOPE, S
- 16  MANNING'S ROUGHNESS COEFFICIENT, n
- 17  VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18  FLOW LENGTH, L
- 19   $T_t = L / (3600 V)$
- 20  Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

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S.F.  
L.F.  
L.F.  
FT./FT.  
FT./SEC.  
L.F.  
HR. OR 0:00 MIN.

TOTAL Tc = 5:00 MIN.

Assume 5 min for Pond

Reference:            *Urban Hydrology for Small Watersheds*  
                               Technical Release 55, Soil Conservation Service  
                               U.S. Department of Agriculture, June 1986

**AdICPR Post Development Model**

Hartwood Marsh Road Phase I inc. S. Hancock runoff  
Post Development  
Pond 2 Hartwood  
Input

=====  
Basins  
=====

Name: 1ST BAPTIST CH                    Node: POND 2                    Status: Onsite  
Group: BASE                            Type: SCS Unit Hydrograph  
  
Unit Hydrograph: Uh484                    Peaking Factor: 484.0  
Rainfall File: Sjrwm96                   Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.300              Time of Conc(min): 14.38  
Area(ac): 30.530                        Time Shift(hrs): 0.00  
Curve Number: 86.20                    Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

First Baptist Church

-----  
Name: BASIN 2                            Node: POND 2                    Status: Onsite  
Group: BASE                            Type: SCS Unit Hydrograph  
  
Unit Hydrograph: Uh484                    Peaking Factor: 484.0  
Rainfall File: Sjrwm96                   Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.300              Time of Conc(min): 17.34  
Area(ac): 7.670                        Time Shift(hrs): 0.00  
Curve Number: 85.20                    Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

Road Basin

-----  
Name: BASIN 2-1                        Node: POND 2                    Status: Onsite  
Group: BASE                            Type: SCS Unit Hydrograph  
  
Unit Hydrograph: Uh484                    Peaking Factor: 484.0  
Rainfall File: Sjrwm96                   Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.300              Time of Conc(min): 10.20  
Area(ac): 0.081                        Time Shift(hrs): 0.00  
Curve Number: 39.00                    Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

Offsite to road

-----  
Name: BASIN 2-2                        Node: POND 2                    Status: Onsite  
Group: BASE                            Type: SCS Unit Hydrograph  
  
Unit Hydrograph: Uh484                    Peaking Factor: 484.0  
Rainfall File: Sjrwm96                   Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.300              Time of Conc(min): 9.24  
Area(ac): 0.300                        Time Shift(hrs): 0.00  
Curve Number: 54.70                    Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

Offsite to road

-----  
Name: BASIN 2-3                        Node: POND 2                    Status: Onsite  
Group: BASE                            Type: SCS Unit Hydrograph  
  
Unit Hydrograph: Uh484                    Peaking Factor: 484.0  
Rainfall File: Sjrwm96                   Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.300              Time of Conc(min): 8.50  
Area(ac): 0.140                        Time Shift(hrs): 0.00  
Curve Number: 43.20                    Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

Offsite to road

-----  
Name: BASIN 2-4                        Node: POND 2                    Status: Onsite  
Group: BASE                            Type: SCS Unit Hydrograph  
  
Unit Hydrograph: Uh484                    Peaking Factor: 484.0  
Rainfall File: Sjrwm96                   Storm Duration(hrs): 96.00  
Rainfall Amount(in): 11.300              Time of Conc(min): 5.00  
Area(ac): 6.340                        Time Shift(hrs): 0.00  
Curve Number: 57.90                    Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

Dry Total Retention Pond 2

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Hartwood Marsh Road Phase I inc. S. Hancock runoff  
 Post Development  
 Pond 2 Hartwood  
 Input

=====  
 Nodes  
 =====

Name: POND 2                      Base Flow(cfs): 0.000                      Init Stage(ft): 104.000  
 Group: BASE                      Warn Stage(ft): 117.000  
 Type: Stage/Area

| Stage(ft) | Area(ac) |
|-----------|----------|
| 104.000   | 1.7760   |
| 108.000   | 2.4420   |
| 110.000   | 2.8130   |
| 113.000   | 3.3910   |
| 116.000   | 3.9850   |
| 117.000   | 4.7580   |

=====  
 Hydrology Simulations  
 =====

Name: 100Y24H  
 Filename: W:\JOBS\41561-1\Phase 1\41561100001\drainage\ROUTINGS\POST\100Y24H.R32

Override Defaults: Yes  
 Storm Duration(hrs): 24.00  
 Rainfall File: Flmod  
 Rainfall Amount(in): 11.50

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 11.000    | 60.00 |          |
| 16.000    | 15.00 |          |
| 40.000    | 60.00 |          |

Name: 10Y24H  
 Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\10Y24H.R32

Override Defaults: Yes  
 Storm Duration(hrs): 24.00  
 Rainfall File: Flmod  
 Rainfall Amount(in): 6.70

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 11.000    | 60.00 |          |
| 16.000    | 15.00 |          |
| 40.000    | 60.00 |          |

Name: 2.3Y24H  
 Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.R32

Override Defaults: Yes  
 Storm Duration(hrs): 24.00  
 Rainfall File: Flmod  
 Rainfall Amount(in): 4.20

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 11.000    | 60.00 |          |
| 16.000    | 15.00 |          |
| 40.000    | 60.00 |          |

Name: 25Y24H  
 Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y24H.R32

Override Defaults: Yes  
 Storm Duration(hrs): 24.00  
 Rainfall File: Flmod  
 Rainfall Amount(in): 8.30

| Time(hrs) | Print | Inc(min) |
|-----------|-------|----------|
| 11.000    | 60.00 |          |
| 16.000    | 15.00 |          |
| 40.000    | 60.00 |          |

Hartwood Marsh Road Phase I inc. S. Hancock runoff  
Post Development  
Pond 2 Hartwood  
Input

-----  
Name: 25Y96H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y96H.R32

Override Defaults: No

| Time (hrs) | Print Inc (min) |
|------------|-----------------|
| 50.000     | 60.00           |
| 62.000     | 15.00           |
| 100.000    | 60.00           |

=====  
=== Routing Simulations ===  
=====

Name: 100Y24H                      Hydrology Sim: 100Y24H  
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\POST\100Y24H.I32

Execute: Yes                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 150.00  
Min Calc Time(sec): 0.5000                      Max Calc Time(sec): 60.0000  
Boundary Stages:                      Boundary Flows:

| Time (hrs) | Print Inc (min) |
|------------|-----------------|
| 11.000     | 60.000          |
| 15.000     | 15.000          |
| 150.000    | 60.000          |

| Group | Run |
|-------|-----|
| BASE  | Yes |

-----  
Name: 10Y24H                      Hydrology Sim: 10Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\10Y24H.I32

Execute: Yes                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 40.00  
Min Calc Time(sec): 0.5000                      Max Calc Time(sec): 60.0000  
Boundary Stages:                      Boundary Flows:

| Time (hrs) | Print Inc (min) |
|------------|-----------------|
| 11.000     | 60.000          |
| 15.000     | 15.000          |
| 40.000     | 60.000          |

| Group | Run |
|-------|-----|
| BASE  | Yes |

-----  
Name: 2.3Y24H                      Hydrology Sim: 2.3Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.I32

Execute: Yes                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 150.00  
Min Calc Time(sec): 0.5000                      Max Calc Time(sec): 60.0000  
Boundary Stages:                      Boundary Flows:

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Hartwood Marsh Road Phase I inc. S. Hancock runoff  
Post Development  
Pond 2 Hartwood  
Input

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| Time (hrs) | Print Inc (min) |
|------------|-----------------|
| 11.000     | 60.000          |
| 15.000     | 15.000          |
| 150.000    | 60.000          |

| Group | Run |
|-------|-----|
| BASE  | Yes |

---

Name: 25Y24H                      Hydrology Sim: 25Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y24H.I32

Execute: Yes                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z (ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time (hrs): 0.000                      End Time (hrs): 40.00  
Min Calc Time (sec): 0.5000                      Max Calc Time (sec): 60.0000  
Boundary Stages:                      Boundary Flows:

---

| Time (hrs) | Print Inc (min) |
|------------|-----------------|
| 11.000     | 60.000          |
| 15.000     | 15.000          |
| 40.000     | 60.000          |

| Group | Run |
|-------|-----|
| BASE  | Yes |

---

Name: 25Y96H                      Hydrology Sim: 25Y96H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y96H.I32

Execute: Yes                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z (ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time (hrs): 0.000                      End Time (hrs): 97.00  
Min Calc Time (sec): 0.5000                      Max Calc Time (sec): 60.0000  
Boundary Stages:                      Boundary Flows:

---

| Time (hrs) | Print Inc (min) |
|------------|-----------------|
| 55.000     | 60.000          |
| 65.000     | 15.000          |
| 97.000     | 60.000          |

| Group | Run |
|-------|-----|
| BASE  | Yes |

=====  
==== Boundary Conditions =====  
=====

Hartwood Marsh Road Phase I inc. S. Hancock runoff  
 Post Development  
 Pond 2 Hartwood  
 Hydrology time series 25y/96h

| Simulation | Node   | Time hrs | Volume ft3 | Volume in | Rate cfs |
|------------|--------|----------|------------|-----------|----------|
| 25Y96H     | POND 2 | 0.00     | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 1.00     | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 2.00     | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 3.00     | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 4.00     | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 5.00     | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 6.00     | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 7.00     | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 8.00     | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 9.00     | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 10.00    | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 11.00    | 0.000      | 0.000     | 0.000    |
| 25Y96H     | POND 2 | 12.00    | 10.978     | 0.000     | 0.006    |
| 25Y96H     | POND 2 | 13.00    | 86.064     | 0.001     | 0.036    |
| 25Y96H     | POND 2 | 14.00    | 274.525    | 0.002     | 0.069    |
| 25Y96H     | POND 2 | 15.00    | 580.682    | 0.004     | 0.101    |
| 25Y96H     | POND 2 | 16.00    | 999.017    | 0.006     | 0.131    |
| 25Y96H     | POND 2 | 17.00    | 1521.685   | 0.009     | 0.159    |
| 25Y96H     | POND 2 | 18.00    | 2142.986   | 0.013     | 0.186    |
| 25Y96H     | POND 2 | 19.00    | 2860.141   | 0.017     | 0.212    |
| 25Y96H     | POND 2 | 20.00    | 3668.887   | 0.022     | 0.237    |
| 25Y96H     | POND 2 | 21.00    | 4569.164   | 0.028     | 0.263    |
| 25Y96H     | POND 2 | 22.00    | 5557.803   | 0.034     | 0.286    |
| 25Y96H     | POND 2 | 23.00    | 6627.856   | 0.041     | 0.308    |
| 25Y96H     | POND 2 | 24.00    | 7776.730   | 0.048     | 0.330    |
| 25Y96H     | POND 2 | 25.00    | 9937.145   | 0.061     | 0.870    |
| 25Y96H     | POND 2 | 26.00    | 13249.920  | 0.081     | 0.970    |
| 25Y96H     | POND 2 | 27.00    | 16906.262  | 0.103     | 1.061    |
| 25Y96H     | POND 2 | 28.00    | 20876.051  | 0.128     | 1.144    |
| 25Y96H     | POND 2 | 29.00    | 25208.141  | 0.154     | 1.262    |
| 25Y96H     | POND 2 | 30.00    | 29886.457  | 0.183     | 1.337    |
| 25Y96H     | POND 2 | 31.00    | 34821.023  | 0.213     | 1.405    |
| 25Y96H     | POND 2 | 32.00    | 39990.676  | 0.244     | 1.467    |
| 25Y96H     | POND 2 | 33.00    | 45287.203  | 0.277     | 1.475    |
| 25Y96H     | POND 2 | 34.00    | 50688.531  | 0.310     | 1.525    |
| 25Y96H     | POND 2 | 35.00    | 56264.117  | 0.344     | 1.572    |
| 25Y96H     | POND 2 | 36.00    | 62001.566  | 0.379     | 1.615    |
| 25Y96H     | POND 2 | 37.00    | 67901.039  | 0.415     | 1.662    |
| 25Y96H     | POND 2 | 38.00    | 73965.156  | 0.452     | 1.707    |
| 25Y96H     | POND 2 | 39.00    | 80185.711  | 0.490     | 1.749    |
| 25Y96H     | POND 2 | 40.00    | 86554.055  | 0.529     | 1.789    |
| 25Y96H     | POND 2 | 41.00    | 93172.219  | 0.570     | 1.888    |
| 25Y96H     | POND 2 | 42.00    | 100036.563 | 0.612     | 1.926    |
| 25Y96H     | POND 2 | 43.00    | 107033.797 | 0.654     | 1.962    |
| 25Y96H     | POND 2 | 44.00    | 114156.391 | 0.698     | 1.995    |
| 25Y96H     | POND 2 | 45.00    | 121280.141 | 0.741     | 1.962    |
| 25Y96H     | POND 2 | 46.00    | 128395.797 | 0.785     | 1.991    |
| 25Y96H     | POND 2 | 47.00    | 135611.984 | 0.829     | 2.018    |
| 25Y96H     | POND 2 | 48.00    | 142926.188 | 0.874     | 2.045    |
| 25Y96H     | POND 2 | 49.00    | 151622.781 | 0.927     | 2.786    |
| 25Y96H     | POND 2 | 50.00    | 161731.172 | 0.989     | 2.830    |
| 25Y96H     | POND 2 | 50.25    | 164448.000 | 1.005     | 3.208    |
| 25Y96H     | POND 2 | 50.50    | 167387.484 | 1.023     | 3.324    |
| 25Y96H     | POND 2 | 50.75    | 170389.375 | 1.042     | 3.346    |
| 25Y96H     | POND 2 | 51.00    | 173407.000 | 1.060     | 3.360    |
| 25Y96H     | POND 2 | 51.25    | 176436.281 | 1.079     | 3.372    |
| 25Y96H     | POND 2 | 51.50    | 179476.969 | 1.097     | 3.385    |
| 25Y96H     | POND 2 | 51.75    | 182528.828 | 1.116     | 3.397    |
| 25Y96H     | POND 2 | 52.00    | 185592.672 | 1.135     | 3.411    |
| 25Y96H     | POND 2 | 52.25    | 188944.406 | 1.155     | 4.037    |
| 25Y96H     | POND 2 | 52.50    | 192668.375 | 1.178     | 4.239    |
| 25Y96H     | POND 2 | 52.75    | 196497.953 | 1.201     | 4.272    |
| 25Y96H     | POND 2 | 53.00    | 200350.375 | 1.225     | 4.289    |
| 25Y96H     | POND 2 | 53.25    | 204218.359 | 1.248     | 4.306    |
| 25Y96H     | POND 2 | 53.50    | 208101.391 | 1.272     | 4.323    |
| 25Y96H     | POND 2 | 53.75    | 211999.172 | 1.296     | 4.339    |
| 25Y96H     | POND 2 | 54.00    | 215912.422 | 1.320     | 4.357    |
| 25Y96H     | POND 2 | 54.25    | 220218.250 | 1.346     | 5.211    |
| 25Y96H     | POND 2 | 54.50    | 225026.344 | 1.376     | 5.473    |
| 25Y96H     | POND 2 | 54.75    | 229971.797 | 1.406     | 5.517    |
| 25Y96H     | POND 2 | 55.00    | 234947.250 | 1.436     | 5.540    |
| 25Y96H     | POND 2 | 55.25    | 239943.172 | 1.467     | 5.562    |
| 25Y96H     | POND 2 | 55.50    | 244958.969 | 1.498     | 5.584    |
| 25Y96H     | POND 2 | 55.75    | 249994.078 | 1.528     | 5.605    |
| 25Y96H     | POND 2 | 56.00    | 255053.891 | 1.559     | 5.639    |
| 25Y96H     | POND 2 | 56.25    | 261154.641 | 1.597     | 7.918    |
| 25Y96H     | POND 2 | 56.50    | 268578.625 | 1.642     | 8.579    |
| 25Y96H     | POND 2 | 56.75    | 276342.969 | 1.689     | 8.675    |
| 25Y96H     | POND 2 | 57.00    | 284170.000 | 1.737     | 8.719    |
| 25Y96H     | POND 2 | 57.25    | 292035.375 | 1.785     | 8.760    |
| 25Y96H     | POND 2 | 57.50    | 299937.375 | 1.834     | 8.800    |



Hartwood Marsh Road Phase I inc. S. Hancock runoff  
 Post Development  
 Pond 2 Hartwood  
 Hydrology time series 25y/96h

| Simulation | Node   | Time hrs | Volume ft3  | Volume in | Rate cfs |
|------------|--------|----------|-------------|-----------|----------|
| 25Y96H     | POND 2 | 57.75    | 307874.844  | 1.882     | 8.839    |
| 25Y96H     | POND 2 | 58.00    | 315850.281  | 1.931     | 8.884    |
| 25Y96H     | POND 2 | 58.25    | 326230.906  | 1.994     | 14.184   |
| 25Y96H     | POND 2 | 58.50    | 339726.000  | 2.077     | 15.806   |
| 25Y96H     | POND 2 | 58.75    | 354055.313  | 2.165     | 16.037   |
| 25Y96H     | POND 2 | 59.00    | 368550.875  | 2.253     | 16.175   |
| 25Y96H     | POND 2 | 59.25    | 387533.063  | 2.369     | 26.008   |
| 25Y96H     | POND 2 | 59.50    | 412345.656  | 2.521     | 29.132   |
| 25Y96H     | POND 2 | 59.75    | 511849.813  | 3.129     | 191.989  |
| 25Y96H     | POND 2 | 60.00    | 707722.500  | 4.327     | 243.284  |
| 25Y96H     | POND 2 | 60.25    | 859052.000  | 5.252     | 93.004   |
| 25Y96H     | POND 2 | 60.50    | 924035.063  | 5.649     | 51.403   |
| 25Y96H     | POND 2 | 60.75    | 960619.750  | 5.873     | 29.896   |
| 25Y96H     | POND 2 | 61.00    | 985376.125  | 6.024     | 25.118   |
| 25Y96H     | POND 2 | 61.25    | 1004767.750 | 6.143     | 17.975   |
| 25Y96H     | POND 2 | 61.50    | 1020165.438 | 6.237     | 16.243   |
| 25Y96H     | POND 2 | 61.75    | 1034725.938 | 6.326     | 16.114   |
| 25Y96H     | POND 2 | 62.00    | 1049226.125 | 6.414     | 16.109   |
| 25Y96H     | POND 2 | 63.00    | 1096292.875 | 6.702     | 10.040   |
| 25Y96H     | POND 2 | 64.00    | 1132471.000 | 6.923     | 10.059   |
| 25Y96H     | POND 2 | 65.00    | 1161522.000 | 7.101     | 6.080    |
| 25Y96H     | POND 2 | 66.00    | 1183423.625 | 7.235     | 6.088    |
| 25Y96H     | POND 2 | 67.00    | 1205352.625 | 7.369     | 6.095    |
| 25Y96H     | POND 2 | 68.00    | 1227299.375 | 7.503     | 6.098    |
| 25Y96H     | POND 2 | 69.00    | 1245597.625 | 7.615     | 4.068    |
| 25Y96H     | POND 2 | 70.00    | 1260248.625 | 7.705     | 4.071    |
| 25Y96H     | POND 2 | 71.00    | 1274901.750 | 7.794     | 4.069    |
| 25Y96H     | POND 2 | 72.00    | 1289548.000 | 7.884     | 4.067    |
| 25Y96H     | POND 2 | 73.00    | 1300680.375 | 7.952     | 2.117    |
| 25Y96H     | POND 2 | 74.00    | 1308304.125 | 7.998     | 2.118    |
| 25Y96H     | POND 2 | 75.00    | 1315930.250 | 8.045     | 2.119    |
| 25Y96H     | POND 2 | 76.00    | 1323559.500 | 8.092     | 2.120    |
| 25Y96H     | POND 2 | 77.00    | 1331222.625 | 8.138     | 2.138    |
| 25Y96H     | POND 2 | 78.00    | 1338919.250 | 8.186     | 2.138    |
| 25Y96H     | POND 2 | 79.00    | 1346618.625 | 8.233     | 2.139    |
| 25Y96H     | POND 2 | 80.00    | 1354320.500 | 8.280     | 2.140    |
| 25Y96H     | POND 2 | 81.00    | 1361993.750 | 8.327     | 2.123    |
| 25Y96H     | POND 2 | 82.00    | 1369638.750 | 8.373     | 2.124    |
| 25Y96H     | POND 2 | 83.00    | 1377286.000 | 8.420     | 2.125    |
| 25Y96H     | POND 2 | 84.00    | 1384935.750 | 8.467     | 2.125    |
| 25Y96H     | POND 2 | 85.00    | 1392588.000 | 8.514     | 2.126    |
| 25Y96H     | POND 2 | 86.00    | 1400242.875 | 8.560     | 2.127    |
| 25Y96H     | POND 2 | 87.00    | 1407900.000 | 8.607     | 2.127    |
| 25Y96H     | POND 2 | 88.00    | 1415559.500 | 8.654     | 2.128    |
| 25Y96H     | POND 2 | 89.00    | 1423252.750 | 8.701     | 2.146    |
| 25Y96H     | POND 2 | 90.00    | 1430979.375 | 8.748     | 2.147    |
| 25Y96H     | POND 2 | 91.00    | 1438708.750 | 8.796     | 2.147    |
| 25Y96H     | POND 2 | 92.00    | 1446440.250 | 8.843     | 2.148    |
| 25Y96H     | POND 2 | 93.00    | 1454142.500 | 8.890     | 2.131    |
| 25Y96H     | POND 2 | 94.00    | 1461815.875 | 8.937     | 2.132    |
| 25Y96H     | POND 2 | 95.00    | 1469491.750 | 8.984     | 2.132    |
| 25Y96H     | POND 2 | 96.00    | 1477153.625 | 9.031     | 2.124    |
| 25Y96H     | POND 2 | 97.00    | 1480977.375 | 9.054     | 0.000    |
| 25Y96H     | POND 2 | 98.00    | 1480977.375 | 9.054     | 0.000    |
| 25Y96H     | POND 2 | 99.00    | 1480977.375 | 9.054     | 0.000    |
| 25Y96H     | POND 2 | 100.00   | 1480977.375 | 9.054     | 0.000    |

33.99 af

TOTAL VOLUME

Hartwood Marsh Road Phase I inc. S. Hancock runoff  
 Post Development  
 Pond 2 Hartwood  
 Node Min/Max

| Name   | Group | Simulation | Max Time<br>Stage<br>hrs | Max<br>Stage<br>ft | Warning<br>Stage<br>ft | Max Delta<br>Stage<br>ft | Max Surf<br>Area<br>ft2 | Max Time<br>Inflow<br>hrs | Max<br>Inflow<br>cfs | Max Time<br>Outflow<br>hrs | Max<br>Outflow<br>cfs |
|--------|-------|------------|--------------------------|--------------------|------------------------|--------------------------|-------------------------|---------------------------|----------------------|----------------------------|-----------------------|
| POND 2 | BASE  | 100Y24H    | 25.00                    | 116.064            | 117.000                | 0.0050                   | 175745                  | 12.00                     | 314.083              | 0.00                       | 0.000                 |
| POND 2 | BASE  | 10Y24H     | 25.01                    | 111.267            | 117.000                | 0.0050                   | 133170                  | 12.00                     | 162.377              | 0.00                       | 0.000                 |
| POND 2 | BASE  | 2.3Y24H    | 25.00                    | 108.276            | 117.000                | 0.0050                   | 108601                  | 12.00                     | 85.119               | 0.00                       | 0.000                 |
| POND 2 | BASE  | 25Y24H     | 25.02                    | 112.987            | 117.000                | 0.0050                   | 147605                  | 12.00                     | 212.731              | 0.00                       | 0.000                 |
| POND 2 | BASE  | 25Y96H     | 96.99                    | 115.985            | 117.000                | 0.0050                   | 173455                  | 60.00                     | 243.249              | 0.00                       | 0.000                 |

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**Water Quality Treatment and Recovery**  
**Calculations**

POLLUTION ABATEMENT VOLUME

**HNTB**

|          |      |           |
|----------|------|-----------|
|          | DATE |           |
| MADE BY: | MSF  | 23-Apr-08 |
| CHCK BY: | KMV  | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 2

BASIN LIMITS: STA. 138+50.00 to STA. 152+39.00, CL CONST. HARTWOOD MARSH

TOTAL TREATMENT AREA: 45.07 AC.

IMPERVIOUS AREA: 30.52 AC. Less Pond

UNDERLINE ONE: RETENTION DETENTION

UNDERLINE ONE: DRY WET

UNDERLINE ONE: ONLINE OFFLINE NOTE: TOTAL RETENTION OF RUNOFF.

REQUIRED TREATMENT VOLUME:

1) COMPUTE FIRST 0.5 INCH OF RUNOFF FROM PROJECT:

$$(0.5"/12) \times 45.07 \text{ AC.} = \text{1.88 AF}$$

2) COMPUTE 1.25 INCHES TIMES IMPERVIOUS AREA:

$$(1.25"/12) \times 30.52 \text{ AC.} = \text{3.18 AF}$$

CONTROLLING CRITERIA: 2

REQUIRED TREATMENT VOLUME: 3.18 AF

*Basin 2 P.A.V.*

*Pond 2 retains  
> req'd P.A.V.  
below outfall  
elevation of 117.0'*

*ON-LINE: OK ✓  
 $\frac{.5}{12}(45.07) = 1.88 \text{ Ac-ft}$   
 $\frac{1.25}{12}(30.52) = 3.18 \text{ Ac-ft}$   
5.06 Ac-ft*

**STAGE / STORAGE CALCULATIONS**



DATE

|          |     |           |
|----------|-----|-----------|
| MADE BY: | MSF | 23-Apr-08 |
| CHK BY:  | KMV | 24-Apr-08 |

PROJECT: **HARTWOOD MARSH ROAD**

POND: 2

| Boring | Existing Ground Elevation | Depth to Encountered Water Surface | Estimated Encountered Water Elevation | Depth to Seasonal High Water Surface | Estimated Seasonal High Water Elevation | Estimated Normal High Water Elevation |
|--------|---------------------------|------------------------------------|---------------------------------------|--------------------------------------|-----------------------------------------|---------------------------------------|
| TH-P3  | 126.8                     | 39.3                               | 87.5                                  | 34.8                                 | 92                                      | 89.75                                 |

Note: Based on boring performed 3/24/08

AVERAGE ELEVATION (FT)                      87.50 ft.                      92.00 ft.                      89.75 ft.

AVG. SHWT ELEVATION: 92.0 Ft. (NAVD)

AVG. GROUND WATER TABLE ELEVATION: 87.5 Ft. (NAVD)

MINIMUM POND CONTROL ELEVATION 95.0 Ft. (NAVD)

Lake County criteria is pond bottom needs to be 3 feet above seasonal high water elevation

| STAGE<br>FT. (NAVD) | AREA<br>AC | AVERAGE AREA<br>AC | INCREMENTAL VOL.<br>AF | CUMULATIVE VOL.<br>AF |
|---------------------|------------|--------------------|------------------------|-----------------------|
| 104.0               | 1.776      |                    | 0.00                   | 0.00                  |
|                     |            | 2.11               |                        |                       |
| 108.0               | 2.442      |                    | 8.44                   | 8.44                  |
|                     |            | 2.63               |                        |                       |
| 110.0               | 2.813      |                    | 5.26                   | 13.69                 |
|                     |            | 3.10               |                        |                       |
| 113.0               | 3.391      |                    | 9.31                   | 23.00                 |
|                     |            | 3.69               |                        |                       |
| 116.0               | 3.985      |                    | 11.06                  | 34.06                 |
|                     |            | 4.37               |                        |                       |
| 117.0               | 4.758      |                    | 4.37                   | 38.43                 |
|                     |            |                    |                        |                       |

REQUIRED TREATMENT VOLUME: 3.18 AF

TREATMENT ELEVATION 105.12 Ft.                      Check total retention volume

PERCOLATION RATE: 30 Ft./Day or 15 Inches/Hr.

FACTOR OF SAFETY: 2 = 7.5 Inches/Hr. = 15 Ft./Day

ESTIMATED IMPERMEABLE BOUNDARY 91.00 Ft.

**PONDS Version 3.3.0223**  
**Retention Pond Recovery - Refined Method**  
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**Project Data**

Project Name: Hartwood Marsh Road Phase 1  
Simulation Description: Pond 2 Water Quality recovery  
Project Number: 41561  
Engineer : KMV  
Supervising Engineer:  
Date: 04-24-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 91.00  
Water Table Elevation, [WT] (ft datum): 92.00  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 15.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 15.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 85813.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 527.0  
Equivalent Pond Width, [W] (ft): 162.0  
Ground water mound is expected to intersect the pond bottom

*Pond 2 Recovery*

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 104.00              | 77377.0                    |
| 108.00              | 106386.0                   |
| 110.00              | 122540.0                   |
| 113.00              | 147715.0                   |
| 116.00              | 173595.0                   |
| 117.00              | 207263.0                   |

**Scenario Input Data**

*Scenario 1 :: Water Quality volume*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration  
  
 Treatment Volume (ft<sup>3</sup>) 138478  
 Initial ground water level (ft datum) default, 92.00

| Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|
| 0.100                         | 2.000                         |
| 0.250                         | 2.500                         |
| 0.500                         | 3.000                         |
| 1.000                         | 3.500                         |
| 1.500                         |                               |

Pond 2 P.A.H.  
 = 5.06 Ac-ft  
 = 220,413.6  
 c.f.

*Scenario 3 ::*

Hydrograph Type: Local Hydrograph  
 Modflow Routing: Routed with infiltration  
 Repetitions: 1  
  
 Initial ground water level (ft datum) default, 92.00

| Time After Storm Event (days) |
|-------------------------------|
| 1.000                         |
| 5.000                         |
| 10.000                        |
| 15.000                        |
| 20.000                        |

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**Detailed Results** :: Scenario 1 :: Water Quality volume

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 23079.6700                       | 0.0000                    | 92.000                     | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 23079.6700                       | 0.0000                    | 105.659                    | 14.89782                               | 0.00000                                 | 138478.0                                    | 89.4                                              | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 104.168                    | 8.70803                                | 0.00000                                 | 138478.0                                    | 125363.1                                          | 0.0                                            | U/P       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 138478.0                                    | 138478.0                                          | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 138478.0                                    | 138478.0                                          | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 138478.0                                    | 138478.0                                          | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 138478.0                                    | 138478.0                                          | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 138478.0                                    | 138478.0                                          | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 138478.0                                    | 138478.0                                          | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 138478.0                                    | 138478.0                                          | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 138478.0                                    | 138478.0                                          | 0.0                                            | dry       |

RECOVERY  
 < 3 HRS



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Retention Pond Recovery - Refined Method  
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**Project Data**

Project Name: Hartwood Marsh Road Phase 1  
Simulation Description: Pond 2 25 year/96 hour recovery  
Project Number: 41561  
Engineer : KMV  
Supervising Engineer:  
Date: 04-24-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 91.00  
Water Table Elevation, [WT] (ft datum): 92.00  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 15.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 15.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 173594.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 694.0  
Equivalent Pond Width, [W] (ft): 250.0  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 104.00              | 77377.0                    |
| 108.00              | 106386.0                   |
| 110.00              | 122540.0                   |
| 113.00              | 147715.0                   |
| 116.00              | 173595.0                   |
| 117.00              | 207263.0                   |

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**Scenario Input Data**

*Scenario 1 :: 25 year/96 hour volume*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 1480978

Initial ground water level (ft datum) default, 92.00

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.100                         | 2.000                         | 5.000                         | 10.000                        | 15.000                        |
| 0.250                         | 2.500                         | 6.000                         | 11.000                        | 16.000                        |
| 0.500                         | 3.000                         | 7.000                         | 12.000                        |                               |
| 1.000                         | 3.500                         | 8.000                         | 13.000                        |                               |
| 1.500                         | 4.000                         | 9.000                         | 14.000                        |                               |

*Scenario 3 ::*

Hydrograph Type: Local Hydrograph  
 Modflow Routing: Routed with infiltration  
 Repetitions: 1

Initial ground water level (ft datum) default, 92.00

| Time After Storm Event (days) |
|-------------------------------|
| 1.000                         |
| 5.000                         |
| 10.000                        |
| 15.000                        |
| 20.000                        |

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**Retention Pond Recovery - Refined Method**  
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**Detailed Results** :: Scenario 1 :: 25 year/96 hour volume

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 246829.7000                      | 0.0000                    | 92.000                     | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 246829.7000                      | 0.0000                    | 115.983                    | 30.11241                               | 0.86098                                 | 1480978.0                                   | 180.7                                             | 2.6                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 113.463                    | 26.26452                               | 0.73155                                 | 1480978.0                                   | 244524.1                                          | 165339.5                                       | U/P       |
| 6.000                | 0.0000                           | 0.0000                    | 109.150                    | 22.27702                               | 0.42709                                 | 1480978.0                                   | 545312.3                                          | 440452.9                                       | U/P       |
| 12.000               | 0.0000                           | 0.0000                    | 104.598                    | 14.18298                               | 0.00000                                 | 1480978.0                                   | 992946.1                                          | 440452.9                                       | U/S       |
| 24.000               | 0.0000                           | 0.0000                    | 103.854                    | 0.55068                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 36.000               | 0.0000                           | 0.0000                    | 103.207                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 48.000               | 0.0000                           | 0.0000                    | 102.733                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 60.000               | 0.0000                           | 0.0000                    | 102.355                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 72.000               | 0.0000                           | 0.0000                    | 102.041                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 84.000               | 0.0000                           | 0.0000                    | 101.770                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 96.000               | 0.0000                           | 0.0000                    | 101.533                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 120.000              | 0.0000                           | 0.0000                    | 101.146                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 144.000              | 0.0000                           | 0.0000                    | 100.820                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 168.000              | 0.0000                           | 0.0000                    | 100.539                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 192.000              | 0.0000                           | 0.0000                    | 100.292                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 216.000              | 0.0000                           | 0.0000                    | 100.073                    | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 240.000              | 0.0000                           | 0.0000                    | 99.875                     | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 264.000              | 0.0000                           | 0.0000                    | 99.696                     | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 288.000              | 0.0000                           | 0.0000                    | 99.532                     | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 312.000              | 0.0000                           | 0.0000                    | 99.381                     | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 336.000              | 0.0000                           | 0.0000                    | 99.242                     | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 360.000              | 0.0000                           | 0.0000                    | 99.112                     | 0.00000                                | 0.00000                                 | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | S         |
| 384.000              | 0.0000                           | 0.0000                    | 98.991                     | ---                                    | ---                                     | 1480978.0                                   | 1040525.0                                         | 440452.9                                       | N.A.      |

← RECOVERY  
~ 18 HRS

Pond 2 25/96 hr  
Recovery



## Ardaman & Associates, Inc.

Geotechnical, Environmental and  
Materials Consultants

April 16, 2008  
File No. 05-6844

HNTB  
300 Primera Boulevard, Suite 200  
Lake Mary, Florida 32746

Attention: Ms. Karen Van den Avont, P.E.

Subject: Additional Subsurface Soil Exploration  
Hartwood Marsh Road - Pond 2  
Lake County, Florida

Dear Ms. Van den Avont:

As requested and authorized, we have completed additional Subsurface Soil Exploration for the Hartwood Marsh Road project, specifically for Pond 2. The purpose of performing this additional exploration was to explore the soil stratigraphy in the Pond 2 area. In addition, we have estimated the normal seasonal high groundwater level at the boring location. This report documents our findings.

The additional field exploration program for Pond 2 consisted of performing 1 Standard Penetration Test boring within the proposed retention pond area. The boring, TH-P3, was advanced to a depth of 50 feet below the ground surface using the methodology outlined in ASTM D-1586. Split-spoon samples recovered during performance of the boring were visually classified in the field and representative portions of the samples were transported to our laboratory in sealed sample jars.

A temporary 2-inch diameter PVC piezometer was installed in Pond 2 to a depth of 50 feet below the ground surface for measurements of water levels. The piezometer has a 5-foot long slotted screen connected to solid PVC casing projecting above the ground surface.

Ardaman & Associates previously performed a Subsurface Soil Exploration relative to the Hartwood Marsh Road project and submitted the results in a report dated September 6, 2007 (A&A File No. 05-6844). The results of our previous exploration relative to Pond 2 are included in Figures 1 and 2. The approximate location of the additional boring is also presented in Figure 2. The boring stations and offsets and the ground surface elevations at the boring locations were provided to us by the client.

Groundwater was encountered in the piezometer in Boring TH-P3 at a depth of 39.3 feet below the ground surface on the date indicated. Fluctuations in groundwater levels should be anticipated throughout the year primarily due to seasonal variations in rainfall and other factors that may vary from the time the borings were conducted.

The normal seasonal high groundwater level each year is the level in the August-September period at the end of the rainy season during a year of normal (average) rainfall. The water table elevations associated with a higher than normal rainfall and in the extreme case, flood, would be higher to much higher than the normal seasonal high groundwater level. The normal high water levels would more approximate the normal seasonal high groundwater levels.

The seasonal high groundwater level is affected by a number of factors. The drainage characteristics of the soils, the land surface elevation, relief points such as drainage ditches, lakes, rivers, swamp areas, etc., and distance to relief points are some of the more important factors influencing the seasonal high groundwater level.

Based on our interpretation of the site conditions using our boring logs, we estimate the normal seasonal high groundwater level at the boring location to be as indicated on the soil boring profile on Figure 2.


This report has been prepared in accordance with generally accepted geotechnical engineering practices for specific application to the project area indicated in this report. No other warranty, expressed or implied, is made. The soils information and recommendations submitted herein are based on the data obtained from the soil borings presented on Figure 2. This report does not reflect any variations which may occur between the borings. The nature and extent of the variations between the borings may not become evident until during construction.

