

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE PERMIT #40-069-114354-1
RAI Submittal

HARTWOOD MARSH ROAD
PHASE II

From 1500 feet east of Hancock Road
to County Line

May 2009

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

POLLUTION ABATEMENT VOLUME



	DATE	
MADE BY	MSF	15 Oct 08
CHCK BY	BJS	10 Jan 09

PROJECT **HARTWOOD MARSH ROAD**

LOCATION BASIN 3

BASIN LIMITS STA 152+39 00 to STA 226+00 00 CL CONST HARTWOOD MARSH ROAD

TOTAL TREATMENT AREA 48 67 AC ✓

IMPERVIOUS AREA 15 89 AC ✓ (excludes 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

$(0.5 / 12) \times 48.67 \text{ AC} = \text{2.03 AF}$

FOR ONLINE TREATMENT ADD 0 5 INCH OF RUNOFF

$(0.5 / 12) \times 48.67 \text{ AC} = \text{2.03 AF}$

TOTAL 4 06 AF

2) COMPUTE 1 25 INCHES TIMES IMPERVIOUS AREA

$(1.25 / 12) \times 15.89 \text{ AC} = \text{1.66 AF}$

FOR ONLINE TREATMENT ADD 0 5 INCH OF RUNOFF

$(0.5 / 12) \times 48.67 \text{ AC} = \text{2.03 AF}$

TOTAL 3 68 AF

CONTROLLING CRITERIA 1

REQUIRED TREATMENT VOLUME 4 06 AF ✓

NOT LAKE APOPKA BASIN

STAGE / STORAGE CALCULATIONS

HNTB

DATE

MADE BY	MSF	30 Sep-08
CHK BY	BJS	10 Jan 09

PROJECT HARTWOOD MARSH ROAD

POND 3A & 3B

Boring	Approx	Depth to <i>BoA</i> ✓	Estimated	Average	Depth to <i>BoA</i> <i>Shwt</i> ✓	Estimated	Average
AB P8	123 25	20 0	103 3	100 86	15 ✓	108 25	105 86
AB P9	118 47	20 0 ✓	98 5		15 ✓	103 47	

Note Above information per pond boring profiles Ardaman & Associates May 2007
Per Ardaman report groundwater not encountered

AVG SHWT ELEVATION 105 9 Ft (NAVD)

AVG GROUND WATER TABLE ELEVATION 100 9 Ft (NAVD)

AVG EXIST GROUND ELEVATION AT BORING LOCATIONS 110 0 Ft (NAVD) X

NOTE ABOVE INFORMATION PER POND BORINGS PROFILES ARDAMAN & ASSOCIATES JUNE 07

STAGE Ft (NAVD)	AREA AC	AVERAGE AREA AC	INCREMENTAL VOL AF
113 0	4 17		0 00
		4 30	
114 0	4 44		4 30
		4 58	
115 0	4 72		4 58
		4 86	
116 0	5 00		4 86
		5 15	
117 0	5 30		5 15
		5 44	
118 0	5 59		5 44
		5 73	
119 0	5 88		5 73
TOTAL			30 06

REQUIRED TREATMENT VOLUME 4 06 AF ✓

TOP EL OF TREATMENT VOLUME 113 94 Ft

PERCOLATION RATE 40 Ft/Day or 20 Inches/Hr

FACTOR OF SAFTEY 2 = 10 Inches/Hr

4.06 $- 21.71 + 3.76 = 25.66$

Group C Bottom =
 borings AB-18, AB-19 (Pond 3B)



— SWIFT 15' BLS

— BOA = 20' BLS

AB-18 { KC = 40 fpl
 14
 C' } NO FS

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Project Data

Project Name Hartwood Marsh Road Phase II
Simulation Description Pond 3 Water Quality Recovery
Project Number 41561 1
Engineer MSF
Supervising Engineer
Date 04 07 2009

Aquifer Data

Base Of Aquifer Elevation [B] (ft datum) 103 00
Water Table Elevation [WT] (ft datum) 104 00
Horizontal Saturated Hydraulic Conductivity [Kh] (ft/day) 20 00
Fillable Porosity [n] (%) 25 00
Unsaturated Vertical Infiltration Rate [Iv] (ft/day) 13 33
Maximum Area For Unsaturated Infiltration [Av] (ft²) 192700 7

101 X } not update
106 X }
✓ w/FS
✓
w/FS

Geometry Data

Equivalent Pond Length [L] (ft) 1062 0
Equivalent Pond Width [W] (ft) 300 0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft²)	
113 00	181645 2	✓
114 00	193406 4	
115 00	205603 2	
✓ 116 00	217800 0	✓
117 00	230868 0	
118 00	243500 4	
119 00	256132 8	✓

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Scenario Input Data

Scenario 1 Water Quality

Hydrograph Type Slug Load
 Modflow Routing Routed with infiltration

 Treatment Volume (ft³) 98881 2 **X**
 Initial ground water level (ft datum) default 104 00

4.06 alt + M₂'2

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	4 000

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Detailed Results *Scenario 1* *Water Quality*

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0 000	16480 2000	0 0000	104 000	0 00000	0 00000	0 0	0 0	0 0	N A
0 002	16480 2000	0 0000	113 534	28 00520	0 00000	98881 2	168 1	0 0	U/P
2 400	0 0000	0 0000				98881 2	98881 2	0 0	dry
6 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
12 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
24 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
36 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
48 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
60 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
72 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
84 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
96 000	0 0000	0 0000				98881 2	98881 2	0 0	dry

RECOVER
 < 6 hrs

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Scenario Input Data

Scenario 1 25 year/96 hour

Hydrograph Type Slug Load
 Modflow Routing Routed with infiltration

Treatment Volume (ft³) 1114578 = 25 59 ac-ft

Initial ground water level (ft datum) default 104 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	3 000	6 500	10 000	13 500
0 250	3 500	7 000	10 500	14 000
0 500	4 000	7 500	11 000	14 500
1 000	4 500	8 000	11 500	
1 500	5 000	8 500	12 000	
2 000	5 500	9 000	12 500	
2 500	6 000	9 500	13 000	

