FINAL

Midway Basin
Engineering Study Report

May 2021

Project No.: 6116-237555

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Project Manager

CDM Smith

Executive Summary

ES.1 Purpose

The objective of this study is to develop a stormwater master plan for the Midway Basin to assess the current level of service (LOS) for flood control, assess the stormwater management needs related to planned development, map the 100-year floodplain, and develop conceptual alternatives to help mitigate chronic flooding within the study area. Where feasible, the conceptual alternatives include consideration for water quality retrofit consistent with the County's obligations under the National Pollutant Discharge Elimination System (NPDES) and other state and federal water quality programs.

ES.2 Study Area

The Midway Basin is located in north-central Seminole County, south of Lake Monroe and east of downtown Sanford. The Midway Basin encompasses an area of approximately 5 square miles with Lake Monroe and the St. Johns River serving as the ultimate receiving waters for stormwater runoff from the basin tributary area. Approximately 3 square miles of the basin are within the unincorporated portion of Seminole County while the remaining 2 square miles are within the City of Sanford, as shown on **Figure ES-1**. The Midway area is bounded by Lake Monroe to the north, the St. Johns River to the east, the Orlando Sanford International Airport to the south, and downtown Sanford to the west. Midway is a census-designated area of approximately 1,700 residents, based on the 2010 government census, fully encompassed within the St. Johns Water Management District (SJRWMD).

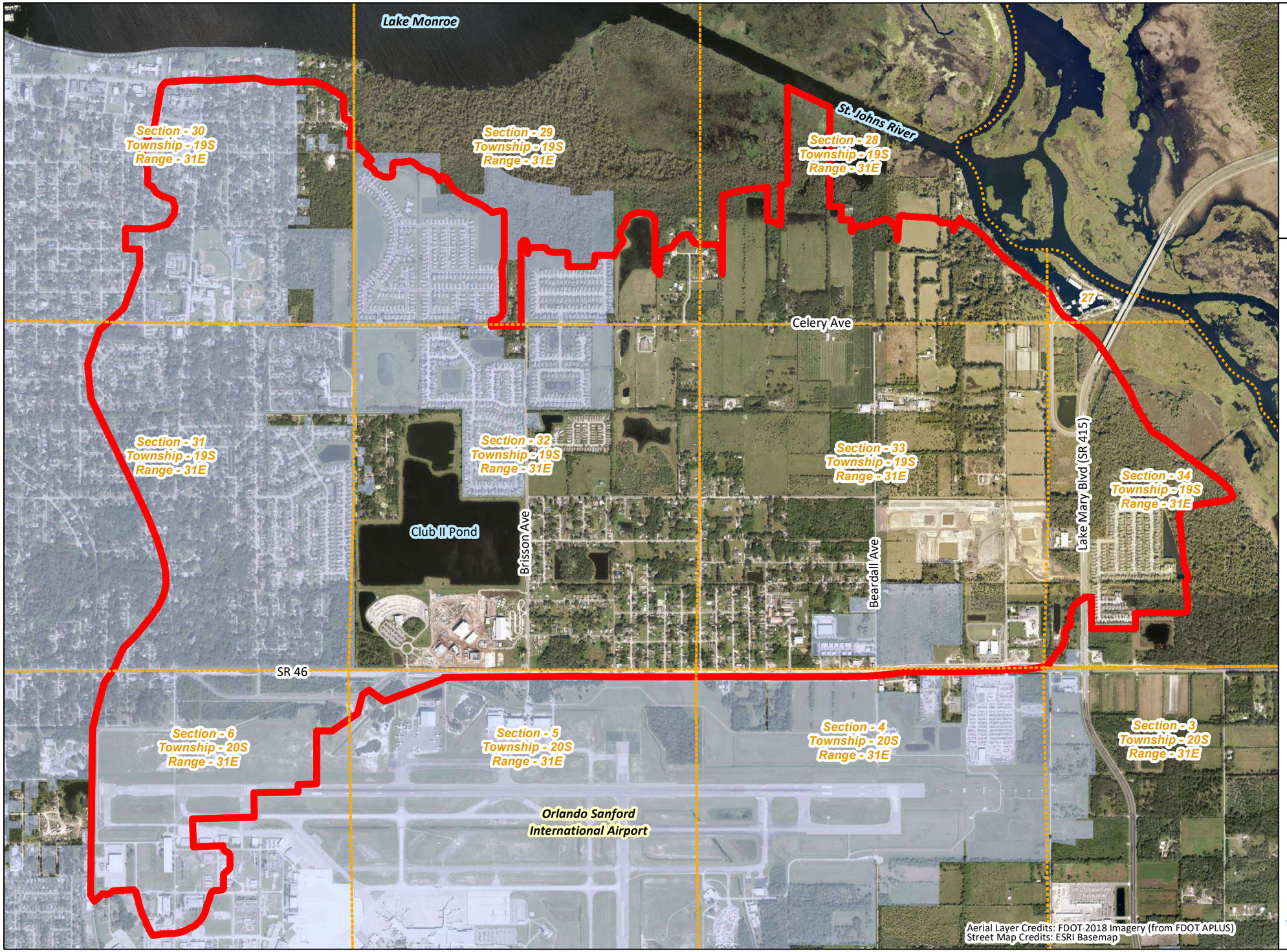
ES.3 Stormwater Model Development and Results

CDM Smith undertook a data compilation effort to assemble relevant basin information in support of the existing and future conditions hydrologic and hydraulic (H/H) modeling, alternatives analysis, and floodplain delineation, with an emphasis on obtaining data pertaining to the Midway Basin and associated stormwater management systems that lie within unincorporated Seminole County. Data were obtained from various online databases, through requests and coordination with Seminole County, the City of Sanford, Orlando Sanford International Airport, SJRWMD, as well as a public meeting with local residents held on June 25, 2019. In addition, survey was collected for high priority structures including drainage infrastructure for major outfalls or in areas where County staff or local residents reported flooding issues;

Using ICPR Version 4.05.02, CDM Smith developed H/H models for the following two scenarios:

1. Existing conditions – represents existing development as shown in 2018 aerial photography based on review of existing as-builts synonymous with this date, field reconnaissance, field survey and other data sources previously documented.

2. Build-out conditions – represents the existing condition (described above) plus updated land use and hydraulics associated with approved/planned development based on review of County approved construction plans and ERPs issued for future development in the study area not yet shown as constructed in the 2018 aerials.



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Section-Township-Range
- Midway Basin (4.3 square miles, 2.4 square miles unincorporated)
- City of Sanford (1.9 square miles within Midway Basin)

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Figure ES-1 Project Location
Midway Basin Engineering Study
Seminole County, Florida

The original 1997 Midway Basin study models were referenced during model development, however the majority of the modeling, particularly within unincorporated areas, was refined and updated with recent information in order to effectively evaluate the existing and future conditions LOS as well as analyze and rank conceptual alternatives. The existing and build-out model schematics are shown in **Figure ES-2** and **Figure ES-3.**

ES 3.1 Level of Service Analysis

Using the existing and build-out condition model results, CDM Smith performed a LOS analysis to identify areas that may be deficient flood control purposes. The design storm criteria used for the LOS analysis is based on the 2018 Seminole County Stormwater Master Plan, which assigns a design storm event for each Facility Type. Generally, streets and swales are evaluated using the 10-year/24-hour event, canals and ponds using the 25-year/24-hour event, and landlocked retention/detention basins using the 100-year/24-hour event. In addition to assigning design storm criteria, service level descriptions were determined for each service level category (i.e., A, B, C, D) for each facility type and location.

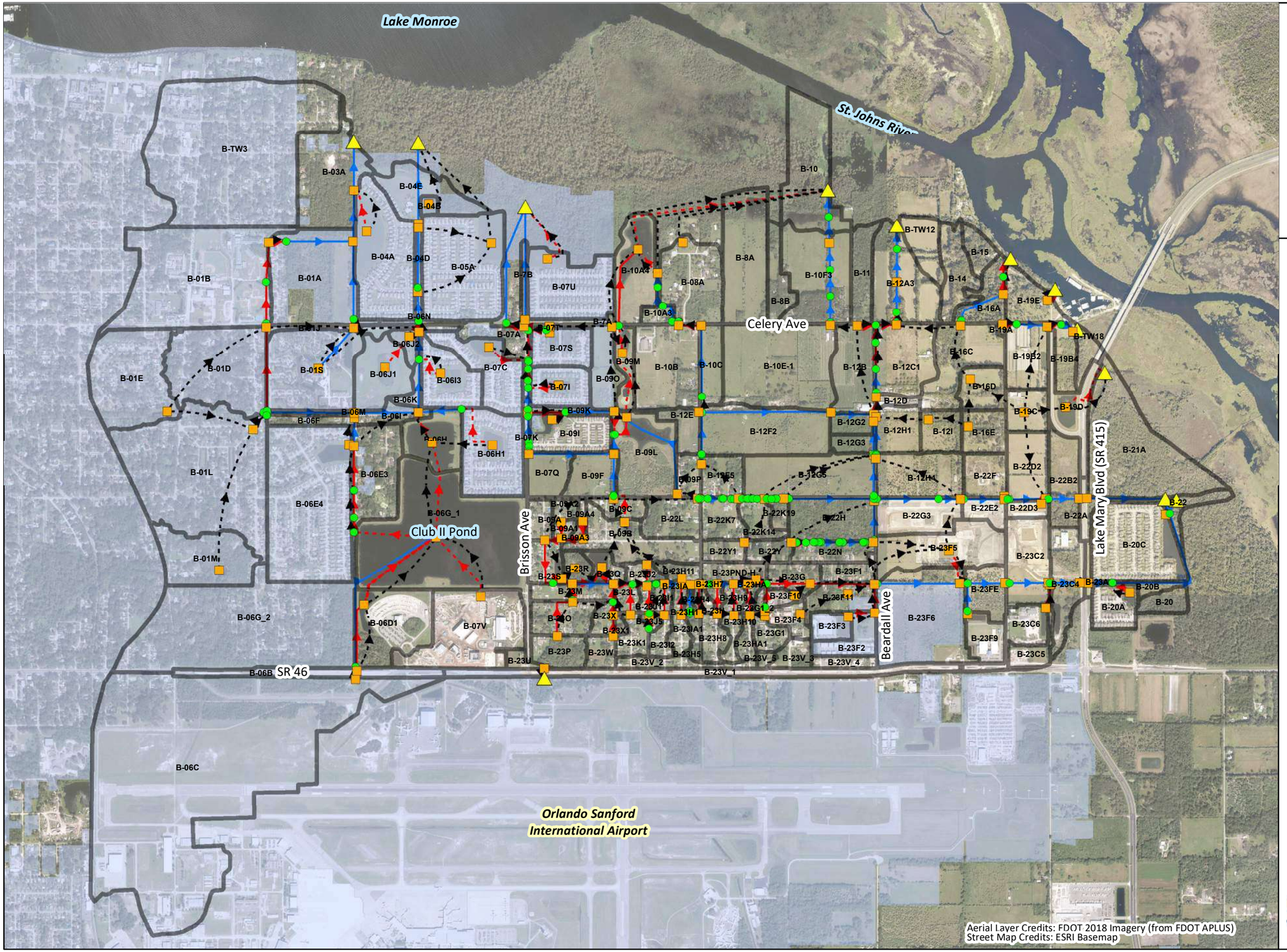
To validate the existing and build-out condition models and assess the reasonability of the model results, CDM Smith compared the LOS analysis to the catalog of known problem areas that was assembled during the data collection phase. Many of those model nodes which received a LOS designation of "D" correspond to an area of flood concern identified by local residents and/or County maintenance staff. In general, the LOS analysis compared favorably to these anecdotal validation points; there were few flood complaint locations that could not be tied to a nearby deficient node.

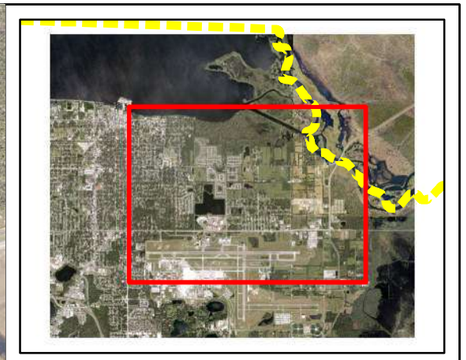
Table ES-1 includes a list of general flood prone areas identified by County staff, resident complaints, and the LOS analysis for subsequently evaluation in the alternatives analysis.

Table ES-1 Flood Prone Areas

Area	Identified by County Staff	Resident Complains	Contains Structures of LOS D
Midway Community	✓	✓	✓
Lincoln Street/Hughey Street at Beardall Avenue	✓	✓	✓
CSX Ditch at Beardall Avenue			✓
Hughey/21st Street and Sipes Avenue	✓	✓	✓
Washington Street Outfall		✓	✓

A comparison was also performed between the existing and build-out condition model results to identify areas with potential changes in LOS as a result of planned developments. Several areas were identified with LOS changes between the existing and build-out conditions, including Celery Avenue and Beardall Avenue, which is expected to improve its flood control LOS, and the Washington Street Outfall, which is expected to see a degradation of its existing LOS. Changes in model stages between existing and build-out conditions can be attributed primarily to the addition or removal of storage and modifications to drainage patterns associated with proposed development.





N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

City of Sanford

ICPR_BASIN Existing

ICPR_NODE

Boundary Node

Junction Node

Storage Node

ICPR_LINK

CHANNEL

DROP STRUCTURE

PIPE

WEIR

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Figure ES-2 Existing Conditions Model Schematic
Midway Basin Engineering Study
Seminole County, Florida

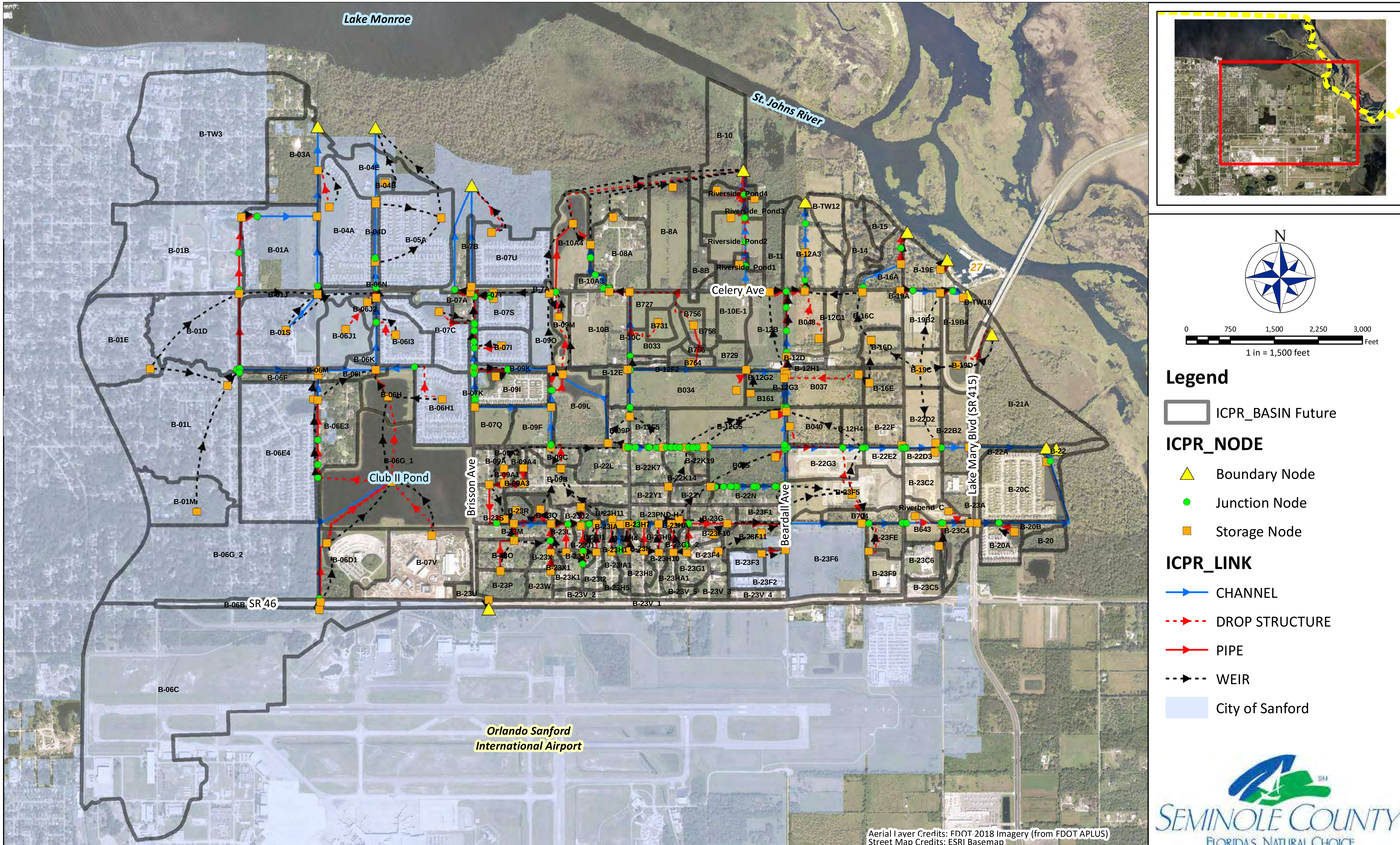

Figure ES-3 Build-Out Conditions Model Schematic
Midway Basin Engineering Study
Seminole County, Florida

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ES 3.2 Floodplain Mapping

Floodplains were delineated for the Midway Basin using the results of the ICPR4 model and available topographic data. The topographic data sources used were the 2005 and 2009 digital elevation models (DEMs) . A gap of coverage exists between the 2005 (western) and 2009 (eastern) DEMs. Additionally, due to the age of the DEM information, topographic voids exist due to new development. Floodplains were manually added as applicable based on aerials and plans information. It is recommended that the County perform an update to this basin study following the anticipated publication of the Florida Department of Emergency Management (FDEM) Statewide LiDAR Project coverages for Seminole County to address the identified topographic voids and refine the modeled floodplains.

The stormwater modeling, LOS analysis, and floodplain mapping are described in greater detail in Section 3 of the report.

ES.4 Alternatives Analysis and Conceptual Improvements

Section 4 of the report addresses the identification and evaluation of conceptual capital improvement projects to mitigate flooding and improve water quality. CDM Smith initially developed six conceptual alternatives to address the flood prone areas identified in Table ES-1. Following the initial presentation of those concepts at the September 2020 public meeting, the concepts were revised to reduce the need for private residential property acquisition within the Midway Community, maximize the use of public lands, and further identify opportunities for improvement in flood control level of service. Furthermore, where appropriate, CDM Smith added water quality components to the conceptual design to provide compensating treatment and improve permitability of the concept and to provide pollutant load reductions in support of the County's goals and regulatory obligations.

The five proposed capital improvement projects/programs include:

1. **Midway Community Drainage Improvements (Revised Alternative 1)** - This alternative addresses known flooding concerns in the heart of the Midway community. As shown in **Figure ES-4**, these improvements include three new stormwater ponds on public lands in the area, new and/or improved primary drainage conveyances to facilitate drainage to the new ponds, and new and/or improved secondary drainage systems on local streets connecting to the primary conveyances.

2. **Lincoln Street Drainage Improvements and Hughey Street Outfall Improvements (Revised Alternative 2)** - This alternative is intended to address frequent flooding experienced by residents living along the western extent of Lincoln Street, as well as identified issues along the Hughey Street Outfall. As shown in **Figure ES-5**, these improvements include new and replacement stormwater collection and conveyance systems along Lincoln Street and Beardall Avenue to the Hughey Street outfall, widening of the existing open channel portion of the Hughey Street Outfall between Beardall Avenue and Cameron Avenue to provide improved conveyance and lineal detention, and the construction of a new regional floodplain compensation pond adjacent to the Hughey Street outfall upstream of the crossing under SR 415.

