

## **Tab 6**

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### **Floodplains Analysis**

# Location Hydraulic Report

## Gardenia Trail Phase II & III PD&E

FPN: 41543212201 & 41611112201

Lake County



■ ■ ■ E Sciences Project Number 1-1001-001

October 10, 2008

Prepared for:  
**The Balmoral Group**



science that works

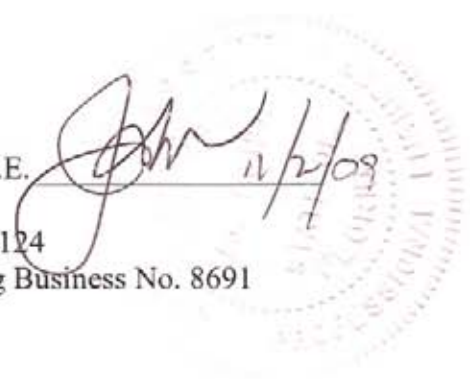
LOCATION HYDRAULIC REPORT  
FOR  
GARDENIA TRAIL PHASE II & III PD&E  
LAKE COUNTY, FLORIDA  
FPN: 41543212201 & 41611112201  
E SCIENCES PROJECT NO. 1-1001-001

Prepared by

E Sciences, Incorporated  
34 E Pine Street  
Orlando, Florida 32801

In accordance with the provisions of Florida Statutes, Chapter 471, E Sciences work for the above-referenced report was prepared under the direct supervision of a Professional Engineer registered in the State of Florida. By signature below, I certify that this report has been prepared in accordance with good professional engineering practices pursuant to Chapter 471 of the Florida Statutes as it applies to the work described herein. The data, findings, recommendations, specifications or professional opinions were prepared solely for the use of the Florida Department of Transportation and the Balmoral Group. E Sciences makes no other warranty, either expresses or implied, and is not responsible for the interpretation by others of these data.

James S. Bassett, P.E.  
Principal Engineer  
Florida P.E. No. 53124  
Florida Engineering Business No. 8691



## LOCATION HYDRAULIC REPORT

### TABLE OF CONTENTS

<b>1.0</b>	<b>Introduction</b> .....	2
1.1	<u>Purpose</u> .....	2
1.2	<u>Project Description</u> .....	2
1.2.1	<i>Gardenia Trail Phase II</i> .....	2
1.2.2	<i>Gardenia Trail Phase III</i> .....	3
<b>2.0</b>	<b>Existing Conditions</b> .....	3
2.1	<u>Drainage</u> .....	3
2.1.1	<i>Basin Boundaries</i> .....	3
2.1.2	<i>Surface Water Drainage</i> .....	3
2.2	<u>Wetlands</u> .....	3
<b>3.0</b>	<b>Floodplain Involvement and Classification</b> .....	4
3.1	<u>Background</u> .....	4
3.2	<u>Existing Encroachments</u> .....	4
	<b>Table 3.1 – Existing Base Floodplain Encroachment Areas</b> .....	5
3.3	<u>Floodplain Criteria</u> .....	5
<b>4.0</b>	<b>Stormwater Management</b> .....	6
<b>5.0</b>	<b>Conclusion</b> .....	6

### FIGURES

Figure 1 – Location Map

Figure 2A – Flood Zone Map

Figure 2B – Flood Zone Map

### APPENDICES

Appendix A – SJRWMD Maps

Appendix B – FEMA Flood Insurance Rate Maps (FIRM)

## 1.0 Introduction

### 1.1 Purpose

This Location Hydraulics Report is one in a series of reports prepared as part of the Project Development and Environment (PD&E) Study for the two proposed multi-use trails in the vicinity of Fruitland Park and Lady Lake in Lake County, Florida. The study will evaluate construction of approximately 11.5 miles of multi-use trail, known as Gardenia Trail Phases II & III.

The purpose of this report is to evaluate the proposed project's floodplain encroachment, the existing drainage patterns along the project, and the drainage system that would be utilized in the proposed project's design.

Protection of floodplains is required by Executive Order 11988 "Floodplain Management"; USDOT Order 5650.2, "Floodplain Management and Protection"; and Federal-Aid Policy Guide 23 CFR 650A. As outlined in Chapter 24 of the Florida Department of Transportation (FDOT) PD&E Manual (2008), "the intent of these regulations is to avoid or minimize highway encroachments within the 100-year (base) floodplains, where practicable, and to avoid supporting land use development which is incompatible with floodplain values."

### 1.2 Project Description

The proposed study involves the construction of approximately 11.5 miles of multi-use trails in Fruitland Park and Lady Lake, Florida. The following sections provide a brief description of the preferred alternative for each of the two trails.

#### 1.2.1 *Gardenia Trail Phase II*

The Gardenia Trail Phase II begins at Dr. Martin Luther King Jr. Blvd. and heads north to Lake Ella Road, a total distance of approximately 5.6 miles. The trail was originally conceived as a rails to trails type project and generally follows the former CSX corridor parallel to U.S. 441 through Fruitland Park. This segment of the trail passes through older neighborhoods and includes a city park, elementary school, and access to retail stores.

In some cases the rail corridor has not remained completely intact, and alternative alignments have been evaluated to provide a better solution for these areas. In addition, "spurs" are shown which branch off from the preferred alignment; several of these spurs have been recognized as part of the overall trail network within the Lake County Master Trails Plan. These sections may be designed and constructed by others, outside of this study.

### 1.2.2 Gardenia Trail Phase III

The Gardenia Trail Phase III proposed corridor begins at Lake Ella Road and heads north to Marion County Road, a total distance of approximately 5.9 miles. In this area, most of the former rail corridor has been removed or developed and is not realistically available for construction of a trail. The preferred alignment is a combination of existing publicly-owned Right of Way, developers' agreements, and former rail corridor.

Refer to **Figure 1** for a location map of the project and the extent of the proposed Gardenia Trails II and III.

## 2.0 Existing Conditions

### 2.1 Drainage

Where the project follows the rail corridor, impacts to drainage are expected to be minimal, since the existing embankment will be used with little or no additional fill required. The exceptions occur in three general areas: where subsequent development has changed the profile of the original rail corridor; where deviations from the rail corridor are necessary because the corridor is no longer available, or where adjustments are required because of environmental considerations.

#### 2.1.1 Basin Boundaries

The proposed trails lie within the Ocklawaha River Basin and drain toward Lake Griffin which forms the headwaters of the Ocklawaha River. St. Johns River Water Management District (SJRWMD) is the regulating surface water authority for this project. Refer to **Appendix A** for maps of the SJRWMD boundaries and drainage basins.

#### 2.1.2 Surface Water Drainage

There were no cross drains or other drainage structures found along the trail corridor during site visits.