24.33 ac-ft @ 25 year

total volume for 25/96 = 25 66 ac ft

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

Elapsed Time (hours)	Inflow Rate (ft /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft)	Cumulative Infiltration Volume (ft)	Cumulative Discharge Volume (ft)	Flow Type
0 000	185763 0000	0 0000	104 000	0 00000	0 00000	0 0	0 0	0 0	N A
0 002	185763 0000	0 0000	118 168	28 03264	0 00000	1114578 0	168 1	0 0	U/P
2 400	0 0000	0 0000	116 783	35 45298	0 00000	1114578 0	341356 1	0 0	U/P
6 000	0 0000	0 0000	115 028	19 42764	0 00000	1114578 0	721771 4	0 0	U/S
12 000	0 0000	0 0000	114 723	2 48106	0 00000	1114578 0	784094 3	0 0	S
24 000	0 0000	0 0000	114 362	1 44228	0 00000	1114578 0	856348 4	0 0	S
36 000	0 0000	0 0000	114 095	1 08933	0 00000	1114578 0	908706 9	0 0	S
48 000	0 0000	0 0000	113 879	0 88938	0 00000	1114578 0	950466 1	0 0	S
60 000	0 0000	0 0000	113 695	0 75838	0 00000	1114578 0	985549 3	0 0	S
72 000	0 0000	0 0000	113 534	0 66479	0 00000	1114578 0	1015990 0	0 0	S
84 000	0 0000	0 0000	113 389	0 59400	0 00000	1114578 0	1042987 0	0 0	S
96 000	0 0000	0 0000	113 258	0 53821	0 00000	1114578 0	1067311 0	0 0	S
108 000	0 0000	0 0000	113 138	0 49288	0 00000	1114578 0	1089489 0	0 0	S
120 000	0 0000	0 0000	113 026	0 29039	0 00000	1114578 0	1109896 0	0 0	S
132 000	0 0000	0 0000	112 904	0 05419	0 00000	1114578 0	1114578 0	0 0	S
144 000	0 0000	0 0000	112 785	0 00000	0 00000	1114578 0	1114578 0	0 0	S
156 000	0 0000	0 0000	112 674	0 00000	0 00000	1114578 0	1114578 0	0 0	S
168 000	0 0000	0 0000	112 571	0 00000	0 00000	1114578 0	1114578 0	0 0	S
180 000	0 0000	0 0000	112 474	0 00000	0 00000	1114578 0	1114578 0	0 0	S
192 000	0 0000	0 0000	112 382	0 00000	0 00000	1114578 0	1114578 0	0 0	S
204 000	0 0000	0 0000	112 295	0 00000	0 00000	1114578 0	1114578 0	0 0	S
216 000	0 0000	0 0000	112 213	0 00000	0 00000	1114578 0	1114578 0	0 0	S
228 000	0 0000	0 0000	112 134	0 00000	0 00000	1114578 0	1114578 0	0 0	S
240 000	0 0000	0 0000	112 059	0 00000	0 00000	1114578 0	1114578 0	0 0	S
252 000	0 0000	0 0000	111 987	0 00000	0 00000	1114578 0	1114578 0	0 0	S
264 000	0 0000	0 0000	111 918	0 00000	0 00000	1114578 0	1114578 0	0 0	S
276 000	0 0000	0 0000	111 852	0 00000	0 00000	1114578 0	1114578 0	0 0	S
288 000	0 0000	0 0000	111 789	0 00000	0 00000	1114578 0	1114578 0	0 0	S
300 000	0 0000	0 0000	111 727	0 00000	0 00000	1114578 0	1114578 0	0 0	S
312 000	0 0000	0 0000	111 668	0 00000	0 00000	1114578 0	1114578 0	0 0	S
324 000	0 0000	0 0000	111 611	0 00000	0 00000	1114578 0	1114578 0	0 0	S
336 000	0 0000	0 0000	111 556	0 00000	0 00000	1114578 0	1114578 0	0 0	S
348 000	0 0000	0 0000	111 502	0 00000	0 00000	1114578 0	1114578 0	0 0	N A

← Recover
 < 6 da

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Project Data

Project Name Hartwood Marsh Road Phase II
 Simulation Description Pond 3 Water Quality Recovery
 Project Number 41561 1
 Engineer MSF
 Supervising Engineer
 Date 04-07 2009

(min Permeability for Recovery)

Aquifer Data

Base Of Aquifer Elevation [B] (ft datum) 103 00
 Water Table Elevation [WT] (ft datum) 104 00
 Horizontal Saturated Hydraulic Conductivity [Kh] (ft/day) 8 00 ←
 Fillable Porosity [n] (/) 25 00
 Unsaturated Vertical Infiltration Rate [Iv] (ft/day) 5 333
 Maximum Area For Unsaturated Infiltration [Av] (ft) 192700 7

Geometry Data

Equivalent Pond Length [L] (ft) 1062 0
 Equivalent Pond Width [W] (ft) 300 0
 Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft)
113 00	181645 2
114 00	193406 4
115 00	205603 2
116 00	217800 0
117 00	230868 0
118 00	243500 4
119 00	256132 8

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Detailed Results *Scenario 1* *Water Quality*

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft)	Cumulative Discharge Volume (ft)	Flow Type
0 000	16480 2000	0 0000	104 000	0 00000	0 00000	0 0	0 0	0 0	N A
0 002	16480 2000	0 0000	113 535	11 20418	0 00000	98881 2	67 3	0 0	U/P
2 400	0 0000	0 0000			--	98881 2	98881 2	0 0	dry
6 000	0 0000	0 0000	--			98881 2	98881 2	0 0	dry
12 000	0 0000	0 0000			---	98881 2	98881 2	0 0	dry
24 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
36 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
48 000	0 0000	0 0000	--			98881 2	98881 2	0 0	dry
60 000	0 0000	0 0000				98881 2	98881 2	0 0	dry
72 000	0 0000	0 0000	--			98881 2	98881 2	0 0	dry
84 000	0 0000	0 0000	--			98881 2	98881 2	0 0	dry
96 000	0 0000	0 0000				98881 2	98881 2	0 0	dry

← Recovery < 6hrs

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Retention Pond Recovery Refined Method
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Project Data

Project Name	Hartwood Marsh Road Phase II
Simulation Description	Pond 3 25yr 96hr Recovery (min Permeability for Recovery)
Project Number	41561 1
Engineer	MSF
Supervising Engineer	
Date	05 13 2009

Aquifer Data

Base Of Aquifer Elevation [B] (ft datum)	103 00	X
Water Table Elevation [WT] (ft datum)	104 00	X
Horizontal Saturated Hydraulic Conductivity [Kh] (ft/day)	8 00	← ✓
Fillable Porosity [n] (/)	25 00	
Unsaturated Vertical Infiltration Rate [Iv] (ft/day)	5 333	✓
Maximum Area For Unsaturated Infiltration [Av] (ft)	256132 8	

Geometry Data

Equivalent Pond Length [L] (ft)	1212 0
Equivalent Pond Width [W] (ft)	476 0

Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
113 00	181645 2
114 00	193406 4
115 00	205603 2
116 00	217800 0
117 00	230868 0
118 00	263500 4
119 00	256132 8

PONDS Version 3 2 0145
Retention Pond Recovery Refined Method
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Detailed Results *Scenario 1* *25 year/96 hour*