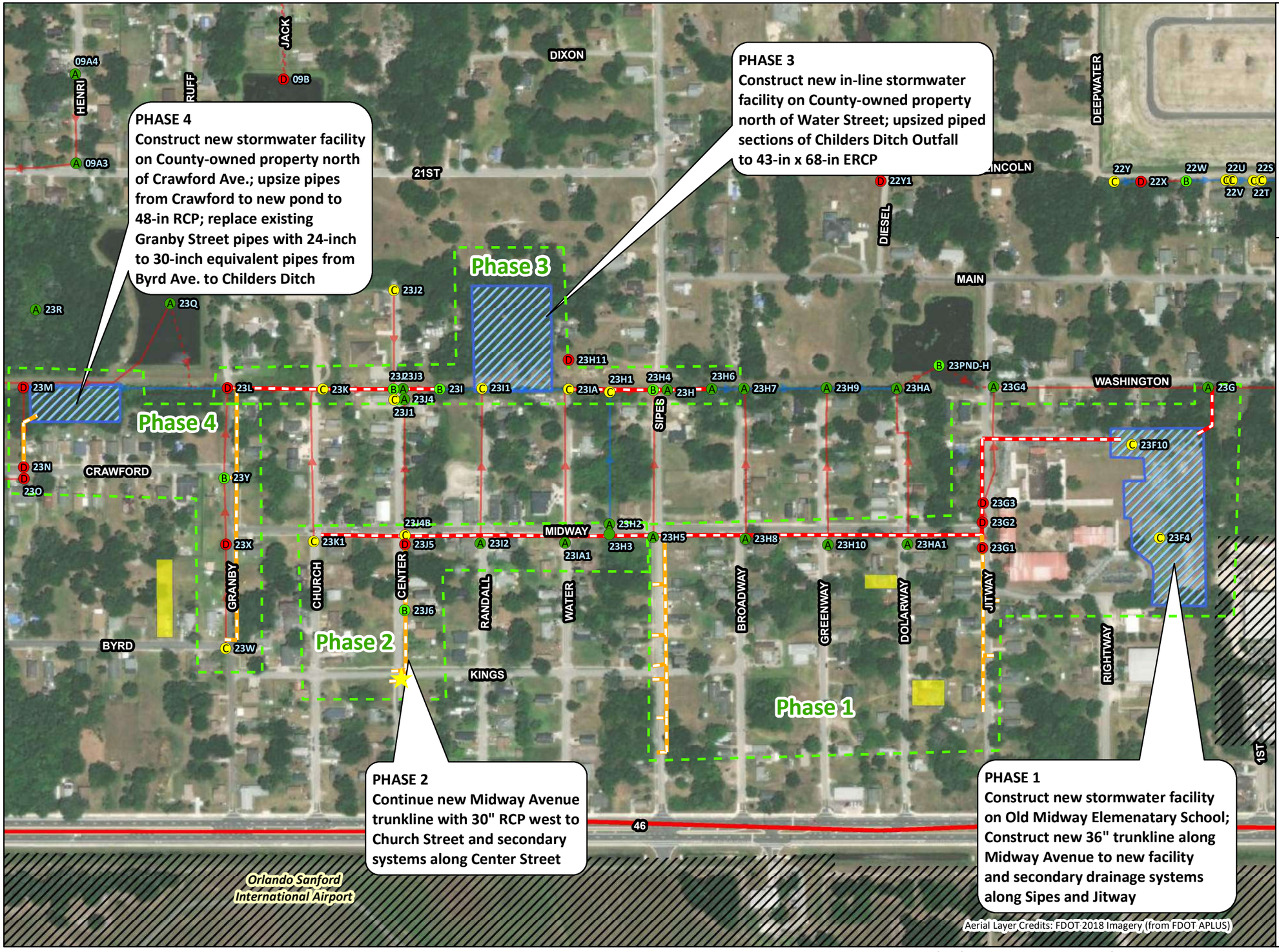

Figure ES-4 Revised Alternative 1 - Midway Community Drainage Improvement Program
Midway Basin Engineering Study
Seminole County, Florida

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Construct new ~8-acre floodplain compensation pond on private property to be acquired and provide direct connection to Hughey Street Outfall to attenuate large storm flows

Construct new drainage systems along Lincoln Street:
1,100 LF 18" RCP and 1,300 LF 24" RCP
Drainage easement acquisition required due to limited County ROW along Lincoln west of Deepwater

Remove existing culverts

Construct ~700LF of new 34-in x 53-in ERCP (42-in equiv.) on east side of Beardall Avenue within County ROW

Widen existing Hughey Street Outfall by ~15-feet on north side within County ROW to improve conveyance and provide lineal detention

NEW ASHFORD
ECKERSON
ONEAL
HUGHEY
SILVERSTREAM
LOOKING GLASS
BLUE ROCK
NYAHWHITE
KLONDIKE
STERLING MEADOWS
EUDELL
MIDWAY
RIGHTWAY
DIXON
KINGS
MAIN
LINCOLN
SAVOY
HOPEDALE
LYONSDALE
TISBURY
DEERPARK
BEARDALL
CAMERON
CELERY
LAKE MARY
DEEPWATER
KINDERHOOK
APALACHICOLA
WH TE PELICAN
CANAAN
WASHINGTON
DOLARWAY
JITWAY
BROADWAY
GREENWAY
DIESEL
MONTE CRISTO
20TH
21ST
1ST

Aerial Layer Credits: FDOT 2018 Imagery (from FDOT APLUS)

N

0 250 500 750 1,000 Feet

1 in = 500 feet

Legend

County-Identified Problem Areas

Legend Public Meeting Comments

City of Sanford

Proposed Conveyance

Open Channel, Primary

Pipe, Primary

Pipe, Secondary

Proposed Storage

ICPR_NODE Future LOS

A

B

C

D

City Jurisdiction

ICPR_LINK Future

CHANNEL

DROP STRUCTURE

PIPE

Proposed Property Acquisition

Midway Basin

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Figure ES-5 Revised Alternative 2 - Lincoln Street and Hughey Street Outfall Drainage Improvements
Midway Basin Engineering Study
Seminole County, Florida

3. **Beardall Avenue Drainage Improvements (Revised Alternative 3)** - This alternative is intended to address LOS deficiencies identified through stormwater modeling around the CSX Ditch at Beardall Avenue. As shown in **Figure ES-6**, the improvements include the construction of a new in-line stormwater pond at the west end of the CSX Ditch at Beardall Avenue, upsizing and regrading of culverted and open channel drainage systems along the east side of Beardall Avenue from the CSX Ditch north to Celery Avenue, and the installation of culverts along Celery Avenue from Beardall Avenue to the Rosseter's Ditch outfall to reduce dependence on an existing, unmaintained outfall to Lake Monroe on private property.

4. **20th Street Drainage Improvements (Revised Alternative 4)** - This is intended to address flooding concerns in the area of 20th Street west of Sipes Avenue, including reported flooding along Dixon Avenue and modeled level-of-service deficiencies at the existing Jack Court stormwater pond and at the upstream end of the Hughey Street Outfall. As shown in **Figure ES-7**, the improvements include new stormwater collection and conveyance systems along Sipes Avenue, Dixon Avenue, and 20th Street and the construction of a new outfall to an expanded IFAS-Midway Treatment Facility, and a reconfiguration of the Jack Court Pond outfall and direct connection to the expanded IFAS-Midway Treatment Facility.

5. **Washington Street Outfall Improvements (Alternative 5)** - This alternative addresses flooding concerns and LOS deficiencies in the vicinity of Washington Street and Beardall Avenue. As shown in **Figure ES-8**, the improvements include upgrades to the culverts under Beardall Avenue and Cameron Avenue, improvements to the outfall ditch between Beardall and Cameron, and the construction of a stormwater pond along the outfall just west of State Road 415.

Conceptual cost estimates were developed for the alternatives and a ranking matrix was developed based on a selected set of criteria that meets the overall goals of improving flood control level-of-service and water quality in the Midway Basin. The ranking of the five final alternatives is as follows:

1. Midway Community Drainage Improvements, Revised Alternative 1
2. 20th Street/Sipes Avenue Drainage Improvements, Revised Alternative 4
3. Washington Street Outfall Improvements, Alternative 5
4. Lincoln Street and Hughey Street Outfall Drainage Improvements, Revised Alternative 2
5. Beardall Avenue/CSX Ditch Drainage Improvements, Revised Alternative 3

ES.5 Summary and Conclusions

CDM Smith developed a conceptual Capital Improvement Plan for the Midway Basin to include five alternatives, shown in **Table ES-2**; the selected alternatives, representing just over $18 million in proposed infrastructure, accomplish the County's goals of directly addressing known flooding areas in the Midway Basin and taking steps towards achieving pollutant load reductions to downstream receiving waters.

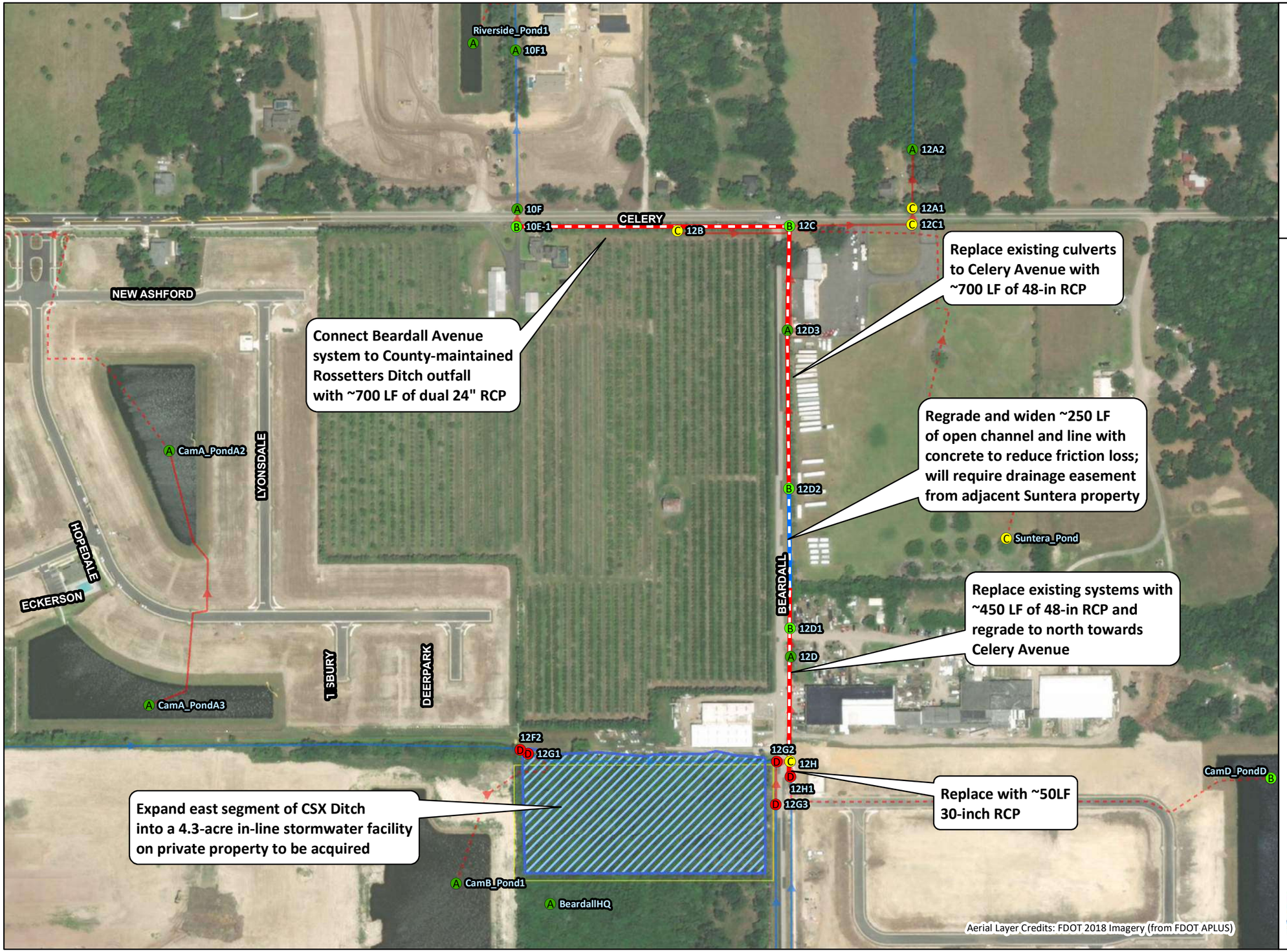
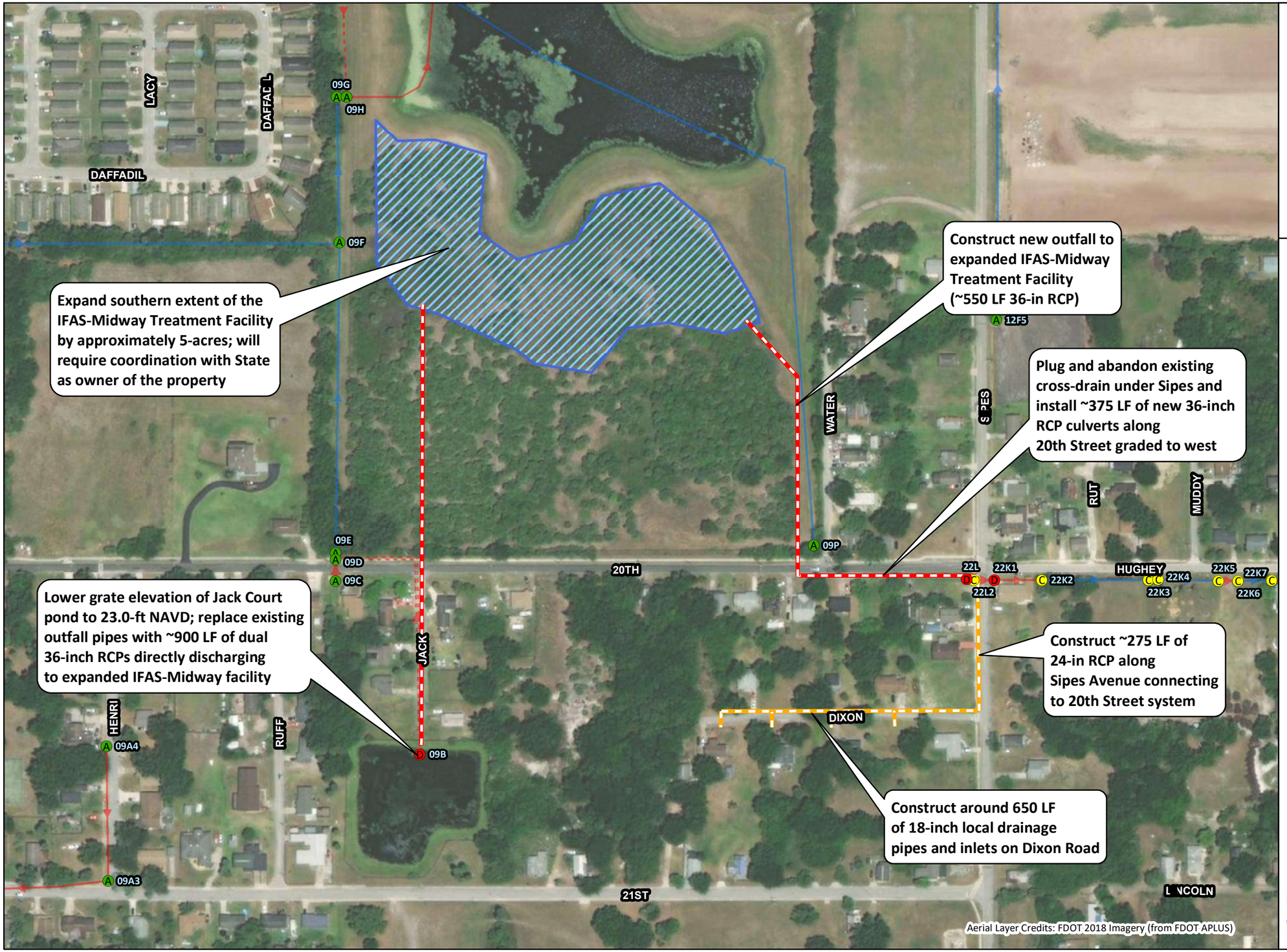


Figure ES-6 Revised Alternative 3 - Beardall Avenue and CSX Ditch Drainage Improvements
Midway Basin Engineering Study
Seminole County, Florida



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0 100 200 300 400 Feet

1 in = 200 feet

Legend

- County-Identified Problem Areas
- Public Meeting Comments
- City of Sanford

Proposed Conveyance

- Open Channel, Primary
- Pipe, Primary
- Pipe, Secondary
- Proposed Storage

ICPR_NODE Future LOS

- A
- B
- C
- D
- City Jurisdiction

ICPR_LINK Future

- CHANNEL
- DROP STRUCTURE
- PIPE
- Midway Basin

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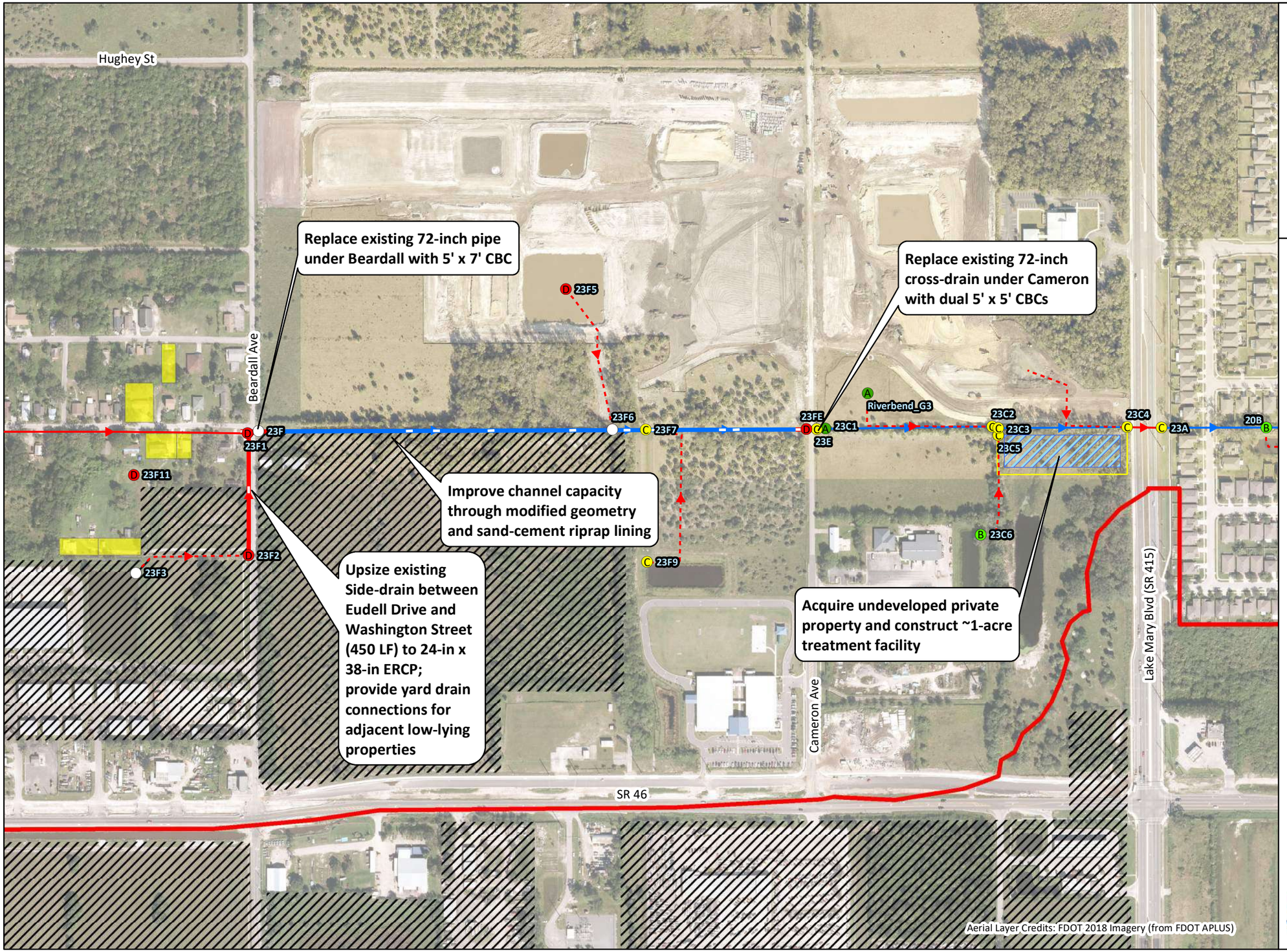
Figure ES-7 Revised Alternative 4 - 20th Street and Sipes Avenue Drainage Improvements
Midway Basin Engineering Study
Seminole County, Florida



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1 in = 350 feet

Legend

- Parcel to be Acquired
- Proposed Pond
- Public Meeting Comments
- Midway Basin
- City of Sanford

Proposed Conveyance Improvements

- Open Channel
- Pipe

ICPR_NODE Future LOS

- A
- B
- C
- D
- City Jurisdiction

ICPR_LINK Future

- CHANNEL
- DROP STRUCTURE
- PIPE

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Figure ES-8 Alternative 5 - Washington Street Outfall Improvements
Midway Basin Engineering Study
Seminole County, Florida

Table ES-2 Recommended Alternatives and Conceptual Capital Improvement Plan

Alternative	Project Name	Cost
1 (Revised)	Midway Community Drainage Improvements	$6,040,000
4 (Revised)	20th Street/Sipes Avenue Drainage Improvements	$2,827,000
5	Washington Street Outfall Improvements	$1,631,000
2 (Revised)	Lincoln Street and Hughey Street Outfall Drainage Improvements	$4,341,000
3 (Revised)	Beardall Avenue/CSX Ditch Drainage Improvements	$3,218,000
Total		**$18,057,000**

Further recommendations were identified, including for proactive operation and maintenance of the County's stormwater infrastructure, and for regular updates of this study to reflect best available data and information and better assist the County in managing the water resources of the Midway Basin.

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Section 1
Introduction

CDM Smith, Inc. (CDM Smith) was tasked by the Seminole County (County) Public Works Department (PWD) to develop stormwater modeling and perform alternative analysis for improvements for the Midway Basin under the PS-1709-18/RTB Master Services Agreement for National Pollutant Discharge Elimination Systems (NPDES) Services dated June 4, 2018.