## 2.2 Wetlands

E Sciences conducted site visits for Gardenia Trail Phases II & III. There are four locations in the corridor where the alignment will cross through or very close to wetlands. These locations correspond to FP-2, FP-3, FP-4, and FP-5, depicted on **Figure 2** and described in **Section 3.2** of this report. The alignment will have minor impacts to wetlands and may require wetland

permitting. If these impacts occur, an environmental resource permit (ERP) application will be required by the SJRWMD, and a section 404 permit may be required by the US Army Corps of Engineers (USACOE).

### 3.0 Floodplain Involvement and Classification

#### 3.1 Background

**Figure 2** illustrates the limits of the 100-year base floodplain according to the Flood Insurance Rate Maps (FIRM) compiled by the Federal Emergency Management Agency (FEMA). A copy of each applicable FIRM is also included in **Appendix B**.

#### 3.2 Existing Encroachments

There are five locations along the Gardenia Trails II and III that fall within the 100-year floodplain as shown in **Figure 2**. These five locations are identified as FP-1 through FP-5 on **Figure 2**.

**FP-1** is located between the two separate parts of Lake Geneva near the intersection of Spring Lake Road and SR 441 in unincorporated Lake County, Florida. Approximately 500 feet of the proposed Gardenia Trail II falls within the 100-year floodplain at this location. This floodplain is identified as Flood Zone A, part of "Special Flood Hazard Areas Inundated by 100-year Flood; no base flood elevations determined."

**FP-2** is located just south of the intersection of Arlington Avenue and Shenandoah Avenue in unincorporated Lake County, Florida. Approximately 400 feet of the proposed Gardenia Trail III falls within the 100-year floodplain at this location. This floodplain is identified as Flood Zone A, part of "Special Flood Hazard Areas Inundated by 100-year Flood; no base flood elevations determined."

**FP-3** is located just south of the intersection of Arlington Avenue and West Lakeview Street in the town of Lady Lake, Florida. Approximately 800 feet of the proposed Gardenia Trail III falls within the 100-year floodplain at this location. This floodplain is identified as Flood Zone AE, part of "Special Flood Hazard Areas Inundated by 100-year Flood" with a determined base flood elevation of 69 feet.

**FP-4** is located at the intersection of Oak Street and Clay Avenue in the town of Lady Lake, Florida. Approximately 1,000 feet of the proposed Gardenia Trail III falls within the 100-year

floodplain at this location. This floodplain is identified as Flood Zone A, part of “Special Flood Hazard Areas Inundated by 100-year Flood; no base flood elevations determined.”

FP-5 is located at the intersection of Smitty Road and SR 27A in unincorporated Lake County, Florida. Approximately 500 feet of the proposed Gardenia Trail III falls within the 100-year floodplain at this location. This floodplain is identified as Flood Zone A, part of “Special Flood Hazard Areas Inundated by 100-year Flood; no base flood elevations determined.”

**Table 3.1 – Existing Base Floodplain Encroachment Areas**

Floodplain ID	Floodplain Location	Flood Zone (FIRM)	Estimated 100-year Base Flood Elevation*	Floodplain Encroachment Length (feet)
FP-1	Lake Geneva	A	ND	500
FP-2	Arlington Ave / Shenandoah Ave	A	ND	400
FP-3	Arlington Ave / Lakeview Street	AE	69	800
FP-4	Oak Street / Clay Ave	A	ND	1,000
FP-5	Smitty Road / SR 27A	A	ND	500

\*NA = Not Applicable  
 ND = Not Determined

The proposed trail construction would be classified as category 2 as defined in Part 2, Chapter 24 of the FDOT PD&E Manual and will not involve the replacement or modification of any drainage structures. This project will not result in any adverse impacts on the operation of the floodplain or cause any changes in flood risk or damage. Because the trail construction and improvements will not affect any major roads or highways, there will not be any changes in the potential for interruption or termination of emergency services or emergency evacuation routes. Therefore, it has been determined that the above mentioned encroachments are minimal.

It has been determined, through consultation with local, state, and federal water resources and floodplain management agencies that the project will not support base floodplain development that is incompatible with existing floodplain management programs.

### 3.3 Floodplain Criteria

According to Chapter IX (Development Design and Improvement Standards) of the Lake County Land Development Regulations, new development projects should “minimize public and private



losses due to Flood conditions [as well as] control the alteration of natural Floodplains, stream channels, and natural protective barriers which are involved in the accommodation of Flood waters.”

The construction of Gardenia Trails II and III will require minimal fill and primarily clearing of vegetation on the already established railroad corridor. Where the trail falls within the 100-year floodplain, trail elevations will be kept at existing elevations so as to not increase flood elevations or velocities during a major storm event.