Elapsed Time (hours)	Inflow Rate (ft /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft /s)	Overflow Discharge (ft /s)	Cumulative Inflow Volume (ft³)	Cumulative Infiltration Volume (ft)	Cumulative Discharge Volume (ft)	Flow Type
0 000	185763 0000	0 0000	104 000	0 00000	0 00000	0 0	0 0	0 0	N A
0 002	185763 0000	0 0000	118 168	11 21516	0 00000	1114578 0	67 3	0 0	U/P
2 400	0 0000	0 0000	117 642	15 70320	0 00000	1114578 0	136566 0	0 0	U/P
6 000	0 0000	0 0000	116 797	16 08790	0 00000	1114578 0	338010 0	0 0	U/P
12 000	0 0000	0 0000	115 109	11 78632	0 00000	1114578 0	705111 9	0 0	U/S
24 000	0 0000	0 0000	114 821	1 14518	0 00000	1114578 0	764210 9	0 0	S
36 000	0 0000	0 0000	114 624	0 82246	0 00000	1114578 0	804055 3	0 0	S
48 000	0 0000	0 0000	114 468	0 66396	0 00000	1114578 0	835271 3	0 0	S
60 000	0 0000	0 0000	114 336	0 56596	0 00000	1114578 0	861421 8	0 0	S
72 000	0 0000	0 0000	114 220	0 49793	0 00000	1114578 0	884170 6	0 0	S
84 000	0 0000	0 0000	114 117	0 44723	0 00000	1114578 0	904442 9	0 0	S
96 000	0 0000	0 0000	114 022	0 40761	0 00000	1114578 0	922811 7	0 0	S
108 000	0 0000	0 0000	113 935	0 37555	0 00000	1114578 0	939660 3	0 0	S
120 000	0 0000	0 0000	113 854	0 34894	0 00000	1114578 0	955259 2	0 0	S
132 000	0 0000	0 0000	113 777	0 32640	0 00000	1114578 0	969808 3	0 0	S
144 000	0 0000	0 0000	113 706	0 30701	0 00000	1114578 0	983459 9	0 0	S
156 000	0 0000	0 0000	113 638	0 29011	0 00000	1114578 0	996333 7	0 0	S
168 000	0 0000	0 0000	113 573	0 27523	0 00000	1114578 0	1008526 0	0 0	S
180 000	0 0000	0 0000	113 512	0 26201	0 00000	1114578 0	1020114 0	0 0	S
192 000	0 0000	0 0000	113 453	0 25016	0 00000	1114578 0	1031163 0	0 0	S
204 000	0 0000	0 0000	113 396	0 23947	0 00000	1114578 0	1041727 0	0 0	S
216 000	0 0000	0 0000	113 342	0 22976	0 00000	1114578 0	1051853 0	0 0	S
228 000	0 0000	0 0000	113 289	0 22090	0 00000	1114578 0	1061579 0	0 0	S
240 000	0 0000	0 0000	113 238	0 21277	0 00000	1114578 0	1070939 0	0 0	S
252 000	0 0000	0 0000	113 189	0 20528	0 00000	1114578 0	1079963 0	0 0	S
264 000	0 0000	0 0000	113 142	0 19835	0 00000	1114578 0	1088675 0	0 0	S
276 000	0 0000	0 0000	113 096	0 19191	0 00000	1114578 0	1097100 0	0 0	S
288 000	0 0000	0 0000	113 051	0 18591	0 00000	1114578 0	1105257 0	0 0	S
300 000	0 0000	0 0000	113 008	0 10789	0 00000	1114578 0	1113163 0	0 0	S
312 000	0 0000	0 0000	112 957	0 01638	0 00000	1114578 0	1114578 0	0 0	S
324 000	0 0000	0 0000	112 907	0 00000	0 00000	1114578 0	1114578 0	0 0	S
336 000	0 0000	0 0000	112 858	0 00000	0 00000	1114578 0	1114578 0	0 0	S
348 000	0 0000	0 0000	112 810			1114578 0	1114578 0	0 0	N A

ReCOVERS WITHIN 135 days
 (Perm 8ft/day)

STAGE / STORAGE CALCULATIONS



DATE

MADE BY	msf	24 Sep 08
CHCK BY	BJS	8 Jan 09

PROJECT HARTWOOD MARSH ROAD PHASE II

POND 5

Boring	Approx E sting Ground Ele at o	Depth to E countered W ter S rface	Est mated Depth to Encountered Water Surfac	Average Estimated D pth to E countered Water Surfac	D pth to Seasonal High Water Surface	Est mated S asonal H gh Water Ele at o	Ave ag Estimated S asonal H gh Water Ele at on
AB P61	109 49	20 0	89 49	84 22	17	92 49	87 22
AB P62	104 27	20 0	84 27		17	87 27	
AB P63	101 15	20 0	81 15		17	84 15	
AB P64	101 95	20 0	81 95		17	84 95	

Note Above information per pond boring profiles Adaman & Associates Jun 2008
Per Adaman report groundwater not encountered

AVG SHWT ELEVATION 87.2 Ft (NAVD)

AVG GROUND WATER TABLE ELEVATION 84.2 Ft (NAVD)

AVG EXIST GROUND ELEVATION AT BORING LOCATIONS 104.2 Ft (NAVD)

STAGE Ft (NAVD)	AREA AC	AVERAGE AREA AC	INCREMENTAL VOL. AF
90.0	0.88		0.00
		0.92	
91.0	0.96		0.92
		1.02	
92.0	1.08		1.02
		1.12	
93.0	1.16		1.12
		1.21	
94.0	1.25		1.21
		1.30	
95.0	1.34		1.30
		1.39	
96.0	1.44		1.39
		1.48	
97.0	1.53		1.48
		1.58	
98.0	1.63		1.58
		1.68	
99.0	1.72		1.68
		1.77	
100.0	1.82		1.77
		1.87	
101.0	1.93		1.87
		2.10	
102.0	2.27		2.10
TOTAL			17.44

TOP EL OF TREATMENT VOLUME 101.00 Ft

AVE PERCOLATION RATE 21 Ft /Day or 10.5 inches/Hr

FACTOR OF SAFETY 2 = 5.25 inches/Hr

PHOSPHOROUS LOAD = 1.89 retained
 BASIN AREA = 17.42 ac x $\frac{1.89}{12}$ = 1.9 ac-ft

H t w d M h R d Ph II
 P t D v l p m t
 P n d 5 H t w d
 N d M /M R p t
 05/11/09