It is a pleasure assisting you with this phase of the project. If you have any questions, or when we may be of further assistance to you, please do not hesitate to contact us.

Very truly yours,  
ARDAMAN & ASSOCIATES, INC.



M. Aris B. Patawaran, PhD, P.E.  
Project Engineer  
Florida Registration No. 65668



Charles H. Cunningham, P.E.  
Division Manager  
Florida Registration No. 38189

4-16-08

ABP/CHC/nfm/ksb  
05-6844 Additional sse letter report abp.wpd (2005 Geo)

PROJECT: HARTWOOD MARSH ROAD FROM US-27 TO LAKE/ORANGE COUNTY LINE

PROJECT No.: P-41561

COUNTY OF LAKE  
CROSS SECTION OF SOIL SURVEY  
REPORT OF TESTS

DATE OF SURVEY: 12/05 TO 08/07, 03/08

SURVEYED BY: BENCHORON, BOWDEN, BRACKINS, CIMINO, FRENCH, NELS, RUIZ, TINDALL, WILLIAMS, ZILE LOCATION

SURVEY BEGINS AT APPROXIMATE STA. No.: 11+00

TOWNSHIP: 23 SOUTH

SURVEY ENDS AT APPROXIMATE STA. No.: 310+00

RANGE: 26 EAST

DATE REPORTED: 04/08

SECTIONS: 1, 2, 3, 9, 10

MECHANICAL ANALYSIS

| STRATUM NO. | LBR VALUE | % PASSING 10 MESH | % PASSING 40 MESH | % PASSING 60 MESH | % PASSING 100 MESH | % PASSING 200 MESH | CONSTANTS MATERIAL PASS NO. 200 SIEVE |               | NO. LBR TESTS | NO. GRAD TEST | NO. LL-PI TEST | CLASSIFICATION GROUP | MATERIAL DESCRIPTION                                                                                                                                   | pH  | RESISTIVITY ohm-cm | CHLORIDES ppm | SULFATES ppm | ENVIRONMENTAL CLASSIFICATION |          |
|-------------|-----------|-------------------|-------------------|-------------------|--------------------|--------------------|---------------------------------------|---------------|---------------|---------------|----------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------|---------------|--------------|------------------------------|----------|
|             |           |                   |                   |                   |                    |                    | LIQUID LIMIT                          | PLASTIC INDEX |               |               |                |                      |                                                                                                                                                        |     |                    |               |              | STEEL                        | CONCRETE |
| 1           | 27-51     | 100               | 51-86             | 12-51             | 4-23               | 1-10               | ---                                   | ---           | 8             | 22            | 0              | A-3                  | LIGHT BROWN TO BROWN, GRAYISH BROWN, ORANGE, ORANGE BROWN, YELLOW BROWN, PALE BROWN, PALE GRAY FINE SAND TO FINE SAND WITH SILT, WITH OCCASIONAL ROOTS | --- | ---                | ---           | ---          | ---                          | ---      |
| 2           | 47        | 100               | 84-90             | 44-55             | 17-24              | 13-34              | ---                                   | ---           | 1             | 7             | 0              | A-2-4                | LIGHT BROWN TO BROWN, ORANGE, ORANGE BROWN FINE SAND WITH CLAY TO CLAYEY FINE SAND                                                                     | --- | ---                | ---           | ---          | ---                          | ---      |

NOTES

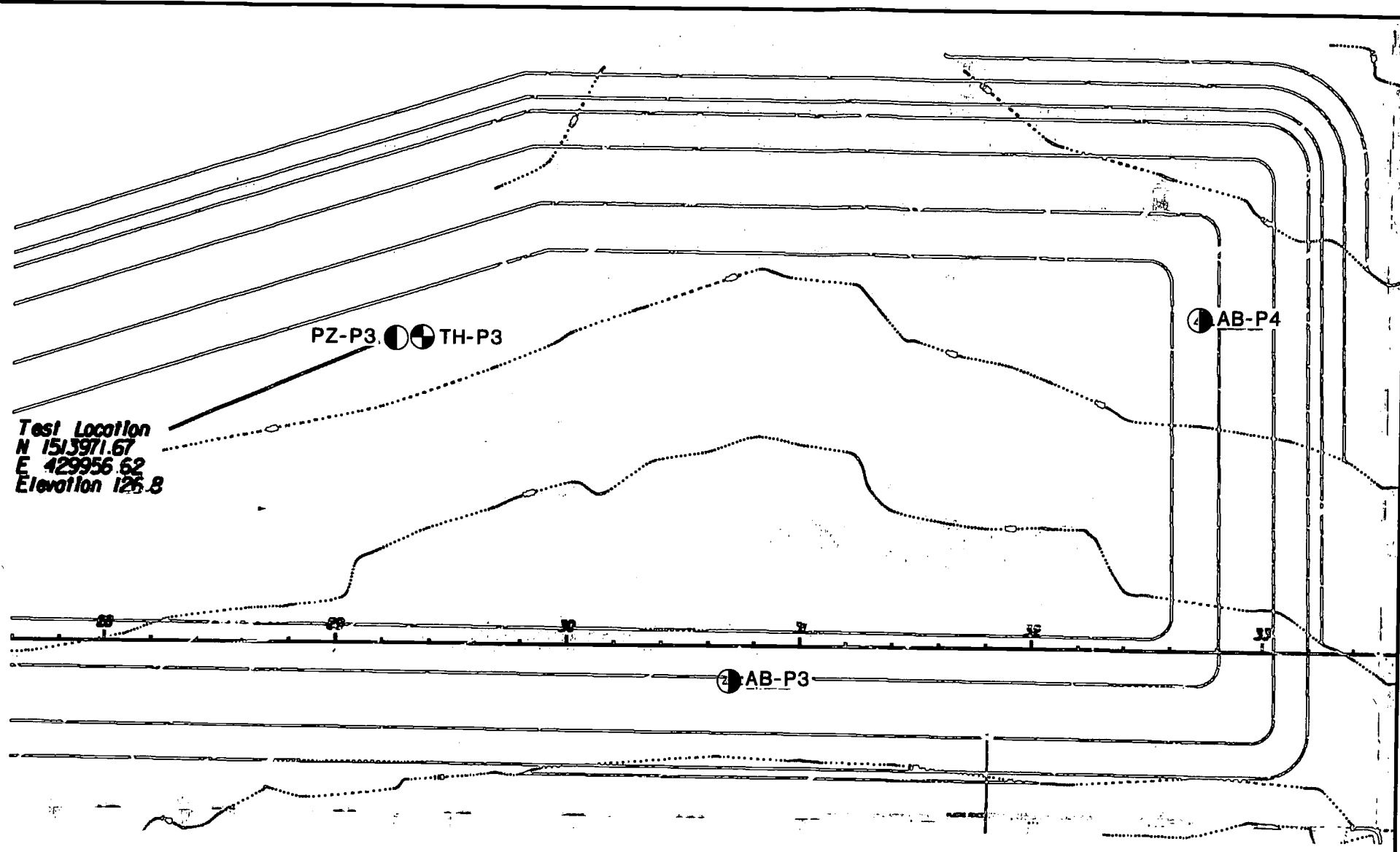
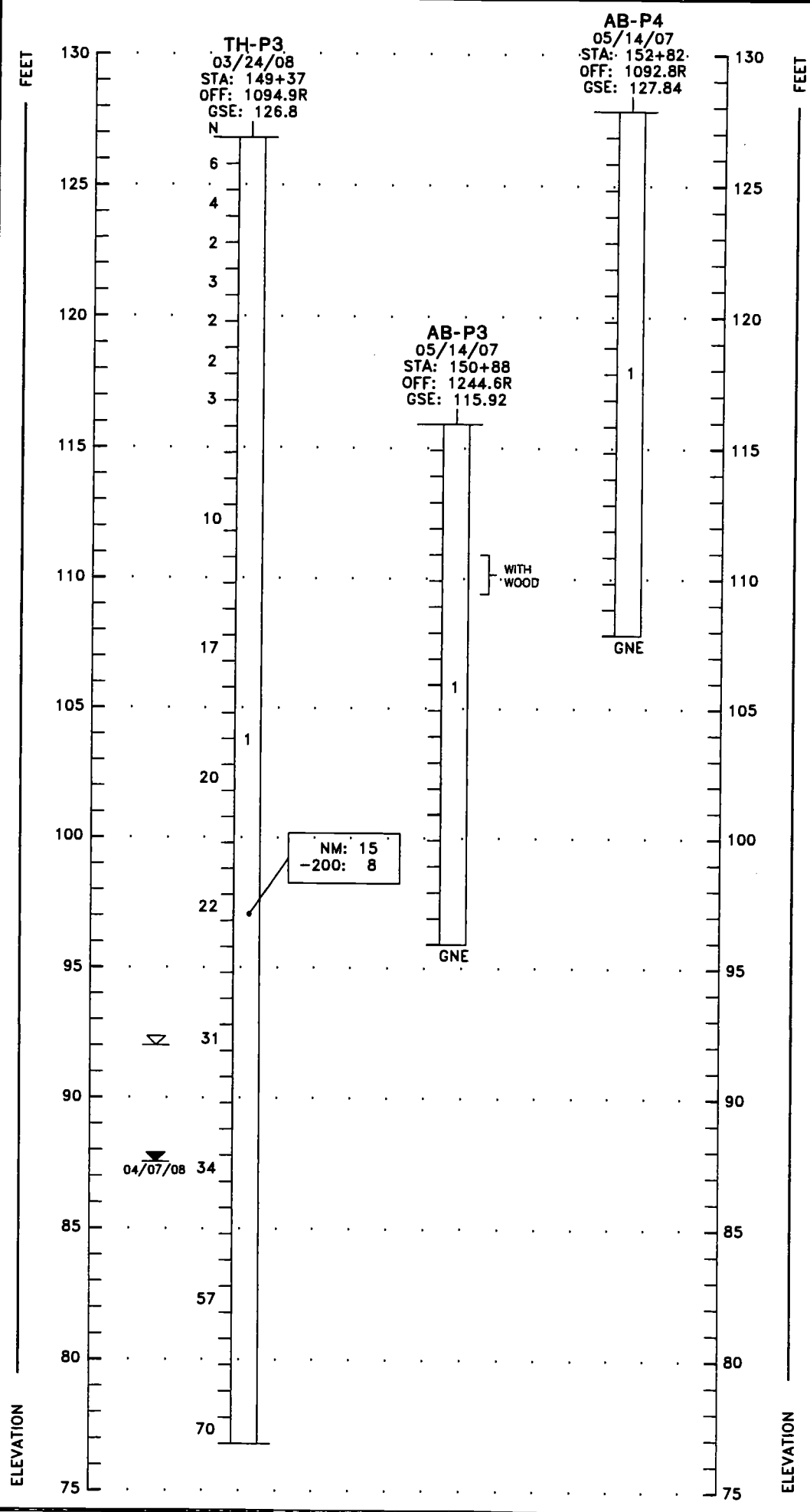
- STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. ANY STRATUM CONNECTING LINES THAT ARE SHOWN ARE FOR ESTIMATING EARTHWORK ONLY AND DO NOT INDICATE ACTUAL STRATUM LIMITS. SUBSURFACE VARIATIONS BETWEEN BORINGS SHOULD BE ANTICIPATED AS INDICATED IN SECTION 2-4 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. FOR FURTHER DETAILS SEE SECTION 120-3.
- LEGEND "GSE" APPROXIMATE GROUND SURFACE ELEVATION  
LEGEND "Σ" ESTIMATED NORMAL SEASONAL HIGH GROUNDWATER LEVEL (ESHWL)  
LEGEND "▼" GROUNDWATER LEVEL MEASURED IN PIEZOMETER ON DATE INDICATED  
04/07/08
- THE SYMBOL "----" REPRESENTS AN UNMEASURED PARAMETER.
- STRATUM 2 WILL RETAIN EXCESS MOISTURE AND BE DIFFICULT TO DRY AND COMPACT.

T:\Orlando\05-6844\Ponds\1.dwg 4/16/2008 10:47:18 AM, chris.drew

| REVISIONS |    |             |      |    |             | Drawn by<br>Checked by<br>Designed by<br>Checked by<br>Approved by | Names<br>CB | Dates<br>09/07 | ENGINEER OF RECORD:<br>CHARLES H. CUNNINGHAM, P.E.<br>FL. REG. NO. 38189 | SEAL: | LAKE COUNTY | ROADWAY SOIL SURVEY<br>HARTWOOD MARSH ROAD<br>FROM US27 TO LAKE/ORANGE COUNTY LINE<br>LAKE COUNTY, FLORIDA | SHEET NO. |
|-----------|----|-------------|------|----|-------------|--------------------------------------------------------------------|-------------|----------------|--------------------------------------------------------------------------|-------|-------------|------------------------------------------------------------------------------------------------------------|-----------|
| Date      | By | Description | Date | By | Description |                                                                    |             |                |                                                                          |       |             |                                                                                                            |           |
|           |    |             |      |    |             |                                                                    |             |                |                                                                          |       |             |                                                                                                            |           |

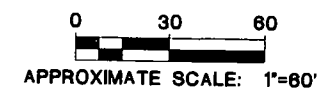
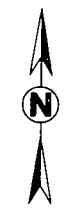


T:\Orlando\05\05-6844\Ponds\Pond 2\056844-5.dwg 4/16/2008 10:49:59 AM. chris drew



**LEGEND**

- TH STANDARD PENETRATION TEST (SPT) BORING LOCATION
- AB AUGER BORING LOCATION
- PZ PIEZOMETER LOCATION
- N STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
- NM NATURAL MOISTURE CONTENT IN PERCENT (ASTM D-2216)
- 200 PERCENT PASSING NO. 200 SIEVE SIZE (PERCENT FINES)(ASTM D-1140)
- GSE APPROXIMATE GROUND SURFACE ELEVATION
- GNE GROUNDWATER NOT ENCOUNTERED ON DATE DRILLED
- ▼ 04/07/08 GROUNDWATER LEVEL MEASURED IN PIEZOMETER ON DATE INDICATED
- ∩ ESTIMATED NORMAL SEASONAL HIGH GROUNDWATER LEVEL



WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED. GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.

NOTE: BORING AB-P3 AND AB-P4 ARE PART OF THE SUBSURFACE SOIL EXPLORATION FOR POND 2 SUBMITTED IN A REPORT DATED SEPTEMBER 6, 2007 (A&A FILE NO. 05-6844).

**Ardaman & Associates, Inc.**  
Geotechnical, Environmental and Materials Consultants

SUBSURFACE SOIL EXPLORATION  
HARTWOOD MARSH ROAD - POND 2  
FROM U.S. 27 TO LAKE/ORANGE COUNTY LINE  
LAKE COUNTY, FLORIDA

|                  |              |                |
|------------------|--------------|----------------|
| DRAWN BY: BH     | CHECKED BY:  | DATE: 04/08/08 |
| FILE NO. 05-6844 | APPROVED BY: | FIGURE: 2      |

**BASIN 3**



*Pre-Development Drainage Basin Data*

## BASIN BREAKDOWN

# HNTB

DATE

|          |     |           |
|----------|-----|-----------|
| MADE BY: | MSF | 23-Apr-08 |
| CHCK BY: | KMV | 24-Apr-08 |

PROJECT: **HARTWOOD MARSH ROAD**

LOCATION: **BASIN 3 - PHASE I**

BASIN LIMITS: STA. 152+39 to STA. 162+00, CL CONST. HARTWOOD MARSH RD.

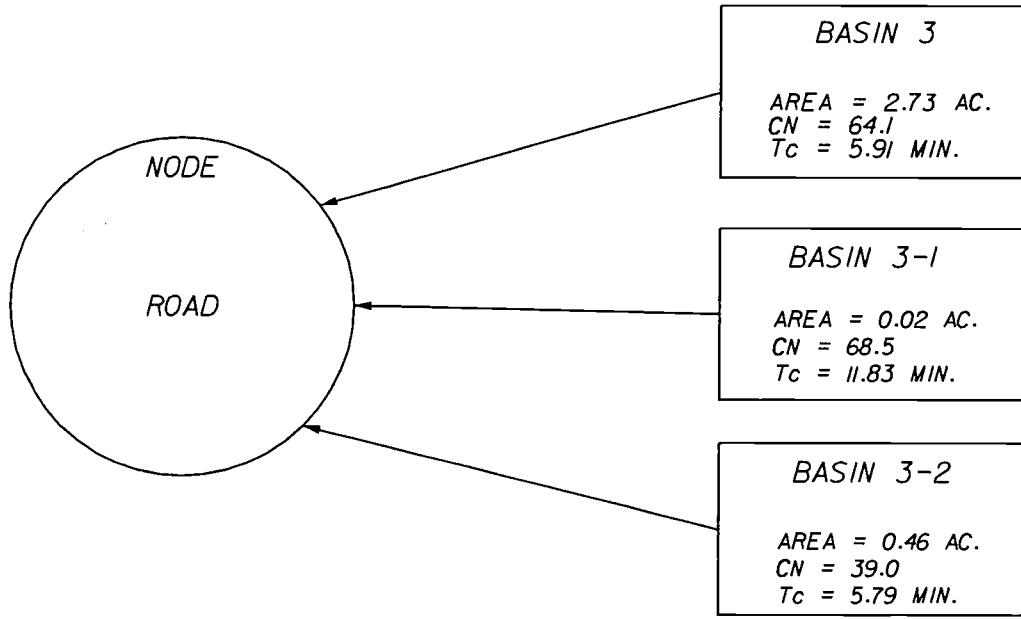
**EXISTING CONDITIONS:**

| LOCATION                  | STATION | To | STATION | BASIN WIDTH<br>(FL) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS |
|---------------------------|---------|----|---------|---------------------|----------------------|-----------------------|-----------------------|---------|
| <b>ON-SITE:</b>           |         |    |         |                     |                      |                       |                       |         |
| BASIN 3                   | 152+39  | -  | 162+00  | 120                 | 0.843                | 1.887                 | 2.730                 |         |
| <b>ON-SITE SUBTOTAL:</b>  |         |    |         |                     | <b>0.843</b>         | <b>1.887</b>          | <b>2.73</b>           |         |
| <b>OFF-SITE:</b>          |         |    |         |                     |                      |                       |                       |         |
| BASIN 3-1 (OFF-SITE)      | 152+39  | -  | 153+09  | -                   | 0.01                 | 0.01                  | 0.02                  |         |
| BASIN 3-2 (OFF-SITE)      | 153+87  | -  | 155+50  | -                   | 0.00                 | 0.46                  | 0.46                  |         |
| <b>OFF-SITE SUBTOTAL:</b> |         |    |         |                     | <b>0.01</b>          | <b>0.47</b>           | <b>0.48</b>           |         |
| <b>TOTAL:</b>             |         |    |         |                     | <b>0.85</b>          | <b>2.35</b>           | <b>3.21</b>           |         |

**PROPOSED CONDITIONS:**

| LOCATION                  | STATION | To | STATION | BASIN WIDTH<br>(FL) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS |
|---------------------------|---------|----|---------|---------------------|----------------------|-----------------------|-----------------------|---------|
| <b>ON-SITE:</b>           |         |    |         |                     |                      |                       |                       |         |
| BASIN 3                   | 152+39  | -  | 162+00  | 120                 | 1.73                 | 1.00                  | 2.73                  |         |
| <b>ON-SITE SUBTOTAL:</b>  |         |    |         |                     | <b>1.73</b>          | <b>1.00</b>           | <b>2.73</b>           |         |
| <b>OFF-SITE:</b>          |         |    |         |                     |                      |                       |                       |         |
| BASIN 3-1 (OFF-SITE)      | 152+39  | -  | 153+09  | -                   | 0.01                 | 0.01                  | 0.02                  |         |
| BASIN 3-2 (OFF-SITE)      | 153+87  | -  | 155+50  | -                   | 0.00                 | 0.46                  | 0.46                  |         |
| <b>OFF-SITE SUBTOTAL:</b> |         |    |         |                     | <b>0.01</b>          | <b>0.47</b>           | <b>0.48</b>           |         |
| <b>TOTAL:</b>             |         |    |         |                     | <b>1.74</b>          | <b>1.47</b>           | <b>3.21</b>           |         |

151



BASIN 3

LOCATION: LAKE COUNTY  
 SEC. 9 & 10, T23S, R26E  
 HARTWOOD MARSH ROAD RECONSTRUCTION  
 US 27 TO 1500 FT EAST OF S. HANCOCK RD

COUNTY: LAKE  
 STATE: FLORIDA  
 DATE: 04-08

DATUM: NAVD 88  
 PURPOSE: PRE-DEVELOPMENT  
 NODAL DIAGRAM

**HNTB**  
 HNTB CORPORATION  
 300 PRIMERA BLVD,  
 SUITE 200  
 LAKE MARY, FL 32746  
 (407) 805-0355  
 CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.  
 FL. REGISTRATION NO. 44794



**LAKE COUNTY**  
 HARTWOOD MARSH ROAD



RUNOFF CURVE NUMBER

DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio.) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                            | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
|                                                | IMPERVIOUS AREA<br>Exist Pavement (On-Site)                                                                                                | 98          |             |             | 0.84          | 82.62                      |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (On-Site)                                                                                                          | 49          |             |             | 1.89          | 92.47                      |
| Totals =                                       |                                                                                                                                            |             |             |             | 2.73          | 175.09                     |

Use CN = 64.1

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986



RUNOFF CURVE NUMBER

DATE:

|          |     |           |
|----------|-----|-----------|
| MADE BY: | MSF | 23-Apr-08 |
| CHKD BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3-1

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected/connected<br>impervious/area ratio) | CN         |            |            | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|---------------|----------------------------|
|                                                |                                                                                                                                                  | Tab<br>2-2 | Fig<br>2-3 | Fig<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                     | 98         |            |            | 0.01          | 0.98                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                               | 39         |            |            | 0.01          | 0.39                       |
| Totals =                                       |                                                                                                                                                  |            |            |            | 0.02          | 1.37                       |

Use CN = 68.5

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

159

RUNOFF CURVE NUMBER



DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3-2

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                    | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
|                                                | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                       | 98          |             |             | 0.00          | 0.00                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                 | 39          |             |             | 0.46          | 17.79                      |
| Totals =                                       |                                                                                                                                                    |             |             |             | 0.46          | 17.79                      |

Use CN = **39.0**

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

**HNTB**

DATE: 

|                 |           |
|-----------------|-----------|
| MADE BY: MSF    | 12-Mar-08 |
| CHECKED BY: KMV | 13-Mar-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: 

|         |
|---------|
| BASIN 3 |
|---------|

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $Tt = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|                |  |                                                              |      |
|----------------|--|--------------------------------------------------------------|------|
| SMOOTH SURFACE |  |                                                              |      |
| 0.011          |  |                                                              |      |
| 1112           |  | FT.                                                          |      |
| 4.70           |  | IN.                                                          |      |
| 0.0286         |  |                                                              |      |
| 0.0158         |  | HR. OR <table border="1"><tr><td>0.95</td></tr></table> MIN. | 0.95 |
| 0.95           |  |                                                              |      |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $Tt = L / (3600 * V)$

|         |  |                                                              |      |
|---------|--|--------------------------------------------------------------|------|
| UNPAVED |  |                                                              |      |
| 877     |  | L.F.                                                         |      |
| 0.0334  |  | FT. / FT.                                                    |      |
| 2.949   |  | FT. / SEC.                                                   |      |
| 0.08    |  | HR. OR <table border="1"><tr><td>4.96</td></tr></table> MIN. | 4.96 |
| 4.96    |  |                                                              |      |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $Tt = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|      |  |                                                              |      |
|------|--|--------------------------------------------------------------|------|
|      |  | S.F.                                                         |      |
|      |  | L.F.                                                         |      |
|      |  | L.F.                                                         |      |
|      |  | FT./FT.                                                      |      |
|      |  | FT./SEC.                                                     |      |
|      |  | L.F.                                                         |      |
|      |  | HR. OR <table border="1"><tr><td>0.00</td></tr></table> MIN. | 0.00 |
| 0.00 |  |                                                              |      |

TOTAL Tc = 

|      |
|------|
| 5.91 |
|------|

 MIN.

Reference: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

**HNTB**

DATE: 

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 12-Mar-08 |
| CHECKED BY: | KMV | 13-Mar-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: 

|           |
|-----------|
| BASIN 3-1 |
|-----------|

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $Tt = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |
|-------------|--|
| SHORT GRASS |  |
| 0.150       |  |
| 100         |  |
| 4.70        |  |
| 0.030       |  |
| 0.115       |  |

FT.  
IN.  
HR. OR 

|      |
|------|
| 6:87 |
|------|

 MIN.  
(TO ROAD)

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $Tt = L / (3600 * V)$

|         |  |
|---------|--|
| UNPAVED |  |
| 877     |  |
| 0.0334  |  |
| 2.949   |  |
| 0.08    |  |

L.F.  
FT. / FT.  
FT./SEC.  
HR. OR 

|      |
|------|
| 4:96 |
|------|

 MIN.

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $Tt = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

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|  |  |
|  |  |

S.F.  
L.F.  
L.F.  
FT./FT.  
FT./SEC.  
L.F.  
HR. OR 

|      |
|------|
| 0.00 |
|------|

 MIN.

TOTAL Tc = 

|       |
|-------|
| 11:83 |
|-------|

 MIN.

Reference: *Urban Hydrology for Small Watersheds*  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986



TIME OF CONCENTRATION CALCULATIONS

**HNTB**

DATE: 

|                 |           |
|-----------------|-----------|
| MADE BY: MSF    | 12-Mar-08 |
| CHECKED BY: KMV | 13-Mar-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: 

|           |
|-----------|
| BASIN 3-2 |
|-----------|

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |
|-------------|--|
| SHORT GRASS |  |
| 0.150       |  |
| 32          |  |
| 4.70        |  |
| 0.128       |  |
| 0.026       |  |

FT.  
IN.  
HR. OR 

|      |
|------|
| 1.55 |
|------|

 MIN.  
(TO ROAD)

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|         |  |
|---------|--|
| UNPAVED |  |
| 755     |  |
| 0.0338  |  |
| 2.965   |  |
| 4.07    |  |

L.F.  
FT. / FT.  
FT. / SEC.  
HR. OR 

|      |
|------|
| 4.24 |
|------|

 MIN.

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

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|  |  |

S.F.  
L.F.  
L.F.  
FT./FT.  
FT./SEC.  
L.F.  
HR. OR 

|      |
|------|
| 0.00 |
|------|

 MIN.

TOTAL Tc = 

|      |
|------|
| 5.79 |
|------|

 MIN.

Reference: *Urban Hydrology for Small Watersheds*  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

Hartwood Marsh Road Phase I  
 Pre Development  
 Basin 3  
 Input

=====  
 Basins  
 =====

|                             |                                  |                |
|-----------------------------|----------------------------------|----------------|
| Name: BASIN 3               | Node: ROAD                       | Status: Onsite |
| Group: BASE                 | Type: SCS Unit Hydrograph        |                |
| Unit Hydrograph: Uh484      | Peaking Factor: 484.0            |                |
| Rainfall File: Sjrwm96      | Storm Duration(hrs): 96.00       |                |
| Rainfall Amount(in): 11.000 | Time of Conc(min): 5.91          |                |
| Area(ac): 2.730             | Time Shift(hrs): 0.00            |                |
| Curve Number: 64.10         | Max Allowable Q(cfs): 999999.000 |                |
| DCIA(%): 0.00               |                                  |                |

Existing Hartwood

|                             |                                  |                |
|-----------------------------|----------------------------------|----------------|
| Name: BASIN 3-1             | Node: ROAD                       | Status: Onsite |
| Group: BASE                 | Type: SCS Unit Hydrograph        |                |
| Unit Hydrograph: Uh484      | Peaking Factor: 484.0            |                |
| Rainfall File: Sjrwm96      | Storm Duration(hrs): 96.00       |                |
| Rainfall Amount(in): 11.000 | Time of Conc(min): 11.83         |                |
| Area(ac): 0.020             | Time Shift(hrs): 0.00            |                |
| Curve Number: 68.50         | Max Allowable Q(cfs): 999999.000 |                |
| DCIA(%): 0.00               |                                  |                |

|                             |                                  |                |
|-----------------------------|----------------------------------|----------------|
| Name: BASIN 3-2             | Node: ROAD                       | Status: Onsite |
| Group: BASE                 | Type: SCS Unit Hydrograph        |                |
| Unit Hydrograph: Uh484      | Peaking Factor: 484.0            |                |
| Rainfall File: Sjrwm96      | Storm Duration(hrs): 96.00       |                |
| Rainfall Amount(in): 11.000 | Time of Conc(min): 5.79          |                |
| Area(ac): 0.460             | Time Shift(hrs): 0.00            |                |
| Curve Number: 39.00         | Max Allowable Q(cfs): 999999.000 |                |
| DCIA(%): 0.00               |                                  |                |

=====  
 Nodes  
 =====

|                  |                       |                       |
|------------------|-----------------------|-----------------------|
| Name:            | Base Flow(cfs): 0.000 | Init Stage(ft): 0.000 |
| Group: BASE      |                       | Warn Stage(ft): 0.000 |
| Type: Stage/Area |                       |                       |

|           |          |
|-----------|----------|
| Stage(ft) | Area(ac) |
|-----------|----------|

=====  
 Drop Structures  
 =====

|                       |            |                                       |
|-----------------------|------------|---------------------------------------|
| Name:                 | From Node: | Length(ft): 0.00                      |
| Group: BASE           | To Node:   | Count: 1                              |
| UPSTREAM              | DOWNSTREAM | Friction Equation: Average Conveyance |
| Geometry: Circular    | Circular   | Solution Algorithm: Automatic         |
| Span(in): 0.00        | 0.00       | Flow: Both                            |
| Rise(in): 0.00        | 0.00       | Entrance Loss Coef: 0.000             |
| Invert(ft): 0.000     | 0.000      | Exit Loss Coef: 0.000                 |
| Manning's N: 0.000000 | 0.000000   | Outlet Ctrl Spec: Use dc or tw        |
| Top Clip(in): 0.000   | 0.000      | Inlet Ctrl Spec: Use dn               |
| Bot Clip(in): 0.000   | 0.000      | Solution Incs: 10                     |

Upstream FHWA Inlet Edge Description:  
 Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:  
 Circular Concrete: Square edge w/ headwall

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Hartwood Marsh Road Phase I  
Pre Development  
Basin 3  
Input

==== Hydrology Simulations =====

Name: 100Y24H  
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\PRE\100Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 10.20

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.00          |
| 16.000    | 15.00          |
| 40.000    | 60.00          |

Name: 10Y24H  
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\PRE\10Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 7.00

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.00          |
| 16.000    | 15.00          |
| 40.000    | 60.00          |

Name: 2.3Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 4.90

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.00          |
| 16.000    | 15.00          |
| 40.000    | 60.00          |

Name: 25Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 8.30

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.00          |
| 16.000    | 15.00          |
| 40.000    | 60.00          |

Name: 25Y96H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y96H.R32

Override Defaults: No

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 50.000    | 60.00          |
| 62.000    | 15.00          |
| 97.000    | 60.00          |

==== Routing Simulations =====

Name: 2.3Y24H                      Hydrology Sim: 2.3Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.I32

Execute: No                      Restart: No                      Patch: No

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Hartwood Marsh Road Phase I  
Pre Development  
Basin 3  
Input

Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 40.00  
Min Calc Time(sec): 0.5000                Max Calc Time(sec): 60.0000  
Boundary Stages:                            Boundary Flows:

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.000         |
| 15.000    | 15.000         |
| 40.000    | 60.000         |

| Group | Run |
|-------|-----|
| BASE  | Yes |

-----  
Name: 25Y24H                      Hydrology Sim: 25Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y24H.I32

Execute: No                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 40.00  
Min Calc Time(sec): 0.5000                Max Calc Time(sec): 60.0000  
Boundary Stages:                            Boundary Flows:

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.000         |
| 15.000    | 15.000         |
| 40.000    | 60.000         |

| Group | Run |
|-------|-----|
| BASE  | Yes |

-----  
Name: 25Y96H                      Hydrology Sim: 25Y96H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y96H.I32

Execute: No                      Restart: No                      Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 97.00  
Min Calc Time(sec): 0.5000                Max Calc Time(sec): 60.0000  
Boundary Stages:                            Boundary Flows:

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 55.000    | 60.000         |
| 65.000    | 15.000         |
| 97.000    | 60.000         |

| Group | Run |
|-------|-----|
| BASE  | Yes |

=====  
==== Boundary Conditions =====  
=====

Hartwood Marsh Road Phase I  
 Pre Development  
 Basin 3  
 Basin Time Series 25yr/96hr

| Simulation | Basin   | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|---------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 3.807      | 0.000     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 33.00    | 1.159       | 0.065       | 0.002             | 0.002             | 18.134     | 0.002     | 0.006    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 34.00    | 1.222       | 0.063       | 0.005             | 0.003             | 45.772     | 0.005     | 0.010    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 35.00    | 1.285       | 0.063       | 0.009             | 0.004             | 86.385     | 0.009     | 0.013    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 36.00    | 1.348       | 0.063       | 0.014             | 0.005             | 139.557    | 0.014     | 0.016    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 37.00    | 1.411       | 0.063       | 0.021             | 0.007             | 204.887    | 0.021     | 0.020    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 38.00    | 1.474       | 0.063       | 0.029             | 0.008             | 281.992    | 0.028     | 0.023    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 39.00    | 1.538       | 0.063       | 0.038             | 0.009             | 370.504    | 0.037     | 0.026    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 40.00    | 1.601       | 0.063       | 0.048             | 0.010             | 470.071    | 0.047     | 0.029    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 41.00    | 1.664       | 0.063       | 0.060             | 0.012             | 582.419    | 0.059     | 0.033    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 42.00    | 1.729       | 0.065       | 0.073             | 0.013             | 707.558    | 0.071     | 0.036    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 43.00    | 1.795       | 0.065       | 0.086             | 0.014             | 843.433    | 0.085     | 0.039    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 44.00    | 1.860       | 0.065       | 0.101             | 0.015             | 989.704    | 0.100     | 0.042    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 45.00    | 1.925       | 0.065       | 0.117             | 0.015             | 1143.357   | 0.115     | 0.043    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 46.00    | 1.988       | 0.063       | 0.133             | 0.016             | 1303.803   | 0.132     | 0.046    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 47.00    | 2.052       | 0.063       | 0.150             | 0.017             | 1473.169   | 0.149     | 0.048    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 48.00    | 2.115       | 0.063       | 0.168             | 0.018             | 1651.237   | 0.167     | 0.051    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 49.00    | 2.178       | 0.063       | 0.194             | 0.026             | 1872.078   | 0.189     | 0.072    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 50.00    | 2.263       | 0.085       | 0.221             | 0.027             | 2138.647   | 0.216     | 0.076    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 50.25    | 2.348       | 0.085       | 0.229             | 0.008             | 2213.446   | 0.223     | 0.090    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 50.50    | 2.373       | 0.025       | 0.237             | 0.008             | 2295.191   | 0.232     | 0.092    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 50.75    | 2.397       | 0.025       | 0.246             | 0.008             | 2378.129   | 0.240     | 0.093    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 51.00    | 2.422       | 0.025       | 0.254             | 0.009             | 2462.234   | 0.248     | 0.094    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 51.25    | 2.447       | 0.025       | 0.263             | 0.009             | 2547.491   | 0.257     | 0.095    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 51.50    | 2.472       | 0.025       | 0.272             | 0.009             | 2633.890   | 0.266     | 0.097    | 0.000        |