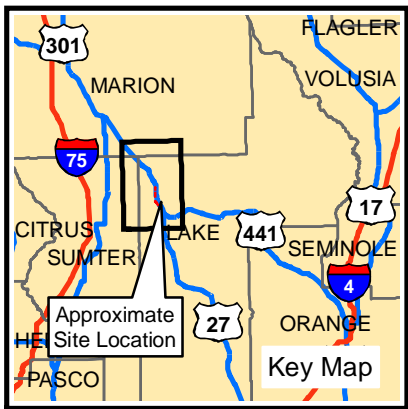
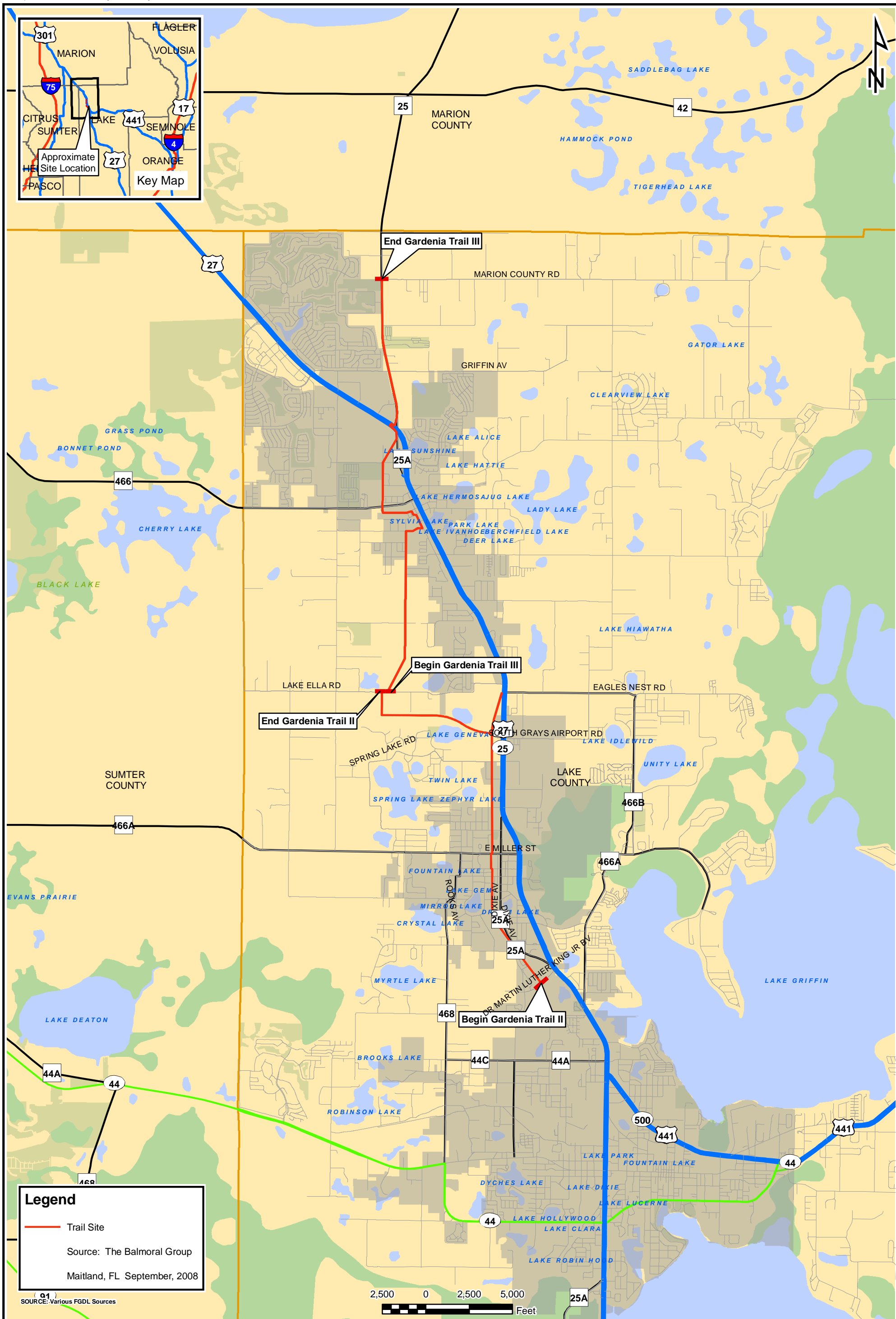
#### **4.0 Stormwater Management**

Stormwater from the trail is currently conveyed to nearby roadside swales, which eventually lead to Lake Griffin outfalls, for most of the project length. The proposed trails will be 14-foot wide asphalt with landscaping on both sides. The landscaped areas will provide stormwater infiltration and erosion control for runoff from the trail.

#### **5.0 Conclusion**

There are five small areas, totaling 3,200 feet (0.6 miles) in length of the 11.5-mile trail, that fall within the 100-year floodplain. Because construction of the trail does not include fill, elevations will not be raised above existing grade. Therefore, minimal impacts to the floodplain are expected for the Gardenia Trails II and III project.

**FIGURES**



**Legend**

- Trail Site

Source: The Balmoral Group  
Maitland, FL September, 2008

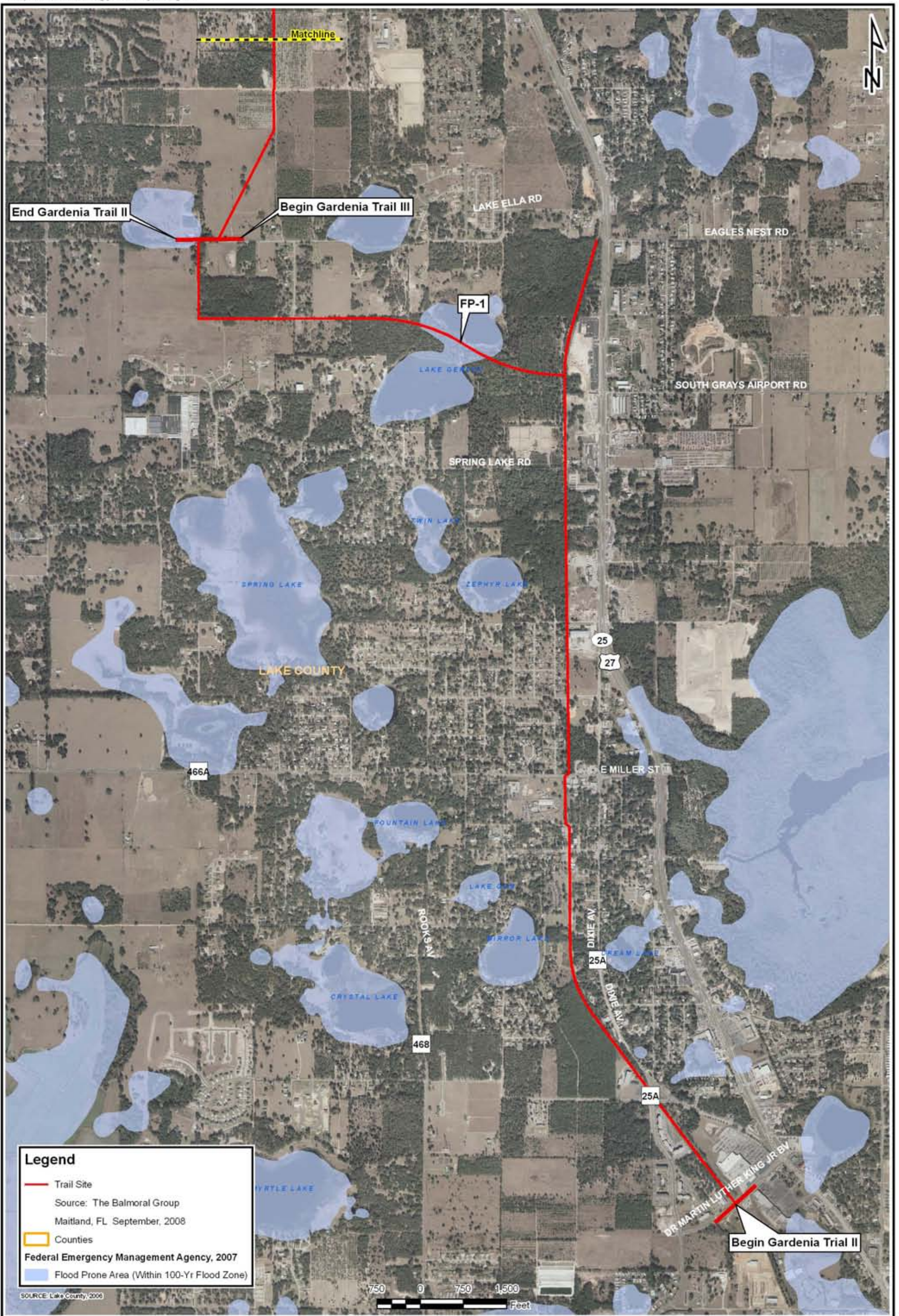
01 SOURCE: Various FGDL Sources



	Location Map	
	SCALE: 1" equals 5,000'	DATE: 09/25/2008

**Gardenia Trail II and III**  
 Sections 4, 8, 9, 10, 15 17, 20, 29, 32, & 33  
 Townships 18S & 19S, Range 24E  
 Lake County, Florida