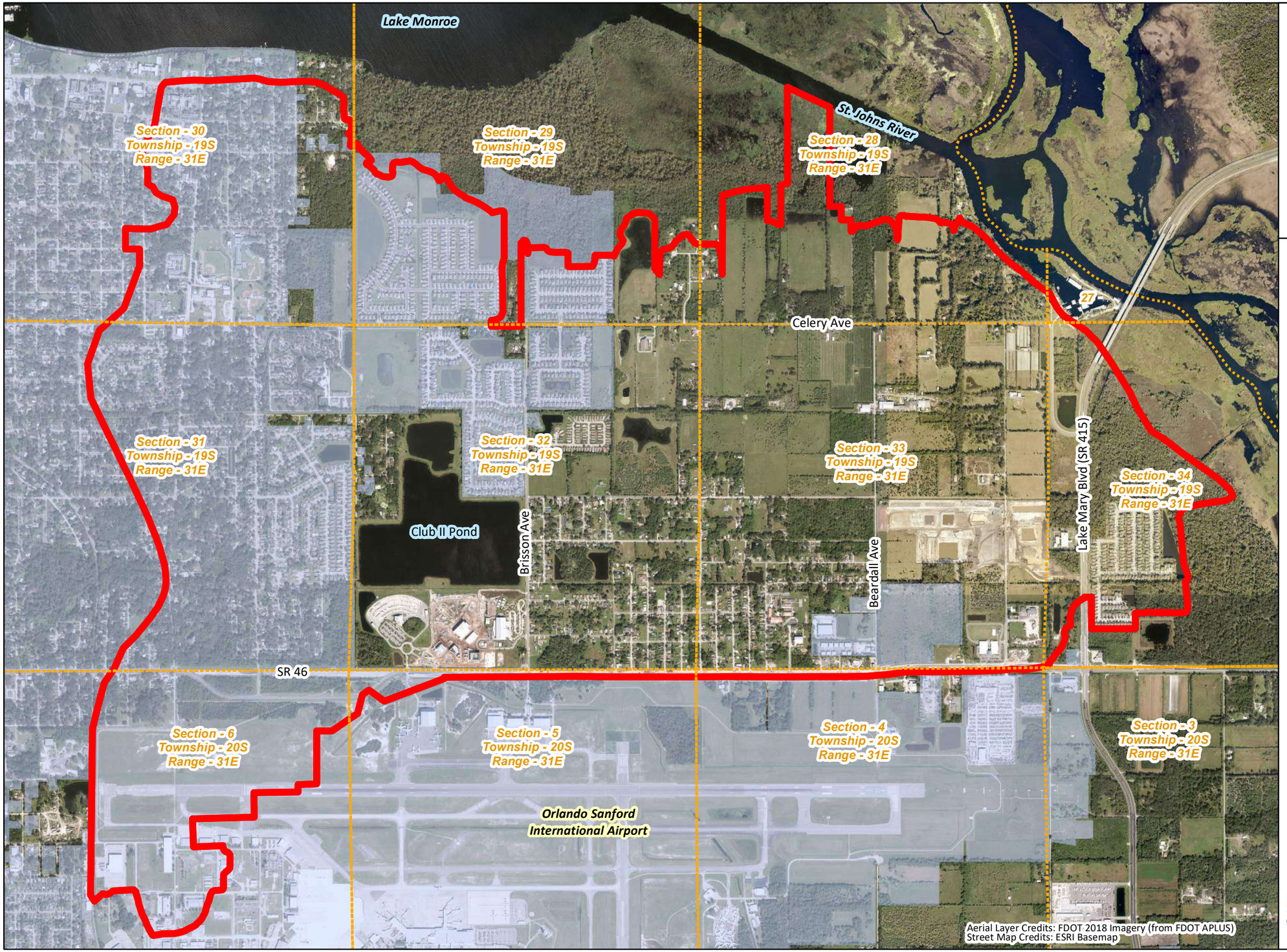
1.1 Background

In 1997, the Seminole County PWD completed the Midway Basin Drainage Inventory and Engineering Study (1997 Study) that identified Capital Improvement Projects (CIPs) to improve the level of service (LOS) for flood protection using stormwater modeling techniques. Based upon the findings of the 1997 Study, the PWD completed several CIP improvements for stormwater as well as continuing with their ongoing stormwater maintenance program for the stormwater conveyance systems within the County's public rights-of-way and stormwater easements dedicated for that purpose.

In 2018, the Seminole County Stormwater Master Plan (2018 Study) was completed, which is a stormwater needs assessment for all stormwater basins in the County, including the Midway Basin. Based upon the results of the 2018 Study and the proposed new development in the basin that is currently under review by the County, the PWD requested that CDM Smith perform an update to the 1997 Study using current stormwater management assessment technologies, which will include identification of the current stormwater management needs within the unincorporated areas of the Midway Basin.

1.2 Project Location and General Description

The Midway Basin is located in north-central Seminole County, just south of Lake Monroe and just over half a mile east of historic downtown Sanford. The Midway Basin encompasses an area of approximately 4 square miles with Lake Monroe and the St. Johns River serving as the ultimate receiving waters for stormwater runoff from the basin tributary area. Approximately 2 square miles of the basin are within the unincorporated portion of Seminole County while the remaining 2 square miles are within the City of Sanford, as shown on **Figure 1-1**. The Midway area is bounded by Lake Monroe to the north, the St. Johns River to the east, the Orlando Sanford International Airport to the south, and downtown Sanford to the west. Midway is a census-designated area of approximately 1,700 residents, based on the 2010 government census, fully encompassed within the St. Johns Water Management District (SJRWMD).



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0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Section-Township-Range
- Midway Basin (4.3 square miles, 2.4 square miles unincorporated)
- City of Sanford (1.9 square miles within Midway Basin)

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Figure 1-1 Project Location
Midway Basin Engineering Study
Seminole County, Florida

1.3 Purpose and Objectives

The objective of this study is to develop an engineering study for the Midway Basin to assess the current LOS for flood control, assess the stormwater management needs of planned development, develop a flood mitigation plan, and map the 100-year floodplain. Where feasible, the flood mitigation plan includes consideration for water quality retrofit consistent with the objectives of the County's water quality program.

This report documents the efforts involved in the development of the study, which includes the following:

- Assembly and Evaluation of Watershed Data, including historic water levels and flood complaints, topographic data, floodplain information, plans and permit research for areas of existing and future development, hydrologic data, drainage patterns and watershed boundary, and review of hydraulic feature inventory including field reconnaissance and development of a survey plan.
- Stormwater Model Development, including stormwater network feature database and model schematic, hydrologic unit delineation, model parametrization, model setup and design storm simulations, Level-of-Service (LOS) Analysis, and floodplain delineation.
- LOS Improvement Alternatives Analysis, including the analysis and ranking of conceptual stormwater CIPs that consider flood control and water quality benefits, permit requirements, potential environmental benefits, probable construction and maintenance costs, and public acceptance.
- Public Meetings to involve stakeholders, answer questions, and solicit input at periodic milestones throughout the study.

Section 2

Assembly and Evaluation of Watershed Data

2.1 Midway Basin Data Inventory

CDM Smith undertook a data compilation effort to assemble relevant basin information in support of the existing and future conditions hydrologic and hydraulic (H/H) modeling, alternatives analysis, and floodplain delineation, with an emphasis on obtaining data pertaining to the Midway Basin and associated stormwater management systems that lie within unincorporated Seminole County. Data were obtained from various online databases, through requests and coordination with Seminole County, the City of Sanford, Orlando Sanford International Airport, SJRWMD, as well as a public meeting with local residents held on June 25, 2019. This section enumerates the data gathered and their sources, as well as identifies potential data gaps that may be needed for this study.

2.1.1 Data Compilation Approach

Geographic Information System (GIS) site characteristics data were collected and compiled for this project from various sources. In addition to GIS data, other data items were compiled to support the assembly of watershed data. A general listing of the compiled data is in **Table 2-1**, and the data are discussed later within this memorandum in further detail:

Table 2-1 Midway Basin Data Collection

Status	Description
Data Obtained by CDM Smith:	▪ Environmental Resource Permit (ERP) GIS polygons, from SJRWMD ▪ ERP Documents from SJRWMD ePermitting database for approximately 90 permits ▪ 2015 Aerial imagery, from LABINS ▪ 2018 Aerial imagery, from FDOT Aerial Library ▪ 2005 Elevation Data as LAS Points, from SJRWMD through NOAA Digital Coast ▪ 2009 Elevation Data as LAS Points, from SJRWMD through NOAA Digital Coast ▪ Existing and Future Land Use Coverage, from Seminole County GIS website ▪ SJRWMD Existing Land Use Coverage (2014) ▪ NRCS Web Soil Survey ▪ Seminole County FEMA Floodplains and FIS Study (effective September 2007), from FEMA Flood Map Service Center ▪ Parcel Data, from Seminole County GIS website (obtained June 2019) ▪ Straight Line Diagrams for SR 46 and SR 415, from FDOT
Data Provided Directly by Seminole County:	▪ Stormwater Inventory GIS files ▪ 1997 Midway Basin Study Report and ICPRv2 files ▪ Seminole County Development Plans (approximately 700 .PDF, .TIF, and .ZIP files obtained May 2019) ▪ Resident Flooding Complaints (as image, CDM Smith georeferenced within GIS) ▪ As-built plans for several County-maintained roads in the study area constructed or modified since the original study was published in 1997 ▪ Geotechnical data for the survey area, including geotechnical engineering reports and boring logs from other studies, designs, or developments ▪ Maintenance logs for County-maintained stormwater infrastructure in the study area

2.1.2 Previous Midway Basin Studies

CDM Smith reviewed the two pertinent studies available for the Midway Basin. Below is a summary of these studies.

Midway Basin Drainage Inventory and Engineering Study (September 1997)

The Midway Basin Study, completed by Lochrane Engineering, provided an update to the original study completed in 1992 due to improvements in computer technology at the time. The purpose of the study was to evaluate the existing conditions within the basin and recommend improvements to provide adequate conveyance for the 10-year and 25-year design storm events to meet a minimum level-of-service C designation.

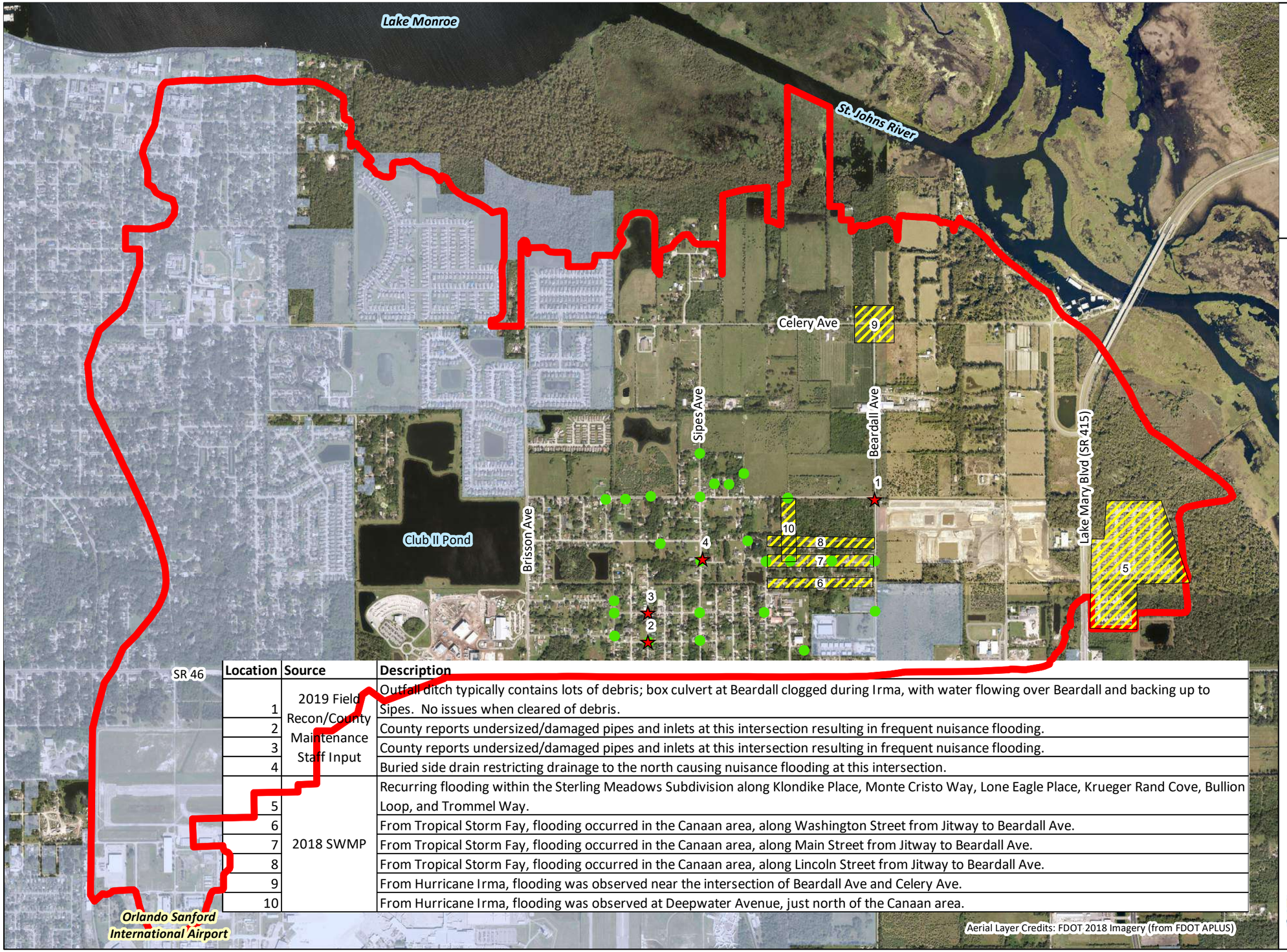
The Interconnected Chanel and Pond Routing Model Version 2 (ICPR2) software was used to develop the 1997 basin model. Model results were reviewed and recommendations were made for the primary system only (defined as structures 30 inches in diameter or larger) at locations that did not meet an LOS C designation. A total of 21 improvements were identified and prioritized. The improvements included culvert upsizing, ditch regrading, and channel improvements.

Seminole County Stormwater Master Plan (February 2018)

The 2018 Seminole County Stormwater Master Plan (SWMP), completed by CH2M (Jacobs), reviewed over 50 reports and studies within Seminole County to develop a project needs list to address stormwater management deficiencies and meet future needs.

The 2018 SWMP identified flooding problems in the following areas for the Midway Basin. The areas of flooding were approximated in GIS and are shown on **Figure 2-1**.

- Recurring flooding within the Sterling Meadows Subdivision along Klondike Place, Monte Cristo Way, Lone Eagle Place, Krueger Rand Cove, Bullion Loop, and Trommel Way.
- Flooding during Tropical Storm Fay in the Canaan area along Washington Street, Main Street, Lincoln Street, from Jitway to Beardall Avenue.
- Flooding during Tropical Storm Fay on the eastern side of the basin, including East SR 46, Celery Avenue, 1st Drive, and Brisson Avenue (Note: not displayed on Figure, report description too generic/vague to locate).
- Flooding during Hurricane Irma observed near the intersection of Beardall Avenue and Celery Avenue.
- Flooding during Hurricane Irma along Deepwater Avenue, just north of the Canaan area.



Location	Source	Description
1	2019 Field Recon/County Maintenance Staff Input	Outfall ditch typically contains lots of debris; box culvert at Beardall clogged during Irma, with water flowing over Beardall and backing up to Sipes. No issues when cleared of debris.
2		County reports undersized/damaged pipes and inlets at this intersection resulting in frequent nuisance flooding.
3		County reports undersized/damaged pipes and inlets at this intersection resulting in frequent nuisance flooding.
4		Buried side drain restricting drainage to the north causing nuisance flooding at this intersection.
5	2018 SWMP	Recurring flooding within the Sterling Meadows Subdivision along Klondike Place, Monte Cristo Way, Lone Eagle Place, Krueger Rand Cove, Bullion Loop, and Trommel Way.
6		From Tropical Storm Fay, flooding occurred in the Canaan area, along Washington Street from Jitway to Beardall Ave.
7		From Tropical Storm Fay, flooding occurred in the Canaan area, along Main Street from Jitway to Beardall Ave.
8		From Tropical Storm Fay, flooding occurred in the Canaan area, along Lincoln Street from Jitway to Beardall Ave.
9		From Hurricane Irma, flooding was observed near the intersection of Beardall Ave and Celery Ave.
10		From Hurricane Irma, flooding was observed at Deepwater Avenue, just north of the Canaan area.

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Figure 2-1 Areas of Flooding and Maintenance Issues
Midway Basin Engineering Study
Seminole County, Florida

The SWMP identified three projects for implementation within the Midway Basin, shown in **Table 2-2**.

Table 2-2 Project Needs in Midway Basin Identified in 2018 SWMP

Name	Type
Midway Basin Study	Study
Midway Closed-circuit television (CCTV), of select storm pipes	CCTV
Midway Water Quality Retrofit of Existing Pond at Jitway and Main St.	Drainage & Water Quality Improvements

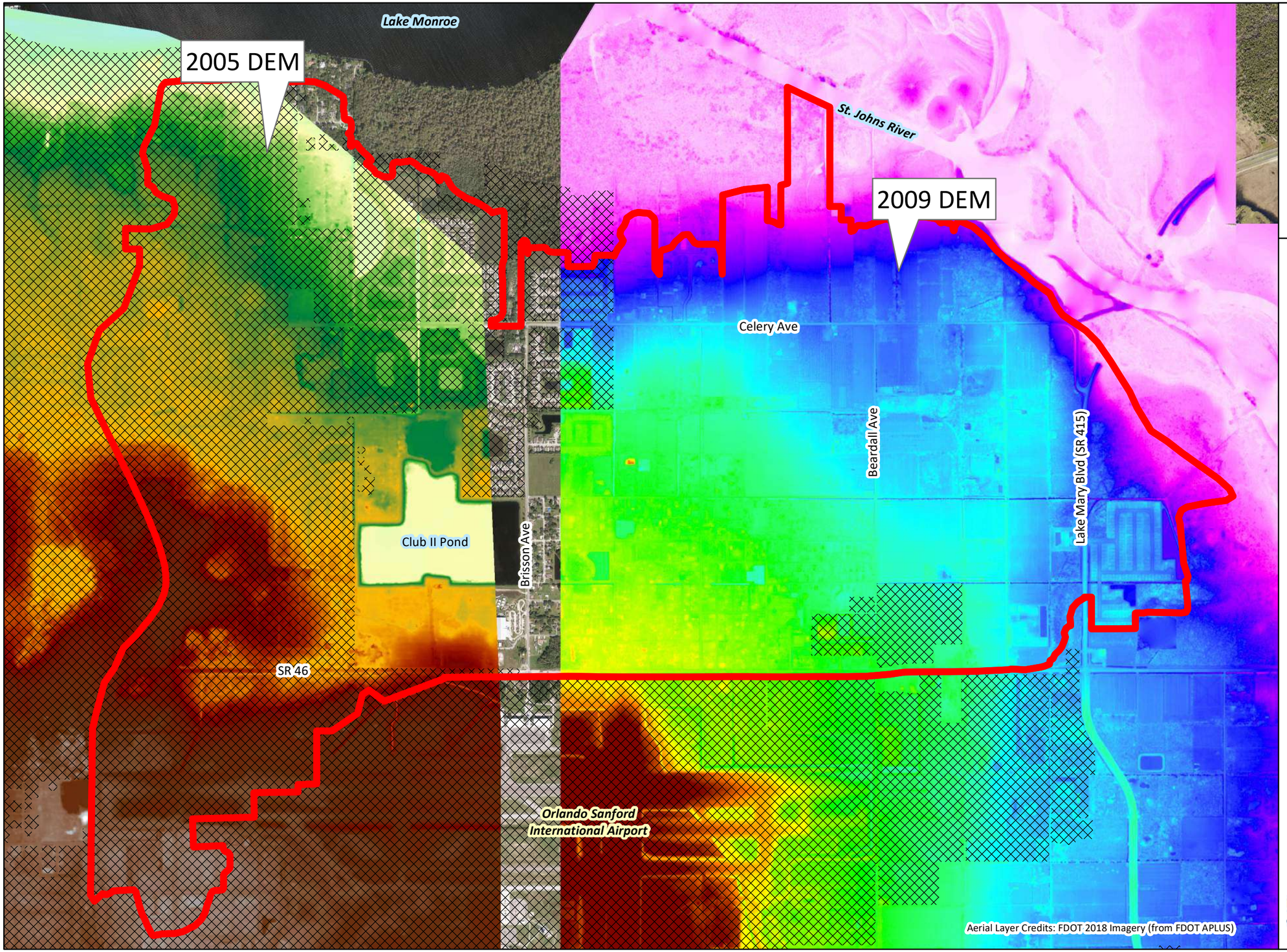
A list of problem areas previously reported by residents was also provided by the County. Based on communication with County staff, these were largely maintenance issues that have since been addressed. These locations are also shown on Figure 2-1 for informational purposes. Problem areas indicated by County staff during CDM Smith's field reconnaissance effort are also shown on this figure but are discussed later in Section 5.0 of this technical memorandum.

2.1.3 Topographic Data

There are two sources of elevation data within the Midway Basin - SJRWMD 2005 LiDAR and SJRWMD 2009 LiDAR data. Both data are in the North American Vertical Datum of 1988 (NAVD88), so no vertical datum conversions are necessary. The 2005 and 2009 data cover the western and eastern extents of the basin, respectively, with an approximately 1,000-foot (ft) wide gap in coverage between the two sources. The gap exists within the central portion of the basin along the Brisson Avenue corridor. CDM Smith created a Log ASCII Standard (LAS) Dataset from LiDAR data obtained in LAS points format through the National Oceanic and Atmospheric Administration (NOAA) Digital Coast website and filtered the dataset on Classification 2 (Ground Cover) before using the ArcGIS LAS to Raster geoprocessing tool in order to create 2.5-ft cell digital elevation model (DEM) rasters. Elevations within the Midway basin range from 1 to 58 ft NAVD. The coverage of the DEMs is shown on **Figure 2-2**.

2.1.4 Historical Water Levels and Flood Complaints

CDM Smith downloaded hydrologic gage data for Lake Monroe and the St. Johns River from the Seminole County Water Atlas. There are five hydrologic gages on Lake Monroe and the St. Johns River near Midway. Two gages are operated and maintained by Seminole County (SCPW-L-MON and SCPW-L-SJR2) and are currently active. Three gages are operated and maintained by the United States Geologic Survey (USGS), one of which is currently active (Site 2234500). Sites SCPW-L-SJR2 and 2234440 are just northeast of Midway at the SR 415 crossing of the St. Johns River. Sites SCPW-L-MON, 2234499, and 2234500 are approximately 5 miles northwest of the Midway study area and are all in the vicinity of I-4 on Lake Monroe near its outfall to the St. Johns River. Water level data for the five gages are summarized in **Table 2-3**. A graph of site 2234500, St. Johns River near Sanford, is presented in **Figure 2-3**. This gage was chosen for display purposes as it is a more recent period of record with a fairly comprehensive dataset. As illustrated in Graph 1, the historical peaks of the St. Johns River near Lake Monroe were after Tropical Storm Fay in 2008, Hurricane Irma in 2017, and during the 2004 hurricane season.