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Hartwood Marsh Road Phase I  
 Pre Development  
 Basin 3  
 Basin Time Series 25yr/96hr

| Simulation | Basin   | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|---------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3 | BASE  | 51.75    | 2.497       | 0.025       | 0.280             | 0.009             | 2721.417   | 0.275     | 0.098    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 52.00    | 2.521       | 0.025       | 0.289             | 0.009             | 2810.082   | 0.284     | 0.099    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 52.25    | 2.546       | 0.025       | 0.301             | 0.011             | 2910.667   | 0.294     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 52.50    | 2.577       | 0.031       | 0.312             | 0.011             | 3023.465   | 0.305     | 0.126    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 52.75    | 2.608       | 0.031       | 0.324             | 0.012             | 3137.952   | 0.317     | 0.128    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 53.00    | 2.638       | 0.031       | 0.336             | 0.012             | 3254.068   | 0.328     | 0.130    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 53.25    | 2.669       | 0.031       | 0.347             | 0.012             | 3371.794   | 0.340     | 0.132    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 53.50    | 2.700       | 0.031       | 0.360             | 0.012             | 3491.107   | 0.352     | 0.133    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 53.75    | 2.730       | 0.031       | 0.372             | 0.012             | 3611.989   | 0.364     | 0.135    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 54.00    | 2.761       | 0.031       | 0.384             | 0.012             | 3734.460   | 0.377     | 0.137    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 54.25    | 2.792       | 0.031       | 0.400             | 0.016             | 3874.235   | 0.391     | 0.174    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 54.50    | 2.830       | 0.038       | 0.416             | 0.016             | 4031.721   | 0.407     | 0.176    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 54.75    | 2.869       | 0.038       | 0.432             | 0.016             | 4191.575   | 0.423     | 0.179    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 55.00    | 2.907       | 0.038       | 0.449             | 0.016             | 4353.714   | 0.439     | 0.181    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 55.25    | 2.945       | 0.038       | 0.465             | 0.017             | 4518.102   | 0.456     | 0.184    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 55.50    | 2.984       | 0.038       | 0.482             | 0.017             | 4684.705   | 0.473     | 0.186    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 55.75    | 3.022       | 0.038       | 0.499             | 0.017             | 4853.489   | 0.490     | 0.189    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 56.00    | 3.061       | 0.038       | 0.517             | 0.017             | 5024.601   | 0.507     | 0.192    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 56.25    | 3.099       | 0.039       | 0.544             | 0.027             | 5243.518   | 0.529     | 0.295    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 56.50    | 3.158       | 0.058       | 0.571             | 0.027             | 5511.471   | 0.556     | 0.300    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 56.75    | 3.216       | 0.058       | 0.599             | 0.028             | 5784.213   | 0.584     | 0.306    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 57.00    | 3.275       | 0.058       | 0.627             | 0.028             | 6061.525   | 0.612     | 0.311    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 57.25    | 3.333       | 0.058       | 0.655             | 0.029             | 6343.307   | 0.640     | 0.316    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 57.50    | 3.391       | 0.058       | 0.684             | 0.029             | 6629.458   | 0.669     | 0.320    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 57.75    | 3.450       | 0.058       | 0.714             | 0.029             | 6919.884   | 0.698     | 0.325    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 58.00    | 3.508       | 0.058       | 0.744             | 0.030             | 7214.736   | 0.728     | 0.330    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 58.25    | 3.567       | 0.058       | 0.797             | 0.054             | 7631.455   | 0.770     | 0.596    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 58.50    | 3.670       | 0.103       | 0.853             | 0.055             | 8174.240   | 0.825     | 0.610    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 58.75    | 3.773       | 0.104       | 0.909             | 0.056             | 8729.419   | 0.881     | 0.623    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 59.00    | 3.877       | 0.104       | 0.967             | 0.058             | 9296.785   | 0.938     | 0.637    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 59.25    | 3.980       | 0.104       | 1.072             | 0.105             | 10107.624  | 1.020     | 1.164    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 59.50    | 4.164       | 0.184       | 1.189             | 0.117             | 11184.487  | 1.129     | 1.229    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 59.75    | 4.349       | 0.185       | 2.134             | 0.945             | 16599.842  | 1.675     | 10.806   | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 60.00    | 5.805       | 1.456       | 3.203             | 1.070             | 26890.186  | 2.713     | 12.062   | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 60.25    | 7.264       | 1.460       | 3.429             | 0.226             | 33398.816  | 3.370     | 2.402    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 60.50    | 7.541       | 0.277       | 3.646             | 0.216             | 35558.230  | 3.588     | 2.397    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 60.75    | 7.817       | 0.276       | 3.760             | 0.114             | 37198.113  | 3.754     | 1.247    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 61.00    | 7.959       | 0.142       | 3.873             | 0.113             | 38321.535  | 3.867     | 1.249    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 61.25    | 8.101       | 0.142       | 3.947             | 0.074             | 39251.285  | 3.961     | 0.817    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 61.50    | 8.193       | 0.092       | 4.022             | 0.074             | 39987.184  | 4.035     | 0.818    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 61.75    | 8.286       | 0.092       | 4.096             | 0.075             | 40725.090  | 4.110     | 0.821    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 62.00    | 8.378       | 0.092       | 4.171             | 0.074             | 41464.883  | 4.184     | 0.823    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 63.00    | 8.470       | 0.092       | 4.358             | 0.187             | 43874.371  | 4.427     | 0.516    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 64.00    | 8.699       | 0.229       | 4.546             | 0.188             | 45738.000  | 4.615     | 0.519    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 65.00    | 8.928       | 0.229       | 4.661             | 0.115             | 47240.059  | 4.767     | 0.315    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 66.00    | 9.067       | 0.139       | 4.776             | 0.115             | 48376.590  | 4.882     | 0.316    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 67.00    | 9.205       | 0.138       | 4.891             | 0.115             | 49517.762  | 4.997     | 0.318    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 68.00    | 9.343       | 0.138       | 5.007             | 0.116             | 50662.414  | 5.112     | 0.318    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 69.00    | 9.481       | 0.138       | 5.084             | 0.077             | 51618.648  | 5.209     | 0.213    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 70.00    | 9.573       | 0.092       | 5.162             | 0.078             | 52386.219  | 5.286     | 0.213    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 71.00    | 9.665       | 0.092       | 5.240             | 0.078             | 53155.199  | 5.364     | 0.214    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 72.00    | 9.757       | 0.092       | 5.317             | 0.078             | 53924.902  | 5.442     | 0.214    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 73.00    | 9.849       | 0.092       | 5.358             | 0.041             | 54510.555  | 5.501     | 0.111    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 74.00    | 9.897       | 0.048       | 5.399             | 0.041             | 54912.137  | 5.541     | 0.112    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 75.00    | 9.945       | 0.048       | 5.439             | 0.041             | 55314.191  | 5.582     | 0.112    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 76.00    | 9.993       | 0.048       | 5.480             | 0.041             | 55716.715  | 5.622     | 0.112    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 77.00    | 10.041      | 0.048       | 5.521             | 0.041             | 56121.352  | 5.663     | 0.113    | 0.000        |

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Hartwood Marsh Road Phase I  
 Pre Development  
 Basin 3  
 Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3   | BASE  | 78.00    | 10.089      | 0.048       | 5.562             | 0.041             | 56528.098  | 5.704     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 79.00    | 10.137      | 0.048       | 5.603             | 0.041             | 56935.305  | 5.745     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 80.00    | 10.185      | 0.048       | 5.644             | 0.041             | 57342.961  | 5.786     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 81.00    | 10.233      | 0.048       | 5.685             | 0.041             | 57749.414  | 5.827     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 82.00    | 10.281      | 0.048       | 5.726             | 0.041             | 58154.668  | 5.868     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 83.00    | 10.329      | 0.048       | 5.767             | 0.041             | 58560.359  | 5.909     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 84.00    | 10.377      | 0.048       | 5.808             | 0.041             | 58966.484  | 5.950     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 85.00    | 10.425      | 0.048       | 5.849             | 0.041             | 59373.039  | 5.991     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 86.00    | 10.473      | 0.048       | 5.891             | 0.041             | 59780.016  | 6.032     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 87.00    | 10.520      | 0.048       | 5.932             | 0.041             | 60187.414  | 6.073     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 88.00    | 10.568      | 0.048       | 5.973             | 0.041             | 60595.230  | 6.115     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 89.00    | 10.616      | 0.048       | 6.015             | 0.042             | 61005.129  | 6.156     | 0.114    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 90.00    | 10.664      | 0.048       | 6.056             | 0.042             | 61417.105  | 6.198     | 0.114    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 91.00    | 10.712      | 0.048       | 6.098             | 0.042             | 61829.496  | 6.239     | 0.115    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 92.00    | 10.761      | 0.048       | 6.140             | 0.042             | 62242.289  | 6.281     | 0.115    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 93.00    | 10.809      | 0.048       | 6.181             | 0.041             | 62653.809  | 6.322     | 0.114    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 94.00    | 10.857      | 0.048       | 6.222             | 0.041             | 63064.055  | 6.364     | 0.114    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 95.00    | 10.904      | 0.048       | 6.264             | 0.041             | 63474.691  | 6.405     | 0.114    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 96.00    | 10.952      | 0.048       | 6.305             | 0.041             | 63883.160  | 6.446     | 0.113    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 97.00    | 11.000      | 0.048       | 6.305             | 0.000             | 64086.215  | 6.467     | 0.000    | ← MAX        |
| 25Y96H     | BASIN 3-1 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.033      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 30.00    | 0.963       | 0.065       | 0.002             | 0.002             | 0.165      | 0.002     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 31.00    | 1.028       | 0.065       | 0.006             | 0.004             | 0.422      | 0.006     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 32.00    | 1.093       | 0.065       | 0.012             | 0.005             | 0.800      | 0.011     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 33.00    | 1.159       | 0.065       | 0.019             | 0.007             | 1.285      | 0.018     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 34.00    | 1.222       | 0.063       | 0.027             | 0.008             | 1.867      | 0.026     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 35.00    | 1.285       | 0.063       | 0.037             | 0.010             | 2.550      | 0.035     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 36.00    | 1.348       | 0.063       | 0.047             | 0.011             | 3.330      | 0.046     | 0.000    | 0.000        |

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Hartwood Marsh Road Phase I  
 Pre Development  
 Basin 3  
 Basin Time Series 25yr/96hr

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| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3-1 | BASE  | 37.00    | 1.411       | 0.063       | 0.060             | 0.012             | 4.204      | 0.058     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 38.00    | 1.474       | 0.063       | 0.073             | 0.013             | 5.168      | 0.071     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 39.00    | 1.538       | 0.063       | 0.088             | 0.015             | 6.218      | 0.086     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 40.00    | 1.601       | 0.063       | 0.104             | 0.016             | 7.353      | 0.101     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 41.00    | 1.664       | 0.063       | 0.121             | 0.018             | 8.589      | 0.118     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 42.00    | 1.729       | 0.065       | 0.140             | 0.019             | 9.928      | 0.137     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 43.00    | 1.795       | 0.065       | 0.160             | 0.020             | 11.347     | 0.156     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 44.00    | 1.860       | 0.065       | 0.180             | 0.021             | 12.844     | 0.177     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 45.00    | 1.925       | 0.065       | 0.202             | 0.021             | 14.388     | 0.198     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 46.00    | 1.988       | 0.063       | 0.224             | 0.022             | 15.976     | 0.220     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 47.00    | 2.052       | 0.063       | 0.247             | 0.023             | 17.630     | 0.243     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 48.00    | 2.115       | 0.063       | 0.270             | 0.024             | 19.347     | 0.266     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 49.00    | 2.178       | 0.063       | 0.304             | 0.033             | 21.446     | 0.295     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 50.00    | 2.263       | 0.085       | 0.338             | 0.035             | 23.948     | 0.330     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 50.25    | 2.348       | 0.085       | 0.349             | 0.010             | 24.638     | 0.339     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 50.50    | 2.373       | 0.025       | 0.359             | 0.011             | 25.390     | 0.350     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 50.75    | 2.397       | 0.025       | 0.370             | 0.011             | 26.158     | 0.360     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 51.00    | 2.422       | 0.025       | 0.381             | 0.011             | 26.933     | 0.371     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 51.25    | 2.447       | 0.025       | 0.392             | 0.011             | 27.717     | 0.382     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 51.50    | 2.472       | 0.025       | 0.403             | 0.011             | 28.510     | 0.393     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 51.75    | 2.497       | 0.025       | 0.414             | 0.011             | 29.310     | 0.404     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 52.00    | 2.521       | 0.025       | 0.425             | 0.011             | 30.118     | 0.415     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 52.25    | 2.546       | 0.025       | 0.439             | 0.014             | 31.019     | 0.427     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 52.50    | 2.577       | 0.031       | 0.453             | 0.014             | 32.028     | 0.441     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 52.75    | 2.608       | 0.031       | 0.468             | 0.014             | 33.061     | 0.455     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 53.00    | 2.638       | 0.031       | 0.482             | 0.015             | 34.107     | 0.470     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 53.25    | 2.669       | 0.031       | 0.497             | 0.015             | 35.163     | 0.484     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 53.50    | 2.700       | 0.031       | 0.512             | 0.015             | 36.231     | 0.499     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 53.75    | 2.730       | 0.031       | 0.527             | 0.015             | 37.310     | 0.514     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 54.00    | 2.761       | 0.031       | 0.542             | 0.015             | 38.401     | 0.529     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 54.25    | 2.792       | 0.031       | 0.561             | 0.019             | 39.623     | 0.546     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 54.50    | 2.830       | 0.038       | 0.580             | 0.019             | 40.998     | 0.565     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 54.75    | 2.869       | 0.038       | 0.600             | 0.020             | 42.408     | 0.584     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 55.00    | 2.907       | 0.038       | 0.620             | 0.020             | 43.833     | 0.604     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 55.25    | 2.945       | 0.038       | 0.640             | 0.020             | 45.275     | 0.624     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 55.50    | 2.984       | 0.038       | 0.660             | 0.020             | 46.732     | 0.644     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 55.75    | 3.022       | 0.038       | 0.680             | 0.020             | 48.204     | 0.664     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 56.00    | 3.061       | 0.038       | 0.701             | 0.021             | 49.692     | 0.684     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 56.25    | 3.099       | 0.039       | 0.733             | 0.032             | 51.541     | 0.710     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 56.50    | 3.158       | 0.058       | 0.765             | 0.032             | 53.806     | 0.741     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 56.75    | 3.216       | 0.058       | 0.798             | 0.033             | 56.151     | 0.773     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 57.00    | 3.275       | 0.058       | 0.831             | 0.033             | 58.529     | 0.806     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 57.25    | 3.333       | 0.058       | 0.864             | 0.033             | 60.938     | 0.839     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 57.50    | 3.391       | 0.058       | 0.898             | 0.034             | 63.376     | 0.873     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 57.75    | 3.450       | 0.058       | 0.932             | 0.034             | 65.844     | 0.907     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 58.00    | 3.508       | 0.058       | 0.967             | 0.035             | 68.343     | 0.941     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 58.25    | 3.567       | 0.058       | 1.029             | 0.062             | 71.729     | 0.988     | 0.005    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 58.50    | 3.670       | 0.103       | 1.093             | 0.064             | 76.152     | 1.049     | 0.005    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 58.75    | 3.773       | 0.104       | 1.157             | 0.065             | 80.788     | 1.113     | 0.005    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 59.00    | 3.877       | 0.104       | 1.224             | 0.067             | 85.511     | 1.178     | 0.005    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 59.25    | 3.980       | 0.104       | 1.342             | 0.118             | 91.971     | 1.267     | 0.009    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 59.50    | 4.164       | 0.184       | 1.485             | 0.143             | 100.575    | 1.385     | 0.010    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 59.75    | 4.349       | 0.185       | 2.516             | 1.031             | 138.850    | 1.913     | 0.075    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 60.00    | 5.805       | 1.456       | 3.654             | 1.138             | 214.087    | 2.949     | 0.092    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 60.25    | 7.264       | 1.460       | 3.907             | 0.253             | 268.321    | 3.696     | 0.028    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 60.50    | 7.541       | 0.277       | 4.136             | 0.228             | 289.530    | 3.988     | 0.019    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 60.75    | 7.817       | 0.276       | 4.258             | 0.122             | 302.849    | 4.171     | 0.011    | 0.000        |



Hartwood Marsh Road Phase I  
 Pre Development  
 Basin 3  
 Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3-1 | BASE  | 61.00    | 7.959       | 0.142       | 4.377             | 0.119             | 312.066    | 4.298     | 0.010    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 61.25    | 8.101       | 0.142       | 4.456             | 0.079             | 319.459    | 4.400     | 0.007    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 61.50    | 8.193       | 0.092       | 4.535             | 0.079             | 325.341    | 4.481     | 0.006    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 61.75    | 8.286       | 0.092       | 4.613             | 0.079             | 331.045    | 4.560     | 0.006    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 62.00    | 8.378       | 0.092       | 4.691             | 0.078             | 336.755    | 4.639     | 0.006    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 63.00    | 8.470       | 0.092       | 4.889             | 0.198             | 355.334    | 4.894     | 0.004    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 64.00    | 8.699       | 0.229       | 5.087             | 0.198             | 369.677    | 5.092     | 0.004    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 65.00    | 8.928       | 0.229       | 5.207             | 0.121             | 381.223    | 5.251     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 66.00    | 9.067       | 0.139       | 5.328             | 0.120             | 389.953    | 5.371     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 67.00    | 9.205       | 0.138       | 5.449             | 0.121             | 398.710    | 5.492     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 68.00    | 9.343       | 0.138       | 5.570             | 0.121             | 407.488    | 5.613     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 69.00    | 9.481       | 0.138       | 5.651             | 0.081             | 414.816    | 5.714     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 70.00    | 9.573       | 0.092       | 5.732             | 0.081             | 420.693    | 5.795     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 71.00    | 9.665       | 0.092       | 5.813             | 0.081             | 426.579    | 5.876     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 72.00    | 9.757       | 0.092       | 5.894             | 0.081             | 432.469    | 5.957     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 73.00    | 9.849       | 0.092       | 5.937             | 0.042             | 436.949    | 6.019     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 74.00    | 9.897       | 0.048       | 5.979             | 0.042             | 440.019    | 6.061     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 75.00    | 9.945       | 0.048       | 6.021             | 0.042             | 443.091    | 6.103     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 76.00    | 9.993       | 0.048       | 6.064             | 0.042             | 446.167    | 6.146     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 77.00    | 10.041      | 0.048       | 6.107             | 0.043             | 449.257    | 6.188     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 78.00    | 10.089      | 0.048       | 6.149             | 0.043             | 452.363    | 6.231     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 79.00    | 10.137      | 0.048       | 6.192             | 0.043             | 455.472    | 6.274     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 80.00    | 10.185      | 0.048       | 6.235             | 0.043             | 458.583    | 6.317     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 81.00    | 10.233      | 0.048       | 6.278             | 0.043             | 461.684    | 6.359     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 82.00    | 10.281      | 0.048       | 6.320             | 0.043             | 464.775    | 6.402     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 83.00    | 10.329      | 0.048       | 6.363             | 0.043             | 467.869    | 6.444     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 84.00    | 10.377      | 0.048       | 6.406             | 0.043             | 470.966    | 6.487     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 85.00    | 10.425      | 0.048       | 6.449             | 0.043             | 474.064    | 6.530     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 86.00    | 10.473      | 0.048       | 6.491             | 0.043             | 477.166    | 6.573     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 87.00    | 10.520      | 0.048       | 6.534             | 0.043             | 480.270    | 6.615     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 88.00    | 10.568      | 0.048       | 6.577             | 0.043             | 483.376    | 6.658     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 89.00    | 10.616      | 0.048       | 6.620             | 0.043             | 486.497    | 6.701     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 90.00    | 10.664      | 0.048       | 6.664             | 0.043             | 489.634    | 6.744     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 91.00    | 10.712      | 0.048       | 6.707             | 0.043             | 492.772    | 6.787     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 92.00    | 10.761      | 0.048       | 6.750             | 0.043             | 495.913    | 6.831     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 93.00    | 10.809      | 0.048       | 6.793             | 0.043             | 499.044    | 6.874     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 94.00    | 10.857      | 0.048       | 6.836             | 0.043             | 502.164    | 6.917     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 95.00    | 10.904      | 0.048       | 6.879             | 0.043             | 505.287    | 6.960     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 96.00    | 10.952      | 0.048       | 6.921             | 0.042             | 508.393    | 7.003     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 97.00    | 11.000      | 0.048       | 6.921             | 0.000             | 509.936    | 7.024     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |

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←max

Hartwood Marsh Road Phase I  
 Pre Development  
 Basin 3  
 Basin Time Series 25yr/96hr

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| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3-2 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 50.25    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 50.50    | 2.373       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 50.75    | 2.397       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 51.00    | 2.422       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 51.25    | 2.447       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 51.50    | 2.472       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 51.75    | 2.497       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 52.00    | 2.521       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 52.25    | 2.546       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 52.50    | 2.577       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 52.75    | 2.608       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 53.00    | 2.638       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 53.25    | 2.669       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 53.50    | 2.700       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 53.75    | 2.730       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 54.00    | 2.761       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 54.25    | 2.792       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 54.50    | 2.830       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 54.75    | 2.869       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 55.00    | 2.907       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 55.25    | 2.945       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 55.50    | 2.984       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 55.75    | 3.022       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |

Hartwood Marsh Road Phase I  
 Pre Development  
 Basin 3  
 Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3-2 | BASE  | 56.00    | 3.061       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 56.25    | 3.099       | 0.039       | 0.000             | 0.000             | 0.079      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 56.50    | 3.158       | 0.058       | 0.000             | 0.000             | 0.593      | 0.000     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 56.75    | 3.216       | 0.058       | 0.001             | 0.001             | 1.818      | 0.001     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 57.00    | 3.275       | 0.058       | 0.003             | 0.001             | 3.752      | 0.002     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 57.25    | 3.333       | 0.058       | 0.004             | 0.002             | 6.387      | 0.004     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 57.50    | 3.391       | 0.058       | 0.006             | 0.002             | 9.717      | 0.006     | 0.004    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 57.75    | 3.450       | 0.058       | 0.009             | 0.003             | 13.732     | 0.008     | 0.005    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 58.00    | 3.508       | 0.058       | 0.012             | 0.003             | 18.427     | 0.011     | 0.006    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 58.25    | 3.567       | 0.058       | 0.018             | 0.006             | 26.302     | 0.016     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 58.50    | 3.670       | 0.103       | 0.026             | 0.007             | 38.054     | 0.023     | 0.014    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 58.75    | 3.773       | 0.104       | 0.034             | 0.009             | 51.850     | 0.031     | 0.016    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 59.00    | 3.877       | 0.104       | 0.044             | 0.010             | 67.662     | 0.041     | 0.019    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 59.25    | 3.980       | 0.104       | 0.064             | 0.020             | 93.660     | 0.056     | 0.039    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 59.50    | 4.164       | 0.184       | 0.090             | 0.026             | 132.327    | 0.079     | 0.047    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 59.75    | 4.349       | 0.185       | 0.391             | 0.301             | 437.457    | 0.262     | 0.631    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 60.00    | 5.805       | 1.456       | 0.860             | 0.469             | 1140.289   | 0.683     | 0.931    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 60.25    | 7.264       | 1.460       | 0.971             | 0.111             | 1649.032   | 0.988     | 0.200    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 60.50    | 7.541       | 0.277       | 1.081             | 0.110             | 1831.840   | 1.097     | 0.206    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 60.75    | 7.817       | 0.276       | 1.140             | 0.059             | 1973.821   | 1.182     | 0.109    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 61.00    | 7.959       | 0.142       | 1.200             | 0.060             | 2072.915   | 1.241     | 0.111    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 61.25    | 8.101       | 0.142       | 1.239             | 0.039             | 2155.825   | 1.291     | 0.073    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 61.50    | 8.193       | 0.092       | 1.279             | 0.040             | 2222.085   | 1.331     | 0.074    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 61.75    | 8.286       | 0.092       | 1.319             | 0.040             | 2289.083   | 1.371     | 0.075    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 62.00    | 8.378       | 0.092       | 1.360             | 0.040             | 2356.775   | 1.411     | 0.076    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 63.00    | 8.470       | 0.092       | 1.463             | 0.103             | 2579.787   | 1.545     | 0.048    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 64.00    | 8.699       | 0.229       | 1.569             | 0.106             | 2755.963   | 1.650     | 0.050    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 65.00    | 8.928       | 0.229       | 1.634             | 0.065             | 2899.789   | 1.737     | 0.030    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 66.00    | 9.067       | 0.139       | 1.700             | 0.066             | 3009.883   | 1.803     | 0.031    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 67.00    | 9.205       | 0.138       | 1.767             | 0.067             | 3121.502   | 1.869     | 0.031    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 68.00    | 9.343       | 0.138       | 1.835             | 0.068             | 3234.538   | 1.937     | 0.032    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 69.00    | 9.481       | 0.138       | 1.881             | 0.046             | 3329.643   | 1.994     | 0.021    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 70.00    | 9.573       | 0.092       | 1.927             | 0.046             | 3406.476   | 2.040     | 0.021    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 71.00    | 9.665       | 0.092       | 1.973             | 0.046             | 3483.898   | 2.086     | 0.022    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 72.00    | 9.757       | 0.092       | 2.020             | 0.047             | 3561.899   | 2.133     | 0.022    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 73.00    | 9.849       | 0.092       | 2.045             | 0.024             | 3621.494   | 2.169     | 0.011    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 74.00    | 9.897       | 0.048       | 2.069             | 0.025             | 3662.455   | 2.193     | 0.011    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 75.00    | 9.945       | 0.048       | 2.094             | 0.025             | 3703.581   | 2.218     | 0.011    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 76.00    | 9.993       | 0.048       | 2.119             | 0.025             | 3744.871   | 2.243     | 0.011    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 77.00    | 10.041      | 0.048       | 2.144             | 0.025             | 3786.493   | 2.268     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 78.00    | 10.089      | 0.048       | 2.169             | 0.025             | 3828.448   | 2.293     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 79.00    | 10.137      | 0.048       | 2.194             | 0.025             | 3870.567   | 2.318     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 80.00    | 10.185      | 0.048       | 2.219             | 0.025             | 3912.847   | 2.343     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 81.00    | 10.233      | 0.048       | 2.245             | 0.025             | 3955.115   | 2.369     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 82.00    | 10.281      | 0.048       | 2.270             | 0.025             | 3997.371   | 2.394     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 83.00    | 10.329      | 0.048       | 2.296             | 0.025             | 4039.783   | 2.419     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 84.00    | 10.377      | 0.048       | 2.321             | 0.026             | 4082.350   | 2.445     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 85.00    | 10.425      | 0.048       | 2.347             | 0.026             | 4125.072   | 2.470     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 86.00    | 10.473      | 0.048       | 2.372             | 0.026             | 4167.948   | 2.496     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 87.00    | 10.520      | 0.048       | 2.398             | 0.026             | 4210.977   | 2.522     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 88.00    | 10.568      | 0.048       | 2.424             | 0.026             | 4254.157   | 2.548     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 89.00    | 10.616      | 0.048       | 2.450             | 0.026             | 4297.667   | 2.574     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 90.00    | 10.664      | 0.048       | 2.477             | 0.026             | 4341.504   | 2.600     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 91.00    | 10.712      | 0.048       | 2.503             | 0.026             | 4385.494   | 2.626     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 92.00    | 10.761      | 0.048       | 2.529             | 0.026             | 4429.632   | 2.653     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 93.00    | 10.809      | 0.048       | 2.556             | 0.026             | 4473.740   | 2.679     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 94.00    | 10.857      | 0.048       | 2.582             | 0.026             | 4517.816   | 2.706     | 0.012    | 0.000        |

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Hartwood Marsh Road Phase I  
 Pre Development  
 Basin 3  
 Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time<br>hrs | Sum Rain<br>in | Inc Rain<br>in | SumExcess<br>Rain in | IncExcess<br>Rain in | Volume<br>ft3 | Volume<br>in | Rate<br>cfs | Velocity<br>fps |
|------------|-----------|-------|-------------|----------------|----------------|----------------------|----------------------|---------------|--------------|-------------|-----------------|
| 25Y96H     | BASIN 3-2 | BASE  | 95.00       | 10.904         | 0.048          | 2.609                | 0.027                | 4562.038      | 2.732        | 0.012       | 0.000           |
| 25Y96H     | BASIN 3-2 | BASE  | 96.00       | 10.952         | 0.048          | 2.635                | 0.026                | 4606.295      | 2.759        | 0.012       | 0.000           |
| 25Y96H     | BASIN 3-2 | BASE  | 97.00       | 11.000         | 0.048          | 2.635                | 0.000                | 4628.405      | 2.772        | 0.000       | 0.000 ← MAX     |

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*Post Development Drainage Basin Data*

## BASIN BREAKDOWN

# HNTB

DATE

|          |     |           |
|----------|-----|-----------|
| MADE BY: | MSF | 23-Apr-08 |
| CHK BY:  | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3 - PHASE 1

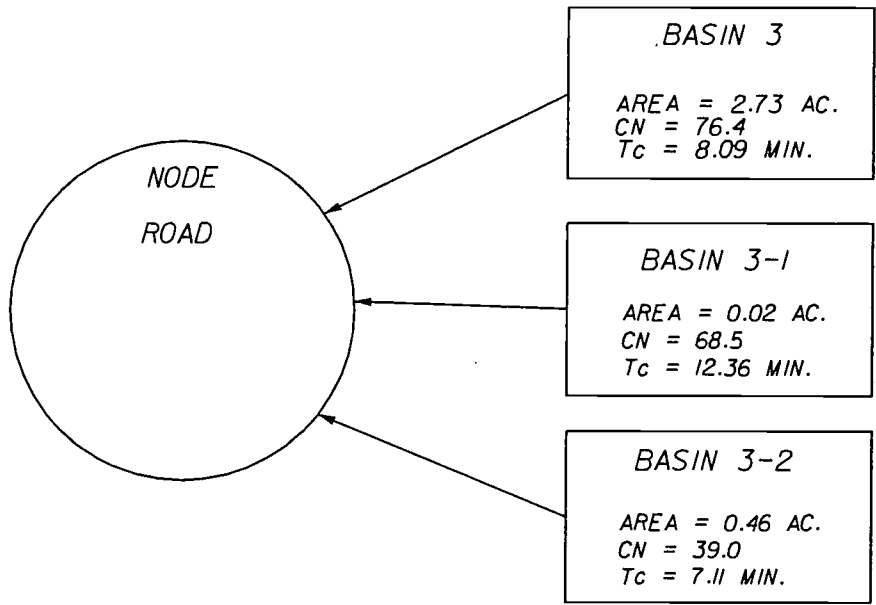
BASIN LIMITS: STA. 152+39 to STA 162+00, CL CONST. HARTWOOD MARSH RD.

**EXISTING CONDITIONS:**

| LOCATION                  | STATION | To | STATION | BASIN WIDTH<br>(Ft.) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS |
|---------------------------|---------|----|---------|----------------------|----------------------|-----------------------|-----------------------|---------|
| <b>ON-SITE:</b>           |         |    |         |                      |                      |                       |                       |         |
| BASIN 3                   | 152+39  | -  | 162+00  | 120                  | 0.843                | 1.887                 | 2.730                 |         |
| <b>ON-SITE SUBTOTAL:</b>  |         |    |         |                      | <b>0.843</b>         | <b>1.887</b>          | <b>2.73</b>           |         |
| <b>OFF-SITE:</b>          |         |    |         |                      |                      |                       |                       |         |
| BASIN 3-1 (OFF-SITE)      | 152+39  | -  | 153+09  | -                    | 0.01                 | 0.01                  | 0.02                  |         |
| BASIN 3-2 (OFF-SITE)      | 153+87  | -  | 155+50  | -                    | 0.00                 | 0.46                  | 0.46                  |         |
| <b>OFF-SITE SUBTOTAL:</b> |         |    |         |                      | <b>0.01</b>          | <b>0.47</b>           | <b>0.48</b>           |         |
| <b>TOTAL:</b>             |         |    |         |                      | <b>0.85</b>          | <b>2.35</b>           | <b>3.21</b>           |         |

**PROPOSED CONDITIONS:**

| LOCATION                  | STATION | To | STATION | BASIN WIDTH<br>(Ft.) | IMP. AREA<br>(Acres) | PERV. AREA<br>(Acres) | TOTAL AREA<br>(Acres) | REMARKS |
|---------------------------|---------|----|---------|----------------------|----------------------|-----------------------|-----------------------|---------|
| <b>ON-SITE:</b>           |         |    |         |                      |                      |                       |                       |         |
| BASIN 3                   | 152+39  | -  | 162+00  | 120                  | 1.73                 | 1.00                  | 2.73                  |         |
| <b>ON-SITE SUBTOTAL:</b>  |         |    |         |                      | <b>1.73</b>          | <b>1.00</b>           | <b>2.73</b>           |         |
| <b>OFF-SITE:</b>          |         |    |         |                      |                      |                       |                       |         |
| BASIN 3-1 (OFF-SITE)      | 152+39  | -  | 153+09  | -                    | 0.01                 | 0.01                  | 0.02                  |         |
| BASIN 3-2 (OFF-SITE)      | 153+87  | -  | 155+50  | -                    | 0.00                 | 0.46                  | 0.46                  |         |
| <b>OFF-SITE SUBTOTAL:</b> |         |    |         |                      | <b>0.01</b>          | <b>0.47</b>           | <b>0.48</b>           |         |
| <b>TOTAL:</b>             |         |    |         |                      | <b>1.74</b>          | <b>1.47</b>           | <b>3.21</b>           |         |



**BASIN 3**

LOCATION: LAKE COUNTY  
 SEC. 9 & 10, T23S, R26E  
 HARTWOOD MARSH ROAD RECONSTRUCTION  
 US 27 TO 1500 FT EAST OF S. HANCOCK RD

COUNTY: LAKE  
 STATE: FLORIDA  
 DATE: 04-08

DATUM: NAVD 88  
 PURPOSE: POST-DEVELOPMENT  
 NODAL DIAGRAM



HNTB CORPORATION  
 300 PRIMERA BLVD,  
 SUITE 200  
 LAKE MARY, FL 32746  
 (407) 805-0355  
 CERT. OF AUTH. NO. 6500



**LAKE COUNTY**  
 FLORIDA

**LAKE COUNTY**  
 HARTWOOD MARSH ROAD

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.  
 FL. REGISTRATION NO. 44794

RUNOFF CURVE NUMBER



DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br><br>(Appendix A) | Cover Description<br><br>(Cover type, treatment, and hydrologic condition; percent impervious; unconnected / connected impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                    |                                                                                                                                               | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
|                                                    | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                  | 98          |             |             | 1.73          | 169.59                     |
| Astatula Sand (A)                                  | GRASS<br>Fair Condition (Off-Site)                                                                                                            | 39          |             |             | 1.00          | 38.99                      |
| Totals =                                           |                                                                                                                                               |             |             |             | 2.73          | 208.58                     |

Use CN = 76.4

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986





RUNOFF CURVE NUMBER

|           |     |       |           |
|-----------|-----|-------|-----------|
| MADE BY:  | MSF | DATE: | 23-Apr-08 |
| CHKED BY: | KMV |       | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3-1

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description<br>(Cover type, treatment, and hydrologic condition; percent impervious; unconnected / connected; impervious area ratio) | CN       |          |          | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|---------------|----------------------------|
|                                                |                                                                                                                                            | Fig. 2-1 | Fig. 2-3 | Fig. 2-4 |               |                            |
| -                                              | IMPERVIOUS AREA                                                                                                                            |          |          |          |               |                            |
|                                                | Exist Pavement (Off-Site)                                                                                                                  | 98       |          |          | 0.01          | 0.98                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                         | 39       |          |          | 0.01          | 0.39                       |
| Totals =                                       |                                                                                                                                            |          |          |          | 0.02          | 1.37                       |

Use CN = 68.5

REFERENCE: Urban Hydrology for Small Watersheds  
Technical Release 55, Soil Conservation Service  
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER



DATE:

|           |     |           |
|-----------|-----|-----------|
| MADE BY:  | MSF | 23-Apr-08 |
| CHKED BY: | KMV | 24-Apr-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3-2

UNDERLINE ONE: EXISTING PROPOSED

| Soil Name and Hydrologic group<br>(Appendix A) | Cover Description:<br>(Cover type, treatment, and hydrologic condition:<br>percent impervious:<br>unconnected / connected<br>impervious area ratio) | CN          |             |             | Area<br>acres | Product<br>of<br>CN x Area |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
|                                                |                                                                                                                                                     | Tab.<br>2-2 | Fig.<br>2-3 | Fig.<br>2-4 |               |                            |
| -                                              | IMPERVIOUS AREA<br>Exist Pavement (Off-Site)                                                                                                        | 98          |             |             | 0.00          | 0.00                       |
| Astatula Sand (A)                              | GRASS<br>Fair Condition (Off-Site)                                                                                                                  | 39          |             |             | 0.46          | 17.79                      |
| Totals =                                       |                                                                                                                                                     |             |             |             | 0.46          | 17.79                      |

Use CN = **39.0**

REFERENCE: *Urban Hydrology for Small Watersheds*  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

**HNTB**

DATE:

MADE BY: MSF 12-Mar-08  
 CHECKED BY: KMV 13-Mar-08

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|                |  |        |           |
|----------------|--|--------|-----------|
| SMOOTH SURFACE |  |        |           |
| 0.011          |  |        |           |
| 300            |  | FT.    |           |
| 4.70           |  | IN.    |           |
| 0.011          |  |        |           |
| 0.052          |  | HR. OR | 3.11 MIN. |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|         |  |          |           |
|---------|--|----------|-----------|
| UNPAVED |  |          |           |
| 306     |  | L.F.     |           |
| 0.0280  |  | FT./ FT. |           |
| 2.699   |  | FT./SEC. |           |
| 0.08    |  | HR. OR   | 4.98 MIN. |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |  |          |           |
|--|--|----------|-----------|
|  |  | S.F.     |           |
|  |  | L.F.     |           |
|  |  | L.F.     |           |
|  |  | FT./FT.  |           |
|  |  | FT./SEC. |           |
|  |  | L.F.     |           |
|  |  | HR. OR   | 0.00 MIN. |

TOTAL Tc = 8.09 MIN.

Reference: Urban Hydrology for Small Watersheds  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS



DATE:

|             |     |           |
|-------------|-----|-----------|
| MADE BY:    | MSF | 12-Mar-08 |
| CHECKED BY: | KMV | 13-Mar-08 |

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3-1

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $T_t = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |        |
|-------------|--------|
| SHORT GRASS |        |
| 0.150       |        |
| 100         | FT.    |
| 4.70        | IN.    |
| 0.030       |        |
| 0.115       | HR. OR |

6.87 MIN.  
(TO ROAD)

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $T_t = L / (3600 * V)$

|         |          |
|---------|----------|
| UNPAVED |          |
| 360     | L.F.     |
| 0.0262  | FT./FT.  |
| 2.613   | FT./SEC. |
| 0.09    | HR. OR   |

5.49 MIN.

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $T_t = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|  |          |
|--|----------|
|  | S.F.     |
|  | L.F.     |
|  | L.F.     |
|  | FT./FT.  |
|  | FT./SEC. |
|  | L.F.     |
|  | HR. OR   |

0.00 MIN.

TOTAL Tc = 12.36 MIN.