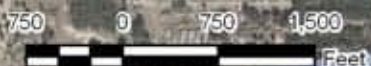
E Sciences, Incorporated FL Engineering Lic. #8691 34 East Pine Street Orlando, Florida, 32801 www.esciencesinc.com Phone: 407-481-9006 Fax: 407-481-9627		
DRAWN BY: TH	CHECKED BY:	PROJECT NUMBER: 1-1001-001



**Legend**

- Trail Site
- Source: The Balmoral Group  
Maitland, FL September, 2008
- Counties
- Federal Emergency Management Agency, 2007
- Flood Prone Area (Within 100-Yr Flood Zone)

SOURCE: Lake County, 2006



2A

FIGURE

Flood Zone Map

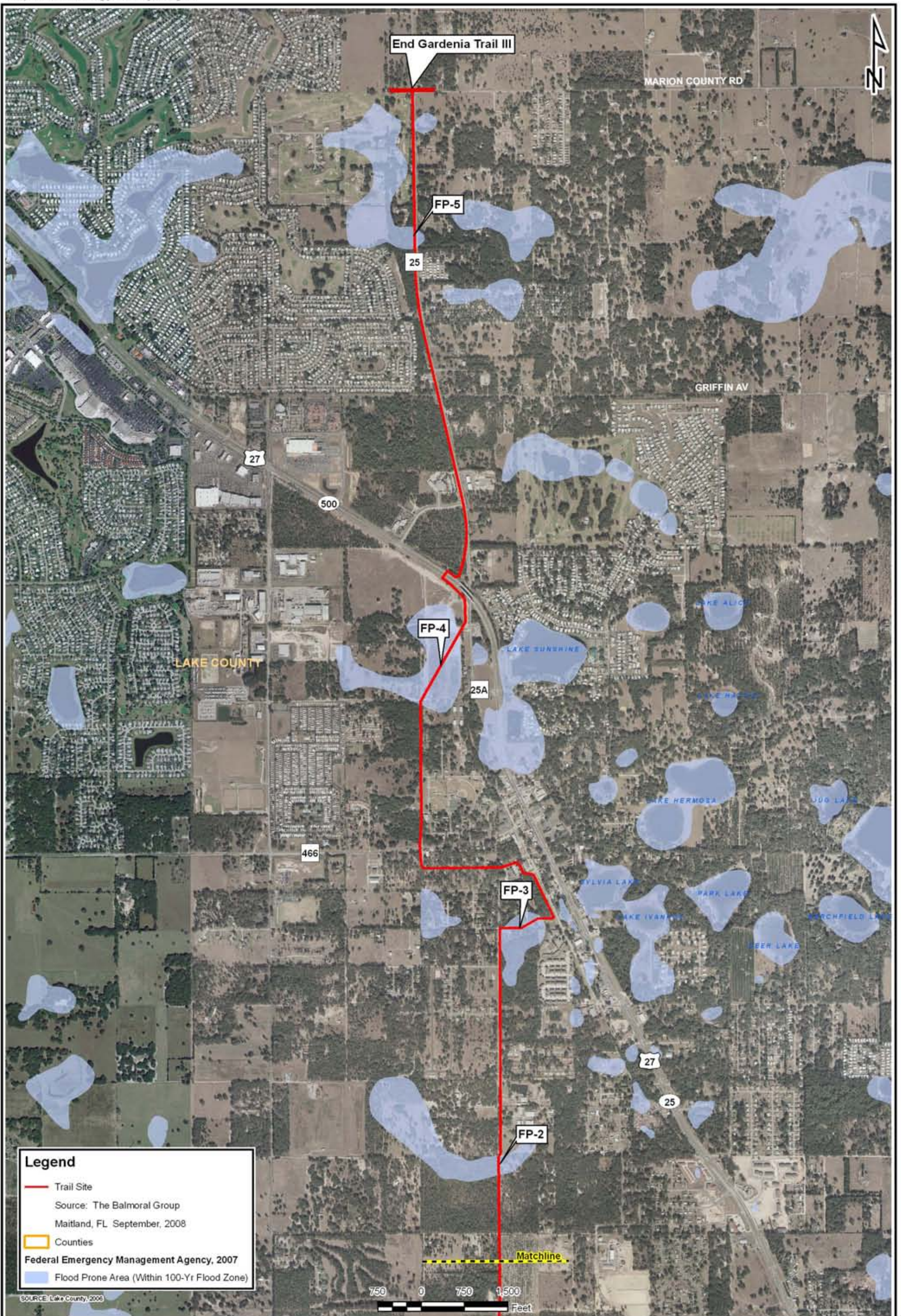
SCALE: 1" equals 1,500'	DATE: 10/08/2008
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Gardenia Trail II and III

Sections 4, 8, 9, 10, 15 17, 20, 29, 32, & 33  
Townships 18S & 19S, Range 24E  
Lake County, Florida

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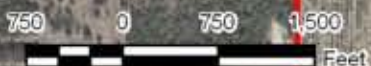
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**Legend**

- Trail Site
- Source: The Balmoral Group  
Maitland, FL September, 2008
- Counties
- Federal Emergency Management Agency, 2007
- Flood Prone Area (Within 100-Yr Flood Zone)