S m l t	N d	T m h	V l m ft3	V l m	R t f
25Y96H	POND 5	57 50	119958 313	1 898	3 511
25Y96H	POND 5	57 75	123124 891	1 948	3 526
25Y96H	POND 5	58 00	126307 703	1 999	3 547
25Y96H	POND 5	58 25	130222 695	2 061	5 153
25Y96H	POND 5	58 50	135309 547	2 141	6 151
25Y96H	POND 5	58 75	140937 219	2 230	6 355
25Y96H	POND 5	59 00	146691 484	2 321	6 433
25Y96H	POND 5	59 25	153819 594	2 434	9 408
25Y96H	POND 5	59 50	163236 109	2 583	11 518
25Y96H	POND 5	59 75	195314 453	3 091	59 767
25Y96H	POND 5	60 00	262901 719	4 160	90 427
25Y96H	POND 5	60 25	326456 125	5 166	50 805
25Y96H	POND 5	60 50	360202 313	5 700	24 186
25Y96H	POND 5	60 75	377484 063	5 973	14 218
25Y96H	POND 5	61 00	388525 469	6 148	10 319
25Y96H	POND 5	61 25	396677 188	6 277	7 796
25Y96H	POND 5	61 50	403129 906	6 379	6 543
25Y96H	POND 5	61 75	408930 938	6 471	6 348
25Y96H	POND 5	62 00	414628 063	6 561	6 312
25Y96H	POND 5	63 00	433071 844	6 853	3 934
25Y96H	POND 5	64 00	447241 000	7 077	3 938
25Y96H	POND 5	65 00	458614 531	7 257	2 381
25Y96H	POND 5	66 00	467190 125	7 392	2 383
25Y96H	POND 5	67 00	475773 938	7 528	2 386
25Y96H	POND 5	68 00	484363 531	7 664	2 386
25Y96H	POND 5	69 00	491524 094	7 777	1 592
25Y96H	POND 5	70 00	497255 656	7 868	1 593
25Y96H	POND 5	71 00	502987 125	7 959	1 592
25Y96H	POND 5	72 00	508714 844	8 050	1 590
25Y96H	POND 5	73 00	513068 125	8 118	0 828
25Y96H	POND 5	74 00	516049 156	8 166	0 828
25Y96H	POND 5	75 00	519030 938	8 213	0 828
25Y96H	POND 5	76 00	522013 656	8 260	0 829
25Y96H	POND 5	77 00	525009 313	8 307	0 836
25Y96H	POND 5	78 00	528018 000	8 355	0 836
25Y96H	POND 5	79 00	531027 313	8 403	0 836
25Y96H	POND 5	80 00	534037 625	8 450	0 836
25Y96H	POND 5	81 00	537036 500	8 498	0 830
25Y96H	POND 5	82 00	540023 875	8 545	0 830
25Y96H	POND 5	83 00	543012 000	8 592	0 830
25Y96H	POND 5	84 00	546001 063	8 639	0 830
25Y96H	POND 5	85 00	548990 688	8 687	0 831
25Y96H	POND 5	86 00	551981 125	8 734	0 831
25Y96H	POND 5	87 00	554972 188	8 781	0 831
25Y96H	POND 5	88 00	557964 188	8 829	0 831
25Y96H	POND 5	89 00	560969 000	8 876	0 838
25Y96H	POND 5	90 00	563986 813	8 924	0 838
25Y96H	POND 5	91 00	567005 250	8 972	0 839
25Y96H	POND 5	92 00	570024 375	9 020	0 839
25Y96H	POND 5	93 00	573032 063	9 067	0 832
25Y96H	POND 5	94 00	576028 125	9 115	0 832
25Y96H	POND 5	95 00	579024 938	9 162	0 833
25Y96H	POND 5	96 00	582015 063	9 209	0 829
25Y96H	POND 5	97 00	583506 500	9 233	0 000
25Y96H	POND 5	98 00	583506 500	9 233	0 000
25Y96H	POND 5	99 00	583506 500	9 233	0 000
25Y96H	POND 5	100 00	583506 500	9 233	0 000
25Y96H	POND 5	101 00	583506 500	9 233	0 000
25Y96H	POND 5	102 00	583506 500	9 233	0 000
25Y96H	POND 5	103 00	583506 500	9 233	0 000
25Y96H	POND 5	104 00	583506 500	9 233	0 000
25Y96H	POND 5	105 00	583506 500	9 233	0 000
25Y96H	POND 5	106 00	583506 500	9 233	0 000
25Y96H	POND 5	107 00	583506 500	9 233	0 000
25Y96H	POND 5	108 00	583506 500	9 233	0 000
25Y96H	POND 5	109 00	583506 500	9 233	0 000
25Y96H	POND 5	110 00	583506 500	9 233	0 000
25Y96H	POND 5	111 00	583506 500	9 233	0 000
25Y96H	POND 5	112 00	583506 500	9 233	0 000
25Y96H	POND 5	113 00	583506 500	9 233	0 000
25Y96H	POND 5	114 00	583506 500	9 233	0 000
25Y96H	POND 5	115 00	583506 500	9 233	0 000
25Y96H	POND 5	116 00	583506 500	9 233	0 000
25Y96H	POND 5	117 00	583506 500	9 233	0 000
25Y96H	POND 5	118 00	583506 500	9 233	0 000
25Y96H	POND 5	119 00	583506 500	9 233	0 000
25Y96H	POND 5	120 00	583506 500	9 233	0 000
25Y96H	POND 5	121 00	583506 500	9 233	0 000
25Y96H	POND 5	122 00	583506 500	9 233	0 000
25Y96H	POND 5	123 00	583506 500	9 233	0 000

Total Volume
 = 13 40 ac-ft ✓

H t w d M h R d Ph II
 Po t D l p m e t
 P d 5 H t w d
 Node M /Ma Rep t
 04/22/09

N m	G p	S m l t	M T m St g h	M Stage ft	W g M St g ft	D l t St g ft	M S f M A ft2	T m I flow h	M I f l w f	M T m O t f l w h	M O t f l o w f
POND 5	BASE	10Y24H	26 01	95 984	101 000	0 0050	62659	12 00	56 657	0 00	0 000
POND 5	BASE	25Y96H	97 00	99 965	101 000	0 0050	79126	60 00	90 422	0 00	0 000

new @ 101.5 19

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Project Data

Project Name Hartwood Marsh Road Phase II
Simulation Description Pond 5 Water Quality Recovery
Project Number 41561 1
Engineer MSF
Supervising Engineer
Date 04 22 2009

Aquifer Data

Base Of Aquifer Elevation [B] (ft datum)	86 00	✓
Water Table Elevation [WT] (ft datum)	87 00	✓
Horizontal Saturated Hydraulic Conductivity [Kh] (ft/day)	21 00	✓
Fillable Porosity [n] (/)	25 00	✓
Unsaturated Vertical Infiltration Rate [Iv] (ft/day)	14 0	✓
Maximum Area For Unsaturated Infiltration [Av] (ft)	99043 0	

*check recovery for
1/2 turn*

Geometry Data

Equivalent Pond Length [L] (ft) 309 0
Equivalent Pond Width [W] (ft) 245 0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)	
90 00	38453 0	✓
91 00	41698 0	
92 00	46870 0	
93 00	50689 0	
94 00	54581 0	
95 00	58545 0	✓
96 00	62582 0	
97 00	66692 0	
98 00	70873 0	
99 00	75128 0	
100 00	79455 0	
101 00	83854 0	
102 00	99043 0	✓

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Scenario Input Data

Scenario 1 Water Quality

Hydrograph Type Slug Load
Modflow Routing Routed with infiltration

Treatment Volume (ft³) 81457

Initial ground water level (ft datum) default 87 00

21.87 ac-ft ✓

<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0 100	2 000
0 250	2 500
0 500	3 000
1 000	3 500
1 500	4 000

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Detailed Results *Scenario 1* *Water Quality*