Reference: Urban Hydrology for Small Watersheds  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

**HNTB**

DATE:

MADE BY: MSF 12-Mar-08  
 CHECKED BY: KMV 13-Mar-08

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3-2

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

- 1 SURFACE DESCRIPTION
- 2 MANNING'S COEFFICIENT, n
- 3 FLOW LENGTH, L, (< 300')
- 4 2 YR/ 24 HR RAINFALL, P
- 5 LAND SLOPE, S
- 6  $Tt = (0.007 (nL)^{0.8}) / (P^{0.5} * S^{0.4})$

|             |  |                            |
|-------------|--|----------------------------|
| SHORT GRASS |  |                            |
| 0.150       |  |                            |
| 32          |  | FT.                        |
| 4.70        |  | IN.                        |
| 0.128       |  |                            |
| 0.026       |  | HR. OR 1.55 MIN. (TO ROAD) |

SHALLOW CONCENTRATED FLOW:

- 7 SURFACE DESCRIPTION (PAVED OR UNPAVED)
- 8 FLOW LENGTH, L
- 9 WATERCOURSE SLOPE, S
- 10 AVERAGE VELOCITY, V
- 11  $Tt = L / (3600 * V)$

|         |  |                  |
|---------|--|------------------|
| UNPAVED |  |                  |
| 745     |  | L.F.             |
| 0.0368  |  | FT./ FT.         |
| 3.094   |  | FT./SEC.         |
| 0.07    |  | HR. OR 4.01 MIN. |

CHANNEL FLOW:

- 12 CROSS-SECTIONAL FLOW AREA, A
- 13 WETTED PERIMETER, Pw
- 14 HYDRAULIC RADIUS, R = (A / Pw)
- 15 CHANNEL SLOPE, S
- 16 MANNING'S ROUGHNESS COEFFICIENT, n
- 17 VELOCITY, V, =  $(1.49 * R^{0.667} * S^{0.5}) / n$
- 18 FLOW LENGTH, L
- 19  $Tt = L / (3600 V)$
- 20 Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

|       |  |                  |           |
|-------|--|------------------|-----------|
|       |  | S.F.             | Pipe flow |
|       |  | L.F.             |           |
|       |  | L.F.             |           |
|       |  | FT./FT.          |           |
|       |  | FT./SEC.         |           |
| 2.500 |  | FT./SEC.         |           |
| 233   |  | L.F.             |           |
| 0.03  |  | HR. OR 1.55 MIN. |           |

TOTAL Tc = 7.11 MIN.

Reference: Urban Hydrology for Small Watersheds  
 Technical Release 55, Soil Conservation Service  
 U.S. Department of Agriculture, June 1986

Hartwood Marsh Road Phase I  
Post Development  
Basin 3  
Input

=====  
Basins  
=====

Name: BASIN 3                   Node: ROAD                   Status: Onsite  
Group: BASE                    Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484                    Peaking Factor: 484.0  
Rainfall File: Sjrwm96                   Storm Duration(hrs): 96.00  
Rainfall Amount (in): 11.000             Time of Conc(min): 8.09  
                  Area(ac): 2.730                    Time Shift(hrs): 0.00  
Curve Number: 76.40                    Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

Existing Hartwood

Name: BASIN 3-1                Node: ROAD                   Status: Onsite  
Group: BASE                    Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484                    Peaking Factor: 484.0  
Rainfall File: Sjrwm96                   Storm Duration(hrs): 96.00  
Rainfall Amount (in): 11.000             Time of Conc(min): 12.36  
                  Area(ac): 0.020                    Time Shift(hrs): 0.00  
Curve Number: 68.50                    Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

Name: BASIN 3-2                Node: ROAD                   Status: Onsite  
Group: BASE                    Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484                    Peaking Factor: 484.0  
Rainfall File: Sjrwm96                   Storm Duration(hrs): 96.00  
Rainfall Amount (in): 11.000             Time of Conc(min): 7.11  
                  Area(ac): 0.460                    Time Shift(hrs): 0.00  
Curve Number: 39.00                    Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

=====  
Hydrology Simulations  
=====

Name: 100Y24H  
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\POST\100Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount (in): 10.20

| Time (hrs) | Print | Inc (min) |
|------------|-------|-----------|
| 11.000     | 60.00 |           |
| 16.000     | 15.00 |           |
| 40.000     | 60.00 |           |

Name: 10Y24H  
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\PRE\10Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount (in): 7.00

| Time (hrs) | Print | Inc (min) |
|------------|-------|-----------|
| 11.000     | 60.00 |           |
| 16.000     | 15.00 |           |
| 40.000     | 60.00 |           |

Name: 2.3Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00

Hartwood Marsh Road Phase I  
Post Development  
Basin 3  
Input

Rainfall File: Flmod  
Rainfall Amount(in): 4.90

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.00          |
| 16.000    | 15.00          |
| 40.000    | 60.00          |

Name: 25Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y24H.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Flmod  
Rainfall Amount(in): 8.30

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.00          |
| 16.000    | 15.00          |
| 40.000    | 60.00          |

Name: 25Y96H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y96H.R32

Override Defaults: No

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 50.000    | 60.00          |
| 62.000    | 15.00          |
| 97.000    | 60.00          |

==== Routing Simulations =====

Name: 10Y24H Hydrology Sim: 10Y24H  
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\POST\10Y24H.I32

Execute: No Restart: No Patch: No  
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000 End Time(hrs): 40.00  
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000  
Boundary Stages: Boundary Flows:

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
| 11.000    | 60.000         |
| 15.000    | 15.000         |
| 40.000    | 60.000         |

| Group | Run |
|-------|-----|
| BASE  | Yes |

Name: 2.3Y24H Hydrology Sim: 2.3Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.I32

Execute: No Restart: No Patch: No  
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000 End Time(hrs): 40.00  
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000  
Boundary Stages: Boundary Flows:

| Time(hrs) | Print Inc(min) |
|-----------|----------------|
|-----------|----------------|

Hartwood Marsh Road Phase I  
Post Development  
Basin 3  
Input

11.000 60.000  
15.000 15.000  
40.000 60.000

Group Run  
-----  
BASE Yes

-----  
Name: 25Y24H Hydrology Sim: 25Y24H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y24H.I32

Execute: No Restart: No Patch: No  
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000 End Time(hrs): 40.00  
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000  
Boundary Stages: Boundary Flows:

Time(hrs) Print Inc(min)  
-----  
11.000 60.000  
15.000 15.000  
40.000 60.000

Group Run  
-----  
BASE Yes

-----  
Name: 25Y96H Hydrology Sim: 25Y96H  
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y96H.I32

Execute: No Restart: No Patch: No  
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000 End Time(hrs): 97.00  
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000  
Boundary Stages: Boundary Flows:

Time(hrs) Print Inc(min)  
-----  
55.000 60.000  
65.000 15.000  
97.000 60.000

Group Run  
-----  
BASE Yes

=====  
----- Boundary Conditions -----  
=====



Hartwood Marsh Road Phase I  
 Post Development  
 Basin 3  
 Basin Time Series 25yr/96hr

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| Simulation | Basin   | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|---------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 2.041      | 0.000     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 25.00    | 0.645       | 0.027       | 0.003             | 0.002             | 20.283     | 0.002     | 0.009    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 26.00    | 0.708       | 0.063       | 0.007             | 0.005             | 64.155     | 0.006     | 0.015    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 27.00    | 0.771       | 0.063       | 0.014             | 0.007             | 130.317    | 0.013     | 0.021    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 28.00    | 0.834       | 0.063       | 0.023             | 0.009             | 217.516    | 0.022     | 0.027    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 29.00    | 0.897       | 0.063       | 0.035             | 0.011             | 326.787    | 0.033     | 0.034    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 30.00    | 0.963       | 0.065       | 0.048             | 0.013             | 457.633    | 0.046     | 0.039    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 31.00    | 1.028       | 0.065       | 0.063             | 0.015             | 607.391    | 0.061     | 0.044    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 32.00    | 1.093       | 0.065       | 0.081             | 0.017             | 775.029    | 0.078     | 0.049    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 33.00    | 1.159       | 0.065       | 0.099             | 0.018             | 956.313    | 0.097     | 0.052    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 34.00    | 1.222       | 0.063       | 0.118             | 0.020             | 1149.891   | 0.116     | 0.056    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 35.00    | 1.285       | 0.063       | 0.140             | 0.021             | 1357.791   | 0.137     | 0.060    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 36.00    | 1.348       | 0.063       | 0.162             | 0.023             | 1579.310   | 0.159     | 0.063    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 37.00    | 1.411       | 0.063       | 0.186             | 0.024             | 1813.793   | 0.183     | 0.067    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 38.00    | 1.474       | 0.063       | 0.211             | 0.025             | 2060.626   | 0.208     | 0.070    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 39.00    | 1.538       | 0.063       | 0.237             | 0.026             | 2319.233   | 0.234     | 0.073    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 40.00    | 1.601       | 0.063       | 0.265             | 0.027             | 2589.075   | 0.261     | 0.076    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 41.00    | 1.664       | 0.063       | 0.294             | 0.029             | 2874.500   | 0.290     | 0.082    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 42.00    | 1.729       | 0.065       | 0.325             | 0.031             | 3175.352   | 0.320     | 0.085    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 43.00    | 1.795       | 0.065       | 0.356             | 0.032             | 3486.627   | 0.352     | 0.088    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 44.00    | 1.860       | 0.065       | 0.389             | 0.033             | 3807.835   | 0.384     | 0.091    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 45.00    | 1.925       | 0.065       | 0.421             | 0.032             | 4133.094   | 0.417     | 0.090    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 46.00    | 1.988       | 0.063       | 0.455             | 0.033             | 4461.748   | 0.450     | 0.092    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 47.00    | 2.052       | 0.063       | 0.489             | 0.034             | 4798.595   | 0.484     | 0.095    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 48.00    | 2.115       | 0.063       | 0.524             | 0.035             | 5143.327   | 0.519     | 0.097    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 49.00    | 2.178       | 0.063       | 0.572             | 0.048             | 5558.006   | 0.561     | 0.134    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 50.00    | 2.263       | 0.085       | 0.621             | 0.049             | 6045.191   | 0.610     | 0.137    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 50.25    | 2.348       | 0.085       | 0.636             | 0.015             | 6179.229   | 0.624     | 0.161    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 50.50    | 2.373       | 0.025       | 0.650             | 0.015             | 6324.689   | 0.638     | 0.162    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 50.75    | 2.397       | 0.025       | 0.665             | 0.015             | 6471.442   | 0.653     | 0.164    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 51.00    | 2.422       | 0.025       | 0.680             | 0.015             | 6619.194   | 0.668     | 0.165    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 51.25    | 2.447       | 0.025       | 0.695             | 0.015             | 6767.929   | 0.683     | 0.166    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 51.50    | 2.472       | 0.025       | 0.711             | 0.015             | 6917.632   | 0.698     | 0.167    | 0.000        |

Hartwood Marsh Road Phase I  
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| Simulation | Basin   | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|---------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3 | BASE  | 51.75    | 2.497       | 0.025       | 0.726             | 0.015             | 7068.290   | 0.713     | 0.168    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 52.00    | 2.521       | 0.025       | 0.741             | 0.015             | 7219.930   | 0.729     | 0.169    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 52.25    | 2.546       | 0.025       | 0.760             | 0.019             | 7390.221   | 0.746     | 0.209    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 52.50    | 2.577       | 0.031       | 0.780             | 0.019             | 7579.898   | 0.765     | 0.212    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 52.75    | 2.608       | 0.031       | 0.799             | 0.019             | 7771.500   | 0.784     | 0.214    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 53.00    | 2.638       | 0.031       | 0.819             | 0.020             | 7964.447   | 0.804     | 0.215    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 53.25    | 2.669       | 0.031       | 0.838             | 0.020             | 8158.716   | 0.823     | 0.217    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 53.50    | 2.700       | 0.031       | 0.858             | 0.020             | 8354.283   | 0.843     | 0.218    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 53.75    | 2.730       | 0.031       | 0.878             | 0.020             | 8551.126   | 0.863     | 0.219    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 54.00    | 2.761       | 0.031       | 0.898             | 0.020             | 8749.286   | 0.883     | 0.221    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 54.25    | 2.792       | 0.031       | 0.923             | 0.025             | 8973.177   | 0.905     | 0.277    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 54.50    | 2.830       | 0.038       | 0.949             | 0.025             | 9223.761   | 0.931     | 0.280    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 54.75    | 2.869       | 0.038       | 0.974             | 0.026             | 9476.907   | 0.956     | 0.282    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 55.00    | 2.907       | 0.038       | 1.000             | 0.026             | 9731.862   | 0.982     | 0.284    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 55.25    | 2.945       | 0.038       | 1.026             | 0.026             | 9988.589   | 1.008     | 0.286    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 55.50    | 2.984       | 0.038       | 1.052             | 0.026             | 10247.049  | 1.034     | 0.288    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 55.75    | 3.022       | 0.038       | 1.079             | 0.026             | 10507.206  | 1.060     | 0.290    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 56.00    | 3.061       | 0.038       | 1.106             | 0.027             | 10769.219  | 1.087     | 0.292    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 56.25    | 3.099       | 0.039       | 1.146             | 0.041             | 11100.069  | 1.120     | 0.443    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 56.50    | 3.158       | 0.058       | 1.187             | 0.041             | 11502.350  | 1.161     | 0.451    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 56.75    | 3.216       | 0.058       | 1.228             | 0.041             | 11909.983  | 1.202     | 0.455    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 57.00    | 3.275       | 0.058       | 1.270             | 0.042             | 12321.057  | 1.243     | 0.459    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 57.25    | 3.333       | 0.058       | 1.312             | 0.042             | 12735.467  | 1.285     | 0.462    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 57.50    | 3.391       | 0.058       | 1.355             | 0.042             | 13153.114  | 1.327     | 0.466    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 57.75    | 3.450       | 0.058       | 1.397             | 0.043             | 13573.903  | 1.370     | 0.469    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 58.00    | 3.508       | 0.058       | 1.440             | 0.043             | 13998.123  | 1.413     | 0.473    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 58.25    | 3.567       | 0.058       | 1.517             | 0.076             | 14587.068  | 1.472     | 0.835    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 58.50    | 3.670       | 0.103       | 1.594             | 0.078             | 15348.230  | 1.549     | 0.856    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 58.75    | 3.773       | 0.104       | 1.673             | 0.079             | 16122.914  | 1.627     | 0.865    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 59.00    | 3.877       | 0.104       | 1.752             | 0.079             | 16905.689  | 1.706     | 0.874    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 59.25    | 3.980       | 0.104       | 1.895             | 0.143             | 18000.586  | 1.816     | 1.559    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 59.50    | 4.164       | 0.184       | 2.053             | 0.158             | 19436.186  | 1.961     | 1.631    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 59.75    | 4.349       | 0.185       | 3.251             | 1.197             | 26066.941  | 2.630     | 13.104   | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 60.00    | 5.805       | 1.456       | 4.519             | 1.268             | 38333.980  | 3.868     | 14.156   | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 60.25    | 7.264       | 1.460       | 4.787             | 0.268             | 46089.785  | 4.651     | 3.079    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 60.50    | 7.541       | 0.277       | 5.036             | 0.249             | 48715.223  | 4.916     | 2.756    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 60.75    | 7.817       | 0.276       | 5.167             | 0.131             | 50613.117  | 5.107     | 1.462    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 61.00    | 7.959       | 0.142       | 5.297             | 0.129             | 51913.082  | 5.239     | 1.427    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 61.25    | 8.101       | 0.142       | 5.381             | 0.085             | 52979.293  | 5.346     | 0.943    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 61.50    | 8.193       | 0.092       | 5.466             | 0.085             | 53822.117  | 5.431     | 0.930    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 61.75    | 8.286       | 0.092       | 5.551             | 0.085             | 54660.098  | 5.516     | 0.932    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 62.00    | 8.378       | 0.092       | 5.635             | 0.084             | 55498.617  | 5.600     | 0.932    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 63.00    | 8.470       | 0.092       | 5.846             | 0.212             | 58222.336  | 5.875     | 0.582    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 64.00    | 8.699       | 0.229       | 6.058             | 0.212             | 60319.406  | 6.087     | 0.583    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 65.00    | 8.928       | 0.229       | 6.187             | 0.129             | 62004.629  | 6.257     | 0.353    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 66.00    | 9.067       | 0.139       | 6.315             | 0.128             | 63275.883  | 6.385     | 0.353    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 67.00    | 9.205       | 0.138       | 6.444             | 0.129             | 64549.414  | 6.514     | 0.354    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 68.00    | 9.343       | 0.138       | 6.573             | 0.129             | 65824.039  | 6.642     | 0.354    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 69.00    | 9.481       | 0.138       | 6.659             | 0.086             | 66887.086  | 6.750     | 0.237    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 70.00    | 9.573       | 0.092       | 6.745             | 0.086             | 67739.023  | 6.835     | 0.237    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 71.00    | 9.665       | 0.092       | 6.831             | 0.086             | 68591.359  | 6.921     | 0.237    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 72.00    | 9.757       | 0.092       | 6.917             | 0.086             | 69443.945  | 7.008     | 0.237    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 73.00    | 9.849       | 0.092       | 6.962             | 0.045             | 70092.211  | 7.073     | 0.123    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 74.00    | 9.897       | 0.048       | 7.007             | 0.045             | 70535.969  | 7.118     | 0.123    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 75.00    | 9.945       | 0.048       | 7.052             | 0.045             | 70979.953  | 7.163     | 0.123    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 76.00    | 9.993       | 0.048       | 7.096             | 0.045             | 71424.164  | 7.207     | 0.123    | 0.000        |
| 25Y96H     | BASIN 3 | BASE  | 77.00    | 10.041      | 0.048       | 7.142             | 0.045             | 71870.406  | 7.252     | 0.124    | 0.000        |

Hartwood Marsh Road Phase I  
 Post Development  
 Basin 3  
 Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3   | BASE  | 78.00    | 10.089      | 0.048       | 7.187             | 0.045             | 72318.680  | 7.298     | 0.125    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 79.00    | 10.137      | 0.048       | 7.232             | 0.045             | 72767.172  | 7.343     | 0.125    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 80.00    | 10.185      | 0.048       | 7.278             | 0.045             | 73215.875  | 7.388     | 0.125    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 81.00    | 10.233      | 0.048       | 7.323             | 0.045             | 73662.977  | 7.433     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 82.00    | 10.281      | 0.048       | 7.368             | 0.045             | 74108.477  | 7.478     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 83.00    | 10.329      | 0.048       | 7.413             | 0.045             | 74554.180  | 7.523     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 84.00    | 10.377      | 0.048       | 7.458             | 0.045             | 75000.086  | 7.568     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 85.00    | 10.425      | 0.048       | 7.503             | 0.045             | 75446.195  | 7.613     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 86.00    | 10.473      | 0.048       | 7.548             | 0.045             | 75892.508  | 7.658     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 87.00    | 10.520      | 0.048       | 7.593             | 0.045             | 76339.016  | 7.703     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 88.00    | 10.568      | 0.048       | 7.638             | 0.045             | 76785.719  | 7.748     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 89.00    | 10.616      | 0.048       | 7.684             | 0.046             | 77234.438  | 7.794     | 0.125    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 90.00    | 10.664      | 0.048       | 7.729             | 0.046             | 77685.172  | 7.839     | 0.125    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 91.00    | 10.712      | 0.048       | 7.775             | 0.046             | 78136.102  | 7.885     | 0.125    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 92.00    | 10.761      | 0.048       | 7.820             | 0.046             | 78587.211  | 7.930     | 0.125    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 93.00    | 10.809      | 0.048       | 7.866             | 0.045             | 79036.680  | 7.976     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 94.00    | 10.857      | 0.048       | 7.911             | 0.045             | 79484.516  | 8.021     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 95.00    | 10.904      | 0.048       | 7.956             | 0.045             | 79932.531  | 8.066     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 96.00    | 10.952      | 0.048       | 8.001             | 0.045             | 80380.523  | 8.111     | 0.124    | 0.000        |
| 25Y96H     | BASIN 3   | BASE  | 97.00    | 11.000      | 0.048       | 8.001             | 0.000             | 80604.461  | 8.134     | 0.000    | 0.000 ← MAX  |
| 25Y96H     | BASIN 3-1 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.033      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 30.00    | 0.963       | 0.065       | 0.002             | 0.002             | 0.163      | 0.002     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 31.00    | 1.028       | 0.065       | 0.006             | 0.004             | 0.420      | 0.006     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 32.00    | 1.093       | 0.065       | 0.012             | 0.005             | 0.797      | 0.011     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 33.00    | 1.159       | 0.065       | 0.019             | 0.007             | 1.281      | 0.018     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 34.00    | 1.222       | 0.063       | 0.027             | 0.008             | 1.863      | 0.026     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 35.00    | 1.285       | 0.063       | 0.037             | 0.010             | 2.545      | 0.035     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 36.00    | 1.348       | 0.063       | 0.047             | 0.011             | 3.325      | 0.046     | 0.000    | 0.000        |

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Hartwood Marsh Road Phase I  
 Post Development  
 Basin 3  
 Basin Time Series 25yr/96hr

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| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3-1 | BASE  | 37.00    | 1.411       | 0.063       | 0.060             | 0.012             | 4.198      | 0.058     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 38.00    | 1.474       | 0.063       | 0.073             | 0.013             | 5.161      | 0.071     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 39.00    | 1.538       | 0.063       | 0.088             | 0.015             | 6.211      | 0.086     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 40.00    | 1.601       | 0.063       | 0.104             | 0.016             | 7.344      | 0.101     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 41.00    | 1.664       | 0.063       | 0.121             | 0.018             | 8.580      | 0.118     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 42.00    | 1.729       | 0.065       | 0.140             | 0.019             | 9.919      | 0.137     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 43.00    | 1.795       | 0.065       | 0.160             | 0.020             | 11.337     | 0.156     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 44.00    | 1.860       | 0.065       | 0.180             | 0.021             | 12.833     | 0.177     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 45.00    | 1.925       | 0.065       | 0.202             | 0.021             | 14.377     | 0.198     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 46.00    | 1.988       | 0.063       | 0.224             | 0.022             | 15.965     | 0.220     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 47.00    | 2.052       | 0.063       | 0.247             | 0.023             | 17.618     | 0.243     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 48.00    | 2.115       | 0.063       | 0.270             | 0.024             | 19.335     | 0.266     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 49.00    | 2.178       | 0.063       | 0.304             | 0.033             | 21.435     | 0.295     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 50.00    | 2.263       | 0.085       | 0.338             | 0.035             | 23.937     | 0.330     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 50.25    | 2.348       | 0.085       | 0.349             | 0.010             | 24.626     | 0.339     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 50.50    | 2.373       | 0.025       | 0.359             | 0.011             | 25.376     | 0.350     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 50.75    | 2.397       | 0.025       | 0.370             | 0.011             | 26.143     | 0.360     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 51.00    | 2.422       | 0.025       | 0.381             | 0.011             | 26.919     | 0.371     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 51.25    | 2.447       | 0.025       | 0.392             | 0.011             | 27.702     | 0.382     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 51.50    | 2.472       | 0.025       | 0.403             | 0.011             | 28.494     | 0.392     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 51.75    | 2.497       | 0.025       | 0.414             | 0.011             | 29.295     | 0.404     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 52.00    | 2.521       | 0.025       | 0.425             | 0.011             | 30.103     | 0.415     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 52.25    | 2.546       | 0.025       | 0.439             | 0.014             | 31.002     | 0.427     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 52.50    | 2.577       | 0.031       | 0.453             | 0.014             | 32.008     | 0.441     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 52.75    | 2.608       | 0.031       | 0.468             | 0.014             | 33.041     | 0.455     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 53.00    | 2.638       | 0.031       | 0.482             | 0.015             | 34.086     | 0.470     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 53.25    | 2.669       | 0.031       | 0.497             | 0.015             | 35.142     | 0.484     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 53.50    | 2.700       | 0.031       | 0.512             | 0.015             | 36.210     | 0.499     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 53.75    | 2.730       | 0.031       | 0.527             | 0.015             | 37.289     | 0.514     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 54.00    | 2.761       | 0.031       | 0.542             | 0.015             | 38.379     | 0.529     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 54.25    | 2.792       | 0.031       | 0.561             | 0.019             | 39.598     | 0.545     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 54.50    | 2.830       | 0.038       | 0.580             | 0.019             | 40.970     | 0.564     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 54.75    | 2.869       | 0.038       | 0.600             | 0.020             | 42.379     | 0.584     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 55.00    | 2.907       | 0.038       | 0.620             | 0.020             | 43.804     | 0.603     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 55.25    | 2.945       | 0.038       | 0.640             | 0.020             | 45.245     | 0.623     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 55.50    | 2.984       | 0.038       | 0.660             | 0.020             | 46.702     | 0.643     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 55.75    | 3.022       | 0.038       | 0.680             | 0.020             | 48.173     | 0.664     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 56.00    | 3.061       | 0.038       | 0.701             | 0.021             | 49.661     | 0.684     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 56.25    | 3.099       | 0.039       | 0.733             | 0.032             | 51.503     | 0.709     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 56.50    | 3.158       | 0.058       | 0.765             | 0.032             | 53.759     | 0.740     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 56.75    | 3.216       | 0.058       | 0.798             | 0.033             | 56.103     | 0.773     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 57.00    | 3.275       | 0.058       | 0.831             | 0.033             | 58.480     | 0.806     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 57.25    | 3.333       | 0.058       | 0.864             | 0.033             | 60.888     | 0.839     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 57.50    | 3.391       | 0.058       | 0.898             | 0.034             | 63.326     | 0.872     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 57.75    | 3.450       | 0.058       | 0.932             | 0.034             | 65.793     | 0.906     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 58.00    | 3.508       | 0.058       | 0.967             | 0.035             | 68.291     | 0.941     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 58.25    | 3.567       | 0.058       | 1.029             | 0.062             | 71.656     | 0.987     | 0.005    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 58.50    | 3.670       | 0.103       | 1.093             | 0.064             | 76.058     | 1.048     | 0.005    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 58.75    | 3.773       | 0.104       | 1.157             | 0.065             | 80.689     | 1.111     | 0.005    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 59.00    | 3.877       | 0.104       | 1.224             | 0.066             | 85.407     | 1.176     | 0.005    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 59.25    | 3.980       | 0.104       | 1.342             | 0.119             | 91.826     | 1.265     | 0.009    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 59.50    | 4.164       | 0.184       | 1.484             | 0.142             | 100.380    | 1.383     | 0.010    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 59.75    | 4.349       | 0.185       | 2.516             | 1.032             | 137.927    | 1.900     | 0.073    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 60.00    | 5.805       | 1.456       | 3.652             | 1.136             | 212.287    | 2.924     | 0.092    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 60.25    | 7.264       | 1.460       | 3.907             | 0.256             | 267.030    | 3.678     | 0.030    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 60.50    | 7.541       | 0.277       | 4.136             | 0.228             | 288.974    | 3.980     | 0.019    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 60.75    | 7.817       | 0.276       | 4.258             | 0.122             | 302.432    | 4.166     | 0.011    | 0.000        |

Hartwood Marsh Road Phase I  
 Post Development  
 Basin 3  
 Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3-1 | BASE  | 61.00    | 7.959       | 0.142       | 4.378             | 0.120             | 311.734    | 4.294     | 0.010    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 61.25    | 8.101       | 0.142       | 4.456             | 0.079             | 319.163    | 4.396     | 0.007    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 61.50    | 8.193       | 0.092       | 4.535             | 0.079             | 325.072    | 4.478     | 0.006    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 61.75    | 8.286       | 0.092       | 4.613             | 0.079             | 330.779    | 4.556     | 0.006    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 62.00    | 8.378       | 0.092       | 4.692             | 0.078             | 336.489    | 4.635     | 0.006    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 63.00    | 8.470       | 0.092       | 4.889             | 0.197             | 355.070    | 4.891     | 0.004    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 64.00    | 8.699       | 0.229       | 5.087             | 0.198             | 369.415    | 5.088     | 0.004    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 65.00    | 8.928       | 0.229       | 5.207             | 0.121             | 380.964    | 5.247     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 66.00    | 9.067       | 0.139       | 5.328             | 0.120             | 389.693    | 5.368     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 67.00    | 9.205       | 0.138       | 5.449             | 0.121             | 398.450    | 5.488     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 68.00    | 9.343       | 0.138       | 5.570             | 0.121             | 407.228    | 5.609     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 69.00    | 9.481       | 0.138       | 5.651             | 0.081             | 414.557    | 5.710     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 70.00    | 9.573       | 0.092       | 5.732             | 0.081             | 420.435    | 5.791     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 71.00    | 9.665       | 0.092       | 5.813             | 0.081             | 426.320    | 5.872     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 72.00    | 9.757       | 0.092       | 5.894             | 0.081             | 432.207    | 5.953     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 73.00    | 9.849       | 0.092       | 5.937             | 0.043             | 436.685    | 6.015     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 74.00    | 9.897       | 0.048       | 5.979             | 0.042             | 439.754    | 6.057     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 75.00    | 9.945       | 0.048       | 6.021             | 0.042             | 442.827    | 6.100     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 76.00    | 9.993       | 0.048       | 6.064             | 0.042             | 445.902    | 6.142     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 77.00    | 10.041      | 0.048       | 6.107             | 0.043             | 448.993    | 6.184     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 78.00    | 10.089      | 0.048       | 6.149             | 0.043             | 452.099    | 6.227     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 79.00    | 10.137      | 0.048       | 6.192             | 0.043             | 455.207    | 6.270     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 80.00    | 10.185      | 0.048       | 6.235             | 0.043             | 458.318    | 6.313     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 81.00    | 10.233      | 0.048       | 6.278             | 0.043             | 461.420    | 6.356     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 82.00    | 10.281      | 0.048       | 6.320             | 0.043             | 464.511    | 6.398     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 83.00    | 10.329      | 0.048       | 6.363             | 0.043             | 467.605    | 6.441     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 84.00    | 10.377      | 0.048       | 6.406             | 0.043             | 470.701    | 6.483     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 85.00    | 10.425      | 0.048       | 6.449             | 0.043             | 473.800    | 6.526     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 86.00    | 10.473      | 0.048       | 6.491             | 0.043             | 476.901    | 6.569     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 87.00    | 10.520      | 0.048       | 6.534             | 0.043             | 480.005    | 6.612     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 88.00    | 10.568      | 0.048       | 6.577             | 0.043             | 483.111    | 6.654     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 89.00    | 10.616      | 0.048       | 6.620             | 0.043             | 486.232    | 6.697     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 90.00    | 10.664      | 0.048       | 6.664             | 0.043             | 489.369    | 6.741     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 91.00    | 10.712      | 0.048       | 6.707             | 0.043             | 492.507    | 6.784     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 92.00    | 10.761      | 0.048       | 6.750             | 0.043             | 495.648    | 6.827     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 93.00    | 10.809      | 0.048       | 6.793             | 0.043             | 498.779    | 6.870     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 94.00    | 10.857      | 0.048       | 6.836             | 0.043             | 501.900    | 6.913     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 95.00    | 10.904      | 0.048       | 6.879             | 0.043             | 505.022    | 6.956     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 96.00    | 10.952      | 0.048       | 6.922             | 0.043             | 508.141    | 6.999     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-1 | BASE  | 97.00    | 11.000      | 0.048       | 6.922             | 0.000             | 509.699    | 7.021     | 0.000    | 0.000 ← max  |
| 25Y96H     | BASIN 3-2 | BASE  | 0.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 1.00     | 0.000       | 0.000       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 2.00     | 0.027       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 3.00     | 0.054       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 4.00     | 0.081       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 5.00     | 0.108       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 6.00     | 0.134       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 7.00     | 0.161       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 8.00     | 0.188       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 9.00     | 0.215       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 10.00    | 0.242       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 11.00    | 0.268       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 12.00    | 0.295       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 13.00    | 0.322       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 14.00    | 0.349       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 15.00    | 0.376       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 16.00    | 0.403       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |

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Hartwood Marsh Road Phase I  
 Post Development  
 Basin 3  
 Basin Time Series 25Yr/96hr

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| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3-2 | BASE  | 17.00    | 0.430       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 18.00    | 0.457       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 19.00    | 0.483       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 20.00    | 0.510       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 21.00    | 0.537       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 22.00    | 0.564       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 23.00    | 0.591       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 24.00    | 0.618       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 25.00    | 0.645       | 0.027       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 26.00    | 0.708       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 27.00    | 0.771       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 28.00    | 0.834       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 29.00    | 0.897       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 30.00    | 0.963       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 31.00    | 1.028       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 32.00    | 1.093       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 33.00    | 1.159       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 34.00    | 1.222       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 35.00    | 1.285       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 36.00    | 1.348       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 37.00    | 1.411       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 38.00    | 1.474       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 39.00    | 1.538       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 40.00    | 1.601       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 41.00    | 1.664       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 42.00    | 1.729       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 43.00    | 1.795       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 44.00    | 1.860       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 45.00    | 1.925       | 0.065       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 46.00    | 1.988       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 47.00    | 2.052       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 48.00    | 2.115       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 49.00    | 2.178       | 0.063       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 50.00    | 2.263       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 50.25    | 2.348       | 0.085       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 50.50    | 2.373       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 50.75    | 2.397       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 51.00    | 2.422       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 51.25    | 2.447       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 51.50    | 2.472       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 51.75    | 2.497       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 52.00    | 2.521       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 52.25    | 2.546       | 0.025       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 52.50    | 2.577       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 52.75    | 2.608       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 53.00    | 2.638       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 53.25    | 2.669       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 53.50    | 2.700       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 53.75    | 2.730       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 54.00    | 2.761       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 54.25    | 2.792       | 0.031       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 54.50    | 2.830       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 54.75    | 2.869       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 55.00    | 2.907       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 55.25    | 2.945       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 55.50    | 2.984       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 55.75    | 3.022       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |

Hartwood Marsh Road Phase I  
 Post Development  
 Basin 3  
 Basin Time Series 25yr/96hr

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| Simulation | Basin     | Group | Time hrs | Sum Rain in | Inc Rain in | SumExcess Rain in | IncExcess Rain in | Volume ft3 | Volume in | Rate cfs | Velocity fps |
|------------|-----------|-------|----------|-------------|-------------|-------------------|-------------------|------------|-----------|----------|--------------|
| 25Y96H     | BASIN 3-2 | BASE  | 56.00    | 3.061       | 0.038       | 0.000             | 0.000             | 0.000      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 56.25    | 3.099       | 0.039       | 0.000             | 0.000             | 0.062      | 0.000     | 0.000    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 56.50    | 3.158       | 0.058       | 0.000             | 0.000             | 0.533      | 0.000     | 0.001    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 56.75    | 3.216       | 0.058       | 0.001             | 0.001             | 1.709      | 0.001     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 57.00    | 3.275       | 0.058       | 0.003             | 0.001             | 3.594      | 0.002     | 0.002    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 57.25    | 3.333       | 0.058       | 0.004             | 0.002             | 6.181      | 0.004     | 0.003    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 57.50    | 3.391       | 0.058       | 0.006             | 0.002             | 9.462      | 0.006     | 0.004    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 57.75    | 3.450       | 0.058       | 0.009             | 0.003             | 13.430     | 0.008     | 0.005    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 58.00    | 3.508       | 0.058       | 0.012             | 0.003             | 18.077     | 0.011     | 0.006    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 58.25    | 3.567       | 0.058       | 0.018             | 0.006             | 25.833     | 0.015     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 58.50    | 3.670       | 0.103       | 0.026             | 0.007             | 37.418     | 0.022     | 0.014    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 58.75    | 3.773       | 0.104       | 0.034             | 0.009             | 51.073     | 0.031     | 0.016    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 59.00    | 3.877       | 0.104       | 0.044             | 0.010             | 66.748     | 0.040     | 0.019    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 59.25    | 3.980       | 0.104       | 0.064             | 0.020             | 92.388     | 0.055     | 0.038    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 59.50    | 4.164       | 0.184       | 0.089             | 0.024             | 130.130    | 0.078     | 0.045    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 59.75    | 4.349       | 0.185       | 0.391             | 0.302             | 422.198    | 0.253     | 0.604    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 60.00    | 5.805       | 1.456       | 0.858             | 0.467             | 1103.809   | 0.661     | 0.911    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 60.25    | 7.264       | 1.460       | 0.971             | 0.113             | 1607.652   | 0.963     | 0.209    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 60.50    | 7.541       | 0.277       | 1.081             | 0.110             | 1794.083   | 1.074     | 0.206    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 60.75    | 7.817       | 0.276       | 1.140             | 0.059             | 1936.241   | 1.160     | 0.110    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 61.00    | 7.959       | 0.142       | 1.199             | 0.059             | 2035.696   | 1.219     | 0.111    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 61.25    | 8.101       | 0.142       | 1.239             | 0.040             | 2118.693   | 1.269     | 0.074    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 61.50    | 8.193       | 0.092       | 1.279             | 0.040             | 2185.098   | 1.309     | 0.074    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 61.75    | 8.286       | 0.092       | 1.319             | 0.040             | 2252.043   | 1.349     | 0.075    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 62.00    | 8.378       | 0.092       | 1.360             | 0.041             | 2319.710   | 1.389     | 0.076    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 63.00    | 8.470       | 0.092       | 1.463             | 0.103             | 2542.694   | 1.523     | 0.048    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 64.00    | 8.699       | 0.229       | 1.569             | 0.106             | 2718.829   | 1.628     | 0.050    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 65.00    | 8.928       | 0.229       | 1.634             | 0.065             | 2862.641   | 1.714     | 0.030    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 66.00    | 9.067       | 0.139       | 1.700             | 0.066             | 2972.708   | 1.780     | 0.031    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 67.00    | 9.205       | 0.138       | 1.767             | 0.067             | 3084.301   | 1.847     | 0.031    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 68.00    | 9.343       | 0.138       | 1.835             | 0.068             | 3197.314   | 1.915     | 0.032    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 69.00    | 9.481       | 0.138       | 1.881             | 0.046             | 3292.404   | 1.972     | 0.021    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 70.00    | 9.573       | 0.092       | 1.927             | 0.046             | 3369.226   | 2.018     | 0.021    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 71.00    | 9.665       | 0.092       | 1.973             | 0.046             | 3446.637   | 2.064     | 0.022    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 72.00    | 9.757       | 0.092       | 2.020             | 0.047             | 3524.609   | 2.111     | 0.022    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 73.00    | 9.849       | 0.092       | 2.045             | 0.024             | 3584.179   | 2.146     | 0.011    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 74.00    | 9.897       | 0.048       | 2.069             | 0.025             | 3625.137   | 2.171     | 0.011    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 75.00    | 9.945       | 0.048       | 2.094             | 0.025             | 3666.260   | 2.196     | 0.011    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 76.00    | 9.993       | 0.048       | 2.119             | 0.025             | 3707.547   | 2.220     | 0.011    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 77.00    | 10.041      | 0.048       | 2.144             | 0.025             | 3749.167   | 2.245     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 78.00    | 10.089      | 0.048       | 2.169             | 0.025             | 3791.120   | 2.270     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 79.00    | 10.137      | 0.048       | 2.194             | 0.025             | 3833.236   | 2.296     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 80.00    | 10.185      | 0.048       | 2.219             | 0.025             | 3875.513   | 2.321     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 81.00    | 10.233      | 0.048       | 2.245             | 0.025             | 3917.779   | 2.346     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 82.00    | 10.281      | 0.048       | 2.270             | 0.025             | 3960.031   | 2.372     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 83.00    | 10.329      | 0.048       | 2.296             | 0.025             | 4002.440   | 2.397     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 84.00    | 10.377      | 0.048       | 2.321             | 0.026             | 4045.005   | 2.422     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 85.00    | 10.425      | 0.048       | 2.347             | 0.026             | 4087.725   | 2.448     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 86.00    | 10.473      | 0.048       | 2.372             | 0.026             | 4130.598   | 2.474     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 87.00    | 10.520      | 0.048       | 2.398             | 0.026             | 4173.624   | 2.499     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 88.00    | 10.568      | 0.048       | 2.424             | 0.026             | 4216.802   | 2.525     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 89.00    | 10.616      | 0.048       | 2.450             | 0.026             | 4260.308   | 2.551     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 90.00    | 10.664      | 0.048       | 2.477             | 0.026             | 4304.143   | 2.578     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 91.00    | 10.712      | 0.048       | 2.503             | 0.026             | 4348.129   | 2.604     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 92.00    | 10.761      | 0.048       | 2.529             | 0.026             | 4392.266   | 2.630     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 93.00    | 10.809      | 0.048       | 2.556             | 0.026             | 4436.371   | 2.657     | 0.012    | 0.000        |
| 25Y96H     | BASIN 3-2 | BASE  | 94.00    | 10.857      | 0.048       | 2.582             | 0.026             | 4480.445   | 2.683     | 0.012    | 0.000        |