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Midway Basin
- City of Sanford

DEM 2005

Value

High : 71.5049

Low : 1.31182

DEM 2009

Value

High : 59.9791

Low : -0.962252

SEMINOLE COUNTY
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Figure 2-2 Topographic Data
Midway Basin Engineering Study
Seminole County, Florida

Table 2-3 Summary of Gage Data – As Obtained from Seminole County Water Atlas

SiteID	Agency	Site Name	Period Of Record	Number of Measurements	Average Stage (ft NAVD)	Maximum Record Stage (ft NAVD)
SCPW-L-MON	Seminole County	Lake Monroe	1989 – Present	308	1.06	5.97
2234499	USGS	Lake Monroe near Sanford	1941 – 2005	23,334	0.82	7.43
2234500	USGS	St. Johns River near Sanford	1987 – Present	9,019	0.95	6.80
2234440	USGS	St. Johns River at 415 near Sanford	2005 – 2012	2,803	0.67	7.09
SCPW-L-SJR2	Seminole County	St. Johns River – Sanford Boatworks	1921 – Present	516	2.43	10.86

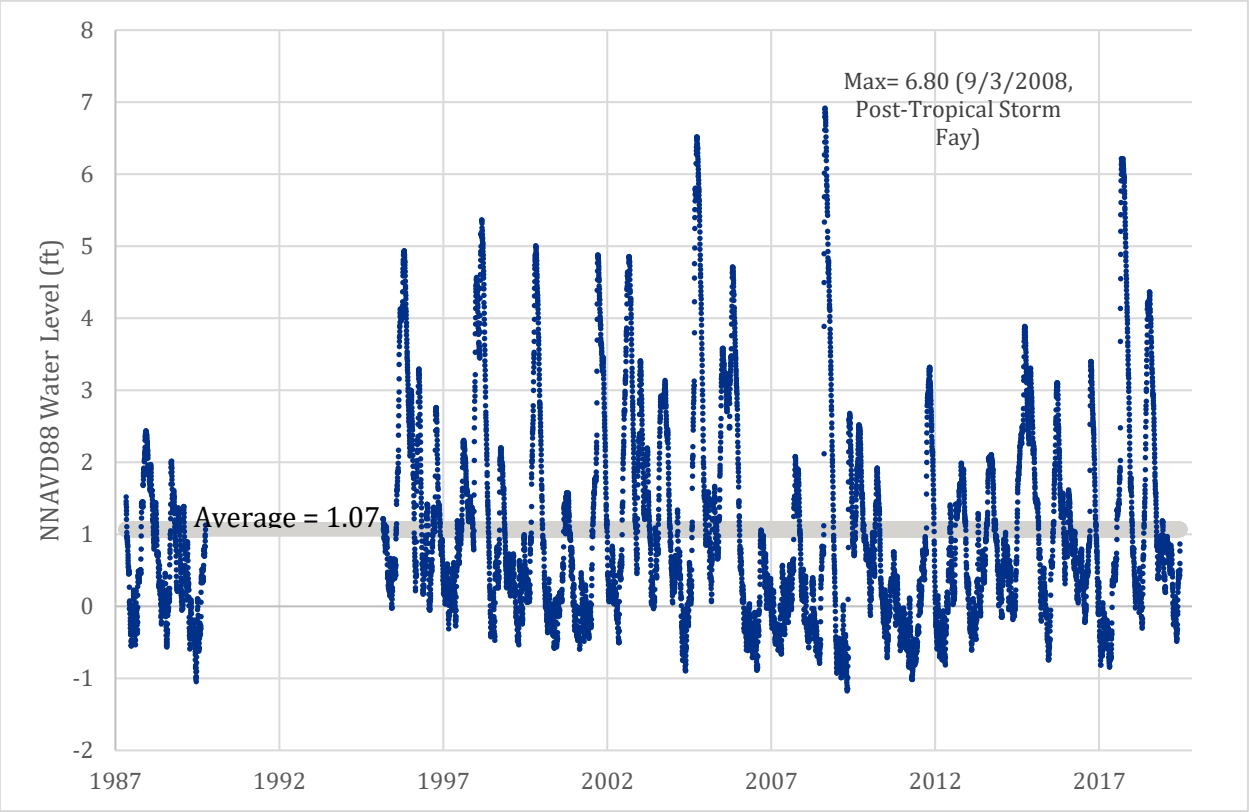
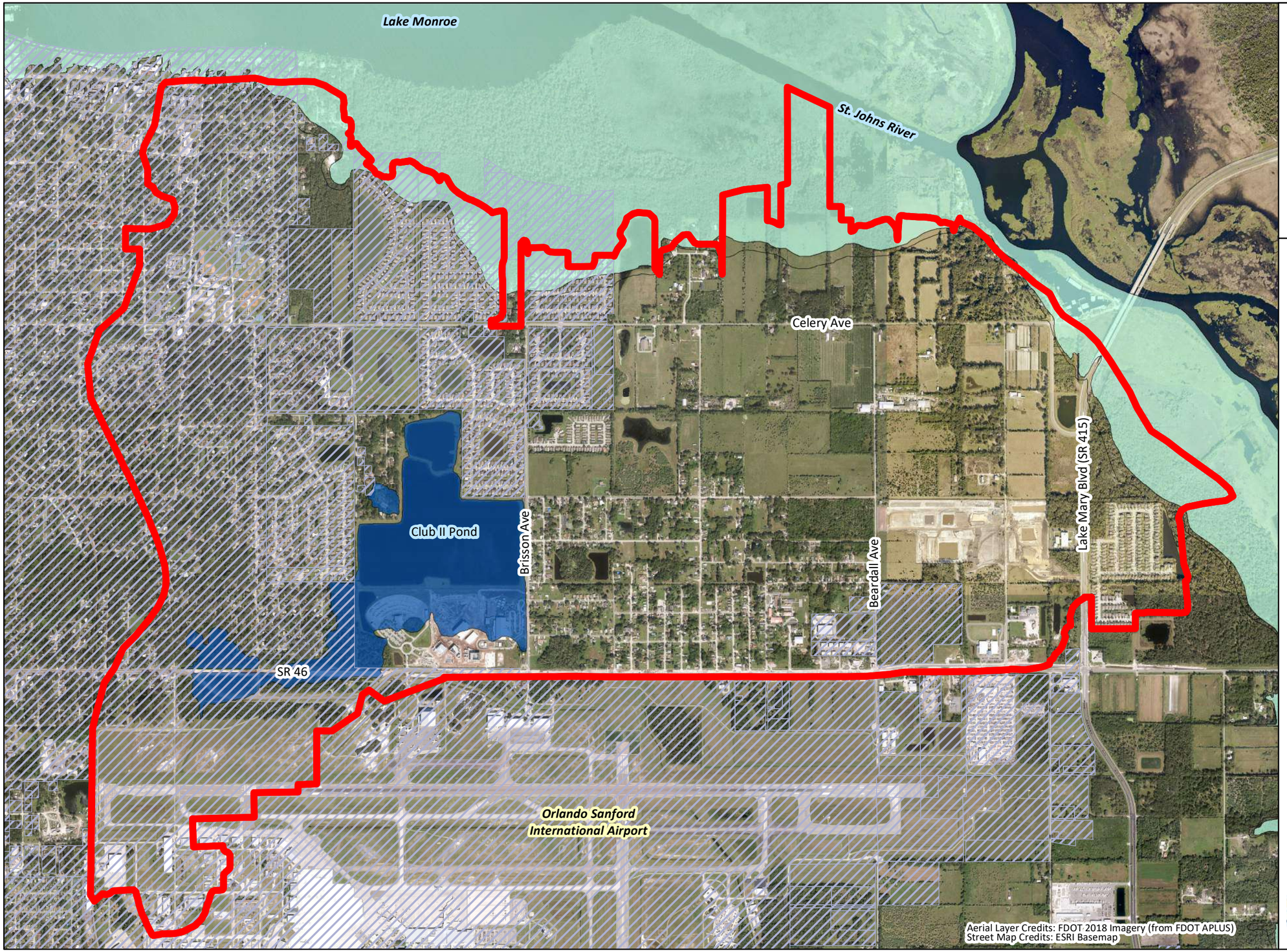


Figure 2-3 St. Johns River Near Sanford, FL Site 2234500 Historical Water Levels

2.1.5 Floodplain Information

The effective National Flood Hazard Layer (NFHL) published by the Federal Emergency Management Agency (FEMA) is provided on **Figure 2-4**. Most of the basin lies outside the 100-year floodplain as defined in the FEMA Flood Insurance Rate Maps; the exceptions are those areas proximal to the St. Johns River and Lake Monroe, for which a base flood elevation (BFE) has been established at 8-ft NAVD, and the areas around the Club II Pond, which lie in a Zone A floodplain with no BFE established.



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Midway Basin
- City of Sanford

FEMA Flood Zone (Seminole County)

- A
- AE
- X

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

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Figure 2-4 FEMA Floodplains
Midway Basin Engineering Study
Seminole County, Florida

2.1.6 Initial Public Meeting

A public meeting was held on June 25, 2019 at the Midway Community Center to present the Midway Basin Engineering Study. Approximately 80 members from the public were in attendance. The meeting format was as follows: sign-in and registration, a brief PowerPoint presentation to the audience, a general question and answer session, and then a breakout session to speak with attendees individually and have them complete comment forms.

The comment forms inquired where residents experienced flooding and asked them to provide specific details on the depth, frequency, and location of the flooding. The breakout session included either having the residents locate their residence on a map of the Midway basin or navigate to their residence using ArcGIS software at a computer station.

A total of 25 comment forms were collected. The locations of the recorded comments based on the respondent's parcel are provided on **Figure A-1**, correlating to the information as provided in **Table A-1**, both located within **Appendix A**. Most comments received were related to yard flooding, maintenance issues, lack of drainage, roadway flooding, roads at higher elevations than adjacent properties, structure flooding, and water quality concerns. An additional four locations were included in this map that do not belong to a specific residence but were specifically referenced in a comment form. One comment cited the elevation of SR 46 compared to the rest of Midway as a potential source of flooding. This comment has been included in the table but is not shown on the map, as it does not refer to a specific location.

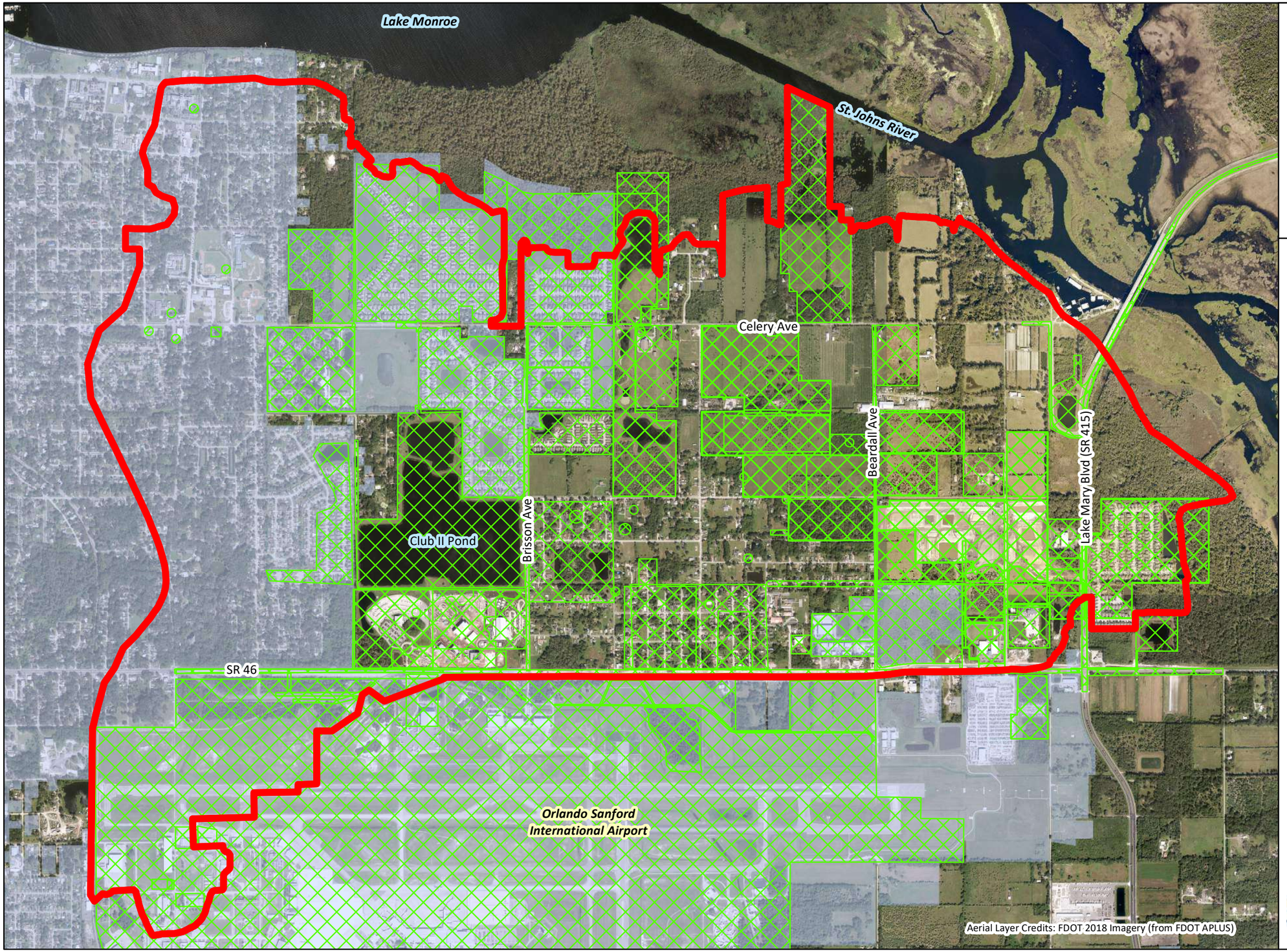
2.2 Plans Review

Plans were obtained from the SJWRMD ePermitting database as well as the Seminole County Development Engineering and Seminole County PWDs. These plans were reviewed and catalogued in order to distinguish future from existing development and will be used to extract hydraulic data for modeling purposes.

2.2.1 Environmental Resource Permits

An Environmental Resource Permit (ERP) inventory was created by exporting the SJRWMD ERP search results within Townships 19S/20S and Range 31E to a .kml file. The permit polygons were imported into ArcGIS and filtered by location for those polygons within the Midway study area. Fields were added to the feature class for ERP review, including hyperlink paths, applicability, plans dates, and plans types. After inventorying the initial spatial search results, additional searches were performed using basin-specific search terms in the SJRWMD ePermitting database, and permit polygon records were subsequently added for those not initially included in the spatial search results. A summary of the ERPs reviewed are shown in **Appendix B** as **Table B-1**.

Figure 2-5 shows the ERPs reviewed for which applicable files were obtained.



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Midway Basin
- Environmental Resource Permit (ERP) Coverage
- City of Sanford

SEMINOLE COUNTY
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Figure 2-5 SJRWMD ERPs in the Midway Basin
Midway Basin Engineering Study
Seminole County, Florida

2.2.2 Seminole County Plan Data

CDM Smith visited the County PWD and County Development Engineering departments and obtained electronic copies of plans within the Midway Basin study area. Searches were performed based on key terms such as Midway, roadway names, and development names. The various plans were organized tabularly to include project name, plans date, status, and comments, and an approximated GIS polygon was generated to locate each project.

An initial inventory of the plans obtained is shown in **Appendix C** as **Table C-1.**

2.2.3 Orlando Sanford International Airport Data

A meeting was held with representatives from the Orlando Sanford International Airport and CPH Engineers to discuss and verify runoff patterns and flows discharging from the northwestern portions of the airport property into the Midway Basin. The original 1997 Midway Basin study quantified an area of approximately 240 acres of the airport which discharges north into the Midway Basin via a cross-drain under State Road 46. The outfall originally continued north through a portion of the western Midway Basin that lies within the City of Sanford to a discharge into Lake Monroe; this outfall has recently been re-routed to discharge directly into the Club II Pond.

The airport staff referred CDM Smith to the latest Orlando Sanford International Airport Stormwater Master Plan, which was completed by PBS&J (now Atkins) in 2003 and submitted to SJRWMD as a Conceptual Environmental Resource Permit application (No. 22192-30). Per airport staff, little development has occurred in this area of the airport property in the intervening years, save for roadway work on the northern property line associated with the FDOT widening of State Road 46. Basin delineations and hydrologic parameters from the 2003 master plan were incorporated into the project GWIS database and ICPR4 models. The cross-drain under State Road 46 was lengthened during the widening activities; models were updated to reflect the as-built condition of that conduit.

2.2.4 Areas of Future Development

Based on the plans reviewed from both SJRWMD and the County, **Table 2-4** and **Figure 2-6** show planned development within the Midway Basin.

2.3 Hydrologic Data

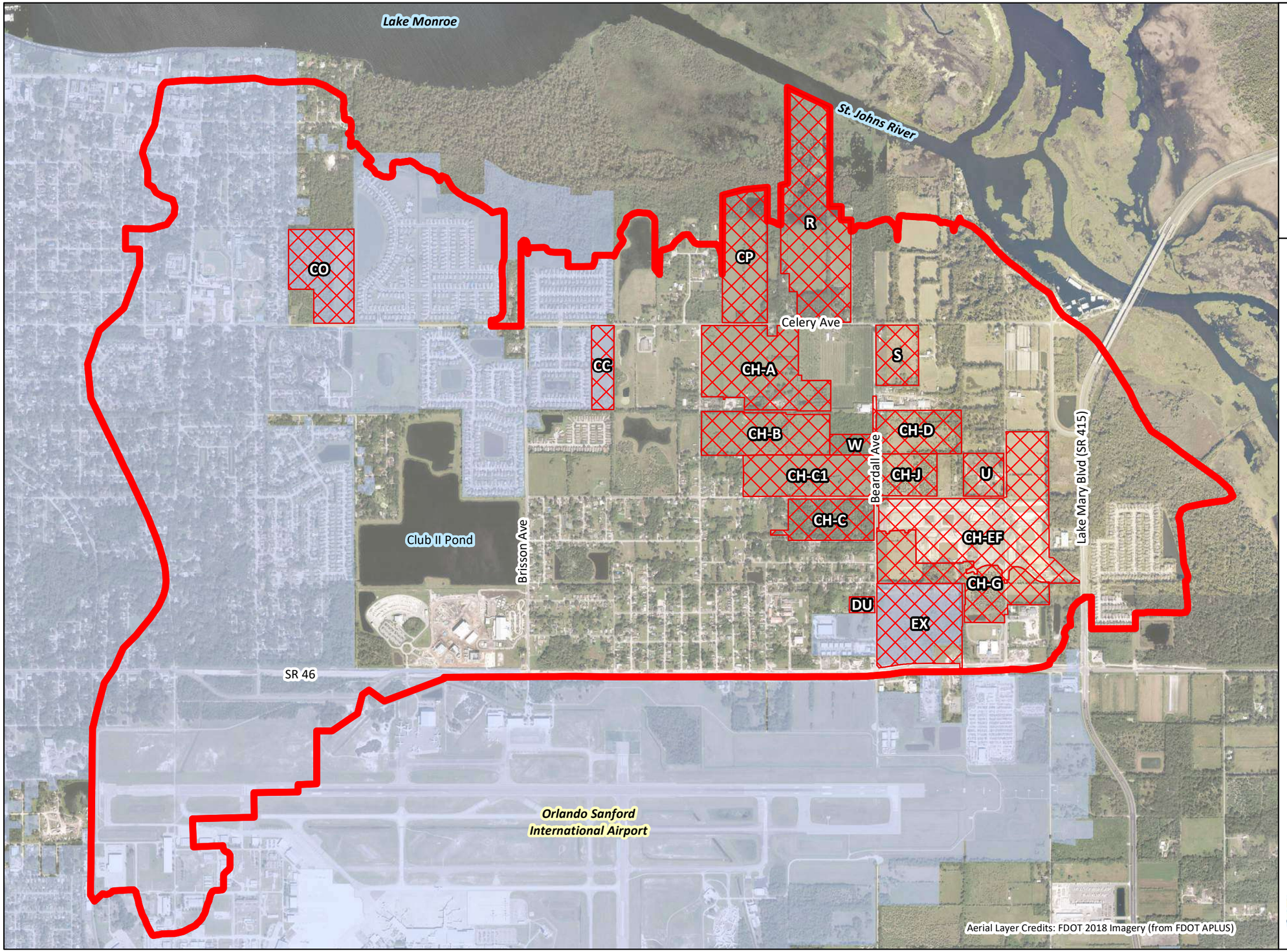
CDM Smith evaluated available hydrologic data for the Midway Basin, including soils and land use data, which will be used to develop the hydrologic components of the existing and proposed conditions models. Basin hydrologic characteristics are described below.

2.3.1 Basin Boundary

The preliminary Midway basin boundary was obtained from the Seminole County GIS catalog. This boundary, illustrated on Figure 1-1 and subsequent figures, represents the basin extents analyzed in the 1997 study and covers approximately 4.3 square miles, 2.4 square miles of which fall within the unincorporated area of Seminole County. The basin is bounded by Lake Monroe to the north, the St. Johns River to the east, the Orlando Sanford International Airport to the south, and downtown Sanford to the west.