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft /s)	Overflow Discharge (ft /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0 000	13576 1700	0 0000	87 000	0 00000	0 00000	0 0	0 0	0 0	N A
0 002	13576 1700	0 0000	91 937	6 23172	0 00000	81457 0	37 4	0 0	U/P
2 400	0 0000	0 0000	90 417	4 52641	0 00000	81457 0	65154 4	0 0	U/P
6 000	0 0000	0 0000	--	--	--	81457 0	81457 0	0 0	dry
12 000	0 0000	0 0000	--	--	--	81457 0	81457 0	0 0	dry
24 000	0 0000	0 0000	--	--	--	81457 0	81457 0	0 0	dry
36 000	0 0000	0 0000	--	--	--	81457 0	81457 0	0 0	dry
48 000	0 0000	0 0000	--	--	--	81457 0	81457 0	0 0	dry
60 000	0 0000	0 0000	--	--	--	81457 0	81457 0	0 0	dry
72 000	0 0000	0 0000	--	--	--	81457 0	81457 0	0 0	dry
84 000	0 0000	0 0000	--	--	--	81457 0	81457 0	0 0	dry
96 000	0 0000	0 0000	--	--	--	81457 0	81457 0	0 0	dry

← Recovery < 6 hrs

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Detailed Results Scenario 1 25 year/96 hour

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft/s)	Overflow Discharge (ft/s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0 000	97251 0900	0 0000	87 000	0 00000	0 00000	0 0	0 0	0 0	N A
0 002	97251 0900	0 0000	99 959	6 23540	0 00000	583506 5	37 4	0 0	U/P
2 400	0 0000	0 0000	98 502	10 77572	0 00000	583506 5	110949 8	0 0	U/P
6 000	0 0000	0 0000	97 084	5 13400	0 00000	583506 5	210328 9	0 0	U/S
12 000	0 0000	0 0000	96 788	0 78484	0 00000	583506 5	229994 5	0 0	S
24 000	0 0000	0 0000	96 434	0 46176	0 00000	583506 5	253047 2	0 0	S
36 000	0 0000	0 0000	96 170	0 35142	0 00000	583506 5	269890 5	0 0	S
48 000	0 0000	0 0000	95 955	0 28858	0 00000	583506 5	283409 6	0 0	S
60 000	0 0000	0 0000	95 771	0 24721	0 00000	583506 5	294824 3	0 0	S
72 000	0 0000	0 0000	95 609	0 21750	0 00000	583506 5	304768 3	0 0	S
84 000	0 0000	0 0000	95 463	0 19493	0 00000	583506 5	313616 5	0 0	S
96 000	0 0000	0 0000	95 330	0 17707	0 00000	583506 5	321610 3	0 0	S
108 000	0 0000	0 0000	95 208	0 16140	0 00000	583506 5	328915 5	0 0	S
144 000	0 0000	0 0000	94 903	0 13168	0 00000	583506 5	346840 0	0 0	S
156 000	0 0000	0 0000	94 806	0 12562	0 00000	583506 5	352433 0	0 0	S
168 000	0 0000	0 0000	94 715	0 11837	0 00000	583506 5	357693 6	0 0	S
180 000	0 0000	0 0000	94 628	0 11196	0 00000	583506 5	362660 6	0 0	S
192 000	0 0000	0 0000	94 546	0 10622	0 00000	583506 5	367366 5	0 0	S
204 000	0 0000	0 0000	94 467	0 10106	0 00000	583506 5	371838 1	0 0	S
216 000	0 0000	0 0000	94 391	0 09639	0 00000	583506 5	376098 3	0 0	S
228 000	0 0000	0 0000	94 318	0 09214	0 00000	583506 5	380166 4	0 0	S
240 000	0 0000	0 0000	94 248	0 08826	0 00000	583506 5	384059 4	0 0	S
252 000	0 0000	0 0000	94 181	0 08468	0 00000	583506 5	387791 7	0 0	S
264 000	0 0000	0 0000	94 116	0 08139	0 00000	583506 5	391376 1	0 0	S
276 000	0 0000	0 0000	94 053	0 07834	0 00000	583506 5	394823 7	0 0	S
288 000	0 0000	0 0000	93 992	0 07551	0 00000	583506 5	398144 6	0 0	S
300 000	0 0000	0 0000	93 934	0 07287	0 00000	583506 5	401347 4	0 0	S
312 000	0 0000	0 0000	93 877	0 07040	0 00000	583506 5	404440 3	0 0	S
324 000	0 0000	0 0000	93 821	0 06809	0 00000	583506 5	407430 2	0 0	S
336 000	0 0000	0 0000	93 767	0 06593	0 00000	583506 5	410323 7	0 0	S
348 000	0 0000	0 0000	93 715			583506 5	413126 4	0 0	N A

↪ After 14 days, 70% Recovered

Remaining Volume in pond: 398 ac-ft
 Add 2nd storm: 13.40 ac-ft

 17 38 ac-ft

equates to elev 101 9 ft in pond

∴ pond will not overtop

14 Days following storm event = 432 hours
 capacity will be greater as than 432 ✓

STAGE / STORAGE/VOLUME

HNTB

	DATE	
MADE BY	msf	22 Apr 09
CHK BY	BJS	24 Ap 09

PROJECT HARTWOOD MARSH ROAD PHASE II

POND 5

STAGE Ft (NAVD)	AREA AC	AVERAGE AREA AC	INCREMENTAL VOL. AF	CUMULATIVE VOL. AF
90 0	0 88		0 00	0 00
		0 92		
91 0	0 96		0 92	0 92
		1 02		
92 0	1 08		1 02	1 94
		1 12		
93 0	1 16		1 12	3 06
		1 21		
94 0	1 25		1 21	4 26
		1 30		
95 0	1 34		1 30	5 56
		1 39		
96 0	1 44		1 39	6 95
		1 48		
97 0	1 53		1 48	8 44
		1 58		
98 0	1 63		1 58	10 02
		1 68		
99 0	1 72		1 68	11 69
		1 77		
100 0	1 82		1 77	13 47
		1 87		
101 0	1 93		1 87	15 34
		2 10		
102 0	2 27		2 10	17 44
TOTAL				17 44

93.77 →
Ft

←

Pre versus Post Phosphorus Loading Basin 5

Location Hartwood Marsh Road from 1500 feet east of S Hancock Road to County Line
 Discharge Point John s Lake (Pre Development) No Discharge (Post Development)