Hartwood Marsh Road Phase I  
 Post Development  
 Basin 3  
 Basin Time Series 25yr/96hr

| Simulation | Basin     | Group | Time<br>hrs | Sum Rain<br>in | Inc Rain<br>in | SumExcess<br>Rain in | IncExcess<br>Rain in | Volume<br>ft3 | Volume<br>in | Rate<br>cfs | Velocity<br>fps |
|------------|-----------|-------|-------------|----------------|----------------|----------------------|----------------------|---------------|--------------|-------------|-----------------|
| 25Y96H     | BASIN 3-2 | BASE  | 95.00       | 10.904         | 0.048          | 2.609                | 0.027                | 4524.664      | 2.710        | 0.012       | 0.000           |
| 25Y96H     | BASIN 3-2 | BASE  | 96.00       | 10.952         | 0.048          | 2.635                | 0.027                | 4568.993      | 2.736        | 0.012       | 0.000           |
| 25Y96H     | BASIN 3-2 | BASE  | 97.00       | 11.000         | 0.048          | 2.635                | 0.000                | 4591.177      | 2.750        | 0.000       | 0.000 ←max      |

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*Water Quality Treatment and Recovery*  
*Calculations*

**POLLUTION ABATEMENT VOLUME**

**HNTB**

|          |      |           |
|----------|------|-----------|
|          | DATE |           |
| MADE BY: | MSF  | 18-Sep-07 |
| CHCK BY: | KMV  | 20-Sep-07 |

**PROJECT: HARTWOOD MARSH ROAD**

**LOCATION: BASIN 3 - PHASE 1**

**BASIN LIMITS:** STA.  to STA , CL CONST. HARTWOOD MARSH RD.

**TOTAL TREATMENT AREA:**  AC.

**IMPERVIOUS AREA:**  AC.

**UNDERLINE ONE:** RETENTION DETENTION

**UNDERLINE ONE:** DRY WET

**UNDERLINE ONE:** ONLINE OFFLINE

**REQUIRED TREATMENT VOLUME:**

1) COMPUTE FIRST 0.5 INCH OF RUNOFF FROM PROJECT:

$$(0.5"/12) \quad \times \quad 3.21 \text{ AC.} \quad = \quad \boxed{0.134} \text{ AF}$$

2) COMPUTE 1.25 INCHES TIMES IMPERVIOUS AREA:

$$(1.25"/12) \quad \times \quad 1.74 \text{ AC.} \quad = \quad \boxed{0.181} \text{ AF}$$

**CONTROLLING CRITERIA:**

**REQUIRED TREATMENT VOLUME:**  AF

3) ADDITIONAL 0.5" INCH FOR ON-LINE RETENTION:

$$0.13 \text{ AF} \quad + \quad 0.18 \text{ AF} \quad = \quad \boxed{0.315} \text{ AF}$$

**TOTAL REQUIRED TREATMENT VOLUME:**  AF

**TOTAL PROVIDED TREATMENT VOLUME:**  AF

STAGE / STORAGE CALCULATIONS



DATE  
 MADE BY: MSF 23-Apr-08  
 CHCK BY: KMV 24-Apr-08

PROJECT: HARTWOOD MARSH ROAD

SWALES:

Borings below are within region of swales between Sta. 156+00 and Sta. 161+00

Ground water was not encounter at a boring depth of 15 feet.

Boring station in report are based on baseline of survey

| Boring | CL Station | Offset    | Existing Ground Elevation | Depth to Encountered Water Surface | Estimated Encountered Water Elevation | Depth to Seasonal High Water | Estimated Seasonal High Water | Estimated Normal High Water | Assumed Depth to Confining Layer | Confining Layer Elevation |
|--------|------------|-----------|---------------------------|------------------------------------|---------------------------------------|------------------------------|-------------------------------|-----------------------------|----------------------------------|---------------------------|
| AB-53  | 155+97     | 50.87' lt | 153.89                    | 20.0                               | 133.9                                 | 15                           | 138.89                        | 136.39                      | 30                               | 123.89                    |
| AB-54  | 157+02     | 7.99' rt  | 149.57                    | 20.0                               | 129.6                                 | 15                           | 134.57                        | 132.07                      | 30                               | 119.57                    |
| AB-55  | 157+97     | 38.52' lt | 146.6                     | 20.0                               | 126.6                                 | 15                           | 131.6                         | 129.1                       | 30                               | 116.6                     |
| AB-56  | 159+04     | 16.28' lt | 140.3                     | 20.0                               | 120.3                                 | 15                           | 125.3                         | 122.8                       | 30                               | 110.3                     |
| AB-57  | 159+94     | 33.05' lt | 135.42                    | 20.0                               | 115.4                                 | 15                           | 120.42                        | 117.92                      | 30                               | 105.42                    |
| AB-58  | 160+98     | 15.25' rt | 131.53                    | 20.0                               | 111.5                                 | 15                           | 116.53                        | 114.03                      | 30                               | 101.53                    |
| AB-59  | 161+93     | 26.33' rt | 127.66                    | 20.0                               | 107.7                                 | 15                           | 112.66                        | 110.16                      | 30                               | 97.66                     |

PERCOLATION RATE: Use percolation rate for Stratum 1 soils as found in ponds  Ft./Day or  Inches/Hr. Boring AB-P2

FACTOR OF SAFETY:  =  Inches/Hr. =  Ft./Day

PROJECT: HARTWOOD MARSH ROAD

POND:

Attenuation Volume For 25 Year/96 Hour Storm Event

Volumes from AdICPR

| Basin | Pre-development CF | Post Development CF |
|-------|--------------------|---------------------|
| 3     | 64,086             | 80,604              |
| 3-1   | 510                | 510                 |
| 3-2   | 4,628              | 4,591               |
| TOTAL | 69,224             | 85,705              |

REQUIRED ATTENUATION VOLUME:  CF  
 PROVIDED ATTENUATION VOLUME  CF

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HARTWOOD MARSH ROAD  
 BASIN 3  
 INTERIM CONDITION  
 SWALE STORAGE CALCULATIONS - Water Quality

HNTB

Ditch Parameters-Left Side

| Station | Ditch Bottom (ft) | Max. Depth (ft) | Max. Elevation (ft) | Est. Elev. Of Base (ft) | Slope | Ditch Back Slope (F) (1:F) | Ditch Bottom Width (ft) | Ditch Fore Slope (B) (1:B) |
|---------|-------------------|-----------------|---------------------|-------------------------|-------|----------------------------|-------------------------|----------------------------|
| 156+00  | 151.4             | 1.21            | 152.61              | 151.84                  |       | 2                          | 4.76                    | 4                          |
| 156+25  | 150.85            | 1.37            | 152.22              | 151.50                  | 0.022 | 2                          | 4.83                    | 4                          |
| 156+50  | 150.3             | 1.53            | 151.83              | 151.16                  | 0.022 | 2                          | 4.9                     | 4                          |
| 156+75  | 149.5             | 1.59            | 151.09              | 150.46                  | 0.032 | 2                          | 5.79                    | 4                          |
| 157+00  | 148.7             | 1.64            | 150.34              | 149.75                  | 0.032 | 2                          | 6.68                    | 4                          |
| 157+25  | 147.65            | 1.74            | 149.39              | 149.10                  | 0.042 | 2                          | 7.205                   | 4                          |
| 157+50  | 146.6             | 1.84            | 148.44              | 148.44                  | 0.042 | 2                          | 7.73                    | 4                          |
| 157+75  | 145.2             | 2.13            | 147.33              | 147.33                  | 0.056 | 2                          | 7.665                   | 4                          |
| 158+00  | 143.8             | 2.41            | 146.21              | 146.21                  | 0.056 | 2                          | 7.6                     | 4                          |
| 158+25  | 141.85            | 2.04            | 143.90              | 143.90                  | 0.078 | 2                          | 7.19                    | 4                          |
| 158+50  | 139.9             | 1.68            | 141.58              | 141.58                  | 0.078 | 2                          | 6.78                    | 4                          |
| 158+75  | 138.4             | 2.10            | 140.50              | 140.50                  | 0.060 | 2                          | 7.01                    | 4                          |
| 159+00  | 136.9             | 2.51            | 139.41              | 139.41                  | 0.060 | 2                          | 7.24                    | 4                          |
| 159+25  | 135.35            | 2.66            | 138.01              | 138.01                  | 0.062 | 2                          | 7.52                    | 4                          |
| 159+50  | 133.8             | 2.81            | 136.61              | 136.61                  | 0.062 | 2                          | 7.8                     | 4                          |
| 159+75  | 132.55            | 2.87            | 135.42              | 135.42                  | 0.050 | 2                          | 7.98                    | 4                          |
| 160+00  | 131.3             | 2.93            | 134.23              | 134.23                  | 0.050 | 2                          | 8.16                    | 4                          |
| 160+25  | 131               | 2.38            | 133.38              | 133.38                  | 0.012 | 2                          | 10.56                   | 4                          |
| 160+50  | 130.7             | 1.82            | 132.52              | 132.52                  | 0.012 | 2                          | 12.96                   | 4                          |
| 160+75  | 129.6             | 1.94            | 131.54              | 131.64                  | 0.044 | 2                          | 14.485                  | 4                          |
| 161+00  | 128.5             | 2.06            | 130.56              | 130.75                  | 0.044 | 2                          | 16.01                   | 4                          |
| 161+25  | 127.8             | 1.79            | 129.54              | 129.75                  | 0.030 | 2                          | 16.545                  | 4                          |
| 161+50  | 127.0             | 1.52            | 128.52              | 128.74                  | 0.030 | 2                          | 17.08                   | 4                          |
| 161+75  | 126.0             | 1.51            | 127.51              | 127.72                  | 0.040 | 2                          | 14.08                   | 4                          |
| 162+00  | 124.0             | 2.50            | 126.50              | 126.7                   | 0.080 | 2                          | 14.54                   | 4                          |

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Water Quality Storage Between Ditch Blocks - Left

| Ditch Station | Ditch Block Height (ft) | Elevation of Ditch Block (ft) | Ditch Back Slope (F) | Ditch Bottom Width (ft) | Ditch Fore Slope (B) (1:B) | Ditch Area at Ditch Block (sf) | Distance to Upstream Ditch Block or Zero Area (1:B) | Area at Upstream Ditch Block on Downstream Side (sf) | Volume (cf) |
|---------------|-------------------------|-------------------------------|----------------------|-------------------------|----------------------------|--------------------------------|-----------------------------------------------------|------------------------------------------------------|-------------|
| 156+50        | 0.85                    | 151.15                        | 2                    | 4.9                     | 4                          | 6.715                          | 25.00                                               | 2.37                                                 | 113.56      |
| 156+75        | 0.95                    | 150.45                        | 2                    | 5.79                    | 4                          | 8.3505                         | 25.00                                               | 1.32                                                 | 120.88      |
| 157+00        | 1.05                    | 149.75                        | 2                    | 6.68                    | 4                          | 10.164                         | 25.00                                               | 2.42                                                 | 157.30      |
| 157+25        | 1.43                    | 149.08                        | 2                    | 7.205                   | 4                          | 14.59315                       | 25.00                                               | 3.87                                                 | 230.79      |
| 157+50        | 1.82                    | 148.42                        | 2                    | 7.73                    | 4                          | 19.5286                        | 25.00                                               | 8.26                                                 | 347.36      |
| 157+75        | 2.12                    | 147.32                        | 2                    | 7.665                   | 4                          | 22.6098                        | 25.00                                               | 7.68                                                 | 378.62      |
| 158+00        | 2.4                     | 146.2                         | 2                    | 7.6                     | 4                          | 25.44                          | 25.00                                               | 10.6                                                 | 450.50      |
| 158+25        | 2.04                    | 143.89                        | 2                    | 7.19                    | 4                          | 20.7876                        | 25.00                                               | 0.92                                                 | 271.35      |
| 158+50        | 1.68                    | 141.58                        | 2                    | 6.78                    | 4                          | 16.4304                        | 21.54                                               | 0                                                    | 176.96      |
| 158+75        | 2.09                    | 140.49                        | 2                    | 7.01                    | 4                          | 20.9209                        | 25.00                                               | 5.9                                                  | 335.26      |
| 159+00        | 2.5                     | 139.4                         | 2                    | 7.24                    | 4                          | 25.6                           | 25.00                                               | 10.24                                                | 448.00      |
| 159+25        | 2.65                    | 138                           | 2                    | 7.52                    | 4                          | 27.878                         | 25.00                                               | 11.57                                                | 493.10      |
| 159+50        | 2.8                     | 136.6                         | 2                    | 7.8                     | 4                          | 30.24                          | 25.00                                               | 13.5                                                 | 546.75      |
| 159+75        | 2.85                    | 135.4                         | 2                    | 7.98                    | 4                          | 31.293                         | 25.00                                               | 17.57                                                | 610.79      |
| 160+00        | 2.92                    | 134.22                        | 2                    | 8.16                    | 4                          | 32.5872                        | 25.00                                               | 18.64                                                | 640.34      |
| 160+25        | 2.35                    | 133.35                        | 2                    | 10.56                   | 4                          | 31.866                         | 25.00                                               | 27.8                                                 | 745.83      |
| 160+50        | 1.8                     | 132.5                         | 2                    | 12.96                   | 4                          | 28.728                         | 25.00                                               | 23.94                                                | 658.35      |
| 160+75        | 2                       | 131.6                         | 2                    | 14.485                  | 4                          | 34.97                          | 25.00                                               | 16.09                                                | 638.25      |
| 161+00        | 2.05                    | 130.55                        | 2                    | 16.01                   | 4                          | 38.9705                        | 25.00                                               | 18.06                                                | 712.88      |
| 161+25        | 1.8                     | 129.55                        | 2                    | 16.545                  | 4                          | 35.181                         | 25.00                                               | 20.52                                                | 696.26      |
| 161+50        | 1.55                    | 128.55                        | 2                    | 17.08                   | 4                          | 31.124                         | 25.00                                               | 16.06                                                | 589.80      |
| 161+75        | 1.5                     | 127.5                         | 2                    | 14.08                   | 4                          | 25.62                          | 25.00                                               | 8.54                                                 | 427.00      |
| 162+00        | 2.5                     | 126.5                         | 2                    | 14.54                   | 4                          | 43.85                          | 25.00                                               | 8.77                                                 | 657.75      |
| Total         |                         |                               |                      |                         |                            |                                |                                                     |                                                      | 10447.67    |
|               |                         |                               |                      |                         |                            |                                |                                                     |                                                      | 0.240 af    |

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HARTWOOD MARSH ROAD  
 BASIN 3  
 INTERIM CONDITION  
 MAXIMUM SWALE STORAGE CALCULATIONS

HNTB

Ditch Parameters-Left Side

| Station | Ditch Bottom (ft) | Max. Depth (ft) | Max. Elevation (ft) | Est. Elev. Of Base (ft) | Slope | Ditch Back Slope (F) (1:F) | Ditch Bottom Width (ft) | Ditch Fore Slope (B) (1:B) |
|---------|-------------------|-----------------|---------------------|-------------------------|-------|----------------------------|-------------------------|----------------------------|
| 156+00  | 151.4             | 1.21            | 152.61              | 151.84                  |       | 2                          | 4.76                    | 4                          |
| 156+25  | 150.85            | 1.37            | 152.22              | 151.5                   | 0.022 | 2                          | 4.83                    | 4                          |
| 156+50  | 150.3             | 1.53            | 151.83              | 151.16                  | 0.022 | 2                          | 4.9                     | 4                          |
| 156+75  | 149.5             | 1.59            | 151.09              | 150.455                 | 0.032 | 2                          | 5.79                    | 4                          |
| 157+00  | 148.7             | 1.64            | 150.34              | 149.75                  | 0.032 | 2                          | 6.68                    | 4                          |
| 157+25  | 147.65            | 1.74            | 149.39              | 149.095                 | 0.042 | 2                          | 7.205                   | 4                          |
| 157+50  | 146.6             | 1.84            | 148.44              | 148.44                  | 0.042 | 2                          | 7.73                    | 4                          |
| 157+75  | 145.2             | 2.13            | 147.33              | 147.325                 | 0.056 | 2                          | 7.665                   | 4                          |
| 158+00  | 143.8             | 2.41            | 146.21              | 146.21                  | 0.056 | 2                          | 7.6                     | 4                          |
| 158+25  | 141.85            | 2.04            | 143.90              | 143.895                 | 0.078 | 2                          | 7.19                    | 4                          |
| 158+50  | 139.9             | 1.68            | 141.58              | 141.58                  | 0.078 | 2                          | 6.78                    | 4                          |
| 158+75  | 138.4             | 2.10            | 140.50              | 140.495                 | 0.060 | 2                          | 7.01                    | 4                          |
| 159+00  | 136.9             | 2.51            | 139.41              | 139.41                  | 0.060 | 2                          | 7.24                    | 4                          |
| 159+25  | 135.35            | 2.66            | 138.01              | 138.01                  | 0.062 | 2                          | 7.52                    | 4                          |
| 159+50  | 133.8             | 2.81            | 136.61              | 136.61                  | 0.062 | 2                          | 7.8                     | 4                          |
| 159+75  | 132.55            | 2.87            | 135.42              | 135.42                  | 0.050 | 2                          | 7.98                    | 4                          |
| 160+00  | 131.3             | 2.93            | 134.23              | 134.23                  | 0.050 | 2                          | 8.16                    | 4                          |
| 160+25  | 131               | 2.38            | 133.38              | 133.375                 | 0.012 | 2                          | 10.56                   | 4                          |
| 160+50  | 130.7             | 1.82            | 132.52              | 132.52                  | 0.012 | 2                          | 12.96                   | 4                          |
| 160+75  | 129.6             | 1.94            | 131.54              | 131.635                 | 0.044 | 2                          | 14.485                  | 4                          |
| 161+00  | 128.5             | 2.06            | 130.56              | 130.75                  | 0.044 | 2                          | 16.01                   | 4                          |
| 161+25  | 127.75            | 1.79            | 129.54              | 129.745                 | 0.030 | 2                          | 16.545                  | 4                          |
| 161+50  | 127               | 1.52            | 128.52              | 128.74                  | 0.030 | 2                          | 17.08                   | 4                          |
| 161+75  | 126               | 1.51            | 127.51              | 127.72                  | 0.040 | 2                          | 14.08                   | 4                          |
| 162+00  | 124               | 2.50            | 126.50              | 126.7                   | 0.080 | 2                          | 14.54                   | 4                          |

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Maximum Storage Between Ditch Blocks - Left

| Ditch Station | Max Depth (ft) | Top Bank at Ditch Block (ft) | Ditch Back Slope (F) | Ditch Bottom Width (ft) | Ditch Fore Slope (B) (1:B) | Ditch Area at Ditch Block (sf) | Distance to Upstream Ditch Block or Zero Area (1:B) | Area at Upstream Ditch Block on Downstream Side (sf) | Volume (cf)     |
|---------------|----------------|------------------------------|----------------------|-------------------------|----------------------------|--------------------------------|-----------------------------------------------------|------------------------------------------------------|-----------------|
| 156+50        | 1.53           | 151.83                       | 2                    | 4.9                     | 4                          | 12.087                         | 25.00                                               | 7.74                                                 | 247.84          |
| 156+75        | 1.59           | 151.085                      | 2                    | 5.79                    | 4                          | 13.93215                       | 25.00                                               | 6.9                                                  | 260.40          |
| 157+00        | 1.64           | 150.34                       | 2                    | 6.68                    | 4                          | 15.8752                        | 25.00                                               | 8.13                                                 | 300.07          |
| 157+25        | 1.74           | 149.39                       | 2                    | 7.205                   | 4                          | 17.7567                        | 25.00                                               | 7.04                                                 | 309.96          |
| 157+50        | 1.84           | 148.44                       | 2                    | 7.73                    | 4                          | 19.7432                        | 25.00                                               | 8.48                                                 | 352.79          |
| 157+75        | 2.13           | 147.325                      | 2                    | 7.665                   | 4                          | 22.663125                      | 25.00                                               | 7.73                                                 | 379.91          |
| 158+00        | 2.41           | 146.21                       | 2                    | 7.6                     | 4                          | 25.546                         | 25.00                                               | 10.71                                                | 453.20          |
| 158+25        | 2.04           | 143.895                      | 2                    | 7.19                    | 4                          | 20.83855                       | 25.00                                               | 0.97                                                 | 272.61          |
| 158+50        | 1.68           | 141.58                       | 2                    | 6.78                    | 4                          | 16.4304                        | 21.54                                               | 0                                                    | 176.96          |
| 158+75        | 2.10           | 140.495                      | 2                    | 7.01                    | 4                          | 20.97095                       | 25.00                                               | 5.96                                                 | 336.64          |
| 159+00        | 2.51           | 139.41                       | 2                    | 7.24                    | 4                          | 25.7024                        | 25.00                                               | 10.34                                                | 450.53          |
| 159+25        | 2.66           | 138.01                       | 2                    | 7.52                    | 4                          | 27.9832                        | 25.00                                               | 11.68                                                | 495.79          |
| 159+50        | 2.81           | 136.61                       | 2                    | 7.8                     | 4                          | 30.348                         | 25.00                                               | 13.61                                                | 549.48          |
| 159+75        | 2.87           | 135.42                       | 2                    | 7.98                    | 4                          | 31.5126                        | 25.00                                               | 17.79                                                | 616.28          |
| 160+00        | 2.93           | 134.23                       | 2                    | 8.16                    | 4                          | 32.6988                        | 25.00                                               | 18.75                                                | 643.11          |
| 160+25        | 2.38           | 133.375                      | 2                    | 10.56                   | 4                          | 32.205                         | 25.00                                               | 28.14                                                | 754.31          |
| 160+50        | 1.82           | 132.52                       | 2                    | 12.96                   | 4                          | 29.0472                        | 25.00                                               | 24.26                                                | 666.34          |
| 160+75        | 1.94           | 131.54                       | 2                    | 14.485                  | 4                          | 33.9209                        | 25.00                                               | 14.69                                                | 607.64          |
| 161+00        | 2.06           | 130.58                       | 2                    | 16.01                   | 4                          | 39.1606                        | 25.00                                               | 18.25                                                | 717.63          |
| 161+25        | 1.79           | 129.54                       | 2                    | 16.545                  | 4                          | 34.98555                       | 25.00                                               | 20.32                                                | 691.32          |
| 161+50        | 1.52           | 128.52                       | 2                    | 17.08                   | 4                          | 30.5216                        | 25.00                                               | 15.46                                                | 574.77          |
| 161+75        | 1.51           | 127.51                       | 2                    | 14.08                   | 4                          | 25.7908                        | 25.00                                               | 6.71                                                 | 431.26          |
| 162+00        | 2.50           | 126.5                        | 2                    | 14.54                   | 4                          | 43.85                          | 25.00                                               | 8.77                                                 | 657.75          |
| <b>Total</b>  |                |                              |                      |                         |                            |                                |                                                     |                                                      | <b>10946.57</b> |

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# HNTB

## Parameters for Recovery Analysis - Left Ditch

| Ditch Block | Estimated SHGW (ft) | Confining Layer Elevation (ft) | Width at Ditch Block (ft) | Width at upper end of swale basin (ft) | Equivalent Pond Width (ft) | Equivalent Pond Length (ft) | Stage 1 (ft) | Area 1 (sf) | Stage 2 (ft) | Area 2 (sf) |
|-------------|---------------------|--------------------------------|---------------------------|----------------------------------------|----------------------------|-----------------------------|--------------|-------------|--------------|-------------|
| 156+50      | 136.73              | 121.73                         | 10.00                     | 4.90                                   | 7.45                       | 25.00                       | 150.30       | 0.00        | 151.83       | 309.87      |
| 156+75      | 135.65              | 120.65                         | 11.49                     | 5.79                                   | 8.64                       | 25.00                       | 149.50       | 0.00        | 151.09       | 311.38      |
| 157+00      | 134.57              | 119.57                         | 12.98                     | 6.68                                   | 9.83                       | 25.00                       | 148.70       | 0.00        | 150.34       | 341.88      |
| 157+25      | 133.83              | 118.83                         | 15.79                     | 7.21                                   | 11.50                      | 25.00                       | 147.65       | 0.00        | 149.39       | 355.81      |
| 157+50      | 133.09              | 118.09                         | 18.65                     | 7.73                                   | 13.19                      | 25.00                       | 146.60       | 0.00        | 148.44       | 383.94      |
| 157+75      | 132.34              | 117.34                         | 20.39                     | 7.67                                   | 14.03                      | 25.00                       | 145.20       | 0.00        | 147.33       | 406.19      |
| 158+00      | 131.60              | 116.60                         | 22.00                     | 7.60                                   | 14.80                      | 25.00                       | 143.80       | 0.00        | 146.21       | 447.31      |
| 158+25      | 130.03              | 115.03                         | 19.43                     | 7.19                                   | 13.31                      | 25.00                       | 141.85       | 0.00        | 143.90       | 345.37      |
| 158+50      | 128.45              | 113.45                         | 16.86                     | 6.78                                   | 11.82                      | 21.54                       | 139.90       | 0.00        | 141.58       | 259.02      |
| 158+75      | 126.88              | 111.88                         | 19.55                     | 7.01                                   | 13.28                      | 25.00                       | 138.40       | 0.00        | 140.50       | 374.13      |
| 159+00      | 125.30              | 110.30                         | 22.24                     | 7.24                                   | 14.74                      | 25.00                       | 136.90       | 0.00        | 139.41       | 442.12      |
| 159+25      | 124.08              | 109.08                         | 23.42                     | 7.52                                   | 15.47                      | 25.00                       | 135.35       | 0.00        | 138.01       | 467.25      |
| 159+50      | 122.86              | 107.86                         | 24.60                     | 7.80                                   | 16.20                      | 25.00                       | 133.80       | 0.00        | 136.61       | 496.75      |
| 159+75      | 121.64              | 106.64                         | 25.08                     | 7.98                                   | 16.53                      | 25.00                       | 132.55       | 0.00        | 135.42       | 534.00      |
| 160+00      | 120.42              | 105.42                         | 25.68                     | 8.16                                   | 16.92                      | 25.00                       | 131.30       | 0.00        | 134.23       | 547.50      |
| 160+25      | 119.45              | 104.45                         | 24.66                     | 10.56                                  | 17.61                      | 25.00                       | 131.00       | 0.00        | 133.38       | 567.75      |
| 160+50      | 118.48              | 103.48                         | 23.76                     | 12.96                                  | 18.36                      | 25.00                       | 130.70       | 0.00        | 132.52       | 544.50      |
| 160+75      | 117.50              | 102.50                         | 26.49                     | 14.49                                  | 20.49                      | 25.00                       | 129.60       | 0.00        | 131.54       | 551.56      |
| 161+00      | 116.53              | 101.53                         | 28.31                     | 16.01                                  | 22.16                      | 25.00                       | 128.50       | 0.00        | 130.56       | 607.69      |
| 161+25      | 115.56              | 100.56                         | 27.35                     | 16.55                                  | 21.95                      | 25.00                       | 127.75       | 0.00        | 129.54       | 619.19      |
| 161+50      | 114.60              | 99.60                          | 26.38                     | 17.08                                  | 21.73                      | 25.00                       | 127.00       | 0.00        | 128.52       | 592.06      |
| 161+75      | 113.63              | 98.63                          | 23.08                     | 14.08                                  | 18.58                      | 25.00                       | 126.00       | 0.00        | 127.51       | 541.00      |
| 162+00      | 112.66              | 97.66                          | 29.54                     | 14.54                                  | 22.04                      | 25.00                       | 124.00       | 0.00        | 126.50       | 582.75      |

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 156+25 to 156+50 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-04-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 121.73  
Water Table Elevation, [WT] (ft datum): 136.73  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 186.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 7.5  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br>(ft datum) | <u>Area</u><br>(ft <sup>2</sup> ) |
|----------------------------|-----------------------------------|
| 150.30                     | 0.0                               |
| 151.83                     | 309.9                             |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 113.56

Initial ground water level (ft datum) default, 136.73

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.010                         | 0.100                         | 0.450                         | 3.000                         |
| 0.002                         | 0.015                         | 0.150                         | 0.500                         | 3.500                         |
| 0.003                         | 0.020                         | 0.250                         | 1.000                         | 4.000                         |
| 0.005                         | 0.030                         | 0.300                         | 1.500                         |                               |
| 0.008                         | 0.050                         | 0.350                         | 2.000                         |                               |
| 0.009                         | 0.080                         | 0.400                         | 2.500                         |                               |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 18.9267                          | 0.0000                    | 136.730                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 18.9267                          | 0.0000                    | 151.358                    | 0.04306                                | 0.00000                                 | 113.6                                       | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 151.342                    | 0.04306                                | 0.00000                                 | 113.6                                       | 3.7                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 151.324                    | 0.04306                                | 0.00000                                 | 113.6                                       | 7.4                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 151.306                    | 0.04306                                | 0.00000                                 | 113.6                                       | 11.2                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 151.268                    | 0.04306                                | 0.00000                                 | 113.6                                       | 18.6                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 151.210                    | 0.04275                                | 0.00000                                 | 113.6                                       | 29.8                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 151.190                    | 0.04217                                | 0.00000                                 | 113.6                                       | 33.4                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 151.169                    | 0.04134                                | 0.00000                                 | 113.6                                       | 37.0                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 151.066                    | 0.03712                                | 0.00000                                 | 113.6                                       | 54.1                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 150.962                    | 0.03238                                | 0.00000                                 | 113.6                                       | 69.1                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 150.750                    | 0.01850                                | 0.00000                                 | 113.6                                       | 93.1                                              | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.6                                       | 113.6                                             | 0.0                                            | dry       |

~1 hr

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 156+50 to 156+75 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-04-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 120.65  
Water Table Elevation, [WT] (ft datum): 135.65  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 216.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 8.6  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br><u>(ft datum)</u> | <u>Area</u><br><u>(ft<sup>2</sup>)</u> |
|-----------------------------------|----------------------------------------|
| 149.50                            | 0.0                                    |
| 151.09                            | 311.4                                  |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 120.88

Initial ground water level (ft datum) default, 135.65

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.010                                        | 0.100                                        | 0.450                                        | 3.000                                        |
| 0.002                                        | 0.015                                        | 0.150                                        | 0.500                                        | 3.500                                        |
| 0.003                                        | 0.020                                        | 0.250                                        | 1.000                                        | 4.000                                        |
| 0.005                                        | 0.030                                        | 0.300                                        | 1.500                                        |                                              |
| 0.008                                        | 0.050                                        | 0.350                                        | 2.000                                        |                                              |
| 0.009                                        | 0.080                                        | 0.400                                        | 2.500                                        |                                              |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 20.1467                          | 0.0000                    | 135.650                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 20.1467                          | 0.0000                    | 150.610                    | 0.05000                                | 0.00000                                 | 120.9                                       | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 150.591                    | 0.04974                                | 0.00000                                 | 120.9                                       | 4.3                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 150.571                    | 0.04900                                | 0.00000                                 | 120.9                                       | 8.6                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 150.551                    | 0.04824                                | 0.00000                                 | 120.9                                       | 12.8                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 150.510                    | 0.04689                                | 0.00000                                 | 120.9                                       | 21.0                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 150.448                    | 0.04368                                | 0.00000                                 | 120.9                                       | 32.9                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 150.428                    | 0.04252                                | 0.00000                                 | 120.9                                       | 36.6                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 150.408                    | 0.04171                                | 0.00000                                 | 120.9                                       | 40.2                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 150.305                    | 0.03764                                | 0.00000                                 | 120.9                                       | 57.5                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 150.201                    | 0.03307                                | 0.00000                                 | 120.9                                       | 72.8                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 149.989                    | 0.01906                                | 0.00000                                 | 120.9                                       | 97.5                                              | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 120.9                                       | 120.9                                             | 0.0                                            | dry       |

~1hr

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 156+75 to 157+00 ft  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 119.57  
Water Table Elevation, [WT] (ft datum): 134.57  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 246.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 9.8  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 148.70              | 0.0                        |
| 150.34              | 341.9                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 157.3

Initial ground water level (ft datum) default, 134.57

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 1.500                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 2.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.500                                        | 2.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.600                                        | 3.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.700                                        | 3.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.800                                        | 4.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.900                                        |                                              |
| 0.012                                        | 0.080                                        | 0.450                                        | 1.000                                        |                                              |



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**Detailed Results**    :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 26.2167                          | 0.0000                    | 134.570                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 26.2167                          | 0.0000                    | 149.927                    | 0.05694                                | 0.00000                                 | 157.3                                       | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 149.909                    | 0.05694                                | 0.00000                                 | 157.3                                       | 4.9                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 149.889                    | 0.05694                                | 0.00000                                 | 157.3                                       | 9.8                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 149.869                    | 0.05677                                | 0.00000                                 | 157.3                                       | 14.8                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 149.829                    | 0.05564                                | 0.00000                                 | 157.3                                       | 24.5                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 149.767                    | 0.05223                                | 0.00000                                 | 157.3                                       | 38.6                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 149.747                    | 0.05100                                | 0.00000                                 | 157.3                                       | 43.1                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 149.727                    | 0.05019                                | 0.00000                                 | 157.3                                       | 47.4                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 149.686                    | 0.04823                                | 0.00000                                 | 157.3                                       | 56.0                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 149.666                    | 0.04725                                | 0.00000                                 | 157.3                                       | 60.1                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 149.625                    | 0.04568                                | 0.00000                                 | 157.3                                       | 68.2                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 149.522                    | 0.04102                                | 0.00000                                 | 157.3                                       | 86.9                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 149.312                    | 0.03122                                | 0.00000                                 | 157.3                                       | 118.3                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 148.859                    | 0.00703                                | 0.00000                                 | 157.3                                       | 154.7                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 157.3                                       | 157.3                                             | 0.0                                            | dry       |

~1 hr

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 157+00 to 157+25 ft  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 118.83  
Water Table Elevation, [WT] (ft datum): 133.83  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 288.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 11.5  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 147.65              | 0.0                        |
| 149.39              | 355.8                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 230.79

Initial ground water level (ft datum) default, 133.83

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 38.4650                          | 0.0000                    | 133.830                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 38.4650                          | 0.0000                    | 149.151                    | 0.06667                                | 0.00000                                 | 230.8                                       | 0.4                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 149.134                    | 0.06667                                | 0.00000                                 | 230.8                                       | 5.8                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 149.114                    | 0.06667                                | 0.00000                                 | 230.8                                       | 11.5                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 149.095                    | 0.06667                                | 0.00000                                 | 230.8                                       | 17.3                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 149.056                    | 0.06661                                | 0.00000                                 | 230.8                                       | 28.8                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 148.994                    | 0.06435                                | 0.00000                                 | 230.8                                       | 46.0                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 148.974                    | 0.06315                                | 0.00000                                 | 230.8                                       | 51.5                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 148.954                    | 0.06236                                | 0.00000                                 | 230.8                                       | 57.0                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 148.913                    | 0.06044                                | 0.00000                                 | 230.8                                       | 67.6                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 148.893                    | 0.05948                                | 0.00000                                 | 230.8                                       | 72.8                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 148.852                    | 0.05795                                | 0.00000                                 | 230.8                                       | 83.0                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 148.750                    | 0.05341                                | 0.00000                                 | 230.8                                       | 107.0                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 148.543                    | 0.04398                                | 0.00000                                 | 230.8                                       | 149.2                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 148.117                    | 0.02389                                | 0.00000                                 | 230.8                                       | 208.5                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 147.896                    | 0.00934                                | 0.00000                                 | 230.8                                       | 224.6                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 230.8                                       | 230.8                                             | 0.0                                            | dry       |