Table 2-4 Approved Plans for Future Development Obtained from County and/or ERPs

Project Name	ERP/ Revision	ERP Plans Date	County Plans Obtained	County Plans Date	County Approval Date	Dated Most Recent
Rosecrest/ Cameron Heights, A	105665-16	10/16/18	Cameron Heights A\Approved Drawings_3638296	10/11/18	11/15/18	ERP
Cameron Heights, B	105665-17 (pending)	6/26/19	Cameron Heights B\Approved Drawings_3254576	3/12/19	3/28/19	ERP
Cameron Heights, C	105665-14	2/22/19	Cameron Heights C\Approved Drawings_5132521	1/22/19	2/1/19	ERP
Cameron Heights, C1	-	-	Cameron Heights C1\Drawings_1916573	5/2/19	-	No ERP Located
Cameron Heights, D	105665-15	1/28/19	Cameron Heights D\Approved Drawings_449308	1/16/19	2/4/19	ERP
Cameron Heights, E&F	-	-	Cameron Heights E&F\Drawings_1216745	3/21/18	-	No ERP Located
Riverbend/ Cameron Heights, G	105665-10	8/9/18	Riverbend\Approved Drawings_273851	10/2/18	10/12/18	County
Cameron Heights, J	105665-13	10/29/18	Cameron Heights J\Approved Drawings_5342438	12/3/18	3/22/19	County
Celery Cove	144208-2	2/14/16	-	-	-	ERP Only (City of Sanford)
Celery Oaks	156589-1 (pending)	4/22/19	-	-	-	ERP Only (City of Sanford)
Celery Pointe	-	-	Celery_Pointe\Drawings_248715	4/29/19	-	No ERP Located
Danus Utilities	151723-1	11/2/17	-	-	-	ERP Only (City of Sanford)
Extruders	155853-1	1/8/19	-	-	-	ERP Only (City of Sanford)
Office/ Warehouse	138395-1	6/10/14	-	-	-	No County Plans Obtained
Riverside Oaks	154888-1	3/20/19	Riverside Oaks\Drawings_4222120	8/24/18	-	ERP
Suntera Park	145774-1 (withdrawn)	3/21/16	Suntera_Park\Drawings_1737949	3/21/16	-	Same
United Infrastructure Group Site Improvements	141943-1	5/31/16	-	-	-	No County Plans Obtained



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Midway Basin
- City of Sanford
- Future Development

SEMINOLE COUNTY
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Figure 2-6 Future Development in the Midway Basin
Midway Basin Engineering Study
Seminole County, Florida

Based on a preliminary review of the DEM, recent aerials, recent development plans and data, and stormwater infrastructure, the boundary appears to be a representative approximation of existing drainage patterns in the area. Based on information received for the airport, portions of the southwestern boundary were modified.

2.3.2 Soils Data

Soils data for the Midway basin were downloaded from the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) Web Soil Survey. The NRCS classifies soils in four hydrologic soil groups (A, B, C, D) and three dual classes (A/D, B/D, and C/D). The four groups are as follows:

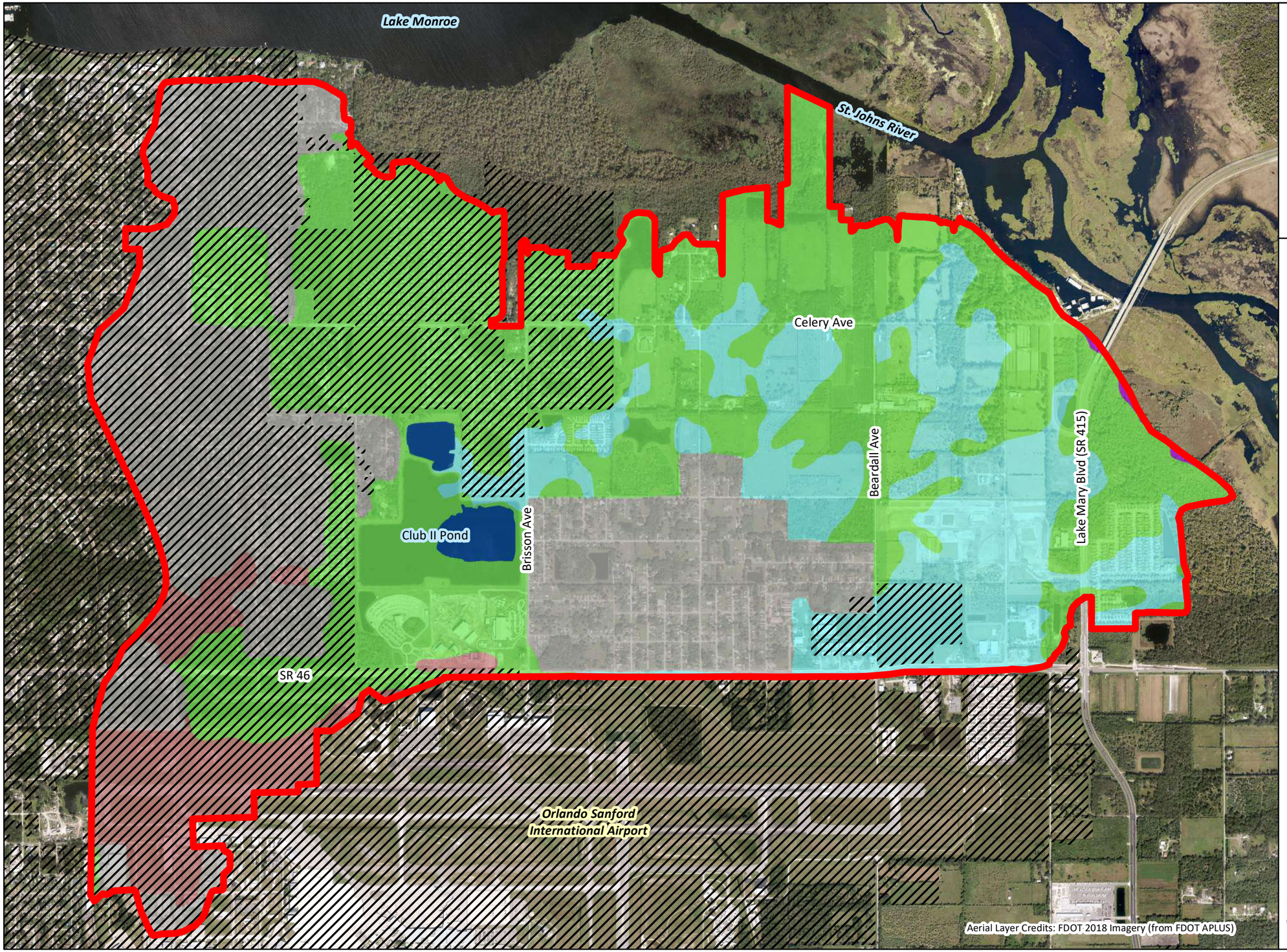
- Group A soils, which have a high infiltration rate (low runoff potential). These are usually well drained or excessively drained sands or gravelly sands with a high rate of water transmission.
- Group B soils, which have a moderate infiltration rate.
- Group C soils, which have a slow infiltration rate.
- Group D Soils, which a very slow infiltration rate (high runoff potential). Group D soils have a very slow rate of water transmission.

For soils with dual classes (A/D, B/D, C/D), the first letter applies for the drained condition, and the second letter applies for undrained conditions.

The majority of the Midway Basin's soils are a dual hydrologic group classification; approximately 46 percent and 18 percent of the basin are A/D and B/D, respectively. The basin soils are comprised of 15 percent unclassified hydrologic groups due to water or urban land coverage, which were assigned as hydrologic group D in order to generate the runoff parameters to support the hydrologic/hydraulic modeling. Furthermore, dual class soils were treated as D soils for modeling purposes as agreed upon with County staff during model parameterization in Task 3. The hydrologic classes of the soils (Hydrologic Soils Groups) in the Midway basin are summarized in **Table 2-5** and depicted on **Figure 2-7**.

Table 2-5 Hydrologic Soil Groups in the Midway Basin

Hydrologic Group	Entire Basin		Unincorporated Only	
	Acres	% Area	Acres	% Area
A	176	6.2%	5	0.3%
A/D	1,294	45.6%	794	49.7%
B/D	502	17.7%	438	27.4%
C/D	4	0.1%	4	0.3%
D, Water	30	1.1%	30	1.9%
D, Urban Land	830	29.2%	327	20.4%
Total	**2,836**	**100%**	**1,598**	**100%**



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Midway Basin
- City of Sanford

Soil Hydrologic Group

- A
- A/D
- B/D
- C/D
- N/A, Water
- N/A, Urban Land

SEMINOLE COUNTY
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Figure 2-7 Midway Soils
Midway Basin Engineering Study
Seminole County, Florida

2.3.3 Existing Land Use Characterization

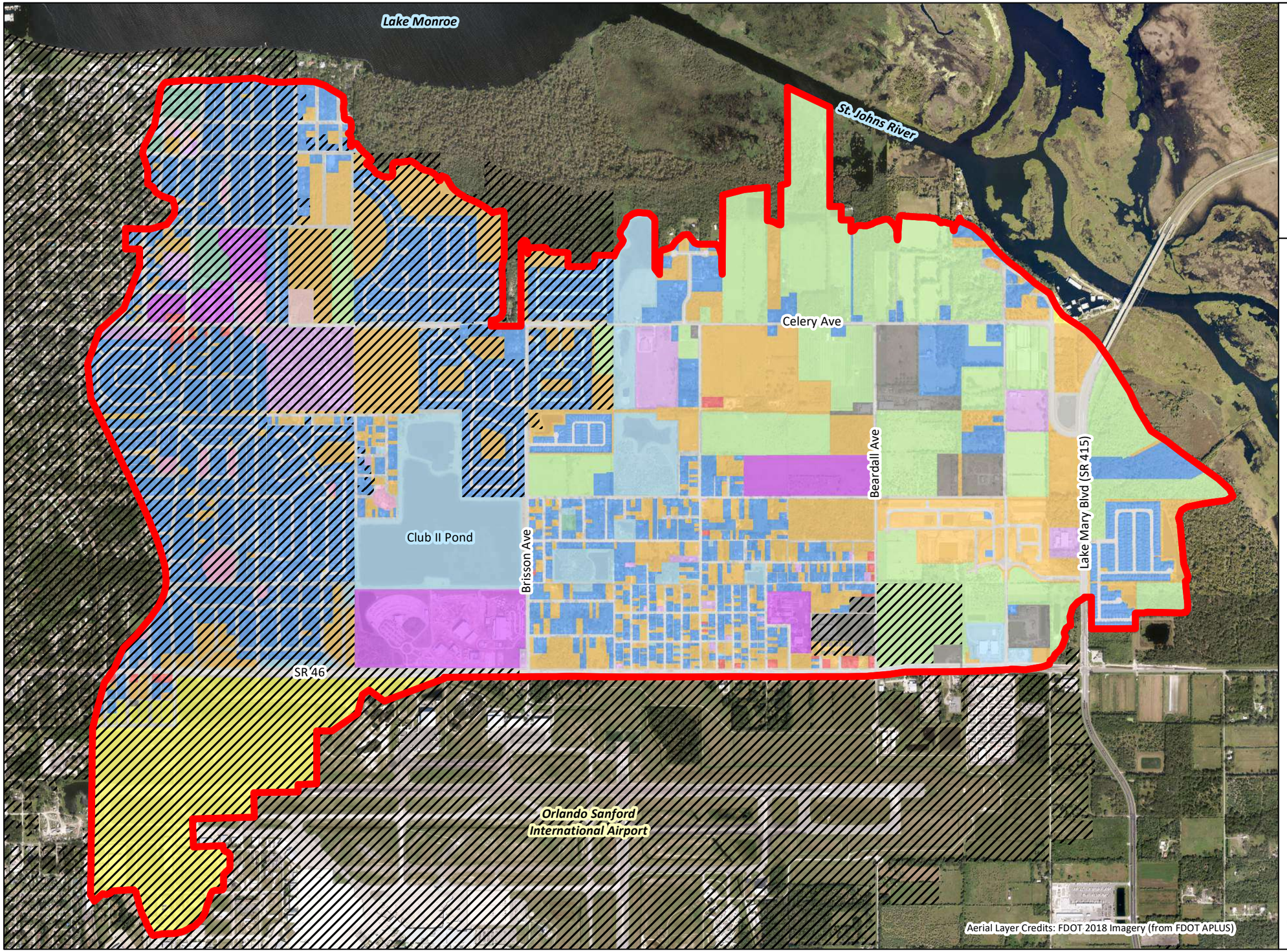
Existing land use for the Midway basin was obtained from the Seminole County GIS data website. The existing land use coverage is available within a geodatabase and is noted with a last update date of 4/2/19. The Seminole County existing land use feature class is based on the property appraiser's Department of Revenue (DOR) codes with additional categorization by Seminole County. Because this land use is based on parcel codes, it does not include coverage in areas of right-of-way. CDM Smith added these gap areas to the land use coverage and assigned the description as "CDMS added, outside of parcel limits, assume R/W" to ensure a continuous existing land use coverage within the Midway basin.

CDM Smith reviewed the existing land use and compared it to the 2018 aerial imagery. The land use categories generally appeared appropriate though there were five polygon features that CDM Smith reclassified. Four of these five were undeveloped and were reclassified from developed descriptions to vacant land. **Table 2-6** and **Figure 2-8** show the existing land use classifications within the Midway basin based on the Seminole County existing land use description, with the minor revisions previously discussed.

Existing land cover information was also obtained from SJRWMD for comparison purposes. Ultimately, the Seminole County land use was used because it provided a higher level of detail. **Figure 2-9** shows the 2014 SJRWMD land cover classification for the Midway Basin.

Table 2-6 Existing Land Use in the Midway Basin

Existing Land Use Description	Entire Basin		Unincorporated Only	
	Acres	% Area	Acres	% Area
Agriculture	463	16.3%	413	25.8%
CDMS added, outside of parcel limits, assume R/W	364	12.8%	174	10.9%
Commercial	11	0.4%	6	0.4%
Education	137	4.8%	111	7.0%
Industrial	66	2.3%	52	3.2%
Institutional	89	3.1%	39	2.4%
Office	7	0.2%	5	0.3%
Public	18	0.6%	1	0.1%
Public Other	215	7.6%	197	12.3%
Recreational	20	0.7%	2	0.1%
Residential Mobile Home	2	0.1%	2	0.1%
Residential Multi-Family	5	0.2%	1	0.1%
Residential Single Family	734	25.9%	269	16.8%
Transportation	222	7.8%	1	0.1%
Vacant Commercial	22	0.8%	19	1.2%
Vacant Industrial	15	0.5%	12	0.8%
Vacant Institutional	35	1.2%	4	0.3%
Vacant Other	109	3.9%	43	2.7%
Vacant Residential	302	10.6%	245	15.4%
Total	**2,836**	**100%**	**1,598**	**100%**



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Midway Basin
- City of Sanford

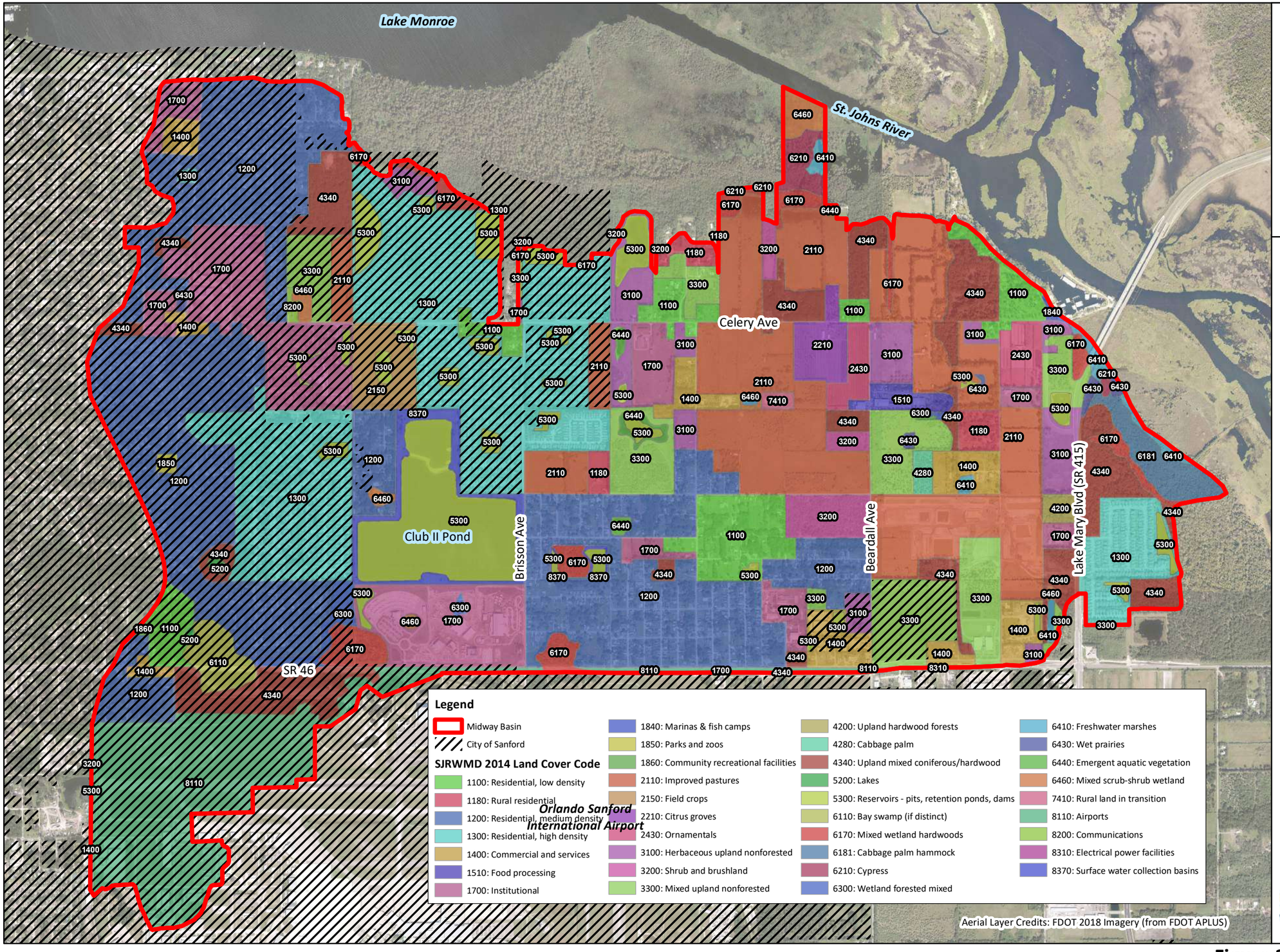
Land Use Description

- CDMS added, outside of parcel limits, assume R/W
- Agriculture
- Commercial
- Education
- Industrial
- Institutional
- Office
- Public
- Public - Other
- Recreational
- Residential - Mobile Home
- Residential - Multi-Family
- Residential - Single Family
- Transportation
- Commercial - Vacant
- Industrial - Vacant
- Institutional - Vacant
- Residential - Vacant
- Other Vacant

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure 2-8 Existing Land Use (County)
Midway Basin Engineering Study
Seminole County, Florida



SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure 2-9 SJRWMD 2014 Land Cover
Midway Basin Engineering Study
Seminole County, Florida

2.3.4 Future Land Use Characterization

Future land use for the Midway Basin was obtained from the Seminole County GIS data website, within the same geodatabase as the existing land use coverage. The future land use covers the unincorporated portions of Seminole County only, with exception of areas where the future land use notes a recent annexation into City limits. Twenty six percent of the unincorporated portion of Midway Basin has been categorized as "planned development" within the future land use coverage. Based on a review of the 2018 aerial imagery, approximately half this planned development appears under construction or fully constructed. Most notably, two residential subdivisions, Cameron Heights and Sterling Meadows, in the southeast corner are either fully or partially constructed.

Table 2-7 and **Figure 2-10** show the future land use classifications, within the unincorporated portion of the Midway basin, based on the Seminole County future land use description.

Table 2-7 Future Land Use in the Midway Basin (Unincorporated Areas)

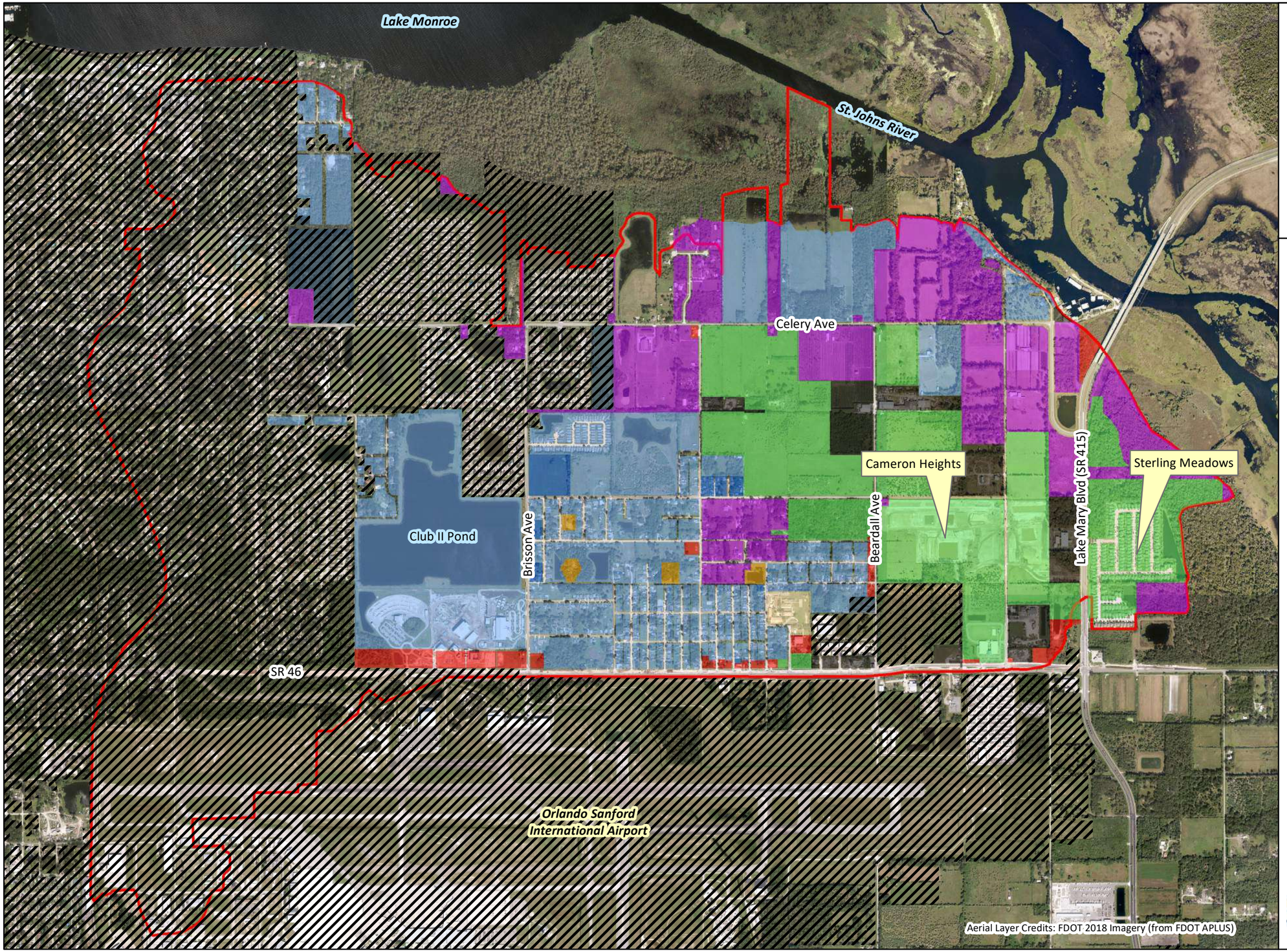
Future Land Use Description	Acres	% Area
City[1]	41	2.8%
Commercial	34	2.3%
Industrial	81	5.5%
Low Density Residential	592	40.1%
Medium Density Residential	17	1.1%
Planned Development	364	24.7%
Public – County	7	0.5%
Public – School	9	0.6%
Suburban Estates	330	22.4%
Total	1475	100%

[1] Defined, according to the metadata, as "Annexed into a city; few historical, most since December 1998"
Note: Future land use coverage does not encompass entire unincorporated Seminole County. Gaps exist in locations such as R/W.