Post Development

Basin	Area (ac)	Outfall	Land Use	Soil Class	Mean Annual Load (kg/ac yr)	Inflow Mass Phosphorus Loading (kg/yr)	Treatment System	Inches of Retention Area over Basin Area (inches)	Pollutant Removal Efficiency (%)	Outflow Mass Loading (kg/yr)	MSSW Table for Removal Efficiency	Comment
5	14.77	Pond 5	Highway max 75 / imp	A	1.053	15.55281	Dry	1.29	89	1.710809	11.7.30	
5.1	2.2	None	Highway max 75 / imp	A	1.053	2.3166	Dry	1.29	89	0.254826	11.7.30	
5.2	0.18	Pond 5	Single Family max 40% imp	A	0.25	0.045	Dry	1.29	94	0.0027	11.7.14	
5.3	0.06	Pond 5	Single Family max 40% imp	A	0.25	0.015	Dry	1.29	94	0.0009	11.7.14	
5.4	0.03	Pond 5	Agriculture Groves	A	0.007	0.00021	Dry	1.29	0	0.00021	NA	
5.5	0.12	Pond 5	Agriculture Groves	A	0.007	0.00084	Dry	1.29	0	0.00084	NA	
5.6	0.05	Pond 5	Agriculture Groves	A	0.007	0.00035	Dry	1.29	0	0.00035	NA	
Total	17.41					17.93081				1.970635		

Mean Annual Phosphorus Load from SJRWMD MSSW Table 11.7.3

Post less than Pre

Equivalent to 40C-42 TV Requirements

CHAPTER VI RESOURCE PROTECTION STANDARDS

Lake County
Municipal
Code

- 6 00 00 General Provisions
- 6 01 00 Wetlands Protection
- 6 02 00 Shoreline and Wetland Protection
- 6 03 00 Wellfield Protection
- 6 04 00 Natural Upland Vegetative Communities, Habitat of Designated Species
- 6 05 00 Reserved
- 6 06 00 Mining
- 6 07 00 Protection of Existing Natural Reservations
- 6 08 00 Air Quality
- 6 09 00 Groundwater Aquifer Recharge
- 6 10 00 Water Quality Standards
- 6 11 00 Operations and Waste Treatment
- 6 12 00 Central Water System/Central Sewage System
- 6 13 00 Nonconforming Uses and Development
- 6 14 00 Golf Courses
- 6 15 00 Lake Apopka Basin Development Design and Resource Protection Standards

6 00 00 General Provisions

6 00 01 Purpose and Intent The purpose of this Section is to establish those resources or areas of a Development Site that must be protected from harmful effects of Development A Developer should apply the provisions of this Section to a proposed Development Site before any other Development design work is done Application of the provisions of this Section will divide a proposed Development Site into areas that may be Developed and areas that must generally be free of Development Activity The proposed Development should then be designed to fit within the areas that may be Developed

H t w d M h R d Ph II
 P t D v l p m t
 P n d 6 H t w d
 Hyd l gy T m S R p t
 05/05/09

S m l t	N d	T m h	V lum ft3	V lum	R t f
25Y96H	POND 6	57 50	42109 719	1 231	1 444
25Y96H	POND 6	57 75	43414 898	1 270	1 456
25Y96H	POND 6	58 00	44732 000	1 308	1 471
25Y96H	POND 6	58 25	46462 363	1 359	2 375
25Y96H	POND 6	58 50	48719 566	1 425	2 641
25Y96H	POND 6	58 75	51122 242	1 495	2 698
25Y96H	POND 6	59 00	53566 742	1 567	2 734
25Y96H	POND 6	59 25	56811 637	1 661	4 477
25Y96H	POND 6	59 50	61094 000	1 787	5 040
25Y96H	POND 6	59 75	79021 328	2 311	34 799
25Y96H	POND 6	60 00	114716 914	3 355	44 525
25Y96H	POND 6	60 25	142269 641	4 161	16 704
25Y96H	POND 6	60 50	154244 031	4 511	9 906
25Y96H	POND 6	60 75	161262 859	4 716	5 691
25Y96H	POND 6	61 00	165999 406	4 855	4 835
25Y96H	POND 6	61 25	169715 641	4 963	3 424
25Y96H	POND 6	61 50	172657 906	5 049	3 115
25Y96H	POND 6	61 75	175444 359	5 131	3 077
25Y96H	POND 6	62 00	178211 922	5 212	3 073
25Y96H	POND 6	63 00	187202 594	5 475	1 922
25Y96H	POND 6	64 00	194135 063	5 677	1 929
25Y96H	POND 6	65 00	199712 703	5 840	1 170
25Y96H	POND 6	66 00	203926 953	5 964	1 172
25Y96H	POND 6	67 00	208150 781	6 087	1 175
25Y96H	POND 6	68 00	212383 734	6 211	1 177
25Y96H	POND 6	69 00	215918 000	6 314	0 787
25Y96H	POND 6	70 00	218751 375	6 397	0 787
25Y96H	POND 6	71 00	221586 750	6 480	0 788
25Y96H	POND 6	72 00	224422 922	6 563	0 788
25Y96H	POND 6	73 00	226580 953	6 626	0 411
25Y96H	POND 6	74 00	228060 250	6 669	0 411
25Y96H	POND 6	75 00	229539 703	6 713	0 411
25Y96H	POND 6	76 00	231020 328	6 756	0 411
25Y96H	POND 6	77 00	232508 172	6 800	0 415
25Y96H	POND 6	78 00	234003 219	6 843	0 415
25Y96H	POND 6	79 00	235499 484	6 887	0 416
25Y96H	POND 6	80 00	236996 844	6 931	0 416
25Y96H	POND 6	81 00	238489 281	6 974	0 413
25Y96H	POND 6	82 00	239976 813	7 018	0 413
25Y96H	POND 6	83 00	241465 391	7 062	0 414
25Y96H	POND 6	84 00	242955 125	7 105	0 414
25Y96H	POND 6	85 00	244445 906	7 149	0 414
25Y96H	POND 6	86 00	245937 750	7 192	0 415
25Y96H	POND 6	87 00	247430 688	7 236	0 415
25Y96H	POND 6	88 00	248924 688	7 280	0 415
25Y96H	POND 6	89 00	250425 813	7 324	0 419
25Y96H	POND 6	90 00	251934 078	7 368	0 419
25Y96H	POND 6	91 00	253443 422	7 412	0 419
25Y96H	POND 6	92 00	254953 781	7 456	0 420
25Y96H	POND 6	93 00	256459 016	7 500	0 417
25Y96H	POND 6	94 00	257959 172	7 544	0 417
25Y96H	POND 6	95 00	259460 313	7 588	0 417
25Y96H	POND 6	96 00	260956 672	7 632	0 414
25Y96H	POND 6	97 00	261703 250	7 653	0 001
25Y96H	POND 6	98 00	261704 313	7 653	0 000
25Y96H	POND 6	99 00	261704 313	7 653	0 000
25Y96H	POND 6	100 00	261704 313	7 653	0 000

Total Volume
 - 599 ac-ft X 6.01 ac-ft

H t w d M h R d Ph II
 P t D l p m t
 P d 6 H t w d
 Nod M /Ma R p t
 05/05/09

N m	G p	S m l t	M T m St g h	M St g ft	W St g ft	M St g ft	D l t St g ft	M S f A ft2	M T m I f l w h	M I f l w f	M T m O t f l w h	M O t f l w f
POND 6	BASE	25Y24H	26 00	116 143	117 000	0 0050	59865	12 00	36 809	0 00	0 000	0 000
POND 6	BASE	25Y96H	97 00	117 611	117 000	0 0050	65991	60 00	44 516	0 00	0 000	0 000

ver-Q 118

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Detailed Results *Scenario 1* *Water Quality*