~1.5 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 157+25 to 157+50 ft  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 118.09  
Water Table Elevation, [WT] (ft datum): 133.09  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 329.8

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 13.2  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 146.60              | 0.0                        |
| 148.44              | 383.9                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 347.36

Initial ground water level (ft datum) default, 133.09

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 57.8933                          | 0.0000                    | 133.090                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 57.8933                          | 0.0000                    | 148.424                    | 0.07633                                | 0.00000                                 | 347.4                                       | 0.5                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 148.407                    | 0.07633                                | 0.00000                                 | 347.4                                       | 6.6                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 148.390                    | 0.07633                                | 0.00000                                 | 347.4                                       | 13.2                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 148.372                    | 0.07633                                | 0.00000                                 | 347.4                                       | 19.8                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 148.336                    | 0.07633                                | 0.00000                                 | 347.4                                       | 33.0                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 148.280                    | 0.07633                                | 0.00000                                 | 347.4                                       | 52.8                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 148.262                    | 0.07633                                | 0.00000                                 | 347.4                                       | 59.4                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 148.242                    | 0.07633                                | 0.00000                                 | 347.4                                       | 66.0                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 148.203                    | 0.07633                                | 0.00000                                 | 347.4                                       | 79.1                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 148.184                    | 0.07633                                | 0.00000                                 | 347.4                                       | 85.7                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 148.143                    | 0.07547                                | 0.00000                                 | 347.4                                       | 98.9                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 148.041                    | 0.07098                                | 0.00000                                 | 347.4                                       | 130.6                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 147.836                    | 0.06145                                | 0.00000                                 | 347.4                                       | 187.9                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 147.420                    | 0.04139                                | 0.00000                                 | 347.4                                       | 277.2                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 147.210                    | 0.03114                                | 0.00000                                 | 347.4                                       | 308.5                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 146.996                    | 0.02078                                | 0.00000                                 | 347.4                                       | 331.0                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 146.767                    | 0.00776                                | 0.00000                                 | 347.4                                       | 344.4                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 347.4                                       | 347.4                                             | 0.0                                            | dry       |

~2 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 157+50 to 157+75 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 117.34  
Water Table Elevation, [WT] (ft datum): 132.34  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [lv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 350.8

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 14.0  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br>(ft datum) | <u>Area</u><br>(ft <sup>2</sup> ) |
|----------------------------|-----------------------------------|
| 145.20                     | 0.0                               |
| 147.33                     | 406.2                             |



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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 378.62

Initial ground water level (ft datum) default, 132.34

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 63.1033                          | 0.0000                    | 132.340                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 63.1033                          | 0.0000                    | 147.191                    | 0.08119                                | 0.00000                                 | 378.6                                       | 0.5                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 147.174                    | 0.08119                                | 0.00000                                 | 378.6                                       | 7.0                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 147.155                    | 0.08119                                | 0.00000                                 | 378.6                                       | 14.0                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 147.137                    | 0.08119                                | 0.00000                                 | 378.6                                       | 21.0                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 147.098                    | 0.08119                                | 0.00000                                 | 378.6                                       | 35.1                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 147.039                    | 0.08119                                | 0.00000                                 | 378.6                                       | 56.1                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 147.019                    | 0.08074                                | 0.00000                                 | 378.6                                       | 63.1                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 146.999                    | 0.08000                                | 0.00000                                 | 378.6                                       | 70.1                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 146.958                    | 0.07822                                | 0.00000                                 | 378.6                                       | 83.8                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 146.938                    | 0.07733                                | 0.00000                                 | 378.6                                       | 90.5                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 146.898                    | 0.07590                                | 0.00000                                 | 378.6                                       | 103.8                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 146.796                    | 0.07170                                | 0.00000                                 | 378.6                                       | 135.7                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 146.592                    | 0.06302                                | 0.00000                                 | 378.6                                       | 193.9                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 146.178                    | 0.04478                                | 0.00000                                 | 378.6                                       | 287.5                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 145.970                    | 0.03549                                | 0.00000                                 | 378.6                                       | 322.1                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 145.759                    | 0.02620                                | 0.00000                                 | 378.6                                       | 348.8                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 145.543                    | 0.01665                                | 0.00000                                 | 378.6                                       | 367.4                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 145.304                    | 0.00589                                | 0.00000                                 | 378.6                                       | 377.6                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 378.6                                       | 378.6                                             | 0.0                                            | dry       |

~2.25 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 157+75 to 158+00 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 116.60  
Water Table Elevation, [WT] (ft datum): 131.60  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 370.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 14.8  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 143.80              | 0.0                        |
| 146.21              | 447.3                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 450.5

Initial ground water level (ft datum) default, 131.60

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 75.0833                          | 0.0000                    | 131.600                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 75.0833                          | 0.0000                    | 146.002                    | 0.08565                                | 0.00000                                 | 450.5                                       | 0.5                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 145.985                    | 0.08565                                | 0.00000                                 | 450.5                                       | 7.4                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 145.967                    | 0.08565                                | 0.00000                                 | 450.5                                       | 14.8                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 145.948                    | 0.08565                                | 0.00000                                 | 450.5                                       | 22.2                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 145.911                    | 0.08565                                | 0.00000                                 | 450.5                                       | 37.0                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 145.853                    | 0.08565                                | 0.00000                                 | 450.5                                       | 59.2                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 145.834                    | 0.08565                                | 0.00000                                 | 450.5                                       | 66.6                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 145.814                    | 0.08565                                | 0.00000                                 | 450.5                                       | 74.0                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 145.774                    | 0.08510                                | 0.00000                                 | 450.5                                       | 88.8                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 145.754                    | 0.08453                                | 0.00000                                 | 450.5                                       | 96.1                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 145.714                    | 0.08315                                | 0.00000                                 | 450.5                                       | 110.6                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 145.612                    | 0.07907                                | 0.00000                                 | 450.5                                       | 145.7                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 145.408                    | 0.07064                                | 0.00000                                 | 450.5                                       | 210.4                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 144.997                    | 0.05298                                | 0.00000                                 | 450.5                                       | 317.6                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 144.790                    | 0.04402                                | 0.00000                                 | 450.5                                       | 359.5                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 144.582                    | 0.03509                                | 0.00000                                 | 450.5                                       | 393.7                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 144.372                    | 0.02606                                | 0.00000                                 | 450.5                                       | 420.1                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 144.156                    | 0.01679                                | 0.00000                                 | 450.5                                       | 438.7                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 143.921                    | 0.01005                                | 0.00000                                 | 450.5                                       | 449.2                                             | 0.0                                            | U/P       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 450.5                                       | 450.5                                             | 0.0                                            | dry       |

~3 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 158+00 to 158+25 It  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 115.03  
 Water Table Elevation, [WT] (ft datum): 130.03  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 332.8

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
 Equivalent Pond Width, [W] (ft): 13.3  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 141.85              | 0.0                        |
| 143.90              | 345.4                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 271.35

Initial ground water level (ft datum) default, 130.03

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 45.2250                          | 0.0000                    | 130.030                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 45.2250                          | 0.0000                    | 143.643                    | 0.06999                                | 0.00000                                 | 271.4                                       | 0.4                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 143.625                    | 0.06959                                | 0.00000                                 | 271.4                                       | 6.0                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 143.605                    | 0.06882                                | 0.00000                                 | 271.4                                       | 12.0                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 143.585                    | 0.06816                                | 0.00000                                 | 271.4                                       | 17.9                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 143.544                    | 0.06701                                | 0.00000                                 | 271.4                                       | 29.6                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 143.483                    | 0.06428                                | 0.00000                                 | 271.4                                       | 46.7                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 143.463                    | 0.06329                                | 0.00000                                 | 271.4                                       | 52.2                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 143.443                    | 0.06263                                | 0.00000                                 | 271.4                                       | 57.7                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 143.402                    | 0.06106                                | 0.00000                                 | 271.4                                       | 68.4                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 143.382                    | 0.06027                                | 0.00000                                 | 271.4                                       | 73.6                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 143.342                    | 0.05901                                | 0.00000                                 | 271.4                                       | 84.0                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 143.240                    | 0.05529                                | 0.00000                                 | 271.4                                       | 108.7                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 143.034                    | 0.04759                                | 0.00000                                 | 271.4                                       | 153.2                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 142.617                    | 0.03136                                | 0.00000                                 | 271.4                                       | 221.8                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 142.406                    | 0.02305                                | 0.00000                                 | 271.4                                       | 245.3                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 142.190                    | 0.01460                                | 0.00000                                 | 271.4                                       | 261.6                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 141.950                    | 0.00515                                | 0.00000                                 | 271.4                                       | 270.5                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 271.4                                       | 271.4                                             | 0.0                                            | dry       |

~2 hrs



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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 158+25 to 158+50 ft  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 113.45  
 Water Table Elevation, [WT] (ft datum): 128.45  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 254.6

**Geometry Data**

Equivalent Pond Length, [L] (ft): 21.5  
 Equivalent Pond Width, [W] (ft): 11.8  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 139.90              | 0.0                        |
| 141.58              | 259.0                      |

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Scenario Input Data

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 176.96

Initial ground water level (ft datum) default, 128.45

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 29.4933                          | 0.0000                    | 128.450                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 29.4933                          | 0.0000                    | 141.414                    | 0.05407                                | 0.00000                                 | 177.0                                       | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 141.395                    | 0.05370                                | 0.00000                                 | 177.0                                       | 4.7                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 141.375                    | 0.05300                                | 0.00000                                 | 177.0                                       | 9.3                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 141.355                    | 0.05240                                | 0.00000                                 | 177.0                                       | 13.8                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 141.314                    | 0.05134                                | 0.00000                                 | 177.0                                       | 22.8                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 141.253                    | 0.04883                                | 0.00000                                 | 177.0                                       | 35.9                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 141.233                    | 0.04792                                | 0.00000                                 | 177.0                                       | 40.1                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 141.213                    | 0.04732                                | 0.00000                                 | 177.0                                       | 44.2                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 141.172                    | 0.04588                                | 0.00000                                 | 177.0                                       | 52.3                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 141.152                    | 0.04515                                | 0.00000                                 | 177.0                                       | 56.2                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 141.111                    | 0.04400                                | 0.00000                                 | 177.0                                       | 63.9                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 141.009                    | 0.04058                                | 0.00000                                 | 177.0                                       | 82.2                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 140.802                    | 0.03347                                | 0.00000                                 | 177.0                                       | 114.2                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 140.377                    | 0.01833                                | 0.00000                                 | 177.0                                       | 159.5                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 140.156                    | 0.00721                                | 0.00000                                 | 177.0                                       | 171.9                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 177.0                                       | 177.0                                             | 0.0                                            | dry       |

*~1.5 hrs*

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 158+50 to 158+75 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 111.88  
Water Table Elevation, [WT] (ft datum): 126.88  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 332.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 13.3  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br>(ft datum) | <u>Area</u><br>(ft <sup>2</sup> ) |
|----------------------------|-----------------------------------|
| 138.40                     | 0.0                               |
| 140.50                     | 374.1                             |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 335.26

Initial ground water level (ft datum) default, 126.88

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 55.8767                          | 0.0000                    | 126.880                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 55.8767                          | 0.0000                    | 140.339                    | 0.07685                                | 0.00000                                 | 335.3                                       | 0.5                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 140.321                    | 0.07685                                | 0.00000                                 | 335.3                                       | 6.6                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 140.301                    | 0.07685                                | 0.00000                                 | 335.3                                       | 13.3                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 140.282                    | 0.07685                                | 0.00000                                 | 335.3                                       | 19.9                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 140.242                    | 0.07649                                | 0.00000                                 | 335.3                                       | 33.2                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 140.180                    | 0.07405                                | 0.00000                                 | 335.3                                       | 52.9                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 140.160                    | 0.07301                                | 0.00000                                 | 335.3                                       | 59.2                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 140.140                    | 0.07232                                | 0.00000                                 | 335.3                                       | 65.5                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 140.100                    | 0.07065                                | 0.00000                                 | 335.3                                       | 77.9                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 140.080                    | 0.06982                                | 0.00000                                 | 335.3                                       | 84.0                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 140.039                    | 0.06849                                | 0.00000                                 | 335.3                                       | 95.9                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 139.938                    | 0.06457                                | 0.00000                                 | 335.3                                       | 124.7                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 139.733                    | 0.05644                                | 0.00000                                 | 335.3                                       | 177.0                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 139.318                    | 0.03937                                | 0.00000                                 | 335.3                                       | 260.2                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 139.109                    | 0.03067                                | 0.00000                                 | 335.3                                       | 290.4                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 138.898                    | 0.02194                                | 0.00000                                 | 335.3                                       | 313.2                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 138.678                    | 0.00877                                | 0.00000                                 | 335.3                                       | 328.4                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 335.3                                       | 335.3                                             | 0.0                                            | dry       |

2 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 158+75 to 159+00 ft  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 110.30  
Water Table Elevation, [WT] (ft datum): 125.30  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 368.5

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 14.7  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage<br/>(ft datum)</u> | <u>Area<br/>(ft<sup>2</sup>)</u> |
|-----------------------------|----------------------------------|
| 136.90                      | 0.0                              |
| 139.41                      | 442.1                            |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 448

Initial ground water level (ft datum) default, 125.30

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |



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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 74.6667                          | 0.0000                    | 125.300                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 74.6667                          | 0.0000                    | 139.154                    | 0.08530                                | 0.00000                                 | 448.0                                       | 0.5                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 139.137                    | 0.08530                                | 0.00000                                 | 448.0                                       | 7.4                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 139.118                    | 0.08530                                | 0.00000                                 | 448.0                                       | 14.7                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 139.099                    | 0.08530                                | 0.00000                                 | 448.0                                       | 22.1                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 139.061                    | 0.08530                                | 0.00000                                 | 448.0                                       | 36.9                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 139.002                    | 0.08530                                | 0.00000                                 | 448.0                                       | 59.0                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 138.982                    | 0.08509                                | 0.00000                                 | 448.0                                       | 66.3                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 138.962                    | 0.08461                                | 0.00000                                 | 448.0                                       | 73.7                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 138.921                    | 0.08296                                | 0.00000                                 | 448.0                                       | 88.2                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 138.901                    | 0.08214                                | 0.00000                                 | 448.0                                       | 95.3                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 138.861                    | 0.08083                                | 0.00000                                 | 448.0                                       | 109.4                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 138.759                    | 0.07696                                | 0.00000                                 | 448.0                                       | 143.5                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 138.556                    | 0.06897                                | 0.00000                                 | 448.0                                       | 206.6                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 138.144                    | 0.05222                                | 0.00000                                 | 448.0                                       | 311.7                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 137.938                    | 0.04372                                | 0.00000                                 | 448.0                                       | 353.1                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 137.731                    | 0.03527                                | 0.00000                                 | 448.0                                       | 387.2                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 137.521                    | 0.02673                                | 0.00000                                 | 448.0                                       | 414.0                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 137.307                    | 0.01800                                | 0.00000                                 | 448.0                                       | 433.4                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 137.080                    | 0.01132                                | 0.00000                                 | 448.0                                       | 445.2                                             | 0.0                                            | U/P       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 448.0                                       | 448.0                                             | 0.0                                            | dry       |

~3 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 159+00 to 159+25 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 109.08  
Water Table Elevation, [WT] (ft datum): 124.08  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 386.8

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 15.5  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br>(ft datum) | <u>Area</u><br>(ft <sup>2</sup> ) |
|----------------------------|-----------------------------------|
| 135.35                     | 0.0                               |
| 138.01                     | 467.3                             |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 493.1

Initial ground water level (ft datum) default, 124.08

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 82.1833                          | 0.0000                    | 124.080                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 82.1833                          | 0.0000                    | 137.718                    | 0.08953                                | 0.00000                                 | 493.1                                       | 0.5                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 137.701                    | 0.08953                                | 0.00000                                 | 493.1                                       | 7.7                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 137.682                    | 0.08953                                | 0.00000                                 | 493.1                                       | 15.5                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 137.663                    | 0.08953                                | 0.00000                                 | 493.1                                       | 23.2                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 137.625                    | 0.08953                                | 0.00000                                 | 493.1                                       | 38.7                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 137.566                    | 0.08953                                | 0.00000                                 | 493.1                                       | 61.9                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 137.546                    | 0.08941                                | 0.00000                                 | 493.1                                       | 69.6                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 137.526                    | 0.08901                                | 0.00000                                 | 493.1                                       | 77.3                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 137.485                    | 0.08737                                | 0.00000                                 | 493.1                                       | 92.6                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 137.465                    | 0.08656                                | 0.00000                                 | 493.1                                       | 100.1                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 137.425                    | 0.08525                                | 0.00000                                 | 493.1                                       | 115.0                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 137.324                    | 0.08139                                | 0.00000                                 | 493.1                                       | 151.0                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 137.120                    | 0.07343                                | 0.00000                                 | 493.1                                       | 217.9                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 136.710                    | 0.05676                                | 0.00000                                 | 493.1                                       | 330.8                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 136.504                    | 0.04831                                | 0.00000                                 | 493.1                                       | 376.1                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 136.297                    | 0.03992                                | 0.00000                                 | 493.1                                       | 414.3                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 136.089                    | 0.03146                                | 0.00000                                 | 493.1                                       | 445.1                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 135.878                    | 0.02288                                | 0.00000                                 | 493.1                                       | 468.6                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 135.660                    | 0.01546                                | 0.00000                                 | 493.1                                       | 484.6                                             | 0.0                                            | U/P       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 493.1                                       | 493.1                                             | 0.0                                            | dry       |

~3 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 159+25 to 159+50 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 107.86  
Water Table Elevation, [WT] (ft datum): 122.86  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 405.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 16.2  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br>(ft datum) | <u>Area</u><br>(ft <sup>2</sup> ) |
|----------------------------|-----------------------------------|
| 133.80                     | 0.0                               |
| 136.61                     | 496.8                             |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 546.75

Initial ground water level (ft datum) default, 122.86

| <u>Time After Storm Event (days)</u> | <u>Time After Storm Event (days)</u> | <u>Time After Storm Event (days)</u> | <u>Time After Storm Event (days)</u> | <u>Time After Storm Event (days)</u> |
|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 0.001                                | 0.013                                | 0.090                                | 0.460                                | 0.900                                |
| 0.002                                | 0.015                                | 0.100                                | 0.470                                | 1.000                                |
| 0.003                                | 0.020                                | 0.150                                | 0.480                                | 1.500                                |
| 0.005                                | 0.030                                | 0.250                                | 0.490                                | 2.000                                |
| 0.008                                | 0.050                                | 0.300                                | 0.500                                | 2.500                                |
| 0.009                                | 0.060                                | 0.350                                | 0.600                                | 3.000                                |
| 0.010                                | 0.070                                | 0.400                                | 0.700                                | 3.500                                |
| 0.012                                | 0.080                                | 0.450                                | 0.800                                | 4.000                                |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 91.1250                          | 0.0000                    | 122.860                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 91.1250                          | 0.0000                    | 136.286                    | 0.09375                                | 0.00000                                 | 546.8                                       | 0.6                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 136.269                    | 0.09375                                | 0.00000                                 | 546.8                                       | 8.1                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 136.250                    | 0.09375                                | 0.00000                                 | 546.8                                       | 16.2                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 136.231                    | 0.09375                                | 0.00000                                 | 546.8                                       | 24.3                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 136.193                    | 0.09375                                | 0.00000                                 | 546.8                                       | 40.5                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 136.135                    | 0.09375                                | 0.00000                                 | 546.8                                       | 64.8                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 136.115                    | 0.09375                                | 0.00000                                 | 546.8                                       | 72.9                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 136.096                    | 0.09375                                | 0.00000                                 | 546.8                                       | 81.0                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 136.055                    | 0.09277                                | 0.00000                                 | 546.8                                       | 97.2                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 136.035                    | 0.09201                                | 0.00000                                 | 546.8                                       | 105.2                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 135.995                    | 0.09070                                | 0.00000                                 | 546.8                                       | 121.0                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 135.894                    | 0.08682                                | 0.00000                                 | 546.8                                       | 159.3                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 135.690                    | 0.07882                                | 0.00000                                 | 546.8                                       | 231.0                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 135.280                    | 0.06207                                | 0.00000                                 | 546.8                                       | 353.0                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 135.075                    | 0.05359                                | 0.00000                                 | 546.8                                       | 403.0                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 134.870                    | 0.04517                                | 0.00000                                 | 546.8                                       | 445.6                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 134.662                    | 0.03670                                | 0.00000                                 | 546.8                                       | 481.0                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 134.453                    | 0.02814                                | 0.00000                                 | 546.8                                       | 509.0                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 134.240                    | 0.01986                                | 0.00000                                 | 546.8                                       | 529.6                                             | 0.0                                            | U/P       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 546.8                                       | 546.8                                             | 0.0                                            | dry       |

~3 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 159+50 to 159+75 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 106.64  
Water Table Elevation, [WT] (ft datum): 121.64  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 413.3

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 16.5  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 132.55              | 0.0                        |
| 135.42              | 534.0                      |



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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 610.79

Initial ground water level (ft datum) default, 121.64

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 101.7983                         | 0.0000                    | 121.640                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 101.7983                         | 0.0000                    | 135.111                    | 0.09566                                | 0.00000                                 | 610.8                                       | 0.6                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 135.095                    | 0.09566                                | 0.00000                                 | 610.8                                       | 8.3                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 135.077                    | 0.09566                                | 0.00000                                 | 610.8                                       | 16.5                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 135.060                    | 0.09566                                | 0.00000                                 | 610.8                                       | 24.8                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 135.024                    | 0.09566                                | 0.00000                                 | 610.8                                       | 41.3                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 134.970                    | 0.09566                                | 0.00000                                 | 610.8                                       | 66.1                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 134.951                    | 0.09566                                | 0.00000                                 | 610.8                                       | 74.4                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 134.933                    | 0.09566                                | 0.00000                                 | 610.8                                       | 82.7                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 134.895                    | 0.09566                                | 0.00000                                 | 610.8                                       | 99.2                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 134.876                    | 0.09566                                | 0.00000                                 | 610.8                                       | 107.4                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 134.838                    | 0.09566                                | 0.00000                                 | 610.8                                       | 124.0                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 134.738                    | 0.09422                                | 0.00000                                 | 610.8                                       | 165.3                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 134.535                    | 0.08704                                | 0.00000                                 | 610.8                                       | 244.2                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 134.126                    | 0.06944                                | 0.00000                                 | 610.8                                       | 379.8                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 133.921                    | 0.06052                                | 0.00000                                 | 610.8                                       | 435.9                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 133.716                    | 0.05168                                | 0.00000                                 | 610.8                                       | 484.4                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 133.509                    | 0.04279                                | 0.00000                                 | 610.8                                       | 525.2                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 133.301                    | 0.03383                                | 0.00000                                 | 610.8                                       | 558.3                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 133.090                    | 0.02444                                | 0.00000                                 | 610.8                                       | 583.6                                             | 0.0                                            | U/P       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 610.8                                       | 610.8                                             | 0.0                                            | dry       |

~3hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 159+75 to 160+00 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 105.42  
Water Table Elevation, [WT] (ft datum): 120.42  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 423.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 16.9  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage<br/>(ft datum)</u> | <u>Area<br/>(ft<sup>2</sup>)</u> |
|-----------------------------|----------------------------------|
| 131.30                      | 0.0                              |
| 134.23                      | 547.5                            |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 640.34

Initial ground water level (ft datum) default, 120.42

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Retention Pond Recovery - Refined Method**  
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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 106.7233                         | 0.0000                    | 120.420                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 106.7233                         | 0.0000                    | 133.917                    | 0.09792                                | 0.00000                                 | 640.3                                       | 0.6                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 133.901                    | 0.09792                                | 0.00000                                 | 640.3                                       | 8.5                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 133.883                    | 0.09792                                | 0.00000                                 | 640.3                                       | 16.9                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 133.866                    | 0.09792                                | 0.00000                                 | 640.3                                       | 25.4                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 133.830                    | 0.09792                                | 0.00000                                 | 640.3                                       | 42.3                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 133.776                    | 0.09792                                | 0.00000                                 | 640.3                                       | 67.7                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 133.757                    | 0.09792                                | 0.00000                                 | 640.3                                       | 76.1                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 133.739                    | 0.09792                                | 0.00000                                 | 640.3                                       | 84.6                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 133.702                    | 0.09792                                | 0.00000                                 | 640.3                                       | 101.5                                             | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 133.683                    | 0.09792                                | 0.00000                                 | 640.3                                       | 110.0                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 133.644                    | 0.09792                                | 0.00000                                 | 640.3                                       | 126.9                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 133.546                    | 0.09668                                | 0.00000                                 | 640.3                                       | 169.2                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 133.342                    | 0.08990                                | 0.00000                                 | 640.3                                       | 250.6                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 132.934                    | 0.07223                                | 0.00000                                 | 640.3                                       | 391.0                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 132.729                    | 0.06328                                | 0.00000                                 | 640.3                                       | 449.5                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 132.524                    | 0.05441                                | 0.00000                                 | 640.3                                       | 500.4                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 132.318                    | 0.04550                                | 0.00000                                 | 640.3                                       | 543.6                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 132.110                    | 0.03653                                | 0.00000                                 | 640.3                                       | 579.0                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 131.900                    | 0.02669                                | 0.00000                                 | 640.3                                       | 606.7                                             | 0.0                                            | U/P       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 640.3                                       | 640.3                                             | 0.0                                            | dry       |

~3hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 160+00 to 160+25 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 104.45  
Water Table Elevation, [WT] (ft datum): 119.45  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 440.3

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 17.6  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br>(ft datum) | <u>Area</u><br>(ft <sup>2</sup> ) |
|----------------------------|-----------------------------------|
| 131.00                     | 0.0                               |
| 133.38                     | 567.8                             |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 745.83

Initial ground water level (ft datum) default, 119.45

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 124.3050                         | 0.0000                    | 119.450                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 124.3050                         | 0.0000                    | 133.503                    | 0.10191                                | 0.00000                                 | 745.8                                       | 0.6                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 133.488                    | 0.10191                                | 0.00000                                 | 745.8                                       | 8.8                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 133.473                    | 0.10191                                | 0.00000                                 | 745.8                                       | 17.6                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 133.457                    | 0.10191                                | 0.00000                                 | 745.8                                       | 26.4                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 133.426                    | 0.10191                                | 0.00000                                 | 745.8                                       | 44.0                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 133.380                    | 0.10191                                | 0.00000                                 | 745.8                                       | 70.4                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 133.364                    | 0.10191                                | 0.00000                                 | 745.8                                       | 79.2                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 133.348                    | 0.10191                                | 0.00000                                 | 745.8                                       | 88.1                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 133.317                    | 0.10191                                | 0.00000                                 | 745.8                                       | 105.7                                             | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 133.301                    | 0.10191                                | 0.00000                                 | 745.8                                       | 114.5                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 133.268                    | 0.10191                                | 0.00000                                 | 745.8                                       | 132.1                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 133.186                    | 0.10191                                | 0.00000                                 | 745.8                                       | 176.1                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 133.010                    | 0.10109                                | 0.00000                                 | 745.8                                       | 264.2                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 132.612                    | 0.08998                                | 0.00000                                 | 745.8                                       | 436.0                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 132.407                    | 0.07958                                | 0.00000                                 | 745.8                                       | 509.7                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 132.202                    | 0.06825                                | 0.00000                                 | 745.8                                       | 573.5                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 131.996                    | 0.05687                                | 0.00000                                 | 745.8                                       | 627.6                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 131.788                    | 0.04540                                | 0.00000                                 | 745.8                                       | 671.8                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 131.578                    | 0.03304                                | 0.00000                                 | 745.8                                       | 706.1                                             | 0.0                                            | U/P       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 745.8                                       | 745.8                                             | 0.0                                            | dry       |

~3hrs



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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 160+25 to 160+50 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 103.48  
Water Table Elevation, [WT] (ft datum): 118.48  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 459.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 18.4  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 130.70              | 0.0                        |
| 132.52              | 544.5                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 658.35

Initial ground water level (ft datum) default, 118.48

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 109.7250                         | 0.0000                    | 118.480                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 109.7250                         | 0.0000                    | 132.818                    | 0.10625                                | 0.00000                                 | 658.4                                       | 0.6                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 132.802                    | 0.10625                                | 0.00000                                 | 658.4                                       | 9.2                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 132.785                    | 0.10625                                | 0.00000                                 | 658.4                                       | 18.4                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 132.769                    | 0.10625                                | 0.00000                                 | 658.4                                       | 27.5                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 132.735                    | 0.10625                                | 0.00000                                 | 658.4                                       | 45.9                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 132.684                    | 0.10625                                | 0.00000                                 | 658.4                                       | 73.4                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 132.667                    | 0.10625                                | 0.00000                                 | 658.4                                       | 82.6                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 132.651                    | 0.10625                                | 0.00000                                 | 658.4                                       | 91.8                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 132.617                    | 0.10625                                | 0.00000                                 | 658.4                                       | 110.2                                             | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 132.600                    | 0.10625                                | 0.00000                                 | 658.4                                       | 119.3                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 132.566                    | 0.10625                                | 0.00000                                 | 658.4                                       | 137.7                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 132.482                    | 0.10625                                | 0.00000                                 | 658.4                                       | 183.6                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 132.300                    | 0.10373                                | 0.00000                                 | 658.4                                       | 275.4                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 131.892                    | 0.08474                                | 0.00000                                 | 658.4                                       | 445.9                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 131.685                    | 0.07060                                | 0.00000                                 | 658.4                                       | 513.1                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 131.477                    | 0.05622                                | 0.00000                                 | 658.4                                       | 568.0                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 131.267                    | 0.04165                                | 0.00000                                 | 658.4                                       | 610.3                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 131.051                    | 0.02669                                | 0.00000                                 | 658.4                                       | 639.9                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 130.814                    | 0.01589                                | 0.00000                                 | 658.4                                       | 656.4                                             | 0.0                                            | U/P       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 658.4                                       | 658.4                                             | 0.0                                            | dry       |

~3 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 160+50 to 160+75 It  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 102.50  
 Water Table Elevation, [WT] (ft datum): 117.50  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 512.3

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
 Equivalent Pond Width, [W] (ft): 20.5  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 129.60              | 0.0                        |
| 131.54              | 551.6                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>)                      638.25

Initial ground water level (ft datum)    default, 117.50

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.001                               | 0.013                               | 0.090                               | 0.460                               | 0.900                               |
| 0.002                               | 0.015                               | 0.100                               | 0.470                               | 1.000                               |
| 0.003                               | 0.020                               | 0.150                               | 0.480                               | 1.500                               |
| 0.005                               | 0.030                               | 0.250                               | 0.490                               | 2.000                               |
| 0.008                               | 0.050                               | 0.300                               | 0.500                               | 2.500                               |
| 0.009                               | 0.060                               | 0.350                               | 0.600                               | 3.000                               |
| 0.010                               | 0.070                               | 0.400                               | 0.700                               | 3.500                               |
| 0.012                               | 0.080                               | 0.450                               | 0.800                               | 4.000                               |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 106.3750                         | 0.0000                    | 117.500                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 106.3750                         | 0.0000                    | 131.726                    | 0.11858                                | 0.00000                                 | 638.3                                       | 0.7                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 131.709                    | 0.11858                                | 0.00000                                 | 638.3                                       | 10.2                                              | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 131.690                    | 0.11858                                | 0.00000                                 | 638.3                                       | 20.5                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 131.671                    | 0.11858                                | 0.00000                                 | 638.3                                       | 30.7                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 131.634                    | 0.11858                                | 0.00000                                 | 638.3                                       | 51.2                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 131.579                    | 0.11858                                | 0.00000                                 | 638.3                                       | 82.0                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 131.560                    | 0.11858                                | 0.00000                                 | 638.3                                       | 92.2                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 131.541                    | 0.11858                                | 0.00000                                 | 638.3                                       | 102.5                                             | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 131.504                    | 0.11858                                | 0.00000                                 | 638.3                                       | 122.9                                             | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 131.485                    | 0.11858                                | 0.00000                                 | 638.3                                       | 133.2                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 131.446                    | 0.11853                                | 0.00000                                 | 638.3                                       | 153.7                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 131.346                    | 0.11576                                | 0.00000                                 | 638.3                                       | 204.8                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 131.142                    | 0.10384                                | 0.00000                                 | 638.3                                       | 300.3                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 130.730                    | 0.07675                                | 0.00000                                 | 638.3                                       | 456.9                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 130.523                    | 0.06299                                | 0.00000                                 | 638.3                                       | 517.2                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 130.314                    | 0.04928                                | 0.00000                                 | 638.3                                       | 565.7                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 130.103                    | 0.03536                                | 0.00000                                 | 638.3                                       | 602.3                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 129.884                    | 0.01416                                | 0.00000                                 | 638.3                                       | 626.8                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 638.3                                       | 638.3                                             | 0.0                                            | dry       |

~ 2.3 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 160+75 to 161+00 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 101.53  
Water Table Elevation, [WT] (ft datum): 116.53  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 554.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 22.2  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 128.50              | 0.0                        |
| 130.56              | 607.7                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 712.88

Initial ground water level (ft datum) default, 116.53

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |



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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 118.8133                         | 0.0000                    | 116.530                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 118.8133                         | 0.0000                    | 130.702                    | 0.12824                                | 0.00000                                 | 712.9                                       | 0.8                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 130.685                    | 0.12824                                | 0.00000                                 | 712.9                                       | 11.1                                              | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 130.667                    | 0.12824                                | 0.00000                                 | 712.9                                       | 22.2                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 130.648                    | 0.12824                                | 0.00000                                 | 712.9                                       | 33.2                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 130.612                    | 0.12824                                | 0.00000                                 | 712.9                                       | 55.4                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 130.557                    | 0.12824                                | 0.00000                                 | 712.9                                       | 88.6                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 130.539                    | 0.12824                                | 0.00000                                 | 712.9                                       | 99.7                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 130.520                    | 0.12824                                | 0.00000                                 | 712.9                                       | 110.8                                             | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 130.483                    | 0.12824                                | 0.00000                                 | 712.9                                       | 133.0                                             | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 130.464                    | 0.12824                                | 0.00000                                 | 712.9                                       | 144.0                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 130.425                    | 0.12822                                | 0.00000                                 | 712.9                                       | 166.2                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 130.325                    | 0.12544                                | 0.00000                                 | 712.9                                       | 221.6                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 130.121                    | 0.11315                                | 0.00000                                 | 712.9                                       | 325.2                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 129.709                    | 0.08509                                | 0.00000                                 | 712.9                                       | 497.1                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 129.503                    | 0.07084                                | 0.00000                                 | 712.9                                       | 564.4                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 129.296                    | 0.05667                                | 0.00000                                 | 712.9                                       | 619.5                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 129.085                    | 0.04233                                | 0.00000                                 | 712.9                                       | 662.4                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 128.870                    | 0.02763                                | 0.00000                                 | 712.9                                       | 692.7                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 128.637                    | 0.01679                                | 0.00000                                 | 712.9                                       | 710.1                                             | 0.0                                            | U/P       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 712.9                                       | 712.9                                             | 0.0                                            | dry       |

~3 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 161+00 to 161+25 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 100.56  
Water Table Elevation, [WT] (ft datum): 115.56  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 548.8

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 22.0  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br>(ft datum) | <u>Area</u><br>(ft <sup>2</sup> ) |
|----------------------------|-----------------------------------|
| 127.75                     | 0.0                               |
| 129.54                     | 619.2                             |

255

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 696.25

Initial ground water level (ft datum) default, 115.56

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results :: Scenario 1 :: Water Quality**

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 116.0417                         | 0.0000                    | 115.580                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 116.0417                         | 0.0000                    | 129.768                    | 0.12703                                | 0.00000                                 | 696.3                                       | 0.8                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 129.752                    | 0.12703                                | 0.00000                                 | 696.3                                       | 11.0                                              | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 129.734                    | 0.12703                                | 0.00000                                 | 696.3                                       | 22.0                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 129.716                    | 0.12703                                | 0.00000                                 | 696.3                                       | 32.9                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 129.681                    | 0.12703                                | 0.00000                                 | 696.3                                       | 54.9                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 129.628                    | 0.12703                                | 0.00000                                 | 696.3                                       | 87.8                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 129.610                    | 0.12703                                | 0.00000                                 | 696.3                                       | 98.8                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 129.592                    | 0.12703                                | 0.00000                                 | 696.3                                       | 109.8                                             | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 129.557                    | 0.12703                                | 0.00000                                 | 696.3                                       | 131.7                                             | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 129.539                    | 0.12703                                | 0.00000                                 | 696.3                                       | 142.7                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 129.503                    | 0.12703                                | 0.00000                                 | 696.3                                       | 164.6                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 129.410                    | 0.12650                                | 0.00000                                 | 696.3                                       | 219.5                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 129.209                    | 0.11819                                | 0.00000                                 | 696.3                                       | 327.9                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 128.796                    | 0.08671                                | 0.00000                                 | 696.3                                       | 507.0                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 128.589                    | 0.08991                                | 0.00000                                 | 696.3                                       | 574.6                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 128.379                    | 0.05314                                | 0.00000                                 | 696.3                                       | 627.8                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 128.165                    | 0.03803                                | 0.00000                                 | 696.3                                       | 666.4                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 127.939                    | 0.01368                                | 0.00000                                 | 696.3                                       | 690.1                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 696.3                                       | 696.3                                             | 0.0                                            | dry       |