2.3.5 TR-55 Land Use

For stormwater modeling purposes, CDM Smith revised the Seminole County existing land use to include TR-55 classifications for purposes of curve number assignments. The Seminole County land use descriptions were aggregated into appropriate TR-55 classifications and reviewed against aerial imagery to confirm consistency with present-day conditions. The existing land use symbolized based on the TR-55 classification is shown in **Figure 2-11**.

A future land use coverage was subsequently created with proposed development information, as shown in **Figure 2-12**. CDM Smith used the modified County land use with TR-55 classifications applied and replaced features that were covered by a polygon within the future land use coverage. The future land use polygons were subsequently reviewed against aerial imagery to determine an appropriate TR-55 land use classification.



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Midway Basin
- City of Sanford

Future Land Use

- City
- Commercial
- Industrial
- Low Density Residential
- Medium Density Residential
- Planned Development
- Public - County
- Public - School
- Suburban Estates

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure 2-10 Future Land Use (County)
Midway Basin Engineering Study
Seminole County, Florida

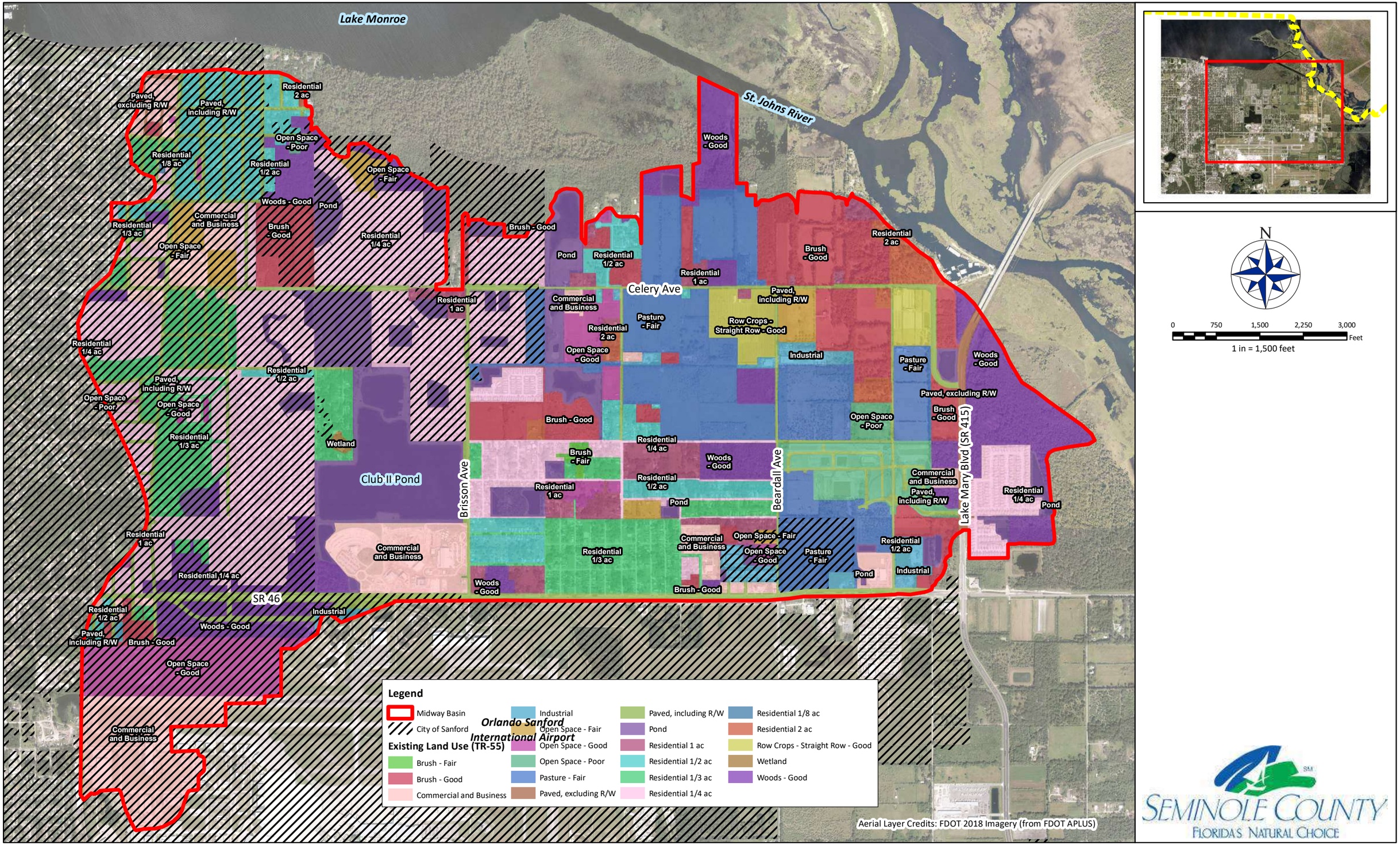


Figure 2-11 TR-55 Land Use (Existing)
Midway Basin Engineering Study
Seminole County, Florida

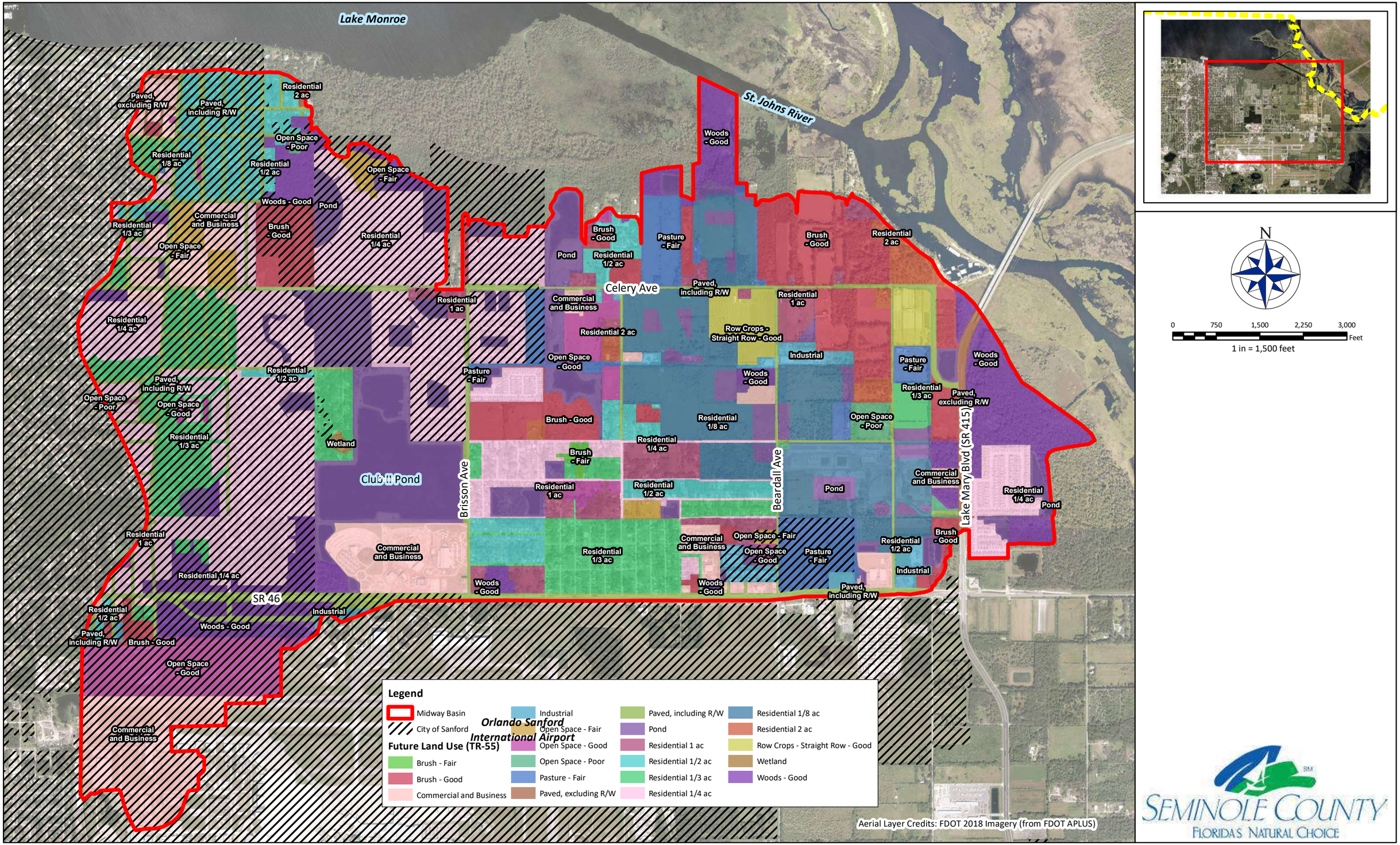


Figure 2-12 TR-55 Land Use (Future)
Midway Basin Engineering Study
Seminole County, Florida

2.4 Hydraulic Features and Drainage Patterns

CDM Smith evaluated the County's stormwater inventory, historic plans and studies, 1997 ICPR Version 2 models, planned development data, and SJRWMD ERP documents to catalog the storage and conveyance elements that comprise the primary stormwater management system (PSMS) of the Midway Basin. These data were used to develop the Geographic Watershed Information System (GWIS) "hydronetwork" and forms the basis for the hydraulic components of the updated ICPR model.

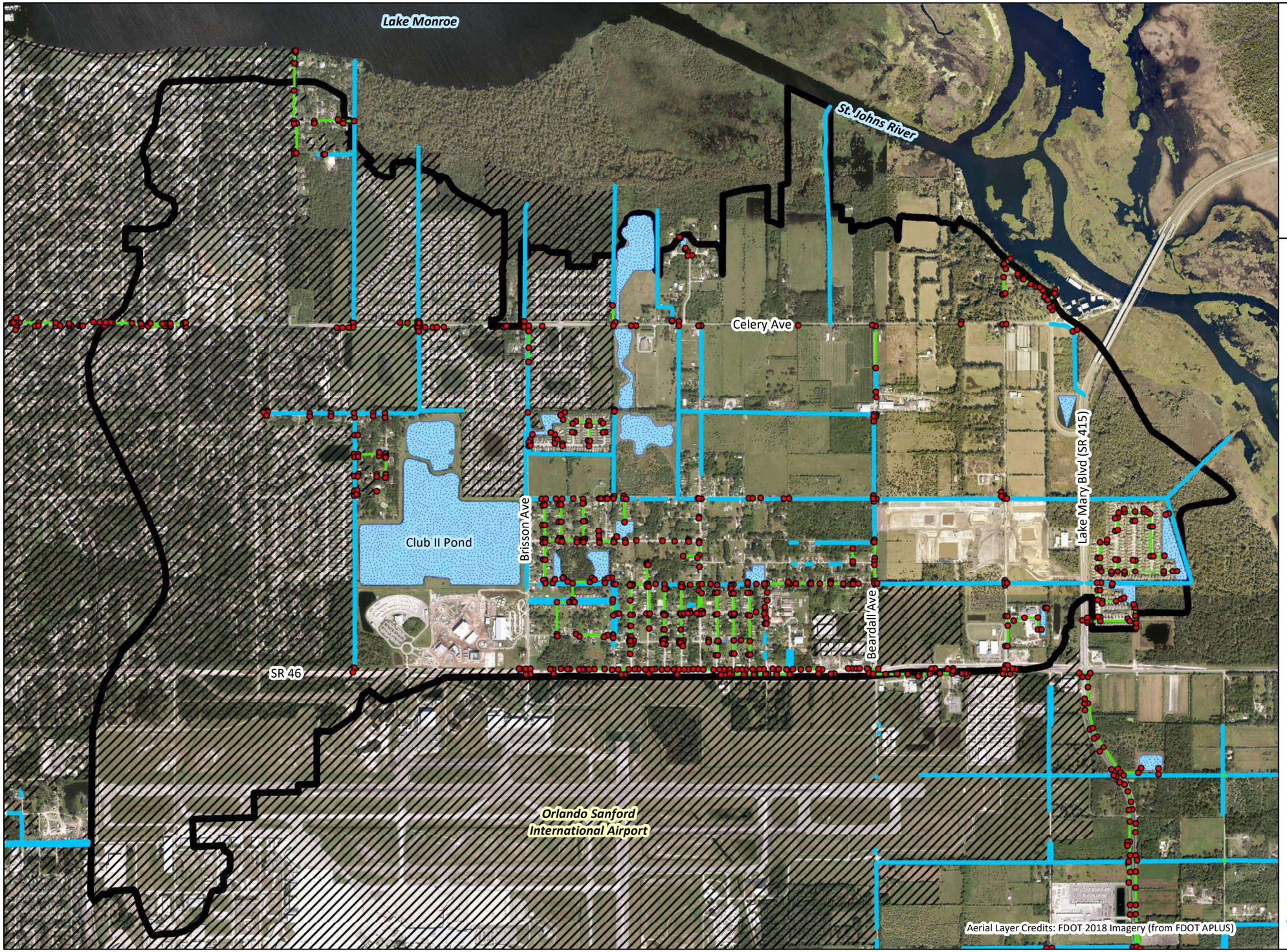
2.4.1 Seminole County Stormwater Inventory

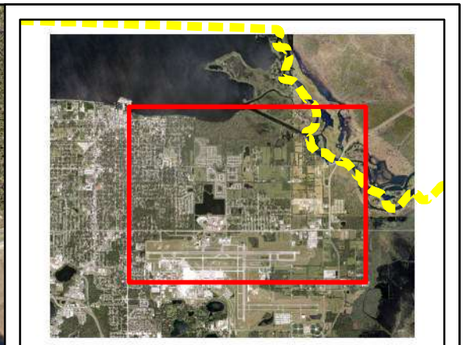
CDM Smith was provided the Seminole County stormwater infrastructure inventory in GIS format and included stormwater structures, culverts, ponds, and canals. The data include relevant hydraulic data such as number of pipes, culvert sizes, material, approximate length, and shape though inverts and slope are not provided. A summary of the number of Seminole County inventory features within the Midway Basin is provided in **Table 2-8** and shown on **Figure 2-13**.

Table 2-8 Stormwater Inventory Features in the Midway Basin[1]

GIS File	Type	Feature Count
Culvert	Storm sewer	281
	Cross drain	236
	Side drain	6
	CBC (Concrete box culvert)	2
	Unknown	1
Stormwater Structures	Ditch Bottom Inlet	162
	Curb Inlet	161
	Manhole	95
	Mitered End Treatment	93
	Headwall	55
	Unknown	39
	Pipe End	16
	Control Structure	10
	Other Devices	10
	Grate Top Inlet	9
	DBI with Weir	3
	Baffle Box	2
	Flared End Treatment	2
Canal	Manmade	30
	Unknown	23
	Natural	6
Pond	Wet	12
	Dry	2
	Not Provided	1

[1] Source: Seminole County Public Works Stormwater Inventory Database, provided 05/21/19





N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Midway Basin
- City of Sanford
- Stormwater Structures
- Culverts
- Canals
- Ponds

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure 2-13 Seminole County Stormwater Infrastructure
Midway Engineering Basin Study
Seminole County, Florida

2.4.2 1997 Midway Basin Study Hydraulic Data

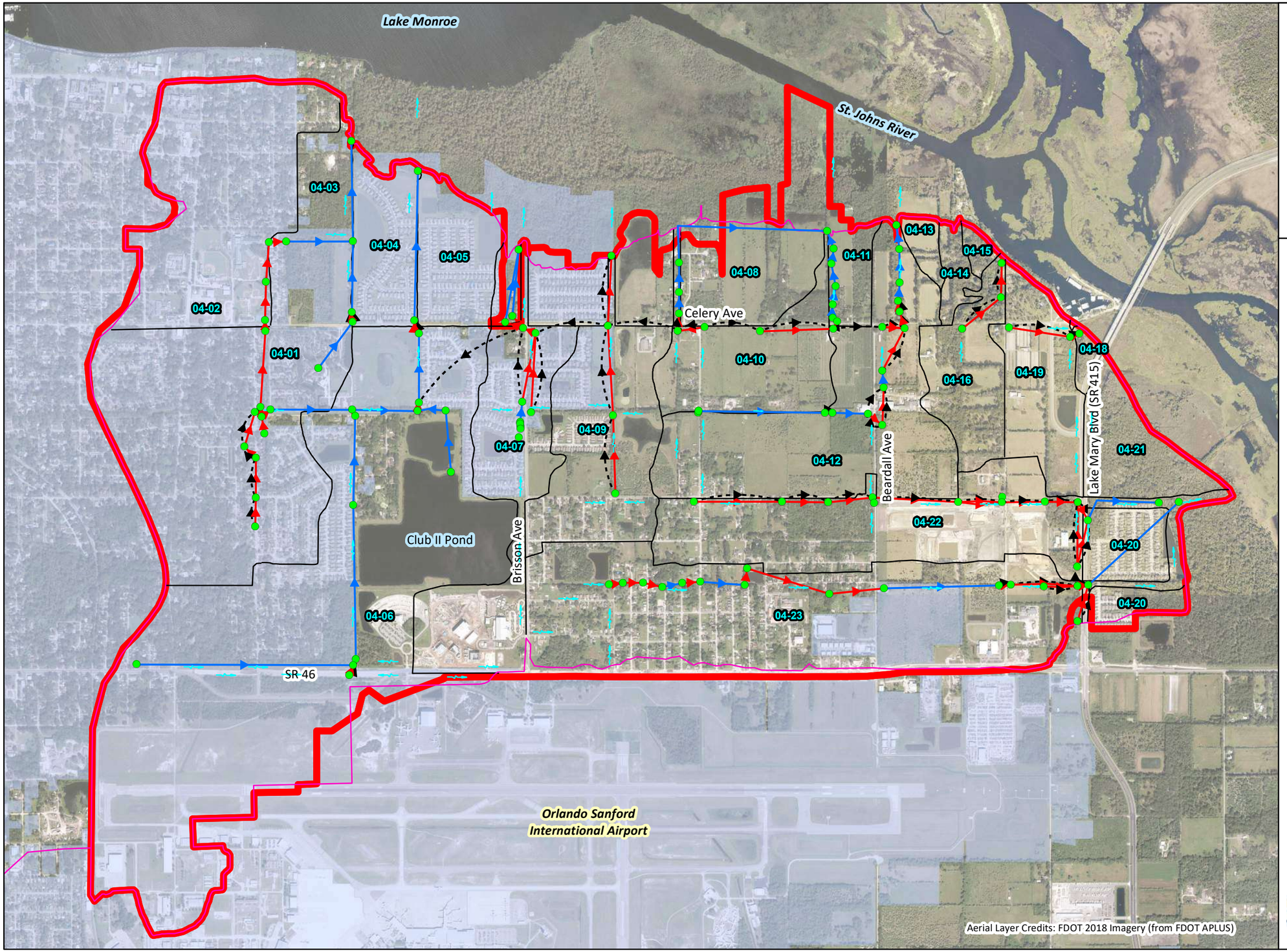
A compressed folder named "ICPR_Midway.zip" was provided to CDM Smith, accompanied by the Midway Basin Drainage Inventory and Engineering Study Report titled "basinreport_Midway.pdf." The compressed folder contained three parent directories and README.TXT files.