SOURCE: Lake County, 2006



2B

FIGURE

Flood Zone Map

SCALE: 1" equals 1,500'	DATE: 10/08/2008
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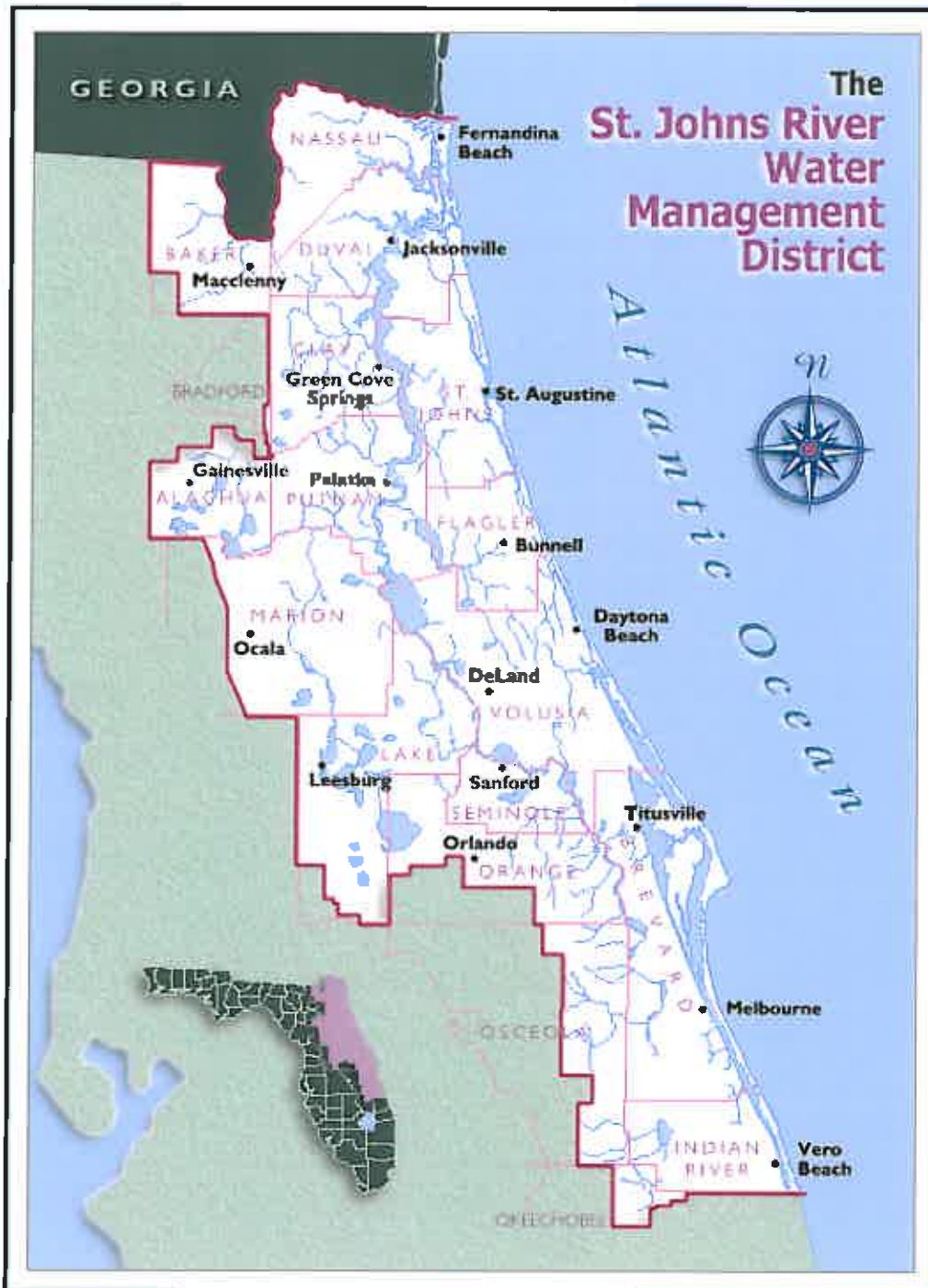
Gardenia Trail II and III

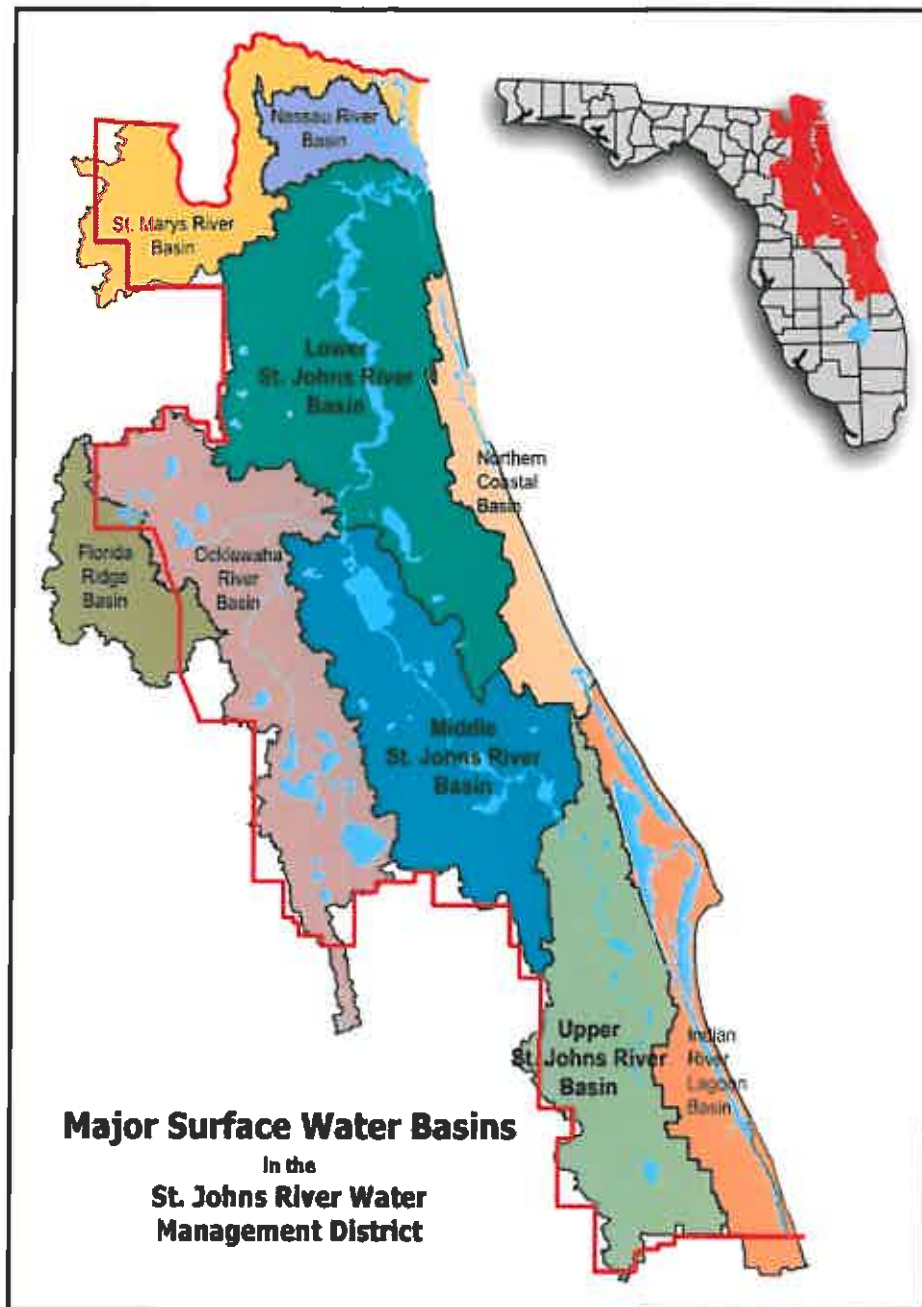
Sections 4, 8, 9, 10, 15 17, 20, 29, 32, & 33  
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APPENDIX A







**APPENDIX B**

# LEGEND



**SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD**

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

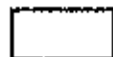


**FLOODWAY AREAS IN ZONE AE**



**OTHER FLOOD AREAS**

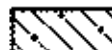
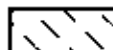
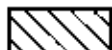
- ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.