Elapsed Time (hours)	Inflow Rate (ft /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft)	Flow Type
0 000	5880 6000	0 0000	98 000	0 00000	0 00000	0 0	0 0	0 0	NA
0 002	5880 6000	0 0000	113 724	5 54198	0 00000	35283 6	33 3	0 0	U/P
2 400	0 0000	0 0000		--		35283 6	35283 6	0 0	dry
6 000	0 0000	0 0000		--		35283 6	35283 6	0 0	dry
12 000	0 0000	0 0000		--		35283 6	35283 6	0 0	dry
24 000	0 0000	0 0000		--		35283 6	35283 6	0 0	dry
36 000	0 0000	0 0000		--		35283 6	35283 6	0 0	dry
48 000	0 0000	0 0000		--		35283 6	35283 6	0 0	dry
60 000	0 0000	0 0000		--		35283 6	35283 6	0 0	dry
72 000	0 0000	0 0000	--	--		35283 6	35283 6	0 0	dry
84 000	0 0000	0 0000	--	--		35283 6	35283 6	0 0	dry
96 000	0 0000	0 0000	--	--		35283 6	35283 6	0 0	dry

← Recovery < 24 hrs

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Detailed Results *Scenario 1* *25 year* *96 hour*

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft)	Flow Type
0 000	43492 7900	0 0000	98 000	0 00000	0 00000	0 0	0 0	0 0	N A
0 002	43492 7900	0 0000	117 598	5 56527	0 00000	260956 7	33 4	0 0	U/P
2 400	0 0000	0 0000	116 566	7 42422	0 00000	260956 7	65797 6	0 0	U/P
6 000	0 0000	0 0000	114 986	4 45939	0 00000	260956 7	158267 5	0 0	U/P
12 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
24 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
36 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
48 000	0 0000	0 0000	--			260956 7	260956 7	0 0	dry
60 000	0 0000	0 0000		--	--	260956 7	260956 7	0 0	dry
72 000	0 0000	0 0000		--		260956 7	260956 7	0 0	dry
84 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
96 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
108 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
120 000	0 0000	0 0000		--		260956 7	260956 7	0 0	dry
132 000	0 0000	0 0000			--	260956 7	260956 7	0 0	dry
144 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
156 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
168 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
180 000	0 0000	0 0000		--		260956 7	260956 7	0 0	dry
192 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
204 000	0 0000	0 0000	--	---		260956 7	260956 7	0 0	dry
216 000	0 0000	0 0000	--			260956 7	260956 7	0 0	dry
228 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
240 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
252 000	0 0000	0 0000		--		260956 7	260956 7	0 0	dry
264 000	0 0000	0 0000			--	260956 7	260956 7	0 0	dry
276 000	0 0000	0 0000	--			260956 7	260956 7	0 0	dry
288 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
300 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
312 000	0 0000	0 0000				260956 7	260956 7	0 0	dry
324 000	0 0000	0 0000	--			260956 7	260956 7	0 0	dry
336 000	0 0000	0 0000	--			260956 7	260956 7	0 0	dry
348 000	0 0000	0 0000				260956 7	260956 7	0 0	dry

← Recovery
 < 12 hrs

H t w d M h R d Ph II
 P t D v l p m t
 P d 7 H t w d
 Hyd l gy T me S R p t
 04/15/09

S m l t	N d	T m h	V lum ft3	V l m	R t f
25Y96H	POND 7	57 50	46795 188	0 820	1 491
25Y96H	POND 7	57 75	48155 613	0 844	1 532
25Y96H	POND 7	58 00	49549 074	0 868	1 565
25Y96H	POND 7	58 25	51098 219	0 895	1 878
25Y96H	POND 7	58 50	52880 633	0 927	2 083
25Y96H	POND 7	58 75	54889 094	0 962	2 380
25Y96H	POND 7	59 00	57158 047	1 002	2 662
25Y96H	POND 7	59 25	59900 711	1 050	3 433
25Y96H	POND 7	59 50	63225 859	1 108	3 957
25Y96H	POND 7	59 75	71862 914	1 259	15 237
25Y96H	POND 7	60 00	89272 766	1 564	23 452
25Y96H	POND 7	60 25	110325 961	1 933	23 333
25Y96H	POND 7	60 50	132804 547	2 327	26 619
25Y96H	POND 7	60 75	154904 047	2 715	22 491
25Y96H	POND 7	61 00	172709 328	3 027	17 076
25Y96H	POND 7	61 25	185946 109	3 259	12 339
25Y96H	POND 7	61 50	195684 156	3 429	9 301
25Y96H	POND 7	61 75	203115 203	3 559	7 212
25Y96H	POND 7	62 00	209026 656	3 663	5 925
25Y96H	POND 7	63 00	225309 672	3 948	3 122
25Y96H	POND 7	64 00	235722 859	4 131	2 664
25Y96H	POND 7	65 00	243868 125	4 274	1 862
25Y96H	POND 7	66 00	250157 906	4 384	1 633
25Y96H	POND 7	67 00	256007 078	4 486	1 617
25Y96H	POND 7	68 00	261838 547	4 589	1 623
25Y96H	POND 7	69 00	266961 000	4 678	1 223
25Y96H	POND 7	70 00	271149 781	4 752	1 104
25Y96H	POND 7	71 00	275106 969	4 821	1 094
25Y96H	POND 7	72 00	279048 594	4 890	1 096
25Y96H	POND 7	73 00	282288 813	4 947	0 705
25Y96H	POND 7	74 00	284610 938	4 988	0 586
25Y96H	POND 7	75 00	286698 219	5 024	0 574
25Y96H	POND 7	76 00	288766 000	5 060	0 575
25Y96H	POND 7	77 00	290842 750	5 097	0 579
25Y96H	POND 7	78 00	292931 125	5 133	0 581
25Y96H	POND 7	79 00	295025 000	5 170	0 582
25Y96H	POND 7	80 00	297122 406	5 207	0 583
25Y96H	POND 7	81 00	299216 750	5 244	0 580
25Y96H	POND 7	82 00	301306 125	5 280	0 580
25Y96H	POND 7	83 00	303396 625	5 317	0 581
25Y96H	POND 7	84 00	305490 094	5 354	0 582
25Y96H	POND 7	85 00	307586 781	5 390	0 583
25Y96H	POND 7	86 00	309686 625	5 427	0 584
25Y96H	POND 7	87 00	311789 625	5 464	0 585
25Y96H	POND 7	88 00	313895 750	5 501	0 585
25Y96H	POND 7	89 00	316011 438	5 538	0 590
25Y96H	POND 7	90 00	318138 625	5 575	0 592
25Y96H	POND 7	91 00	320271 063	5 613	0 593
25Y96H	POND 7	92 00	322406 813	5 650	0 594
25Y96H	POND 7	93 00	324539 063	5 687	0 591
25Y96H	POND 7	94 00	326665 938	5 725	0 591
25Y96H	POND 7	95 00	328793 625	5 762	0 591
25Y96H	POND 7	96 00	330919 719	5 799	0 590
25Y96H	POND 7	97 00	332222 906	5 822	0 134
25Y96H	POND 7	98 00	332487 813	5 827	0 013
25Y96H	POND 7	99 00	332511 656	5 827	0 000
25Y96H	POND 7	100 00	332512 250	5 827	0 000