The ICPR Version 2 files in the \DRAINAGE directory were first imported into ICPR Version 3. Based on inspection, only the models in the POST folders contained relevant model data. The following models were found to contain data:

- ICPR_Midway\DRAINAGE\04-01\POST\04-0110.INF
- ICPR_Midway\DRAINAGE\04-06\POST\04-0610.INF
- ICPR_Midway\DRAINAGE\04-07\POST\04-0710.INF
- ICPR_Midway\DRAINAGE\04-09\POST\04-0910.INF
- ICPR_Midway\DRAINAGE\04-10\POST\04-1010.INF
- ICPR_Midway\DRAINAGE\04-12\POST\04-1210.INF
- ICPR_Midway\DRAINAGE\04-16\POST\04-1610.INF
- ICPR_Midway\DRAINAGE\04-19\POST\04-1920.INF
- ICPR_Midway\DRAINAGE\04-2223\POST\04-2220.INF

Node locations were approximated in GIS based on Exhibit 5.2 of the 1997 study, noting any discrepancies between the modeling data and what was shown in the report. With the node locations and new ICPR Version 3 files, the models were subsequently converted into ICPR4 format and to a GWIS schema for reference. It should be noted that files for subbasin delineations were not available from the previous studies.

Based on review of the converted models, it was apparent that the subbasin model 04-01 in fact contained the models for subbasins 04-06, 04-07, 40-09, 04-10, and 04-12, with only a few discrepancies from the individual models. The converted GWIS schematics for 04-01, 04-16, 04-19, and 04-22 are shown on **Figure 2-14**.



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Midway Basin
- City of Sanford

ICPR_LINK

- CHANNEL
- PIPE
- WEIR
- ICPR_NODE (Approximated)

1997 CADD Linework

- BASIN
- FLOWARROWS
- SUB-BASINS

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure 2-14 Approximated 1997 Study Model Schematic
Midway Basin Engineering Study
Seminole County, Florida

2.4.3 Field Verification Efforts

CDM Smith staff performed an initial field reconnaissance for the Midway Basin on June 5, 2019 with follow-up field reconnaissance on July 3. During the initial reconnaissance, staff from the County Public Works Roads-Stormwater Division accompanied CDM Smith staff on a review of several areas of the basin. Major conveyances visited during this initial effort included the Hughey Street and Washington Street outfalls (discharging east to the St. Johns River), Rossetters Ditch and Sanford Trails outfalls (discharging north to Lake Monroe), the CSX Ditch (between Brisson Avenue and Beardall Avenue south of Celery Avenue), and the IFAS-Midway Regional Treatment Facility. County staff provided input on known nuisance flooding problem areas in the Midway community, including undersized culverts and inlets along Center Street between Kings Road and Midway Avenue, and a sumped, obstructed side drain at the intersection of Sipes Avenue and Main Street.

CDM Smith used a geodatabase hosted on ArcGIS online during field verification for real-time field input. Example screenshots of the Collector for ArcGIS Field Verification are shown on **Figure 2-15**, with the WebMap viewer shown on the left, and Collector for ArcGIS in the middle and right. The GIS locations obtained from the field are located in a geodatabase named Field_Recon_20190703.gdb within the electronic deliverable in the Geodatabase\General\Field_Recon\ directory, and the points are hyperlinked to photos located in \Hyperlink\Photographs\. There is a map document in the MXD folder that has these field points already loaded as a layer, and the lightning bolt tool can be used to click on to open the linked photos similar to the plans discussed in Section 3.

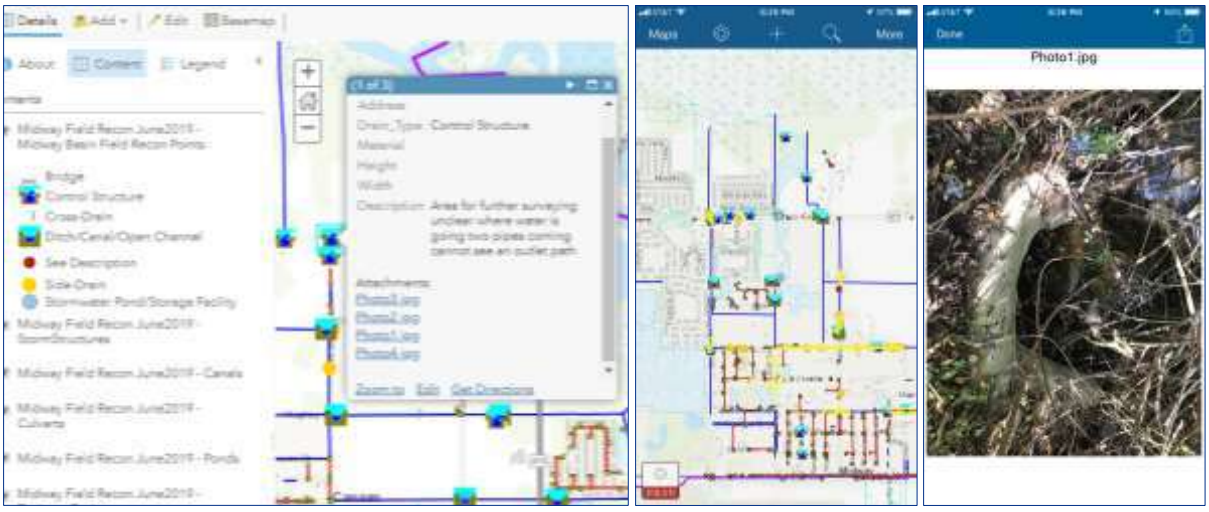
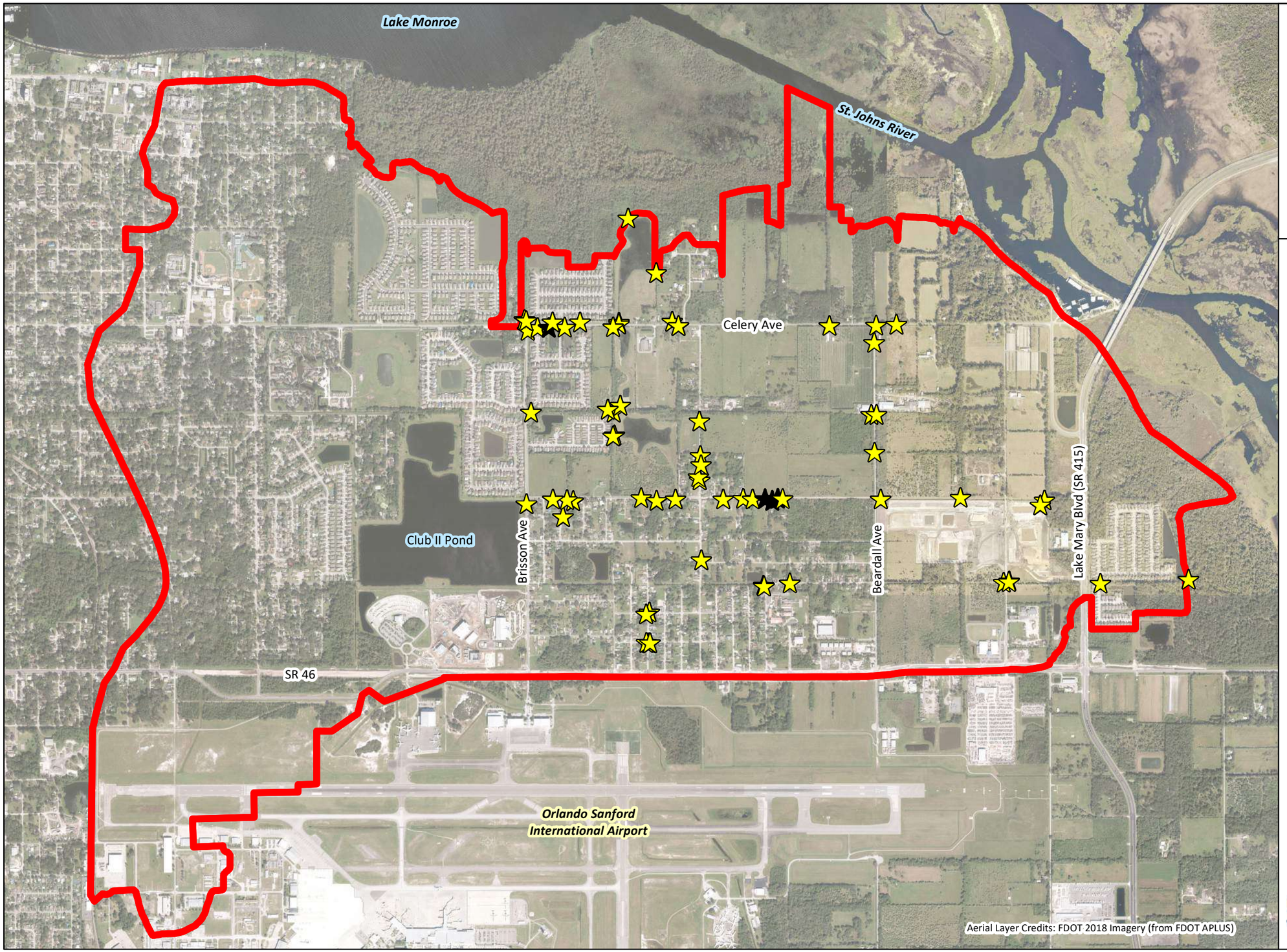


Figure 2-15 Collector for ArcGIS Field Verification Example

Figure 2-16 shows the locations of the field review. These are also included in the field geodatabase in the electronic deliverable, with points hyperlinked to the photo locations. Additional field reconnaissance will be performed to verify or clarify hydraulic data obtained (or missing) from other sources, as well as establish needs for additional survey to be performed in parallel with subsequent model development tasks.



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

Midway Basin

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure 2-16 Field Verification Locations
Midway Basin Engineering Study
Seminole County, Florida

2.4.4 Survey Data

A survey plan was developed in coordination with Southeastern Surveying and Mapping Corporation (SSMC). The survey deliverable was provided in geodatabase format along with hyperlinked photos. The locations where survey was obtained is provided on **Figure 2-17**.

The survey plan was developed following review of compiled plan and permit data and field reconnaissance efforts in order to address identified data gaps; this could include an absence of information for a particular structure or conduit, conflicting information between plans and field observations, or an inability to glean information from available documentation due to poor quality or illegibility. CDM Smith prioritized the identified survey elements as such:

- "High" priority elements included data gaps on major outfalls, or in areas where County staff or local residents reported flooding issues;
- "Medium" priority elements included those for which some limited data may be available, or which consist of secondary drainage elements in known problem areas;
- "Low" priority elements often included those for which reliable data may be available from permits but for which as-builts may not be available, or confirmatory reconnaissance to verify drainage connectivity.

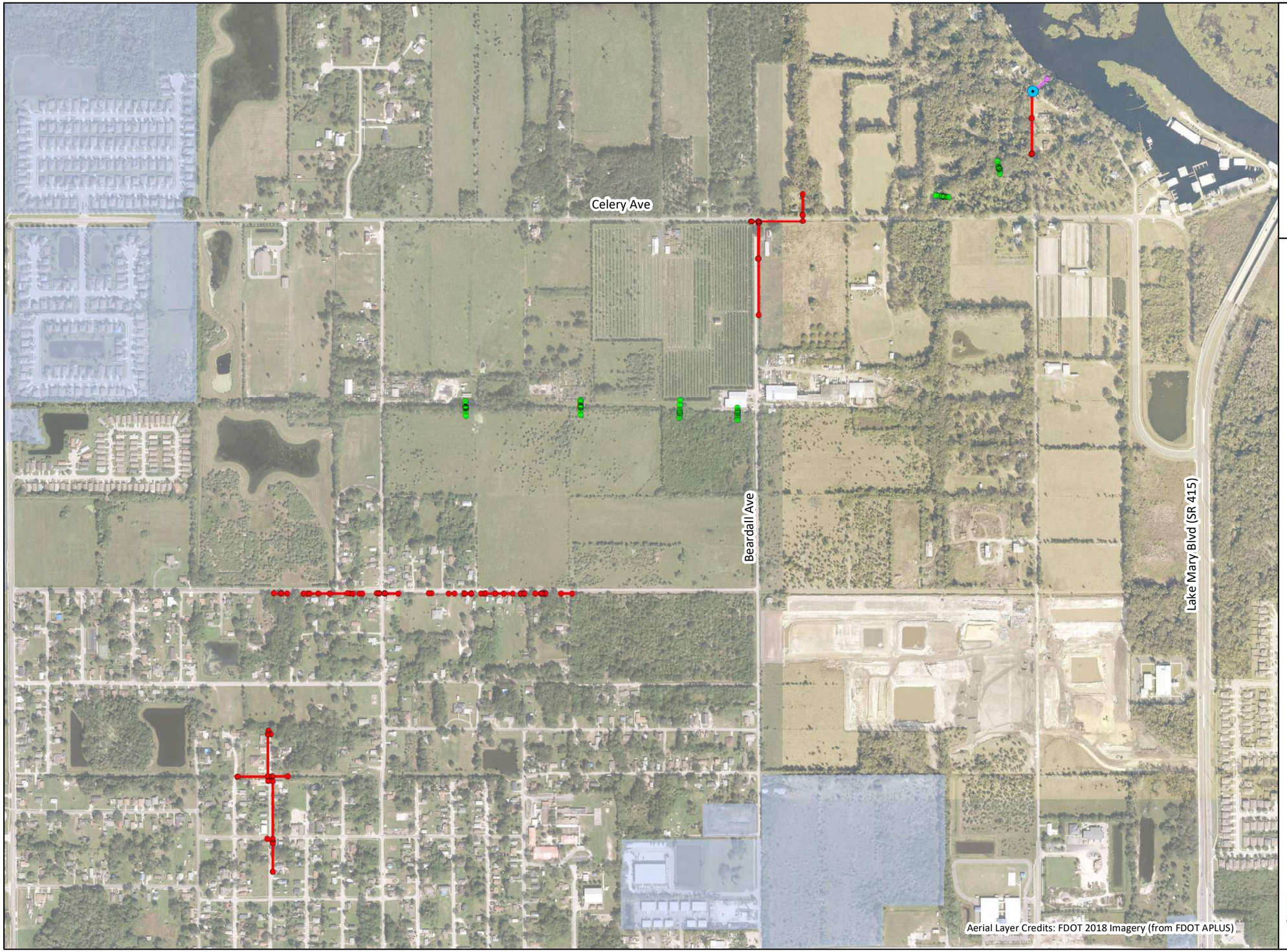
Survey was performed by SSMC in July and August of 2019; based on the allocated resources for this project, only the "high" priority elements could be surveyed. A copy of the project survey deliverable is included with the electronic deliverable accompanying this report.

2.5 Summary of Data Gaps

As described in the previous sections, CDM Smith obtained and reviewed relevant watershed data to support the existing and future conditions model development, alternatives analysis, and floodplain delineation. The data gathered assisted in refining the definition of the primary stormwater management system, identifying particular areas of flood concern for model refinement, delineation of hydrologic units, and determining existing and future condition hydrologic parameters.

Although CDM Smith has gathered a large volume of pertinent information, several data gaps were identified, including:

- A general lack of flooding photos and high-water marks that could be used as validation points in the modeling task.
- Some gaps in the County's stormwater inventory database, including missing conduits and conflicting information regarding drainage patterns.
- Conflicting design information between County development plans and ERP databases and ensuring that future infrastructure is accurately represented (e.g., outfalls through Cameron Heights into the Washington Street ditch).
- Updated LiDAR reflecting current conditions and including the gap of missing elevation data along Brisson Avenue.



N

0 350 700 1,050 1,400 Feet

1 in = 700 feet

Legend

- City of Sanford

SSMC Survey (MW_Survey_PH1.gdb)

- Drop Structure Points (1)
- Drop Culvert Points (2)
- Drop Culvert Lines (1)
- Drop Weir Points (2)
- Culvert Points (110)
- Culvert Lines (59)
- Cross-Section Points (64)
- Cross-Section Lines (6)

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure 2-17 Midway Survey Obtained
Midway Basin Engineering Study
Seminole County, Florida

Section 3
Stormwater Model Development

The following sections describe CDM Smith's workflow for refining the model features and developing model parameters included in ICPR Version 4.05.02. The GWIS Version 2.1 database was used to store the model schematic, parameters and supporting data.

The original 1997 study models were referenced at the beginning of development of the existing conditions model for identifying the overall study area and primary stormwater management system. However, the majority of the modeling, particularly within unincorporated areas, was refined and updated with recent information in order to effectively evaluate the existing and future conditions Level-of-Service (LOS) as well as analyze and rank conceptual alternatives.

For the purposes of H/H modeling, CDM Smith has defined the two scenarios:

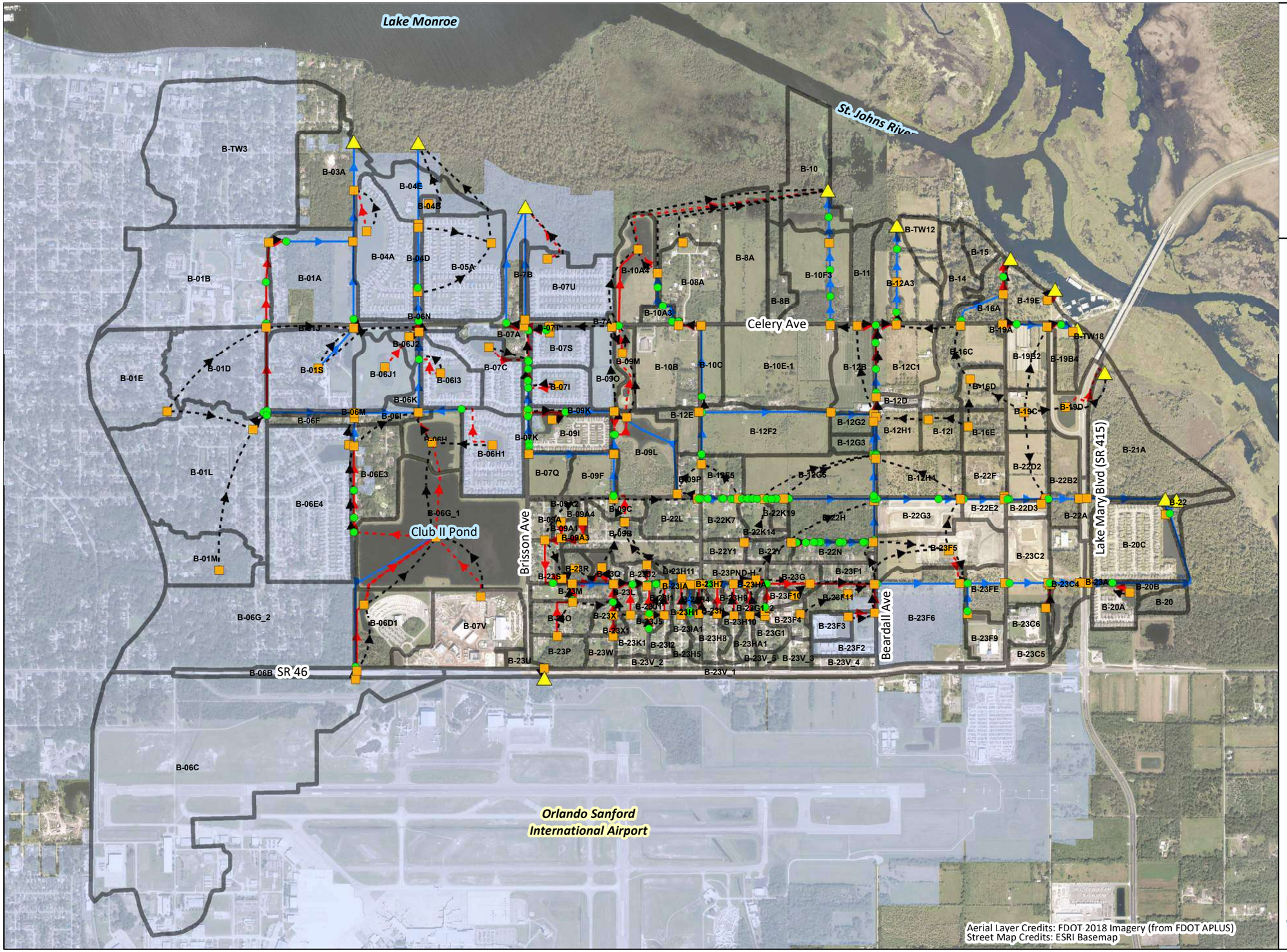
1. Existing conditions – represents existing development as shown in 2018 aerial photography based on review of existing as-builts synonymous with this date, field reconnaissance, field survey and other data sources previously documented.
2. Future conditions – represents the existing condition (described above) plus updated land use and hydraulics associated with approved/planned development based on review of County approved construction plans and ERPs issued for future development not yet shown as constructed in the 2018 aerials.

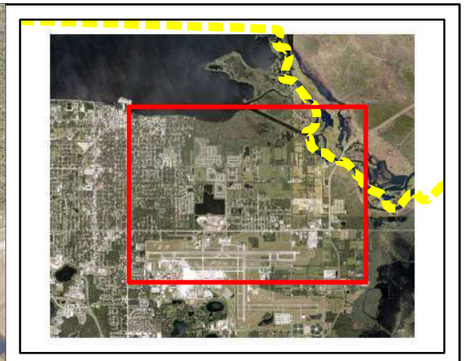
The existing conditions model schematic and future conditions model schematic are shown in **Figure 3-1**, **Figure 3-1B**, **Figure 3-2** and **Figure 3-2B**, respectively. The following sections document the development of the hydrologic and hydraulic parameters used in the development of the Midway Basin model.

3.1 Hydrologic Parameters

Hydrologic parameters were developed for both the existing and future conditions stormwater models. Because detailed catchment delineations were not available for the 1997 study, the larger subbasin areas (i.e., 04-01) were referenced to delineate new detailed subbasins. The 1997 combined subbasin areas and the updated Existing Conditions basins are shown in **Figure 3-3**. The level of subbasin refinement throughout the basin reflects the level of detail required for the subsequent LOS evaluation and alternatives analysis tasks.

Additionally, the updated Midway Basin stormwater models use the NRCS Unit Hydrograph with a peaking factor of 256, as compared to the Santa Barbara Urban Hydrograph method used in the 1997 study.