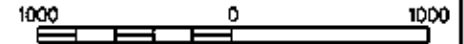
**OTHER AREAS**

- ZONE X** Areas determined to be outside 500-year floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.

**UNDEVELOPED COASTAL BARRIERS\***



APPROXIMATE SCALE



**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
 LAKE COUNTY,  
 FLORIDA  
 AND INCORPORATED AREAS

**PANEL 170 OF 725**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

**CONTAINS:**

COMMUNITY	NUMBER	PANEL	SUFFIX
HEALTHLAND JAIL, CITY OF	10001	070	0
LADY LAKE BOARDS OF	10002	070	0
LAKE COUNTY	10003	070	0

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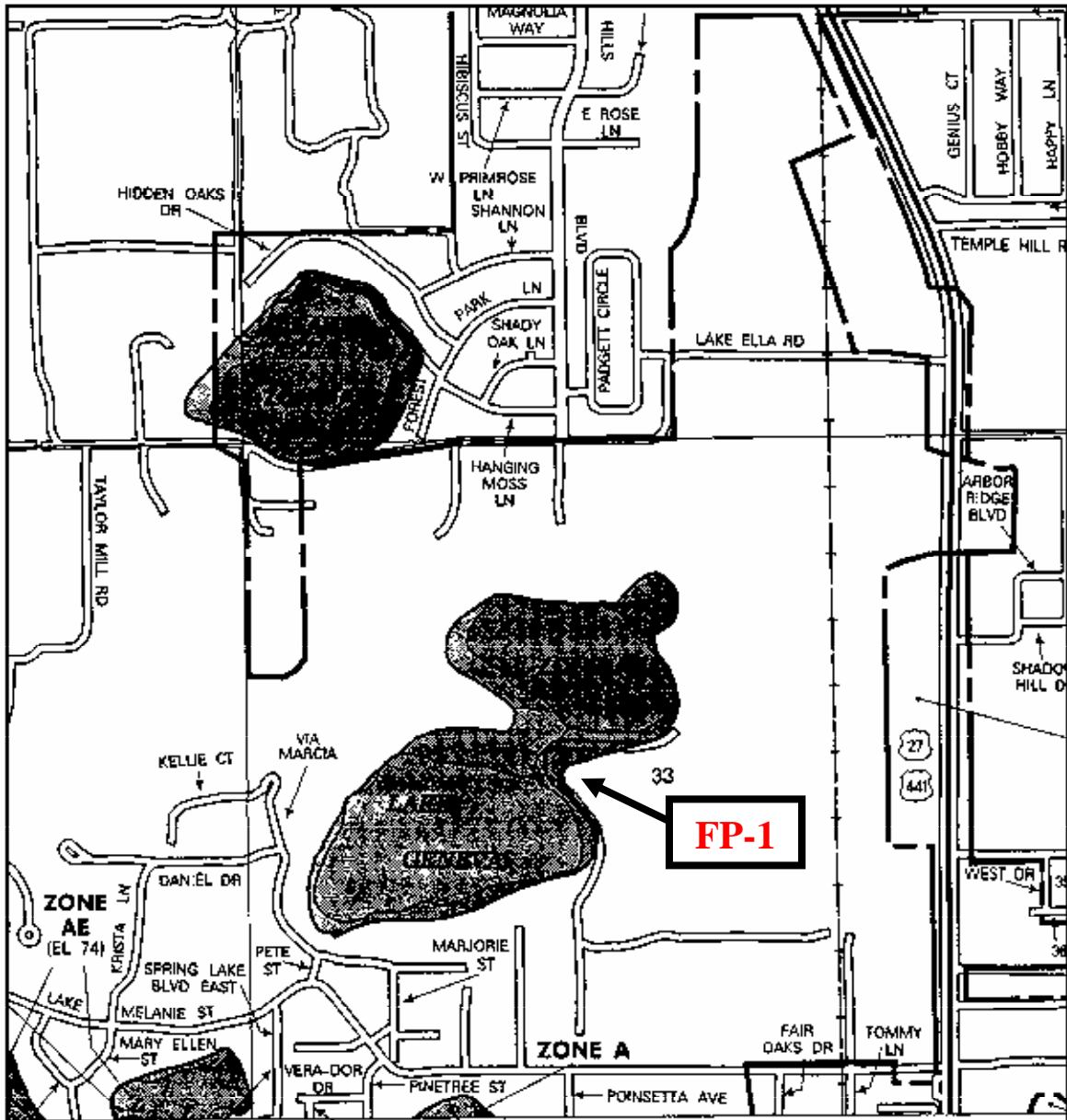
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**EFFECTIVE DATE:**  
**JULY 3, 2002**



Federal Emergency Management Agency

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**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
**LAKE COUNTY,**  
**FLORIDA**  
**AND INCORPORATED AREAS**