~2.3 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 161+25 to 161+50 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 99.60  
Water Table Elevation, [WT] (ft datum): 114.60  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 543.3

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 21.7  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 127.00              | 0.0                        |
| 128.52              | 592.1                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 589.8

Initial ground water level (ft datum) default, 114.60

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 98.3000                          | 0.0000                    | 114.600                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 98.3000                          | 0.0000                    | 128.755                    | 0.12575                                | 0.00000                                 | 589.8                                       | 0.8                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 128.738                    | 0.12575                                | 0.00000                                 | 589.8                                       | 10.9                                              | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 128.720                    | 0.12575                                | 0.00000                                 | 589.8                                       | 21.7                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 128.701                    | 0.12575                                | 0.00000                                 | 589.8                                       | 32.6                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 128.664                    | 0.12575                                | 0.00000                                 | 589.8                                       | 54.3                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 128.609                    | 0.12575                                | 0.00000                                 | 589.8                                       | 86.9                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 128.591                    | 0.12575                                | 0.00000                                 | 589.8                                       | 97.8                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 128.573                    | 0.12575                                | 0.00000                                 | 589.8                                       | 108.7                                             | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 128.536                    | 0.12575                                | 0.00000                                 | 589.8                                       | 130.4                                             | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 128.518                    | 0.12575                                | 0.00000                                 | 589.8                                       | 141.2                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 128.480                    | 0.12575                                | 0.00000                                 | 589.8                                       | 163.0                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 128.383                    | 0.12335                                | 0.00000                                 | 589.8                                       | 217.3                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 128.178                    | 0.10941                                | 0.00000                                 | 589.8                                       | 319.7                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 127.760                    | 0.07188                                | 0.00000                                 | 589.8                                       | 477.3                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 127.549                    | 0.05265                                | 0.00000                                 | 589.8                                       | 531.0                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 127.333                    | 0.03309                                | 0.00000                                 | 589.8                                       | 568.3                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 127.090                    | 0.01155                                | 0.00000                                 | 589.8                                       | 588.2                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 589.8                                       | 589.8                                             | 0.0                                            | dry       |

~2hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 161+50 to 161+75 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 98.63  
Water Table Elevation, [WT] (ft datum): 113.63  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 464.5

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 18.6  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br>(ft datum) | <u>Area</u><br>(ft <sup>2</sup> ) |
|----------------------------|-----------------------------------|
| 126.00                     | 0.0                               |
| 127.51                     | 541.0                             |



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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 427

Initial ground water level (ft datum) default, 113.63

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 71.1667                          | 0.0000                    | 113.630                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 71.1667                          | 0.0000                    | 127.543                    | 0.10752                                | 0.00000                                 | 427.0                                       | 0.6                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 127.527                    | 0.10752                                | 0.00000                                 | 427.0                                       | 9.3                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 127.510                    | 0.10752                                | 0.00000                                 | 427.0                                       | 18.6                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 127.493                    | 0.10752                                | 0.00000                                 | 427.0                                       | 27.9                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 127.458                    | 0.10752                                | 0.00000                                 | 427.0                                       | 46.5                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 127.403                    | 0.10752                                | 0.00000                                 | 427.0                                       | 74.3                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 127.385                    | 0.10752                                | 0.00000                                 | 427.0                                       | 83.6                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 127.366                    | 0.10752                                | 0.00000                                 | 427.0                                       | 92.9                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 127.327                    | 0.10752                                | 0.00000                                 | 427.0                                       | 111.5                                             | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 127.308                    | 0.10752                                | 0.00000                                 | 427.0                                       | 120.8                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 127.267                    | 0.10622                                | 0.00000                                 | 427.0                                       | 139.4                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 127.165                    | 0.09896                                | 0.00000                                 | 427.0                                       | 183.8                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 126.959                    | 0.08247                                | 0.00000                                 | 427.0                                       | 262.4                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 126.535                    | 0.04748                                | 0.00000                                 | 427.0                                       | 375.7                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 126.318                    | 0.02921                                | 0.00000                                 | 427.0                                       | 408.9                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 126.069                    | 0.00999                                | 0.00000                                 | 427.0                                       | 426.2                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 427.0                                       | 427.0                                             | 0.0                                            | dry       |

~1.7 hrs

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**Retention Pond Recovery - Refined Method**  
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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 161+75 to 162+00 It  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 97.66  
Water Table Elevation, [WT] (ft datum): 112.66  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 551.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 22.0  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 124.00              | 0.0                        |
| 126.50              | 582.8                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 657.75

Initial ground water level (ft datum) default, 112.66

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Retention Pond Recovery - Refined Method**  
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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 109.6250                         | 0.0000                    | 112.660                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 109.6250                         | 0.0000                    | 126.374                    | 0.12755                                | 0.00000                                 | 657.8                                       | 0.8                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 126.356                    | 0.12733                                | 0.00000                                 | 657.8                                       | 11.0                                              | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 126.336                    | 0.12656                                | 0.00000                                 | 657.8                                       | 22.0                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 126.315                    | 0.12566                                | 0.00000                                 | 657.8                                       | 32.9                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 126.275                    | 0.12407                                | 0.00000                                 | 657.8                                       | 54.5                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 126.214                    | 0.12030                                | 0.00000                                 | 657.8                                       | 86.3                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 126.194                    | 0.11894                                | 0.00000                                 | 657.8                                       | 96.6                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 126.174                    | 0.11803                                | 0.00000                                 | 657.8                                       | 106.9                                             | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 126.134                    | 0.11586                                | 0.00000                                 | 657.8                                       | 127.1                                             | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 126.114                    | 0.11477                                | 0.00000                                 | 657.8                                       | 137.1                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 126.073                    | 0.11304                                | 0.00000                                 | 657.8                                       | 156.8                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 125.972                    | 0.10792                                | 0.00000                                 | 657.8                                       | 204.5                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 125.768                    | 0.09735                                | 0.00000                                 | 657.8                                       | 293.3                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 125.358                    | 0.07524                                | 0.00000                                 | 657.8                                       | 442.9                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 125.152                    | 0.06402                                | 0.00000                                 | 657.8                                       | 503.0                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 124.946                    | 0.05288                                | 0.00000                                 | 657.8                                       | 553.5                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 124.738                    | 0.04165                                | 0.00000                                 | 657.8                                       | 594.4                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | 124.526                    | 0.03026                                | 0.00000                                 | 657.8                                       | 625.5                                             | 0.0                                            | U/P       |
| 2.400                | 0.0000                           | 0.0000                    | 124.309                    | 0.02043                                | 0.00000                                 | 657.8                                       | 646.7                                             | 0.0                                            | U/P       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 657.8                                       | 657.8                                             | 0.0                                            | dry       |

23h-5

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Water Quality Storage Between Ditch Blocks - Right

| Ditch-Station | Ditch Block Height (ft) | Elevation of Ditch Block (ft) | Ditch Back Slope (F) (ft) | Ditch Bottom Width (ft) | Ditch Fore Slope (B) (1:B) | Ditch Area at Ditch Block (sf) | Distance to Upstream Ditch Block or Zero Area (1:B) | Area at Upstream Ditch Block on Downstream Side (sf) | Volume (cf)                |
|---------------|-------------------------|-------------------------------|---------------------------|-------------------------|----------------------------|--------------------------------|-----------------------------------------------------|------------------------------------------------------|----------------------------|
| 156+25        | 1                       | 149.875                       | 2                         | 3.67                    | 4                          | 6.67                           | 25.00                                               | 4.17                                                 | 135.50                     |
| 156+50        | 1.4                     | 149.9                         | 2                         | 3.52                    | 4                          | 9.128                          | 25.00                                               | 6.68                                                 | 197.60                     |
| 156+75        | 1.2                     | 148.95                        | 2                         | 4.405                   | 4                          | 8.886                          | 25.00                                               | 3.33                                                 | 152.70                     |
| 157+00        | 1                       | 148                           | 2                         | 5.29                    | 4                          | 8.29                           | 25.00                                               | 2.07                                                 | 129.50                     |
| 157+25        | 1.2                     | 147.2                         | 2                         | 5.09                    | 4                          | 9.708                          | 25.00                                               | 1.62                                                 | 141.60                     |
| 157+50        | 1.5                     | 146.5                         | 2                         | 4.89                    | 4                          | 11.835                         | 25.00                                               | 3.95                                                 | 197.31                     |
| 157+75        | 1.6                     | 145.85                        | 2                         | 6.635                   | 4                          | 15.416                         | 25.00                                               | 8.19                                                 | 295.08                     |
| 158+00        | 1.6                     | 145.1                         | 2                         | 8.38                    | 4                          | 18.208                         | 25.00                                               | 9.67                                                 | 348.48                     |
| 158+25        | 1.1                     | 143.35                        | 2                         | 9.035                   | 4                          | 13.2385                        | 22.00                                               | 0                                                    | 145.62                     |
| 158+50        | 0.57                    | 141.57                        | 2                         | 9.69                    | 4                          | 7.2333                         | 11.40                                               | 0                                                    | 41.23                      |
| 158+75        | 0.55                    | 140.55                        | 2                         | 12.845                  | 4                          | 8.71475                        | 13.75                                               | 0                                                    | 59.91                      |
| 159+00        | 0.55                    | 139.55                        | 2                         | 16                      | 4                          | 10.45                          | 13.75                                               | 0                                                    | 71.84                      |
| 159+25        | 0.55                    | 138.05                        | 2                         | 16.405                  | 4                          | 10.67275                       | 9.17                                                | 0                                                    | 48.93                      |
| 159+50        | 0.6                     | 136.6                         | 2                         | 18.81                   | 4                          | 11.888                         | 10.00                                               | 0                                                    | 59.43                      |
| 159+75        | 0.6                     | 135.35                        | 2                         | 14.985                  | 4                          | 10.791                         | 12.00                                               | 0                                                    | 64.75                      |
| 160+00        | 0.55                    | 134.05                        | 2                         | 13.16                   | 4                          | 8.888                          | 11.00                                               | 0                                                    | 48.88                      |
| 160+25        | 0.7                     | 133.2                         | 2                         | 13.18                   | 4                          | 11.326                         | 17.50                                               | 0                                                    | 99.10                      |
| 160+50        | 0.75                    | 132.25                        | 2                         | 13.2                    | 4                          | 12.15                          | 18.75                                               | 0                                                    | 113.91                     |
| 160+75        | 0.9                     | 131.4                         | 2                         | 12.355                  | 4                          | 13.8195                        | 22.50                                               | 0                                                    | 155.47                     |
| 161+00        | 0.8                     | 130.3                         | 2                         | 11.51                   | 4                          | 11.608                         | 20.00                                               | 0                                                    | 116.08                     |
| 161+25        | 0.95                    | 129.6                         | 2                         | 11.35                   | 4                          | 13.6325                        | 25.00                                               | 1.44                                                 | 188.41                     |
| 161+50        | 0.92                    | 128.72                        | 2                         | 11.19                   | 4                          | 13.0548                        | 25.00                                               | 0.99                                                 | 175.56                     |
| 161+95        | 1                       | 127.74                        | 2                         | 12.5                    | 4                          | 15.5                           | 42.45                                               | 0                                                    | 328.99                     |
| <b>Total</b>  |                         |                               |                           |                         |                            |                                |                                                     |                                                      | <b>3315.88</b><br>0.076 af |

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HARTWOOD MARSH ROAD  
 BASIN 3  
 INTERIM CONDITION  
 MAXIMUM SWALE STORAGE CALCULATIONS

**HNTB**

Ditch Parameters-Right Side

| Station | Ditch Bottom (ft) | Max. Depth (ft) | Max. Elevation (ft) | Est. Elev. Of Base (ft) | Slope | Ditch Back Slope (F) (1:F) | Ditch Bottom Width (ft) | Ditch Fore Slope (B) (1:B) |
|---------|-------------------|-----------------|---------------------|-------------------------|-------|----------------------------|-------------------------|----------------------------|
| 156+00  | 149.25            | 0.74            | 149.99              | 150.88                  |       | 2                          | 3.82                    | 4                          |
|         |                   |                 |                     |                         | 0.015 |                            |                         |                            |
| 156+25  | 148.875           | 1.05            | 149.93              | 150.585                 |       | 2                          | 3.67                    | 4                          |
|         |                   |                 |                     |                         | 0.015 |                            |                         |                            |
| 156+50  | 148.5             | 1.36            | 149.86              | 150.29                  |       | 2                          | 3.52                    | 4                          |
|         |                   |                 |                     |                         | 0.030 |                            |                         |                            |
| 156+75  | 147.75            | 1.18            | 148.93              | 149.625                 |       | 2                          | 4.405                   | 4                          |
|         |                   |                 |                     |                         | 0.030 |                            |                         |                            |
| 157+00  | 147               | 1.00            | 148.00              | 148.96                  |       | 2                          | 5.29                    | 4                          |
|         |                   |                 |                     |                         | 0.040 |                            |                         |                            |
| 157+25  | 146               | 1.29            | 147.29              | 148.05                  |       | 2                          | 5.09                    | 4                          |
|         |                   |                 |                     |                         | 0.040 |                            |                         |                            |
| 157+50  | 145               | 1.57            | 146.57              | 147.14                  |       | 2                          | 4.89                    | 4                          |
|         |                   |                 |                     |                         | 0.030 |                            |                         |                            |
| 157+75  | 144.25            | 1.80            | 145.85              | 146.14                  |       | 2                          | 6.635                   | 4                          |
|         |                   |                 |                     |                         | 0.030 |                            |                         |                            |
| 158+00  | 143.5             | 1.62            | 145.12              | 145.14                  |       | 2                          | 8.38                    | 4                          |
|         |                   |                 |                     |                         | 0.050 |                            |                         |                            |
| 158+25  | 142.25            | 1.76            | 144.01              | 143.36                  |       | 2                          | 9.035                   | 4                          |
|         |                   |                 |                     |                         | 0.050 |                            |                         |                            |
| 158+50  | 141               | 1.89            | 142.89              | 141.58                  |       | 2                          | 9.69                    | 4                          |
|         |                   |                 |                     |                         | 0.040 |                            |                         |                            |
| 158+75  | 140               | 1.51            | 141.52              | 140.565                 |       | 2                          | 12.845                  | 4                          |
|         |                   |                 |                     |                         | 0.040 |                            |                         |                            |
| 159+00  | 139               | 1.14            | 140.14              | 139.55                  |       | 2                          | 16                      | 4                          |
|         |                   |                 |                     |                         | 0.060 |                            |                         |                            |
| 159+25  | 137.5             | 1.13            | 138.63              | 138.08                  |       | 2                          | 16.405                  | 4                          |
|         |                   |                 |                     |                         | 0.060 |                            |                         |                            |
| 159+50  | 136               | 1.11            | 137.11              | 136.61                  |       | 2                          | 16.81                   | 4                          |
|         |                   |                 |                     |                         | 0.050 |                            |                         |                            |
| 159+75  | 134.75            | 0.97            | 135.72              | 135.35                  |       | 2                          | 14.985                  | 4                          |
|         |                   |                 |                     |                         | 0.050 |                            |                         |                            |
| 160+00  | 133.5             | 0.83            | 134.33              | 134.09                  |       | 2                          | 13.16                   | 4                          |
|         |                   |                 |                     |                         | 0.040 |                            |                         |                            |
| 160+25  | 132.5             | 1.13            | 133.64              | 133.195                 |       | 2                          | 13.18                   | 4                          |
|         |                   |                 |                     |                         | 0.040 |                            |                         |                            |
| 160+50  | 131.5             | 1.44            | 132.94              | 132.3                   |       | 2                          | 13.2                    | 4                          |
|         |                   |                 |                     |                         | 0.040 |                            |                         |                            |
| 160+75  | 130.5             | 1.55            | 132.05              | 131.405                 |       | 2                          | 12.355                  | 4                          |
|         |                   |                 |                     |                         | 0.040 |                            |                         |                            |
| 161+00  | 129.5             | 1.65            | 131.15              | 130.51                  |       | 2                          | 11.51                   | 4                          |
|         |                   |                 |                     |                         | 0.034 |                            |                         |                            |
| 161+25  | 128.65            | 1.63            | 130.29              | 129.627                 |       | 2                          | 11.35                   | 4                          |
|         |                   |                 |                     |                         | 0.034 |                            |                         |                            |
| 161+50  | 127.8             | 1.62            | 129.42              | 128.744                 |       | 2                          | 11.19                   | 4                          |
|         |                   |                 |                     |                         | 0.024 |                            |                         |                            |
| 161+85  | 126.74            | 1.87            | 128.61              | 127.74                  |       | 2                          | 12.5                    | 4                          |
|         |                   |                 |                     |                         |       |                            |                         |                            |

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Parameters for Recovery Analysis - Right Ditch

| Ditch Block | Estimated SHGW (ft) | Confining Layer Elevation (ft) | Width at Ditch Block (ft) | Width at upper end of swale basin (ft) | Equivalent Pond Width (ft) | Equivalent Pond Length (ft) | Stage 1 (ft) | Area 1 (sf) | Stage 2 (ft) | Area 2 (sf) |
|-------------|---------------------|--------------------------------|---------------------------|----------------------------------------|----------------------------|-----------------------------|--------------|-------------|--------------|-------------|
| 156+25      | 137.81              | 122.81                         | 9.67                      | 3.82                                   | 6.75                       | 25.00                       | 148.88       | 0.00        | 149.93       | 223.00      |
| 156+50      | 136.73              | 121.73                         | 11.92                     | 3.67                                   | 7.80                       | 25.00                       | 148.50       | 0.00        | 149.86       | 265.75      |
| 156+75      | 135.65              | 120.65                         | 11.61                     | 3.52                                   | 7.56                       | 25.00                       | 147.75       | 0.00        | 148.93       | 219.81      |
| 157+00      | 134.57              | 119.57                         | 11.29                     | 4.41                                   | 7.85                       | 25.00                       | 147.00       | 0.00        | 148.00       | 214.94      |
| 157+25      | 133.83              | 118.83                         | 12.29                     | 5.29                                   | 8.79                       | 25.00                       | 146.00       | 0.00        | 147.29       | 247.50      |
| 157+50      | 133.09              | 118.09                         | 13.89                     | 5.09                                   | 9.49                       | 25.00                       | 145.00       | 0.00        | 146.57       | 285.25      |
| 157+75      | 132.34              | 117.34                         | 16.24                     | 4.89                                   | 10.56                      | 25.00                       | 144.25       | 0.00        | 145.85       | 327.06      |
| 158+00      | 131.60              | 116.60                         | 17.98                     | 6.64                                   | 12.31                      | 25.00                       | 143.50       | 0.00        | 145.12       | 374.44      |
| 158+25      | 130.03              | 115.03                         | 15.64                     | 8.38                                   | 12.01                      | 22.00                       | 142.25       | 0.00        | 144.01       | 387.19      |
| 158+50      | 128.45              | 113.45                         | 13.11                     | 9.04                                   | 11.07                      | 11.40                       | 141.00       | 0.00        | 142.89       | 423.81      |
| 158+75      | 126.88              | 111.88                         | 16.15                     | 9.69                                   | 12.92                      | 13.75                       | 140.00       | 0.00        | 141.52       | 433.94      |
| 159+00      | 125.30              | 110.30                         | 19.30                     | 12.85                                  | 16.07                      | 13.75                       | 139.00       | 0.00        | 140.14       | 456.56      |
| 159+25      | 124.08              | 109.08                         | 19.71                     | 16.00                                  | 17.85                      | 9.17                        | 137.50       | 0.00        | 138.63       | 367.08      |
| 159+50      | 122.86              | 107.86                         | 20.41                     | 16.41                                  | 18.41                      | 10.00                       | 136.00       | 0.00        | 137.11       | 368.84      |
| 159+75      | 121.64              | 106.64                         | 18.59                     | 16.81                                  | 17.70                      | 12.00                       | 134.75       | 0.00        | 135.72       | 364.87      |
| 160+00      | 120.42              | 105.42                         | 16.46                     | 14.97                                  | 15.72                      | 11.00                       | 133.50       | 0.00        | 134.33       | 274.94      |
| 160+25      | 119.45              | 104.45                         | 17.38                     | 13.16                                  | 15.27                      | 17.50                       | 132.50       | 0.00        | 133.64       | 424.50      |
| 160+50      | 118.48              | 103.48                         | 17.70                     | 13.18                                  | 15.44                      | 18.75                       | 131.50       | 0.00        | 132.94       | 470.75      |
| 160+75      | 117.50              | 102.50                         | 17.76                     | 13.20                                  | 15.48                      | 25.00                       | 130.50       | 0.00        | 132.05       | 476.19      |
| 161+00      | 116.53              | 101.53                         | 16.31                     | 12.35                                  | 14.33                      | 25.00                       | 129.50       | 0.00        | 131.15       | 470.81      |
| 161+25      | 115.56              | 100.56                         | 17.05                     | 11.51                                  | 14.28                      | 25.00                       | 128.65       | 0.00        | 130.29       | 467.25      |
| 161+50      | 114.60              | 99.60                          | 16.71                     | 11.35                                  | 14.03                      | 25.00                       | 127.80       | 0.00        | 129.42       | 461.00      |
| 161+95      | 113.63              | 98.63                          | 18.50                     | 11.19                                  | 14.85                      | 42.45                       | 126.74       | 0.00        | 128.61       | 894.82      |

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 156+00 to 156+25 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 122.81  
Water Table Elevation, [WT] (ft datum): 137.81  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 168.8

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 6.8  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 148.88              | 0.0                        |
| 149.93              | 223.0                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 135.5

Initial ground water level (ft datum) default, 137.81

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.010                                        | 0.100                                        | 0.450                                        | 3.000                                        |
| 0.002                                        | 0.015                                        | 0.150                                        | 0.500                                        | 3.500                                        |
| 0.003                                        | 0.020                                        | 0.250                                        | 1.000                                        | 4.000                                        |
| 0.005                                        | 0.030                                        | 0.300                                        | 1.500                                        |                                              |
| 0.008                                        | 0.050                                        | 0.350                                        | 2.000                                        |                                              |
| 0.009                                        | 0.080                                        | 0.400                                        | 2.500                                        |                                              |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 22.5833                          | 0.0000                    | 137.810                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 22.5833                          | 0.0000                    | 150.012                    | 0.03906                                | 0.00000                                 | 135.5                                       | 0.2                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 149.998                    | 0.03906                                | 0.00000                                 | 135.5                                       | 3.4                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 149.982                    | 0.03906                                | 0.00000                                 | 135.5                                       | 6.8                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 149.967                    | 0.03906                                | 0.00000                                 | 135.5                                       | 10.1                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 149.937                    | 0.03906                                | 0.00000                                 | 135.5                                       | 16.9                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 149.891                    | 0.03906                                | 0.00000                                 | 135.5                                       | 27.0                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 149.875                    | 0.03906                                | 0.00000                                 | 135.5                                       | 30.4                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 149.859                    | 0.03906                                | 0.00000                                 | 135.5                                       | 33.8                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 149.774                    | 0.03906                                | 0.00000                                 | 135.5                                       | 50.6                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 149.680                    | 0.03799                                | 0.00000                                 | 135.5                                       | 67.5                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 149.471                    | 0.03068                                | 0.00000                                 | 135.5                                       | 98.5                                              | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 149.011                    | 0.01223                                | 0.00000                                 | 135.5                                       | 133.7                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 135.5                                       | 135.5                                             | 0.0                                            | dry       |

~1.5 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 156+25 to 156+50 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 121.73  
Water Table Elevation, [WT] (ft datum): 136.73  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 195.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 7.8  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br>(ft datum) | <u>Area</u><br>(ft <sup>2</sup> ) |
|----------------------------|-----------------------------------|
| 148.50                     | 0.0                               |
| 149.86                     | 265.8                             |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 197.6

Initial ground water level (ft datum) default, 136.73

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.010                         | 0.100                         | 0.450                         | 3.000                         |
| 0.002                         | 0.015                         | 0.150                         | 0.500                         | 3.500                         |
| 0.003                         | 0.020                         | 0.250                         | 1.000                         | 4.000                         |
| 0.005                         | 0.030                         | 0.300                         | 1.500                         |                               |
| 0.008                         | 0.050                         | 0.350                         | 2.000                         |                               |
| 0.009                         | 0.080                         | 0.400                         | 2.500                         |                               |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 32.9333                          | 0.0000                    | 136.730                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 32.9333                          | 0.0000                    | 149.923                    | 0.04514                                | 0.00000                                 | 197.6                                       | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 149.909                    | 0.04514                                | 0.00000                                 | 197.6                                       | 3.9                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 149.894                    | 0.04514                                | 0.00000                                 | 197.6                                       | 7.8                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 149.880                    | 0.04514                                | 0.00000                                 | 197.6                                       | 11.7                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 149.850                    | 0.04514                                | 0.00000                                 | 197.6                                       | 19.5                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 149.805                    | 0.04514                                | 0.00000                                 | 197.6                                       | 31.2                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 149.790                    | 0.04514                                | 0.00000                                 | 197.6                                       | 35.1                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 149.774                    | 0.04514                                | 0.00000                                 | 197.6                                       | 39.0                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 149.693                    | 0.04514                                | 0.00000                                 | 197.6                                       | 58.5                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 149.606                    | 0.04504                                | 0.00000                                 | 197.6                                       | 78.0                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 149.410                    | 0.04107                                | 0.00000                                 | 197.6                                       | 116.8                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 148.985                    | 0.02011                                | 0.00000                                 | 197.6                                       | 174.7                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.6                                       | 197.6                                             | 0.0                                            | dry       |

~1.5 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 156+50 to 156+75 rt  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-04-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 120.65  
 Water Table Elevation, [WT] (ft datum): 135.65  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 189.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
 Equivalent Pond Width, [W] (ft): 7.6  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 147.75              | 0.0                        |
| 148.93              | 219.8                      |



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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 152.7

Initial ground water level (ft datum) default, 135.65

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.001                               | 0.010                               | 0.100                               | 0.450                               | 3.000                               |
| 0.002                               | 0.015                               | 0.150                               | 0.500                               | 3.500                               |
| 0.003                               | 0.020                               | 0.250                               | 1.000                               | 4.000                               |
| 0.005                               | 0.030                               | 0.300                               | 1.500                               |                                     |
| 0.008                               | 0.050                               | 0.350                               | 2.000                               |                                     |
| 0.009                               | 0.080                               | 0.400                               | 2.500                               |                                     |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 25.4500                          | 0.0000                    | 135.650                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 25.4500                          | 0.0000                    | 149.034                    | 0.04375                                | 0.00000                                 | 152.7                                       | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 149.018                    | 0.04375                                | 0.00000                                 | 152.7                                       | 3.8                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 149.000                    | 0.04375                                | 0.00000                                 | 152.7                                       | 7.6                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 148.983                    | 0.04375                                | 0.00000                                 | 152.7                                       | 11.3                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 148.949                    | 0.04375                                | 0.00000                                 | 152.7                                       | 18.9                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 148.897                    | 0.04375                                | 0.00000                                 | 152.7                                       | 30.2                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 148.879                    | 0.04375                                | 0.00000                                 | 152.7                                       | 34.0                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 148.861                    | 0.04375                                | 0.00000                                 | 152.7                                       | 37.8                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 148.765                    | 0.04320                                | 0.00000                                 | 152.7                                       | 56.7                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 148.663                    | 0.04056                                | 0.00000                                 | 152.7                                       | 75.1                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 148.454                    | 0.03188                                | 0.00000                                 | 152.7                                       | 106.5                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 148.015                    | 0.01375                                | 0.00000                                 | 152.7                                       | 146.2                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 152.7                                       | 152.7                                             | 0.0                                            | dry       |

~1.5 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 156+75 to 157+00 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 119.57  
Water Table Elevation, [WT] (ft datum): 134.57  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [lv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 196.3

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 7.9  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage<br/>(ft datum)</u> | <u>Area<br/>(ft<sup>2</sup>)</u> |
|-----------------------------|----------------------------------|
| 147.00                      | 0.0                              |
| 148.00                      | 214.9                            |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 129.5

Initial ground water level (ft datum) default, 134.57

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 1.500                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 2.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.500                                        | 2.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.600                                        | 3.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.700                                        | 3.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.800                                        | 4.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.900                                        |                                              |
| 0.012                                        | 0.080                                        | 0.450                                        | 1.000                                        |                                              |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type  |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|------------|
| 0.000                | 21.5833                          | 0.0000                    | 134.570                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.       |
| 0.002                | 21.5833                          | 0.0000                    | 148.101                    | 0.04543                                | 0.00000                                 | 129.5                                       | 0.3                                               | 0.0                                            | U/P        |
| 0.024                | 0.0000                           | 0.0000                    | 148.084                    | 0.04543                                | 0.00000                                 | 129.5                                       | 3.9                                               | 0.0                                            | U/P        |
| 0.048                | 0.0000                           | 0.0000                    | 148.066                    | 0.04543                                | 0.00000                                 | 129.5                                       | 7.9                                               | 0.0                                            | U/P        |
| 0.072                | 0.0000                           | 0.0000                    | 148.048                    | 0.04543                                | 0.00000                                 | 129.5                                       | 11.8                                              | 0.0                                            | U/P        |
| 0.120                | 0.0000                           | 0.0000                    | 148.011                    | 0.04543                                | 0.00000                                 | 129.5                                       | 19.6                                              | 0.0                                            | U/P        |
| 0.192                | 0.0000                           | 0.0000                    | 147.955                    | 0.04543                                | 0.00000                                 | 129.5                                       | 31.4                                              | 0.0                                            | U/P        |
| 0.216                | 0.0000                           | 0.0000                    | 147.936                    | 0.04543                                | 0.00000                                 | 129.5                                       | 35.3                                              | 0.0                                            | U/P        |
| 0.240                | 0.0000                           | 0.0000                    | 147.916                    | 0.04543                                | 0.00000                                 | 129.5                                       | 39.3                                              | 0.0                                            | U/P        |
| 0.288                | 0.0000                           | 0.0000                    | 147.876                    | 0.04419                                | 0.00000                                 | 129.5                                       | 47.1                                              | 0.0                                            | U/P        |
| 0.312                | 0.0000                           | 0.0000                    | 147.855                    | 0.04323                                | 0.00000                                 | 129.5                                       | 50.9                                              | 0.0                                            | U/P        |
| 0.360                | 0.0000                           | 0.0000                    | 147.814                    | 0.04161                                | 0.00000                                 | 129.5                                       | 58.2                                              | 0.0                                            | U/P        |
| 0.480                | 0.0000                           | 0.0000                    | 147.711                    | 0.03678                                | 0.00000                                 | 129.5                                       | 75.2                                              | 0.0                                            | U/P        |
| 0.720                | 0.0000                           | 0.0000                    | 147.499                    | 0.02125                                | 0.00000                                 | 129.5                                       | 102.7                                             | 0.0                                            | U/P ~ 1 hr |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 129.5                                       | 129.5                                             | 0.0                                            | dry        |

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 157+00 to 157+25 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 118.83  
Water Table Elevation, [WT] (ft datum): 133.83  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 219.8

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 8.8  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 146.00              | 0.0                        |
| 147.29              | 247.5                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 141.6

Initial ground water level (ft datum) default, 133.83

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 23.6000                          | 0.0000                    | 133.830                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 23.6000                          | 0.0000                    | 147.214                    | 0.05087                                | 0.00000                                 | 141.6                                       | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 147.196                    | 0.05087                                | 0.00000                                 | 141.6                                       | 4.4                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 147.177                    | 0.05087                                | 0.00000                                 | 141.6                                       | 8.8                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 147.157                    | 0.05087                                | 0.00000                                 | 141.6                                       | 13.2                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 147.117                    | 0.05036                                | 0.00000                                 | 141.6                                       | 22.0                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 147.055                    | 0.04754                                | 0.00000                                 | 141.6                                       | 34.8                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 147.035                    | 0.04641                                | 0.00000                                 | 141.6                                       | 38.9                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 147.015                    | 0.04566                                | 0.00000                                 | 141.6                                       | 42.8                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 146.974                    | 0.04385                                | 0.00000                                 | 141.6                                       | 50.6                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 146.954                    | 0.04295                                | 0.00000                                 | 141.6                                       | 54.4                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 146.913                    | 0.04150                                | 0.00000                                 | 141.6                                       | 61.7                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 146.810                    | 0.03722                                | 0.00000                                 | 141.6                                       | 78.7                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 146.600                    | 0.02818                                | 0.00000                                 | 141.6                                       | 107.1                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 146.143                    | 0.00628                                | 0.00000                                 | 141.6                                       | 139.6                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 141.6                                       | 141.6                                             | 0.0                                            | dry       |

~1.3 hrs



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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 157+25 to 157+50 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 118.09  
Water Table Elevation, [WT] (ft datum): 133.09  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 237.3

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 9.5  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage<br/>(ft datum)</u> | <u>Area<br/>(ft<sup>2</sup>)</u> |
|-----------------------------|----------------------------------|
| 145.00                      | 0.0                              |
| 146.57                      | 285.3                            |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 197.31

Initial ground water level (ft datum) default, 133.09

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 32.8850                          | 0.0000                    | 133.090                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 32.8850                          | 0.0000                    | 146.473                    | 0.05492                                | 0.00000                                 | 197.3                                       | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 146.456                    | 0.05492                                | 0.00000                                 | 197.3                                       | 4.7                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 146.438                    | 0.05492                                | 0.00000                                 | 197.3                                       | 9.5                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 146.420                    | 0.05492                                | 0.00000                                 | 197.3                                       | 14.2                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 146.382                    | 0.05492                                | 0.00000                                 | 197.3                                       | 23.7                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 146.324                    | 0.05492                                | 0.00000                                 | 197.3                                       | 38.0                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 146.305                    | 0.05489                                | 0.00000                                 | 197.3                                       | 42.7                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 146.284                    | 0.05458                                | 0.00000                                 | 197.3                                       | 47.4                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 146.244                    | 0.05288                                | 0.00000                                 | 197.3                                       | 56.8                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 146.224                    | 0.05203                                | 0.00000                                 | 197.3                                       | 61.3                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 146.183                    | 0.05067                                | 0.00000                                 | 197.3                                       | 70.2                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 146.081                    | 0.04663                                | 0.00000                                 | 197.3                                       | 91.2                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 145.874                    | 0.03824                                | 0.00000                                 | 197.3                                       | 128.0                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 145.447                    | 0.02035                                | 0.00000                                 | 197.3                                       | 179.2                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 145.224                    | 0.00786                                | 0.00000                                 | 197.3                                       | 192.8                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 197.3                                       | 197.3                                             | 0.0                                            | dry       |

~ 1.5hs

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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 157+50 to 157+75 rt  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 117.34  
 Water Table Elevation, [WT] (ft datum): 132.34  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 264.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
 Equivalent Pond Width, [W] (ft): 10.6  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 144.25              | 0.0                        |
| 145.85              | 327.1                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 295.08

Initial ground water level (ft datum) default, 132.34

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 49.1800                          | 0.0000                    | 132.340                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 49.1800                          | 0.0000                    | 145.951                    | 0.06111                                | 0.00000                                 | 295.1                                       | 0.4                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 145.936                    | 0.06111                                | 0.00000                                 | 295.1                                       | 5.3                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 145.920                    | 0.06111                                | 0.00000                                 | 295.1                                       | 10.6                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 145.904                    | 0.06111                                | 0.00000                                 | 295.1                                       | 15.8                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 145.872                    | 0.06111                                | 0.00000                                 | 295.1                                       | 26.4                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 145.823                    | 0.06111                                | 0.00000                                 | 295.1                                       | 42.2                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 145.806                    | 0.06111                                | 0.00000                                 | 295.1                                       | 47.5                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 145.790                    | 0.06111                                | 0.00000                                 | 295.1                                       | 52.8                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 145.756                    | 0.06111                                | 0.00000                                 | 295.1                                       | 63.4                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 145.739                    | 0.06111                                | 0.00000                                 | 295.1                                       | 68.6                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 145.703                    | 0.06111                                | 0.00000                                 | 295.1                                       | 79.2                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 145.612                    | 0.06078                                | 0.00000                                 | 295.1                                       | 105.6                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 145.410                    | 0.05575                                | 0.00000                                 | 295.1                                       | 157.5                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 144.992                    | 0.03687                                | 0.00000                                 | 295.1                                       | 238.8                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 144.781                    | 0.02677                                | 0.00000                                 | 295.1                                       | 266.3                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 144.564                    | 0.01645                                | 0.00000                                 | 295.1                                       | 285.0                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 144.312                    | 0.00559                                | 0.00000                                 | 295.1                                       | 294.7                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 295.1                                       | 295.1                                             | 0.0                                            | dry       |

22 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 157+75 to 158+00 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 116.60  
Water Table Elevation, [WT] (ft datum): 131.60  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 307.8

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 12.3  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 143.50              | 0.0                        |
| 145.12              | 374.4                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 348.48