Total Volume
760 ac-ft

H t w d M h R d Ph II
 P t D l p m t
 P d 7 H a t w d
 Node M /Ma Repo t
 04/15/09

Nam	G p	S m lat	M T m St g h	M St g ft	W St g ft	M D l t St g ft	M S f A ft2	M T m I fl w h	M I fl w cfs	M T m O t fl w h	M O t fl w f
POND 7	BASE	25Y24H	28 01	<u>157 700</u>	160 000	0 0050	52535	12 50	19 946	0 00	0 000

user @ 160 ✓

ab

Scenario Input Data

Scenario 1 Water Quality

Hydrograph Type Slug Load
Modflow Routing Routed with infiltration

Treatment Volume (ft) 57063 6

= 131 ✓

Initial ground water level (ft datum) default 140 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	4 000

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Retention Pond Recovery Refined Method
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Scenario Input Data

Scenario 1 25 year 96 hour

Hydrograph Type Slug Load
 Modflow Routing Routed with infiltration

Treatment Volume (ft) 330919.7 = 7.6 ac-ft

Initial ground water level (ft datum) default 140.00

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	2 700	3 500	7 500	11 500
0 250	2 800	4 000	8 000	12 000
0 500	2 900	4 500	8 500	12 500
1 000	3 000	5 000	9 000	13 000
1 500	3 100	5 500	9 500	13 500
2 000	3 200	6 000	10 000	14 000
2 500	3 300	6 500	10 500	14 500
2 600	3 400	7 000	11 000	

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Retention Pond Recovery Refined Method
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Detailed Results *Scenario 1* *25 year* *96 hour*

Elapsed Time (hours)	Inflow Rate (ft /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft /s)	Overflow Discharge (ft /s)	Cumulative Inflow Volume (ft³)	Cumulative Infiltration Volume (ft³)	Cumulative Discharge Volume (ft³)	Flow Type
0 000	55153 2900	0 0000	140 000	0 00000	0 00000	0 0	0 0	0 0	NA
0 002	55153 2900	0 0000	159 846	5 59453	0 00000	330919 7	33 6	0 0	U/P
2 400	0 0000	0 0000	158 461	9 12831	0 00000	330919 7	82094 1	0 0	U/P
6 000	0 0000	0 0000	156 303	6 84127	0 00000	330919 7	193081 8	0 0	U/P
12 000	0 0000	0 0000	154 355	2 95004	0 00000	330919 7	278839 7	0 0	U/S
24 000	0 0000	0 0000	153 347	0 60278	0 00000	330919 7	318133 9	0 0	S
36 000	0 0000	0 0000	152 379	0 14798	0 00000	330919 7	330919 7	0 0	S
48 000	0 0000	0 0000	151 465	0 00000	0 00000	330919 7	330919 7	0 0	S
60 000	0 0000	0 0000	150 782	0 00000	0 00000	330919 7	330919 7	0 0	S
62 400	0 0000	0 0000	150 654	0 00000	0 00000	330919 7	330919 7	0 0	S
64 800	0 0000	0 0000	150 532	0 00000	0 00000	330919 7	330919 7	0 0	S
67 200	0 0000	0 0000	150 416	0 00000	0 00000	330919 7	330919 7	0 0	S
69 600	0 0000	0 0000	150 306	0 00000	0 00000	330919 7	330919 7	0 0	S
72 000	0 0000	0 0000	150 200	0 00000	0 00000	330919 7	330919 7	0 0	S
74 400	0 0000	0 0000	150 100	0 00000	0 00000	330919 7	330919 7	0 0	S
76 800	0 0000	0 0000	150 003	0 00000	0 00000	330919 7	330919 7	0 0	S
79 200	0 0000	0 0000	149 910	0 00000	0 00000	330919 7	330919 7	0 0	S
81 600	0 0000	0 0000	149 821	0 00000	0 00000	330919 7	330919 7	0 0	S
84 000	0 0000	0 0000	149 735	0 00000	0 00000	330919 7	330919 7	0 0	S
96 000	0 0000	0 0000	149 365	0 00000	0 00000	330919 7	330919 7	0 0	S
108 000	0 0000	0 0000	149 043	0 00000	0 00000	330919 7	330919 7	0 0	S
120 000	0 0000	0 0000	148 757	0 00000	0 00000	330919 7	330919 7	0 0	S
132 000	0 0000	0 0000	148 502	0 00000	0 00000	330919 7	330919 7	0 0	S
144 000	0 0000	0 0000	148 271	0 00000	0 00000	330919 7	330919 7	0 0	S
156 000	0 0000	0 0000	148 060	0 00000	0 00000	330919 7	330919 7	0 0	S
168 000	0 0000	0 0000	147 868	0 00000	0 00000	330919 7	330919 7	0 0	S
180 000	0 0000	0 0000	147 690	0 00000	0 00000	330919 7	330919 7	0 0	S
192 000	0 0000	0 0000	147 525	0 00000	0 00000	330919 7	330919 7	0 0	S
204 000	0 0000	0 0000	147 372	0 00000	0 00000	330919 7	330919 7	0 0	S
216 000	0 0000	0 0000	147 229	0 00000	0 00000	330919 7	330919 7	0 0	S
228 000	0 0000	0 0000	147 095	0 00000	0 00000	330919 7	330919 7	0 0	S
240 000	0 0000	0 0000	146 969	0 00000	0 00000	330919 7	330919 7	0 0	S
252 000	0 0000	0 0000	146 850	0 00000	0 00000	330919 7	330919 7	0 0	S
264 000	0 0000	0 0000	146 738	0 00000	0 00000	330919 7	330919 7	0 0	S
276 000	0 0000	0 0000	146 631	0 00000	0 00000	330919 7	330919 7	0 0	S
288 000	0 0000	0 0000	146 530	0 00000	0 00000	330919 7	330919 7	0 0	S
300 000	0 0000	0 0000	146 434	0 00000	0 00000	330919 7	330919 7	0 0	S
312 000	0 0000	0 0000	146 342	0 00000	0 00000	330919 7	330919 7	0 0	S
324 000	0 0000	0 0000	146 254	0 00000	0 00000	330919 7	330919 7	0 0	S
336 000	0 0000	0 0000	146 170	0 00000	0 00000	330919 7	330919 7	0 0	S
348 000	0 0000	0 0000	146 090	0 00000	0 00000	330919 7	330919 7	0 0	NA

← Recovery < 48 hrs