**PANEL 170 OF 725**

USE MAP INDEX FOR PANELS NOT PRINTED


**CONTAINS**

COMMUNITY	NUMBER	PANEL	SUFFIX
MAYLAND PARK CTY OF	12000	010	0
LAKELAND TOWN OF	12001	010	0
LAKE COUNTY	12002	010	0

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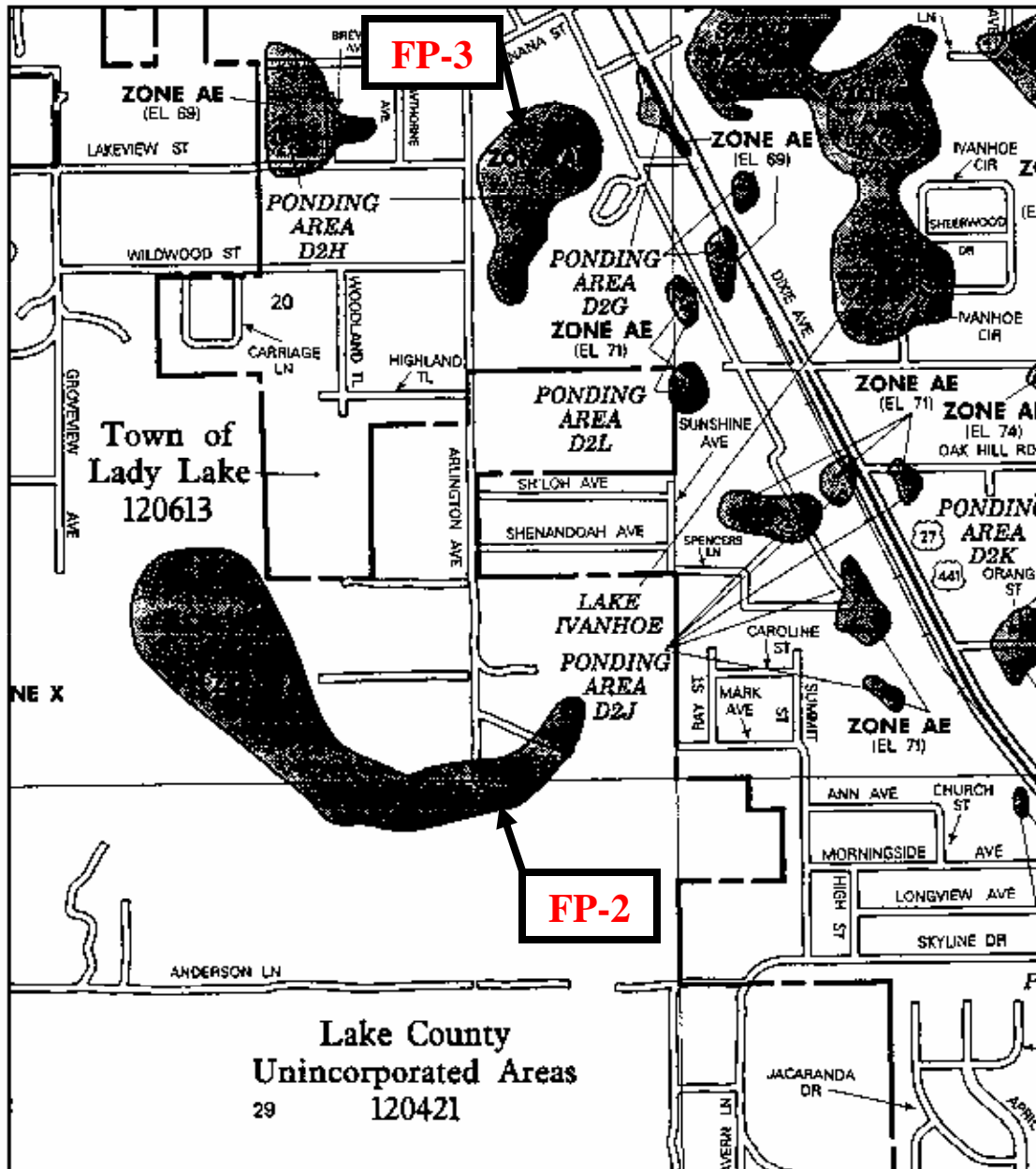
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**JULY 3, 2002**

  
 Federal Emergency Management Agency

JOINS PANEL 0306 TWIN LAKES

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NATIONAL FLOOD INSURANCE PROGRAM

**FIRM**  
FLOOD INSURANCE RATE MAP  
LAKE COUNTY,  
FLORIDA  
AND INCORPORATED AREAS

PANEL 17D OF 725


THIS MAP INDEX FOR PANELS NOT PRINTED

COMMUNITY	NUMBER	PANEL	SHEET
WILDWOOD TOWN OF	0007	010	0
LADY LAKE TOWN OF	0008	010	0
LAKE COUNTY	0009	010	0

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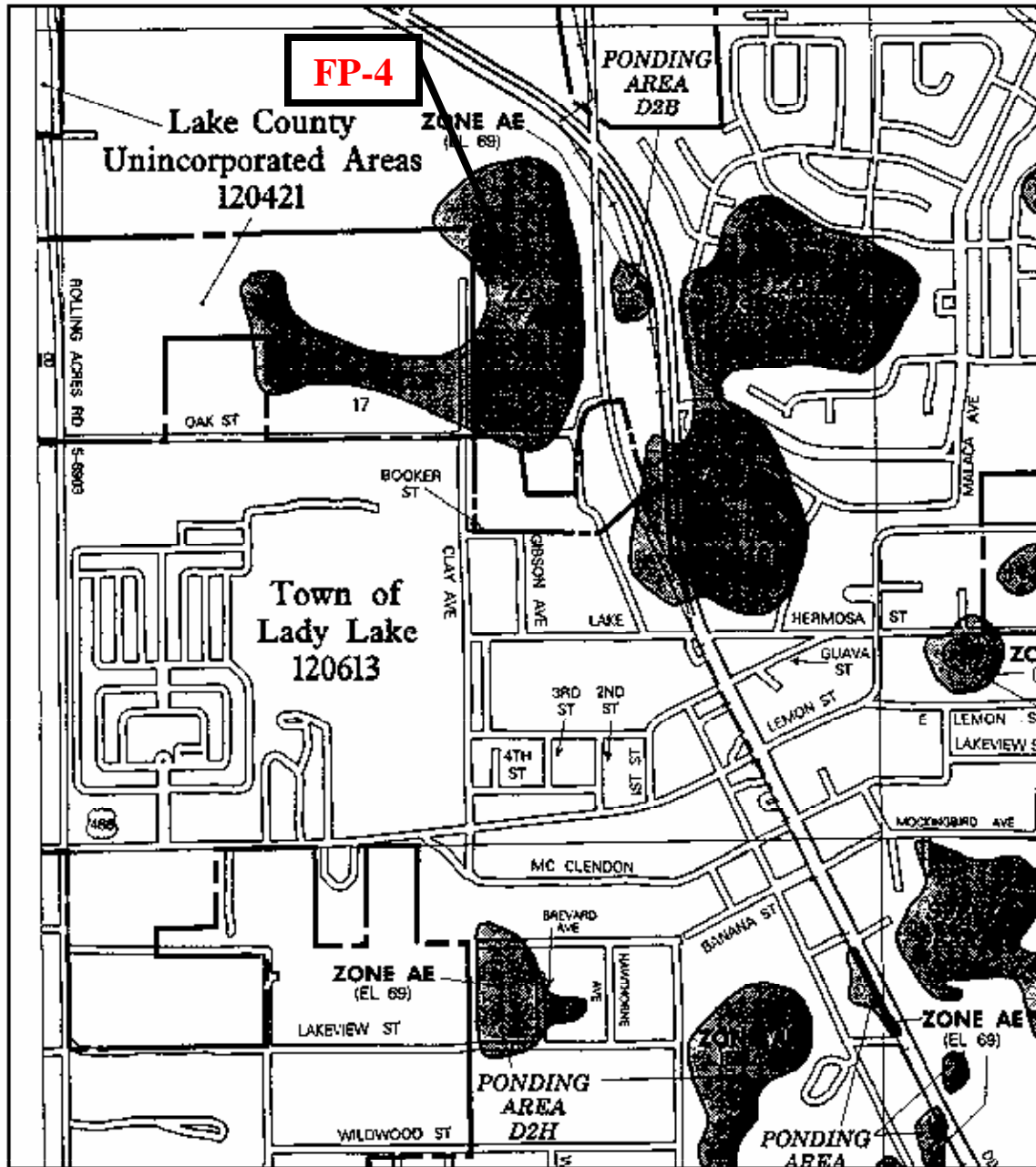
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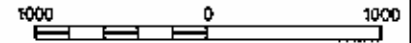