Initial ground water level (ft datum) default, 131.60

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |



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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 58.0800                          | 0.0000                    | 131.600                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 58.0800                          | 0.0000                    | 145.240                    | 0.07124                                | 0.00000                                 | 348.5                                       | 0.4                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 145.224                    | 0.07124                                | 0.00000                                 | 348.5                                       | 6.2                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 145.208                    | 0.07124                                | 0.00000                                 | 348.5                                       | 12.3                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 145.191                    | 0.07124                                | 0.00000                                 | 348.5                                       | 18.5                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 145.159                    | 0.07124                                | 0.00000                                 | 348.5                                       | 30.8                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 145.109                    | 0.07124                                | 0.00000                                 | 348.5                                       | 49.2                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 145.093                    | 0.07124                                | 0.00000                                 | 348.5                                       | 55.4                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 145.076                    | 0.07124                                | 0.00000                                 | 348.5                                       | 61.6                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 145.042                    | 0.07124                                | 0.00000                                 | 348.5                                       | 73.9                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 145.024                    | 0.07124                                | 0.00000                                 | 348.5                                       | 80.0                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 144.989                    | 0.07124                                | 0.00000                                 | 348.5                                       | 92.3                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 144.897                    | 0.07083                                | 0.00000                                 | 348.5                                       | 123.1                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 144.695                    | 0.06502                                | 0.00000                                 | 348.5                                       | 183.6                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 144.277                    | 0.04357                                | 0.00000                                 | 348.5                                       | 278.7                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | 144.067                    | 0.03218                                | 0.00000                                 | 348.5                                       | 311.4                                             | 0.0                                            | U/P       |
| 1.680                | 0.0000                           | 0.0000                    | 143.851                    | 0.02062                                | 0.00000                                 | 348.5                                       | 334.3                                             | 0.0                                            | U/P       |
| 1.920                | 0.0000                           | 0.0000                    | 143.614                    | 0.00736                                | 0.00000                                 | 348.5                                       | 347.0                                             | 0.0                                            | U/P       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 348.5                                       | 348.5                                             | 0.0                                            | dry       |

~2hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 158+00 to 158+25 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 115.03  
Water Table Elevation, [WT] (ft datum): 130.03  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 264.2

**Geometry Data**

Equivalent Pond Length, [L] (ft): 22.0  
Equivalent Pond Width, [W] (ft): 12.0  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage<br/>(ft datum)</u> | <u>Area<br/>(ft<sup>2</sup>)</u> |
|-----------------------------|----------------------------------|
| 142.25                      | 0.0                              |
| 144.01                      | 387.2                            |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 145.62

Initial ground water level (ft datum) default, 130.03

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 24.2700                          | 0.0000                    | 130.030                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 24.2700                          | 0.0000                    | 143.399                    | 0.05859                                | 0.00000                                 | 145.6                                       | 0.4                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 143.380                    | 0.05806                                | 0.00000                                 | 145.6                                       | 5.1                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 143.360                    | 0.05705                                | 0.00000                                 | 145.6                                       | 10.0                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 143.340                    | 0.05620                                | 0.00000                                 | 145.6                                       | 14.9                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 143.299                    | 0.05468                                | 0.00000                                 | 145.6                                       | 24.5                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 143.238                    | 0.05107                                | 0.00000                                 | 145.6                                       | 38.4                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 143.217                    | 0.04977                                | 0.00000                                 | 145.6                                       | 42.7                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 143.197                    | 0.04892                                | 0.00000                                 | 145.6                                       | 47.0                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 143.156                    | 0.04684                                | 0.00000                                 | 145.6                                       | 55.3                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 143.136                    | 0.04580                                | 0.00000                                 | 145.6                                       | 59.3                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 143.095                    | 0.04415                                | 0.00000                                 | 145.6                                       | 67.1                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 142.992                    | 0.03921                                | 0.00000                                 | 145.6                                       | 85.1                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 142.781                    | 0.02876                                | 0.00000                                 | 145.6                                       | 114.7                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 142.276                    | 0.00596                                | 0.00000                                 | 145.6                                       | 145.5                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 145.6                                       | 145.6                                             | 0.0                                            | dry       |

~1.2hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 158+25 to 158+50 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 113.45  
Water Table Elevation, [WT] (ft datum): 128.45  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 126.2

**Geometry Data**

Equivalent Pond Length, [L] (ft): 11.4  
Equivalent Pond Width, [W] (ft): 11.1  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage<br/>(ft datum)</u> | <u>Area<br/>(ft<sup>2</sup>)</u> |
|-----------------------------|----------------------------------|
| 141.00                      | 0.0                              |
| 142.89                      | 423.8                            |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 41.23

Initial ground water level (ft datum) default, 128.45

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 6.8717                           | 0.0000                    | 128.450                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 6.8717                           | 0.0000                    | 141.605                    | 0.02921                                | 0.00000                                 | 41.2                                        | 0.2                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 141.588                    | 0.02921                                | 0.00000                                 | 41.2                                        | 2.5                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 141.568                    | 0.02921                                | 0.00000                                 | 41.2                                        | 5.0                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 141.548                    | 0.02896                                | 0.00000                                 | 41.2                                        | 7.6                                               | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 141.506                    | 0.02758                                | 0.00000                                 | 41.2                                        | 12.5                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 141.442                    | 0.02379                                | 0.00000                                 | 41.2                                        | 19.3                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 141.422                    | 0.02243                                | 0.00000                                 | 41.2                                        | 21.3                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 141.401                    | 0.02154                                | 0.00000                                 | 41.2                                        | 23.2                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 141.359                    | 0.01937                                | 0.00000                                 | 41.2                                        | 26.8                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 141.339                    | 0.01828                                | 0.00000                                 | 41.2                                        | 28.4                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 141.296                    | 0.01653                                | 0.00000                                 | 41.2                                        | 31.4                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 141.184                    | 0.00928                                | 0.00000                                 | 41.2                                        | 37.4                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 41.2                                        | 41.2                                              | 0.0                                            | dry       |

20.6 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 158+50 to 158+75 rt  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 111.88  
 Water Table Elevation, [WT] (ft datum): 126.88  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 177.7

**Geometry Data**

Equivalent Pond Length, [L] (ft): 13.8  
 Equivalent Pond Width, [W] (ft): 12.9  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 140.00              | 0.0                        |
| 141.52              | 433.9                      |



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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 59.91

Initial ground water level (ft datum) default, 126.88

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 9.9850                           | 0.0000                    | 126.880                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 9.9850                           | 0.0000                    | 140.647                    | 0.04112                                | 0.00000                                 | 59.9                                        | 0.2                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 140.628                    | 0.04112                                | 0.00000                                 | 59.9                                        | 3.6                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 140.608                    | 0.04066                                | 0.00000                                 | 59.9                                        | 7.1                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 140.588                    | 0.03975                                | 0.00000                                 | 59.9                                        | 10.6                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 140.546                    | 0.03775                                | 0.00000                                 | 59.9                                        | 17.3                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 140.483                    | 0.03295                                | 0.00000                                 | 59.9                                        | 26.7                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 140.462                    | 0.03122                                | 0.00000                                 | 59.9                                        | 29.4                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 140.442                    | 0.03010                                | 0.00000                                 | 59.9                                        | 32.0                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 140.400                    | 0.02735                                | 0.00000                                 | 59.9                                        | 37.1                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 140.379                    | 0.02597                                | 0.00000                                 | 59.9                                        | 39.4                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 140.337                    | 0.02375                                | 0.00000                                 | 59.9                                        | 43.7                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 140.227                    | 0.01365                                | 0.00000                                 | 59.9                                        | 52.5                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.9                                        | 59.9                                              | 0.0                                            | dry       |

no. 6 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 158+75 to 159+00 rt  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 110.30  
 Water Table Elevation, [WT] (ft datum): 125.30  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 206.5

**Geometry Data**

Equivalent Pond Length, [L] (ft): 16.1  
 Equivalent Pond Width, [W] (ft): 13.8  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 139.00              | 0.0                        |
| 140.14              | 456.6                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 71.84

Initial ground water level (ft datum) default, 125.30

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 11.9733                          | 0.0000                    | 125.300                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 11.9733                          | 0.0000                    | 139.598                    | 0.04780                                | 0.00000                                 | 71.8                                        | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 139.582                    | 0.04780                                | 0.00000                                 | 71.8                                        | 4.1                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 139.564                    | 0.04780                                | 0.00000                                 | 71.8                                        | 8.3                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 139.545                    | 0.04780                                | 0.00000                                 | 71.8                                        | 12.4                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 139.506                    | 0.04743                                | 0.00000                                 | 71.8                                        | 20.7                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 139.442                    | 0.04242                                | 0.00000                                 | 71.8                                        | 32.8                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 139.421                    | 0.03999                                | 0.00000                                 | 71.8                                        | 36.3                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 139.401                    | 0.03840                                | 0.00000                                 | 71.8                                        | 39.7                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 139.358                    | 0.03453                                | 0.00000                                 | 71.8                                        | 46.1                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 139.338                    | 0.03258                                | 0.00000                                 | 71.8                                        | 49.0                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 139.295                    | 0.02945                                | 0.00000                                 | 71.8                                        | 54.4                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 139.183                    | 0.01653                                | 0.00000                                 | 71.8                                        | 65.1                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 71.8                                        | 71.8                                              | 0.0                                            | dry       |

no. 6 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 159+00 to 159+25 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 109.08  
Water Table Elevation, [WT] (ft datum): 124.08  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 163.6

**Geometry Data**

Equivalent Pond Length, [L] (ft): 17.9  
Equivalent Pond Width, [W] (ft): 9.2  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 137.50              | 0.0                        |
| 138.63              | 367.1                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 48.93

Initial ground water level (ft datum) default, 124.08

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Retention Pond Recovery - Refined Method**  
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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type    |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|--------------|
| 0.000                | 8.1550                           | 0.0000                    | 124.080                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.         |
| 0.002                | 8.1550                           | 0.0000                    | 138.048                    | 0.03787                                | 0.00000                                 | 48.9                                        | 0.2                                               | 0.0                                            | U/P          |
| 0.024                | 0.0000                           | 0.0000                    | 138.030                    | 0.03787                                | 0.00000                                 | 48.9                                        | 3.3                                               | 0.0                                            | U/P          |
| 0.048                | 0.0000                           | 0.0000                    | 138.011                    | 0.03787                                | 0.00000                                 | 48.9                                        | 6.5                                               | 0.0                                            | U/P          |
| 0.072                | 0.0000                           | 0.0000                    | 137.991                    | 0.03755                                | 0.00000                                 | 48.9                                        | 9.8                                               | 0.0                                            | U/P          |
| 0.120                | 0.0000                           | 0.0000                    | 137.949                    | 0.03564                                | 0.00000                                 | 48.9                                        | 16.2                                              | 0.0                                            | U/P          |
| 0.192                | 0.0000                           | 0.0000                    | 137.884                    | 0.03011                                | 0.00000                                 | 48.9                                        | 24.9                                              | 0.0                                            | U/P          |
| 0.216                | 0.0000                           | 0.0000                    | 137.864                    | 0.02812                                | 0.00000                                 | 48.9                                        | 27.4                                              | 0.0                                            | U/P          |
| 0.240                | 0.0000                           | 0.0000                    | 137.843                    | 0.02684                                | 0.00000                                 | 48.9                                        | 29.8                                              | 0.0                                            | U/P          |
| 0.288                | 0.0000                           | 0.0000                    | 137.801                    | 0.02367                                | 0.00000                                 | 48.9                                        | 34.3                                              | 0.0                                            | U/P          |
| 0.312                | 0.0000                           | 0.0000                    | 137.780                    | 0.02208                                | 0.00000                                 | 48.9                                        | 36.2                                              | 0.0                                            | U/P          |
| 0.360                | 0.0000                           | 0.0000                    | 137.736                    | 0.01950                                | 0.00000                                 | 48.9                                        | 39.9                                              | 0.0                                            | U/P          |
| 0.480                | 0.0000                           | 0.0000                    | 137.620                    | 0.01043                                | 0.00000                                 | 48.9                                        | 46.6                                              | 0.0                                            | U/P no-6 hrs |
| 0.720                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry          |



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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 159+25 to 159+50 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 107.86  
Water Table Elevation, [WT] (ft datum): 122.86  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 184.1

**Geometry Data**

Equivalent Pond Length, [L] (ft): 18.4  
Equivalent Pond Width, [W] (ft): 10.0  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage<br/>(ft datum)</u> | <u>Area<br/>(ft<sup>2</sup>)</u> |
|-----------------------------|----------------------------------|
| 136.00                      | 0.0                              |
| 137.11                      | 368.8                            |

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Scenario Input Data

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 59.43

Initial ground water level (ft datum) default, 122.86

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type    |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|--------------|
| 0.000                | 9.9050                           | 0.0000                    | 122.860                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.         |
| 0.002                | 9.9050                           | 0.0000                    | 136.597                    | 0.04262                                | 0.00000                                 | 59.4                                        | 0.3                                               | 0.0                                            | U/P          |
| 0.024                | 0.0000                           | 0.0000                    | 136.579                    | 0.04262                                | 0.00000                                 | 59.4                                        | 3.7                                               | 0.0                                            | U/P          |
| 0.048                | 0.0000                           | 0.0000                    | 136.560                    | 0.04262                                | 0.00000                                 | 59.4                                        | 7.4                                               | 0.0                                            | U/P          |
| 0.072                | 0.0000                           | 0.0000                    | 136.540                    | 0.04225                                | 0.00000                                 | 59.4                                        | 11.0                                              | 0.0                                            | U/P          |
| 0.120                | 0.0000                           | 0.0000                    | 136.498                    | 0.04023                                | 0.00000                                 | 59.4                                        | 18.2                                              | 0.0                                            | U/P          |
| 0.192                | 0.0000                           | 0.0000                    | 136.434                    | 0.03461                                | 0.00000                                 | 59.4                                        | 28.1                                              | 0.0                                            | U/P          |
| 0.216                | 0.0000                           | 0.0000                    | 136.413                    | 0.03259                                | 0.00000                                 | 59.4                                        | 31.0                                              | 0.0                                            | U/P          |
| 0.240                | 0.0000                           | 0.0000                    | 136.393                    | 0.03127                                | 0.00000                                 | 59.4                                        | 33.8                                              | 0.0                                            | U/P          |
| 0.288                | 0.0000                           | 0.0000                    | 136.351                    | 0.02806                                | 0.00000                                 | 59.4                                        | 39.0                                              | 0.0                                            | U/P          |
| 0.312                | 0.0000                           | 0.0000                    | 136.330                    | 0.02644                                | 0.00000                                 | 59.4                                        | 41.3                                              | 0.0                                            | U/P          |
| 0.360                | 0.0000                           | 0.0000                    | 136.287                    | 0.02384                                | 0.00000                                 | 59.4                                        | 45.7                                              | 0.0                                            | U/P          |
| 0.480                | 0.0000                           | 0.0000                    | 136.175                    | 0.01331                                | 0.00000                                 | 59.4                                        | 54.3                                              | 0.0                                            | U/P ~0.6 hrs |
| 0.720                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 59.4                                        | 59.4                                              | 0.0                                            | dry          |

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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 159+50 to 159+75 rt  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 106.64  
 Water Table Elevation, [WT] (ft datum): 121.64  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 212.4

**Geometry Data**

Equivalent Pond Length, [L] (ft): 17.7  
 Equivalent Pond Width, [W] (ft): 12.0  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 134.75              | 0.0                        |
| 135.72              | 364.9                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 64.75

Initial ground water level (ft datum) default, 121.64

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 10.7917                          | 0.0000                    | 121.640                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 10.7917                          | 0.0000                    | 135.335                    | 0.04917                                | 0.00000                                 | 64.8                                        | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 135.317                    | 0.04917                                | 0.00000                                 | 64.8                                        | 4.2                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 135.297                    | 0.04839                                | 0.00000                                 | 64.8                                        | 8.5                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 135.277                    | 0.04703                                | 0.00000                                 | 64.8                                        | 12.6                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 135.235                    | 0.04440                                | 0.00000                                 | 64.8                                        | 20.5                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 135.171                    | 0.03802                                | 0.00000                                 | 64.8                                        | 31.5                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 135.150                    | 0.03573                                | 0.00000                                 | 64.8                                        | 34.6                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 135.130                    | 0.03424                                | 0.00000                                 | 64.8                                        | 37.7                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 135.087                    | 0.03059                                | 0.00000                                 | 64.8                                        | 43.4                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 135.067                    | 0.02876                                | 0.00000                                 | 64.8                                        | 45.9                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 135.024                    | 0.02581                                | 0.00000                                 | 64.8                                        | 50.7                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 134.910                    | 0.01427                                | 0.00000                                 | 64.8                                        | 59.9                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 64.8                                        | 64.8                                              | 0.0                                            | dry       |

no. 6 hrs

315

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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 159+75 to 160+00 rt  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 105.42  
 Water Table Elevation, [WT] (ft datum): 120.42  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 172.9

**Geometry Data**

Equivalent Pond Length, [L] (ft): 15.7  
 Equivalent Pond Width, [W] (ft): 11.0  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 133.50              | 0.0                        |
| 134.33              | 274.9                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 48.88

Initial ground water level (ft datum) default, 120.42

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.001                               | 0.013                               | 0.090                               | 0.460                               | 0.900                               |
| 0.002                               | 0.015                               | 0.100                               | 0.470                               | 1.000                               |
| 0.003                               | 0.020                               | 0.150                               | 0.480                               | 1.500                               |
| 0.005                               | 0.030                               | 0.250                               | 0.490                               | 2.000                               |
| 0.008                               | 0.050                               | 0.300                               | 0.500                               | 2.500                               |
| 0.009                               | 0.060                               | 0.350                               | 0.600                               | 3.000                               |
| 0.010                               | 0.070                               | 0.400                               | 0.700                               | 3.500                               |
| 0.012                               | 0.080                               | 0.450                               | 0.800                               | 4.000                               |



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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 8.1467                           | 0.0000                    | 120.420                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 8.1467                           | 0.0000                    | 134.042                    | 0.04003                                | 0.00000                                 | 48.9                                        | 0.2                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 134.024                    | 0.04003                                | 0.00000                                 | 48.9                                        | 3.5                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 134.003                    | 0.03931                                | 0.00000                                 | 48.9                                        | 6.9                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 133.983                    | 0.03807                                | 0.00000                                 | 48.9                                        | 10.3                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 133.941                    | 0.03575                                | 0.00000                                 | 48.9                                        | 16.7                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 133.876                    | 0.03010                                | 0.00000                                 | 48.9                                        | 25.4                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 133.856                    | 0.02807                                | 0.00000                                 | 48.9                                        | 27.9                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 133.835                    | 0.02676                                | 0.00000                                 | 48.9                                        | 30.3                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 133.793                    | 0.02352                                | 0.00000                                 | 48.9                                        | 34.7                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 133.772                    | 0.02190                                | 0.00000                                 | 48.9                                        | 36.6                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 133.728                    | 0.01926                                | 0.00000                                 | 48.9                                        | 40.2                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 133.610                    | 0.01021                                | 0.00000                                 | 48.9                                        | 46.9                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 48.9                                        | 48.9                                              | 0.0                                            | dry       |

70.6 hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 160+00 to 160+25 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 104.45  
Water Table Elevation, [WT] (ft datum): 119.45  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 267.2

**Geometry Data**

Equivalent Pond Length, [L] (ft): 17.5  
Equivalent Pond Width, [W] (ft): 15.3  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 132.50              | 0.0                        |
| 133.64              | 424.5                      |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>)                      99.1

Initial ground water level (ft datum)    default, 119.45

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.001                               | 0.013                               | 0.090                               | 0.460                               | 0.900                               |
| 0.002                               | 0.015                               | 0.100                               | 0.470                               | 1.000                               |
| 0.003                               | 0.020                               | 0.150                               | 0.480                               | 1.500                               |
| 0.005                               | 0.030                               | 0.250                               | 0.490                               | 2.000                               |
| 0.008                               | 0.050                               | 0.300                               | 0.500                               | 2.500                               |
| 0.009                               | 0.060                               | 0.350                               | 0.600                               | 3.000                               |
| 0.010                               | 0.070                               | 0.400                               | 0.700                               | 3.500                               |
| 0.012                               | 0.080                               | 0.450                               | 0.800                               | 4.000                               |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 16.5167                          | 0.0000                    | 119.450                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 16.5167                          | 0.0000                    | 133.228                    | 0.06186                                | 0.00000                                 | 99.1                                        | 0.4                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 133.210                    | 0.06153                                | 0.00000                                 | 99.1                                        | 5.3                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 133.189                    | 0.06029                                | 0.00000                                 | 99.1                                        | 10.6                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 133.169                    | 0.05883                                | 0.00000                                 | 99.1                                        | 15.8                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 133.128                    | 0.05625                                | 0.00000                                 | 99.1                                        | 25.7                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 133.065                    | 0.05003                                | 0.00000                                 | 99.1                                        | 39.8                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 133.044                    | 0.04779                                | 0.00000                                 | 99.1                                        | 44.0                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 133.024                    | 0.04632                                | 0.00000                                 | 99.1                                        | 48.0                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 132.982                    | 0.04276                                | 0.00000                                 | 99.1                                        | 55.8                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 132.962                    | 0.04097                                | 0.00000                                 | 99.1                                        | 59.4                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 132.920                    | 0.03811                                | 0.00000                                 | 99.1                                        | 66.3                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 132.813                    | 0.02935                                | 0.00000                                 | 99.1                                        | 80.9                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 132.560                    | 0.01351                                | 0.00000                                 | 99.1                                        | 98.4                                              | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 99.1                                        | 99.1                                              | 0.0                                            | dry       |

~0.72hrs

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 160+25 to 160+50 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 103.48  
Water Table Elevation, [WT] (ft datum): 118.48  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 203.5

**Geometry Data**

Equivalent Pond Length, [L] (ft): 18.8  
Equivalent Pond Width, [W] (ft): 15.4  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage<br/>(ft datum)</u> | <u>Area<br/>(ft<sup>2</sup>)</u> |
|-----------------------------|----------------------------------|
| 131.50                      | 0.0                              |
| 132.94                      | 470.8                            |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 113.91

Initial ground water level (ft datum) default, 118.48

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 18.9850                          | 0.0000                    | 118.480                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 18.9850                          | 0.0000                    | 132.334                    | 0.04711                                | 0.00000                                 | 113.9                                       | 0.3                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 132.320                    | 0.04711                                | 0.00000                                 | 113.9                                       | 4.1                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 132.304                    | 0.04711                                | 0.00000                                 | 113.9                                       | 8.1                                               | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 132.289                    | 0.04711                                | 0.00000                                 | 113.9                                       | 12.2                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 132.257                    | 0.04711                                | 0.00000                                 | 113.9                                       | 20.4                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 132.206                    | 0.04711                                | 0.00000                                 | 113.9                                       | 32.6                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 132.188                    | 0.04711                                | 0.00000                                 | 113.9                                       | 36.6                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 132.169                    | 0.04711                                | 0.00000                                 | 113.9                                       | 40.7                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 132.131                    | 0.04711                                | 0.00000                                 | 113.9                                       | 48.8                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 132.111                    | 0.04681                                | 0.00000                                 | 113.9                                       | 52.9                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 132.070                    | 0.04477                                | 0.00000                                 | 113.9                                       | 60.9                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 131.964                    | 0.03729                                | 0.00000                                 | 113.9                                       | 78.7                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 131.743                    | 0.01976                                | 0.00000                                 | 113.9                                       | 104.3                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 113.9                                       | 113.9                                             | 0.0                                            | dry       |

~1 hr

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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 160+50 to 160+75 rt  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 102.50  
 Water Table Elevation, [WT] (ft datum): 117.50  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 348.3

**Geometry Data**

Equivalent Pond Length, [L] (ft): 22.5  
 Equivalent Pond Width, [W] (ft): 15.5  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 130.50              | 0.0                        |
| 132.05              | 476.2                      |



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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 155.47

Initial ground water level (ft datum) default, 117.50

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 25.9117                          | 0.0000                    | 117.500                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 25.9117                          | 0.0000                    | 131.505                    | 0.07154                                | 0.00000                                 | 155.5                                       | 0.4                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 131.486                    | 0.07080                                | 0.00000                                 | 155.5                                       | 6.2                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 131.466                    | 0.06939                                | 0.00000                                 | 155.5                                       | 12.2                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 131.445                    | 0.06819                                | 0.00000                                 | 155.5                                       | 18.2                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 131.405                    | 0.06607                                | 0.00000                                 | 155.5                                       | 29.8                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 131.342                    | 0.06101                                | 0.00000                                 | 155.5                                       | 46.5                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 131.322                    | 0.05919                                | 0.00000                                 | 155.5                                       | 51.6                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 131.302                    | 0.05799                                | 0.00000                                 | 155.5                                       | 56.7                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 131.261                    | 0.05508                                | 0.00000                                 | 155.5                                       | 66.5                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 131.241                    | 0.05363                                | 0.00000                                 | 155.5                                       | 71.2                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 131.200                    | 0.05131                                | 0.00000                                 | 155.5                                       | 80.3                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 131.095                    | 0.04436                                | 0.00000                                 | 155.5                                       | 101.0                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 130.881                    | 0.02486                                | 0.00000                                 | 155.5                                       | 133.2                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 155.5                                       | 155.5                                             | 0.0                                            | dry       |

~1 hr

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 160+75 to 161+00 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 101.53  
Water Table Elevation, [WT] (ft datum): 116.53  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 286.6

**Geometry Data**

Equivalent Pond Length, [L] (ft): 20.0  
Equivalent Pond Width, [W] (ft): 14.3  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage</u><br>(ft datum) | <u>Area</u><br>(ft <sup>2</sup> ) |
|----------------------------|-----------------------------------|
| 129.50                     | 0.0                               |
| 131.15                     | 470.8                             |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 116.08

Initial ground water level (ft datum) default, 116.53

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 19.3467                          | 0.0000                    | 116.530                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 19.3467                          | 0.0000                    | 130.401                    | 0.05957                                | 0.00000                                 | 116.1                                       | 0.4                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 130.382                    | 0.05889                                | 0.00000                                 | 116.1                                       | 5.1                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 130.362                    | 0.05758                                | 0.00000                                 | 116.1                                       | 10.2                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 130.341                    | 0.05646                                | 0.00000                                 | 116.1                                       | 15.1                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 130.300                    | 0.05449                                | 0.00000                                 | 116.1                                       | 24.7                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 130.238                    | 0.04977                                | 0.00000                                 | 116.1                                       | 38.4                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 130.218                    | 0.04807                                | 0.00000                                 | 116.1                                       | 42.6                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 130.197                    | 0.04695                                | 0.00000                                 | 116.1                                       | 46.7                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 130.156                    | 0.04425                                | 0.00000                                 | 116.1                                       | 54.7                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 130.136                    | 0.04289                                | 0.00000                                 | 116.1                                       | 58.4                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 130.095                    | 0.04072                                | 0.00000                                 | 116.1                                       | 65.7                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 129.990                    | 0.03421                                | 0.00000                                 | 116.1                                       | 81.9                                              | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 129.770                    | 0.01838                                | 0.00000                                 | 116.1                                       | 105.7                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 116.1                                       | 116.1                                             | 0.0                                            | dry       |

~1 hr

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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 161+00 to 161+25 rt  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 100.56  
Water Table Elevation, [WT] (ft datum): 115.56  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 357.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 14.3  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage<br/>(ft datum)</u> | <u>Area<br/>(ft<sup>2</sup>)</u> |
|-----------------------------|----------------------------------|
| 128.65                      | 0.0                              |
| 130.29                      | 467.3                            |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 188.41

Initial ground water level (ft datum) default, 115.56

| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 0.001                         | 0.013                         | 0.090                         | 0.460                         | 0.900                         |
| 0.002                         | 0.015                         | 0.100                         | 0.470                         | 1.000                         |
| 0.003                         | 0.020                         | 0.150                         | 0.480                         | 1.500                         |
| 0.005                         | 0.030                         | 0.250                         | 0.490                         | 2.000                         |
| 0.008                         | 0.050                         | 0.300                         | 0.500                         | 2.500                         |
| 0.009                         | 0.060                         | 0.350                         | 0.600                         | 3.000                         |
| 0.010                         | 0.070                         | 0.400                         | 0.700                         | 3.500                         |
| 0.012                         | 0.080                         | 0.450                         | 0.800                         | 4.000                         |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 31.4017                          | 0.0000                    | 115.560                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 31.4017                          | 0.0000                    | 129.799                    | 0.07584                                | 0.00000                                 | 188.4                                       | 0.5                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 129.780                    | 0.07516                                | 0.00000                                 | 188.4                                       | 6.5                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 129.760                    | 0.07385                                | 0.00000                                 | 188.4                                       | 13.0                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 129.740                    | 0.07274                                | 0.00000                                 | 188.4                                       | 19.3                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 129.699                    | 0.07078                                | 0.00000                                 | 188.4                                       | 31.7                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 129.637                    | 0.06611                                | 0.00000                                 | 188.4                                       | 49.7                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 129.617                    | 0.06442                                | 0.00000                                 | 188.4                                       | 55.3                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 129.597                    | 0.06331                                | 0.00000                                 | 188.4                                       | 60.8                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 129.556                    | 0.06063                                | 0.00000                                 | 188.4                                       | 71.6                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 129.535                    | 0.05928                                | 0.00000                                 | 188.4                                       | 76.7                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 129.495                    | 0.05714                                | 0.00000                                 | 188.4                                       | 86.8                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 129.391                    | 0.05075                                | 0.00000                                 | 188.4                                       | 110.1                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 129.180                    | 0.03721                                | 0.00000                                 | 188.4                                       | 148.4                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 128.674                    | 0.00770                                | 0.00000                                 | 188.4                                       | 188.3                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 188.4                                       | 188.4                                             | 0.0                                            | dry       |

~1.2 hrs



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**Project Data**

Project Name: Hartwood Marsh Road  
Simulation Description: Swale Recovery Water Quality  
Sta. 161+25 to 161+50 r  
Project Number: 41561  
Engineer : kmv  
Supervising Engineer:  
Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 99.60  
Water Table Elevation, [WT] (ft datum): 114.60  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 350.8

**Geometry Data**

Equivalent Pond Length, [L] (ft): 25.0  
Equivalent Pond Width, [W] (ft): 14.0  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| <u>Stage<br/>(ft datum)</u> | <u>Area<br/>(ft<sup>2</sup>)</u> |
|-----------------------------|----------------------------------|
| 127.80                      | 0.0                              |
| 129.42                      | 461.0                            |

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**Scenario Input Data**

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 175.56

Initial ground water level (ft datum) default, 114.60

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.001                               | 0.013                               | 0.090                               | 0.460                               | 0.900                               |
| 0.002                               | 0.015                               | 0.100                               | 0.470                               | 1.000                               |
| 0.003                               | 0.020                               | 0.150                               | 0.480                               | 1.500                               |
| 0.005                               | 0.030                               | 0.250                               | 0.490                               | 2.000                               |
| 0.008                               | 0.050                               | 0.300                               | 0.500                               | 2.500                               |
| 0.009                               | 0.060                               | 0.350                               | 0.600                               | 3.000                               |
| 0.010                               | 0.070                               | 0.400                               | 0.700                               | 3.500                               |
| 0.012                               | 0.080                               | 0.450                               | 0.800                               | 4.000                               |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 29.2600                          | 0.0000                    | 114.600                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 29.2600                          | 0.0000                    | 128.909                    | 0.07316                                | 0.00000                                 | 175.6                                       | 0.4                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 128.891                    | 0.07248                                | 0.00000                                 | 175.6                                       | 6.3                                               | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 128.871                    | 0.07118                                | 0.00000                                 | 175.6                                       | 12.5                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 128.850                    | 0.07007                                | 0.00000                                 | 175.6                                       | 18.6                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 128.810                    | 0.06811                                | 0.00000                                 | 175.6                                       | 30.6                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 128.748                    | 0.06344                                | 0.00000                                 | 175.6                                       | 47.8                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 128.727                    | 0.06175                                | 0.00000                                 | 175.6                                       | 53.2                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 128.707                    | 0.06064                                | 0.00000                                 | 175.6                                       | 58.5                                              | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 128.666                    | 0.05796                                | 0.00000                                 | 175.6                                       | 68.8                                              | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 128.646                    | 0.05661                                | 0.00000                                 | 175.6                                       | 73.7                                              | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 128.605                    | 0.05447                                | 0.00000                                 | 175.6                                       | 83.4                                              | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 128.502                    | 0.04808                                | 0.00000                                 | 175.6                                       | 105.5                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 128.290                    | 0.02772                                | 0.00000                                 | 175.6                                       | 141.5                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 175.6                                       | 175.6                                             | 0.0                                            | dry       |

u/hr

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**Retention Pond Recovery - Refined Method**  
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**Project Data**

Project Name: Hartwood Marsh Road  
 Simulation Description: Swale Recovery Water Quality  
 Sta. 161+50 to 161+95 ft  
 Project Number: 41561  
 Engineer : kmv  
 Supervising Engineer:  
 Date: 05-05-2008

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 98.63  
 Water Table Elevation, [WT] (ft datum): 113.63  
 Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00  
 Fillable Porosity, [n] (%): 30.00  
 Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0  
 Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 636.3

**Geometry Data**

Equivalent Pond Length, [L] (ft): 42.5  
 Equivalent Pond Width, [W] (ft): 14.9  
 Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 126.74              | 0.0                        |
| 128.61              | 894.8                      |

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Scenario Input Data

*Scenario 1 :: Water Quality*

Hydrograph Type: Slug Load  
Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 328.99

Initial ground water level (ft datum) default, 113.63

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.001                                        | 0.013                                        | 0.090                                        | 0.460                                        | 0.900                                        |
| 0.002                                        | 0.015                                        | 0.100                                        | 0.470                                        | 1.000                                        |
| 0.003                                        | 0.020                                        | 0.150                                        | 0.480                                        | 1.500                                        |
| 0.005                                        | 0.030                                        | 0.250                                        | 0.490                                        | 2.000                                        |
| 0.008                                        | 0.050                                        | 0.300                                        | 0.500                                        | 2.500                                        |
| 0.009                                        | 0.060                                        | 0.350                                        | 0.600                                        | 3.000                                        |
| 0.010                                        | 0.070                                        | 0.400                                        | 0.700                                        | 3.500                                        |
| 0.012                                        | 0.080                                        | 0.450                                        | 0.800                                        | 4.000                                        |

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**Detailed Results** :: Scenario 1 :: Water Quality

| Elapsed Time (hours) | Inflow Rate (ft <sup>3</sup> /s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft <sup>3</sup> /s) | Overflow Discharge (ft <sup>3</sup> /s) | Cumulative Inflow Volume (ft <sup>3</sup> ) | Cumulative Infiltration Volume (ft <sup>3</sup> ) | Cumulative Discharge Volume (ft <sup>3</sup> ) | Flow Type |
|----------------------|----------------------------------|---------------------------|----------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|-----------|
| 0.000                | 54.8317                          | 0.0000                    | 113.630                    | 0.00000                                | 0.00000                                 | 0.0                                         | 0.0                                               | 0.0                                            | N.A.      |
| 0.002                | 54.8317                          | 0.0000                    | 127.911                    | 0.12988                                | 0.00000                                 | 329.0                                       | 0.8                                               | 0.0                                            | U/P       |
| 0.024                | 0.0000                           | 0.0000                    | 127.893                    | 0.12873                                | 0.00000                                 | 329.0                                       | 11.2                                              | 0.0                                            | U/P       |
| 0.048                | 0.0000                           | 0.0000                    | 127.872                    | 0.12654                                | 0.00000                                 | 329.0                                       | 22.2                                              | 0.0                                            | U/P       |
| 0.072                | 0.0000                           | 0.0000                    | 127.852                    | 0.12467                                | 0.00000                                 | 329.0                                       | 33.1                                              | 0.0                                            | U/P       |
| 0.120                | 0.0000                           | 0.0000                    | 127.811                    | 0.12138                                | 0.00000                                 | 329.0                                       | 54.4                                              | 0.0                                            | U/P       |
| 0.192                | 0.0000                           | 0.0000                    | 127.750                    | 0.11354                                | 0.00000                                 | 329.0                                       | 85.1                                              | 0.0                                            | U/P       |
| 0.216                | 0.0000                           | 0.0000                    | 127.729                    | 0.11071                                | 0.00000                                 | 329.0                                       | 94.8                                              | 0.0                                            | U/P       |
| 0.240                | 0.0000                           | 0.0000                    | 127.709                    | 0.10884                                | 0.00000                                 | 329.0                                       | 104.3                                             | 0.0                                            | U/P       |
| 0.288                | 0.0000                           | 0.0000                    | 127.668                    | 0.10434                                | 0.00000                                 | 329.0                                       | 122.8                                             | 0.0                                            | U/P       |
| 0.312                | 0.0000                           | 0.0000                    | 127.648                    | 0.10208                                | 0.00000                                 | 329.0                                       | 131.7                                             | 0.0                                            | U/P       |
| 0.360                | 0.0000                           | 0.0000                    | 127.607                    | 0.09848                                | 0.00000                                 | 329.0                                       | 149.1                                             | 0.0                                            | U/P       |
| 0.480                | 0.0000                           | 0.0000                    | 127.504                    | 0.08776                                | 0.00000                                 | 329.0                                       | 189.3                                             | 0.0                                            | U/P       |
| 0.720                | 0.0000                           | 0.0000                    | 127.293                    | 0.06510                                | 0.00000                                 | 329.0                                       | 255.8                                             | 0.0                                            | U/P       |
| 1.200                | 0.0000                           | 0.0000                    | 126.817                    | 0.01385                                | 0.00000                                 | 329.0                                       | 327.6                                             | 0.0                                            | U/P       |
| 1.440                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 1.680                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 1.920                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 2.160                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 2.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 3.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 6.000                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 7.200                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 8.400                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 9.600                | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 10.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 11.040               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 11.280               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 11.520               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 11.760               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 12.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 14.400               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 16.800               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 19.200               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 21.600               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 24.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 36.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 48.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 60.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 72.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 84.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |
| 96.000               | 0.0000                           | 0.0000                    | ---                        | ---                                    | ---                                     | 329.0                                       | 329.0                                             | 0.0                                            | dry       |

4.3 hrs

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