Federal Emergency Management Agency

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APPROXIMATE SCALE



**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM  
FLOOD INSURANCE RATE MAP  
LAKE COUNTY,  
FLORIDA  
AND INCORPORATED AREAS**

PANEL 170 OF 725

SEE MAP INDEX FOR PANELS NOT PRINTED

**CONTAINS**

COMMUNITY	NUMBER	PANEL	SURFACE
LAKE COUNTY OF FLORIDA	0000	010	0
LADY LAKE TOWN OF LAKE COUNTY	0000	010	0
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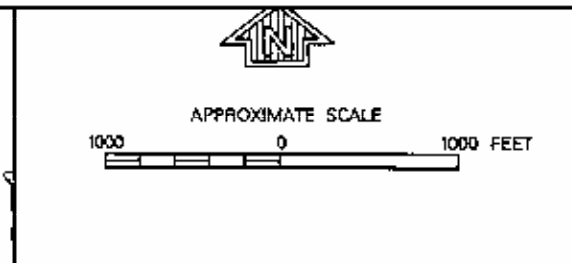
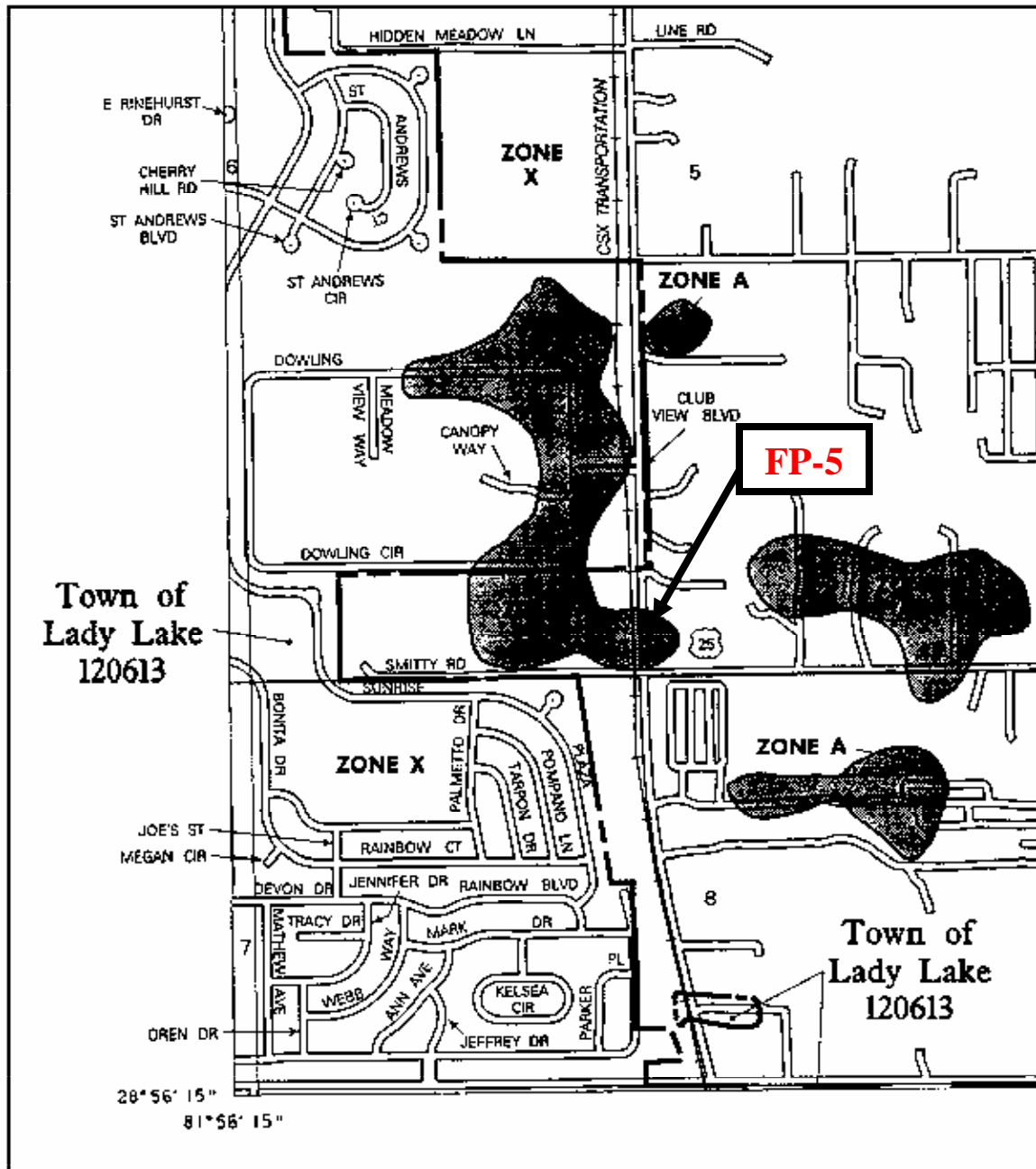
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**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
 LAKE COUNTY,  
 FLORIDA  
 AND INCORPORATED AREAS

**PANEL 160 OF 725**

SEE MAP INDEX FOR PANELS NOT PRINTED

**CONTAINS:**

COMMUNITY	NUMBER	PANEL	SHEET
LADY LAKE, TOWN OF LAKE COUNTY	1090	160	0
	1091	160	0

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**EFFECTIVE DATE:**  
 JULY 3, 2002

Federal Emergency Management Agency

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