N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- City of Sanford
- ICPR_BASIN Existing

ICPR_NODE

- Boundary Node
- Junction Node
- Storage Node

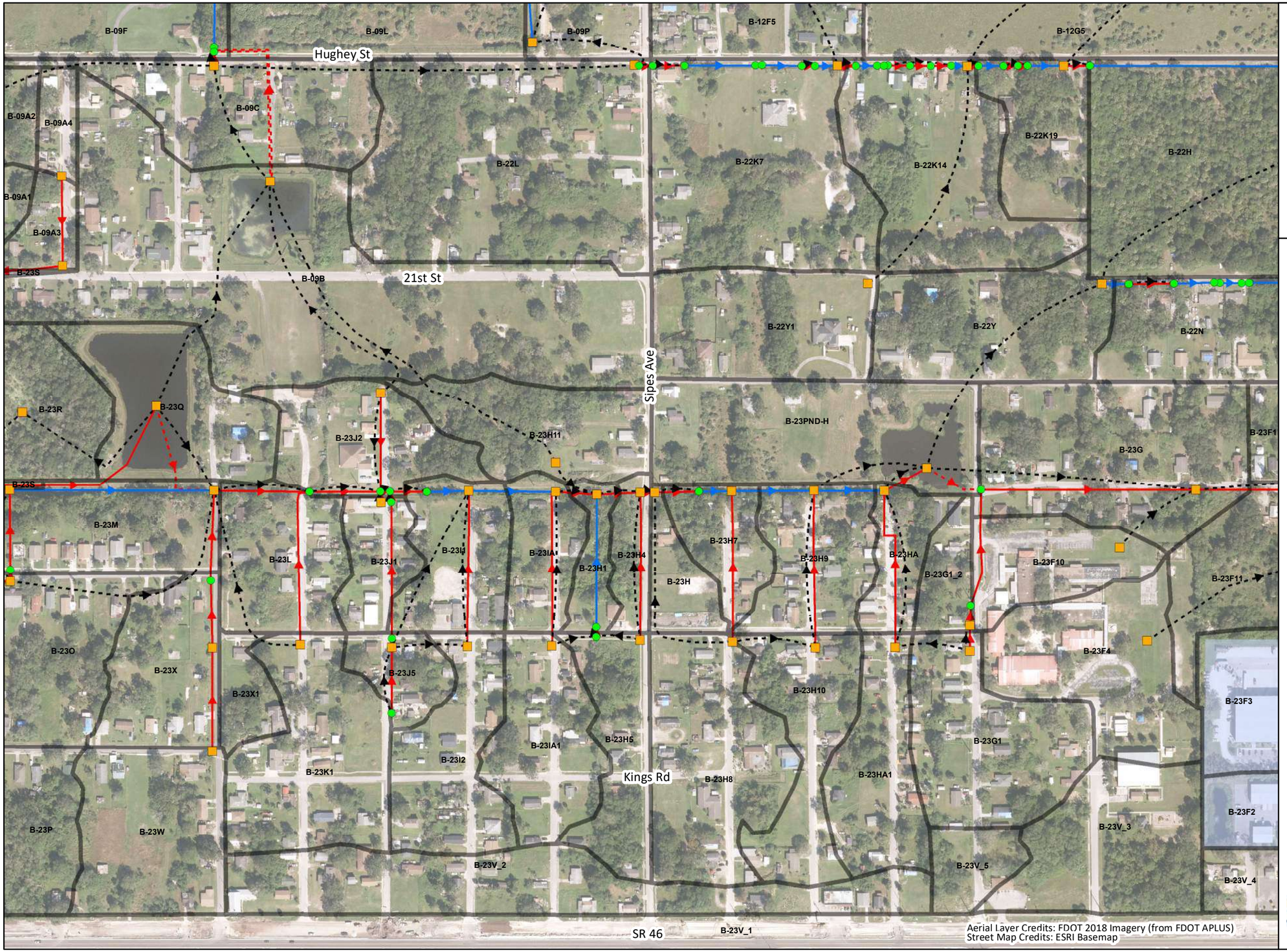
ICPR_LINK

- CHANNEL
- DROP STRUCTURE
- PIPE
- WEIR

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure 3-1 Existing Conditions Model Schematic
Midway Basin Engineering Study
Seminole County, Florida



N

0 150 300 450 600 Feet

1 in = 300 feet

Legend

- City of Sanford
- ICPR_BASIN Existing

ICPR_NODE

- Boundary Node
- Junction Node
- Storage Node

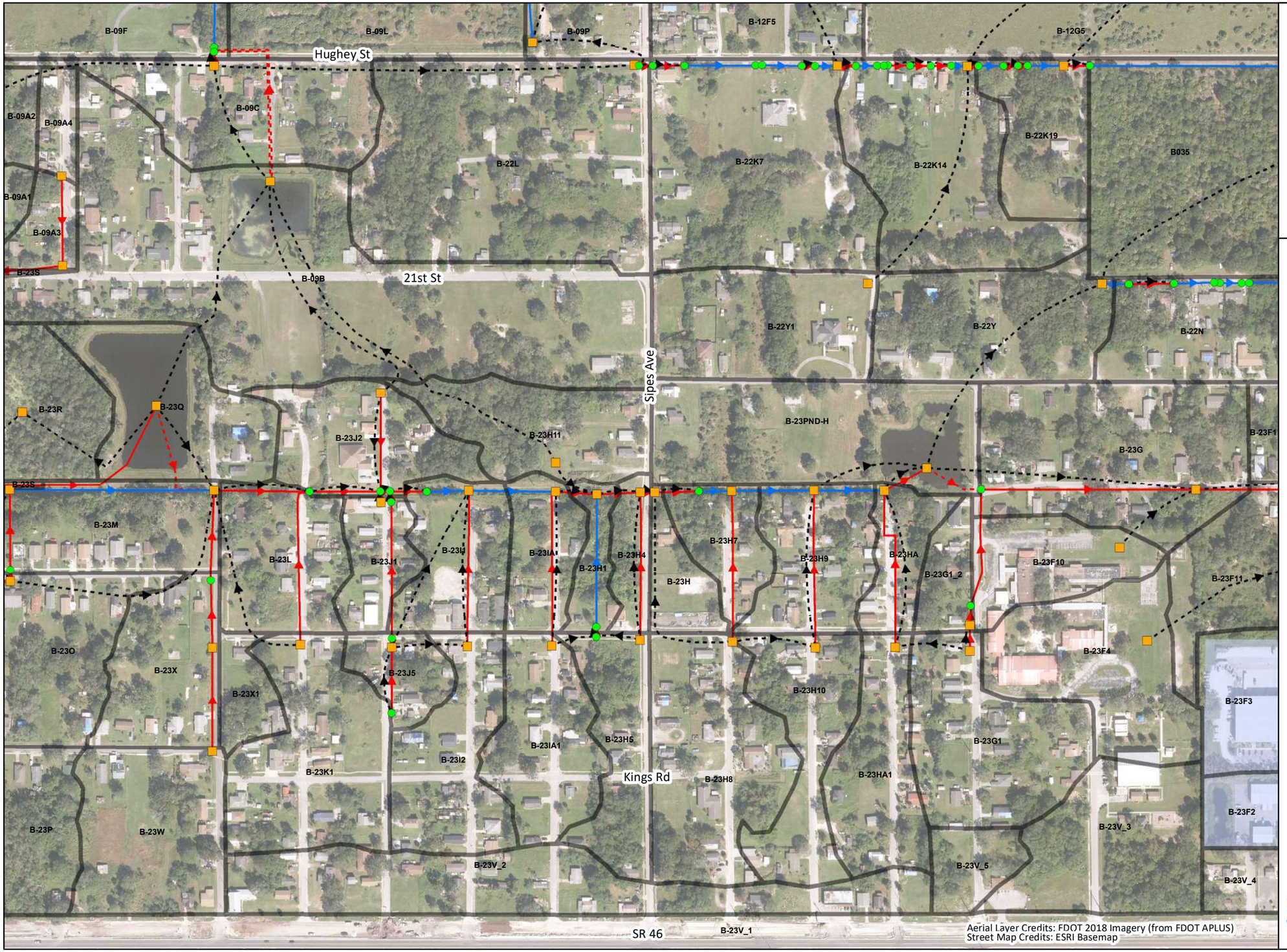
ICPR_LINK

- CHANNEL
- DROP STRUCTURE
- PIPE
- WEIR

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure 3-1B Existing Conditions Model Schematic
Midway Basin Engineering Study
Seminole County, Florida



N

0 150 300 450 600 Feet

1 in = 300 feet

Legend

- City of Sanford
- ICPR_BASIN Future

ICPR_NODE

- Boundary Node
- Junction Node
- Storage Node

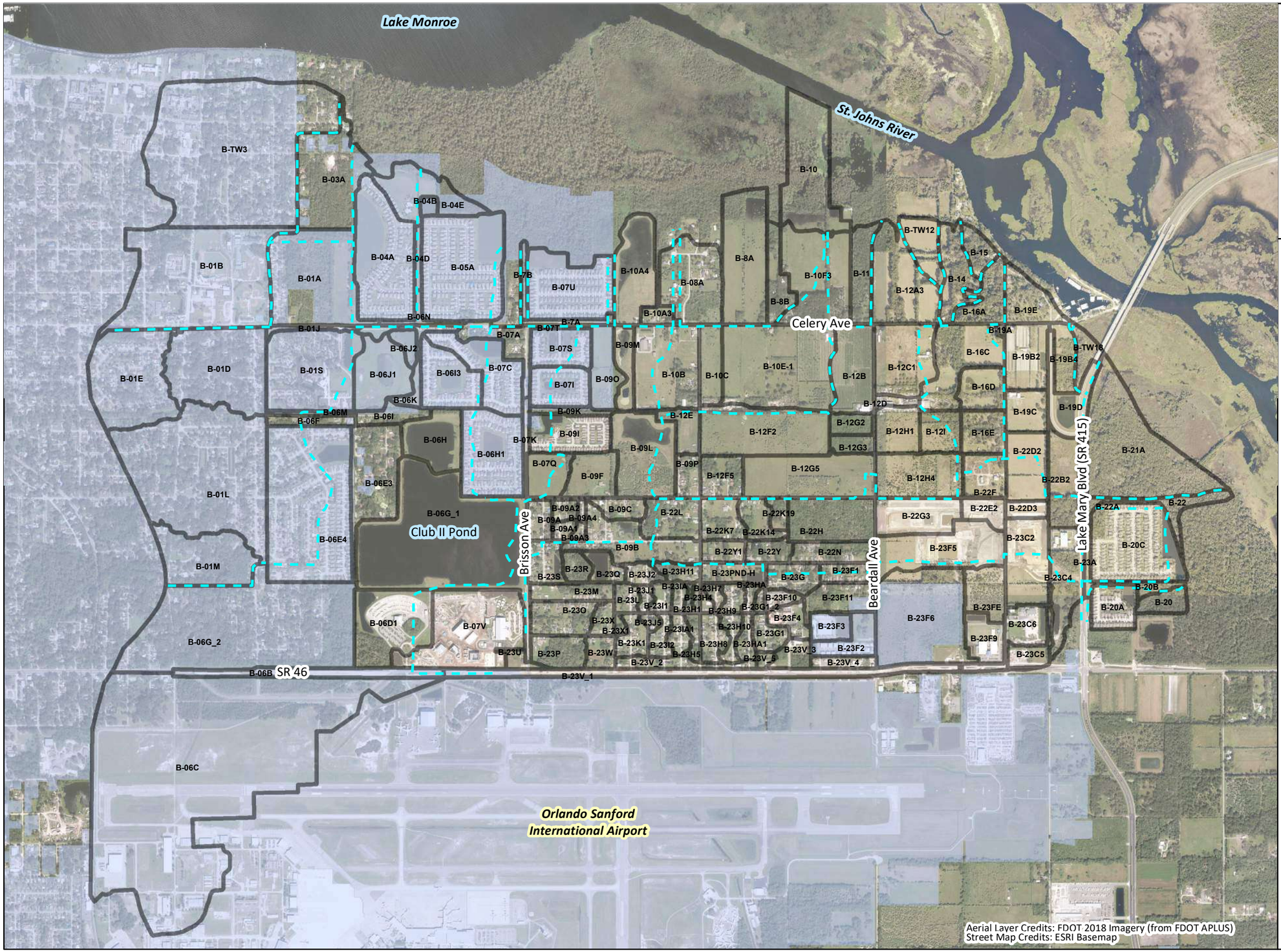
ICPR_LINK

- CHANNEL
- DROP STRUCTURE
- PIPE
- WEIR

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure 3-2B Future Conditions Model Schematic
Midway Basin Engineering Study
Seminole County, Florida



CDM Smith

Figure 3-3 Basin Delineations
Midway Basin Engineering Study
Seminole County, Florida

3.1.1 Curve Number

The Midway Basin existing and future condition models use the Curve Number (CN) method to calculate the rainfall excess. CDM Smith reviewed the land use coverages for both the existing and future scenario and recategorized the descriptions into an appropriate TR-55 land use, based on review of aerial imagery and planned development. Due to the prevalence of a high-water table throughout the watershed and proximity of the system to Lake Monroe, the undrained condition is used in assigning the CN for soils with a dual hydrologic group. **Table 3-1** provides the CN look-up table for unique land use and hydrologic soil group combinations within the basin. The CN look-up tables are included in the GWIS table ICPR4_CURVE_NUMBER_ZONES and have been imported into the ICPR4 model. ICPR4 automatically assigns units representing each unique soil hydrologic group and land use to the subbasins through the "Process Polygons" function.

Table 3-1 Composite Curve Number Lookup Table

TR 55 Land Use	Composite CN				
	A	A/D	B/D	C/D	D
Open Space - Poor	68	89	89	89	89
Open Space - Fair	49	84	84	84	84
Open Space - Good	39	80	80	80	80
Paved excluding R/W	98	98	98	98	98
Paved including R/W	83	93	93	93	93
Gravel including R/W	76	91	91	91	91
Dirt including R/W	72	89	89	89	89
Commercial and Business	89	95	95	95	95
Industrial	81	93	93	93	93
Residential 1/8 ac	77	92	92	92	92
Residential 1/4 ac	61	87	87	87	87
Residential 1/3 ac	57	86	86	86	86
Residential 1/2 ac	54	85	85	85	85
Residential 1 ac	51	84	84	84	84
Residential 2 ac	46	82	82	82	82
Newly Graded Areas	77	94	94	94	94
Row Crops - Straight Row - Poor	72	91	91	91	91
Row Crops - Straight Row - Good	67	89	89	89	89
Pasture - Poor	68	89	89	89	89
Pasture - Fair	49	84	84	84	84
Pasture - Good	39	80	80	80	80
Brush - Poor	48	83	83	83	83
Brush - Fair	35	77	77	77	77
Brush - Good	30	73	73	73	73
Woods - Poor	45	83	83	83	83
Woods - Fair	36	79	79	79	79
Woods - Good	30	77	77	77	77
Pond	98	98	98	98	98
Wetland	98	98	98	98	98

3.1.2 Time of Concentration

The time of concentration (Tc) is the time for stormwater runoff to travel from the hydraulically most distant point of the watershed to the point of interest (outflow from the area). The time of concentration for each basin was calculated by identifying the longest flow path, which was subsequently divided into three types of flow (sheet flow, shallow concentrated flow, and open channel/pipe flow). The total time of concentration is the sum of the travel times for each of the three types of flow, which were calculated in accordance with TR-55. In most cases, the sheet flow component accounts for a significant percent of the total time of concentration for the hydrologic unit, even though it makes up a small percentage of the total flow length in larger basins (sheet flow is limited to 100 feet for Tc calculations, as shallow concentrated flow is assumed beyond this length).

A minimum Tc of 10 minutes was used. For sheet flow calculations, a rainfall value of 4.28 inches was used based on the NOAA Atlas 14 2-year/24-hour precipitation estimated value for a central point within the Midway Basin. Upstream and downstream elevations were approximated from the digital elevation model (DEM) or other available information and used to calculate an initial segment slope. Noted in the comments field, slopes were subsequently updated for reasonableness, such as instances with pipe segments where the slope was adverse or velocities weren't typical. A slope of 0.01 ft/ft was assumed for pipe segments and 0.001 ft/ft was assigned as a minimum slope for overland or sheet flow segments. Additionally, assumptions were made for segments within topographic void areas or in areas where modeled conditions were not reflected in the DEM. A total of 360 segments were created for the 170 subbasins within the model.

An modified set of segments were created for the future conditions scenario using the same methodology described above. **Table 3-2** provides a summary of the Tc values used in the Midway Basin model.

Table 3-2 Summary of Time of Concentration Values

Time of Concentration (minutes)	Existing Scenario: Subbasin Count	Future Scenario: Subbasin Count
10 (minimum Tc)	12	18
10-20	55	79
20-30	45	47
30-40	31	28
40-50	17	11
50-60	6	3
60-70	0	0
70-85	4	3
Total	170	189

3.2 Hydraulic Parameters

Hydraulic parameters were developed for both the existing and future conditions stormwater models. Model features were parametrized using data from sources such as development plans, survey, and LiDAR. Model data from the original 1997 study were used where applicable in incorporated areas, or locations where more detailed information such as plans or survey were not available. **Table 3-3** provides a summary of the model features.

Table 3-3 Model Features

Model Feature	Type	Existing Scenario: Number of Features	Future Scenario: Number of Features
ICPR_BASIN	N/A	170	189
ICPR_NODE	Stage-Area Node (Junction)	125	130
	Stage-Area Node (Storage)	150	159
	Stage-Volume Node (Storage)	0	1
	Time-Stage Node (Boundary)	12	12
ICPR_LINK	Pipe	160	161
	Channel	88	87
	Weir (Overland)	206	194
	Weir (Sharp/Structural)	0	1
	Drop Structure	35 (with 74 weirs)	51 (with 121 weirs)
ICPR_XSECT	Channel Cross Section	84	84
	Weir Cross Section	72	63

3.2.1 Initial Conditions

Initial stages were established for the Midway Basin to ensure static conditions. Initial stages for storage nodes within stormwater ponds were typically set to the lowest control structure weir invert. Stormwater ponds within the Midway Basin watershed are primarily wet detention ponds so the lowest control structure weir invert is typically an orifice or v-notch weir elevation. Initial stages for storage nodes within natural depressional areas were set to an estimated water level based on comparison of aerial imagery and topography. Junction nodes were set with an initial stage consistent with the lowest inflow and/or outflow link inverts.

3.2.2 Node Storage

Stage-area relationships are defined for 150 existing condition model nodes and 159 future condition model nodes in the Midway Basin. Additionally, one stage-volume node is defined in the future conditions model, based on ERP model input. Junction nodes (e.g., nodes connecting channel or pipe links, such as at inlets and manholes, but not representing the storage of the basin) are not assigned a stage-area relationship as there is a negligible amount of storage that occurs at these nodes. The ICPR4 default minimum surface area of 113 square-feet is used for all nodes.

Stage-area relationships were developed for storage nodes from development plans, the two project DEMs, or a combination of the three. Where the DEM was used to extract the stage-area relationship within a basin polygon using the ArcHydro Drainage Area Characterization tool,

channel exclusion polygons were applied as needed in order to prevent overestimation of storage that is already accounted for within the channel cross sections. Storage approximations were made where topographic voids exist within the "gap area". For all storage nodes, the source of the stage-area relationship is noted within the ICPR_NODE COMMENT field (as well as within the ICPR_NODE_STORAGE table).

3.2.3 Channels

Of the 88 channels links modeled under existing conditions, 15 are modeled as trapezoidal and 73 with irregular cross-sections. Irregular cross sections were extracted from the 1997 model, the DEM plans/survey data, or a combination thereof; the source of which is documented in the ICPR_LINK COMMENT field. Based on proposed development, one channel link was removed from the future conditions model. Surveyed channel cross-sections were collected at 6 locations. Manning's "n" values were assigned based on review of field photos, aerial imagery, and survey photos. Manning's "n" values are consistent with the acceptable ranges provided in "Open Channel Hydraulics" (Chow, 1959). Manning's roughness coefficient for channels range from 0.03 to 0.1 and is based on cover observed in field review and aerial imagery. Channel expansion and contraction coefficients set to 0.3 and 0.1, respectively, in accordance with standard values for gradual transitions.

3.2.4 Pipes

Pipe hydraulic parameters such as size and invert data were collected from permits and plans, as available. Survey was collected for 59 pipes and incorporated within the existing conditions model. For pipes not available through available development plans or survey, sizes were obtained from the County's stormwater infrastructure database and inverts were estimated based on the surrounding topography or as noted in the link comment field.

Entrance losses were applied to pipes using standard values based on the design of the pipe entrance. Exit losses were assigned based on the following:

- Exit loss of 1.0 for discharge into a pond or lake;
- Exit loss of 0.5 for discharge into a ditch or canal at a direction perpendicular to flow;
- Exit loss of 0.0 for discharge into a similarly sized downstream pipe segment.

Manning's roughness coefficient applied to pipes using standard values based on the pipe material. Manning's roughness coefficient for pipes range from 0.011 to 0.024.

3.2.5 Weirs

The Midway Basin model includes 206 weirs for the existing condition, all of which are overflow weirs. In the future conditions model, 12 of these were removed (or flow set to none) and one structural weir was added. Cross sections for irregular overland weirs were obtained from the DEMs or plans data, as noted in the link comment. Overland weirs were assigned a weir coefficient of 2.8 and an orifice coefficient of 0.6. For structural weirs, typically located on wet detention ponds within the basin, dimensions and inverts were obtained from permits and plans. The weir and orifice coefficients were assigned as 3.1 and 0.6, respectively, unless otherwise obtained directly from development model input.

3.2.6 Drop Structures

There are 35 drop structures in the existing condition and 51 drop structures represented in the future condition. Drop, or control, structures within the basin are primarily located on wet detention ponds and are used to attenuate flow for recent subdivision developments. Drop structure individual pipe and weir component parameters such as Mannings value and weir/orifice coefficient values follow the assignment procedures previously discussed in the weir and pipe sections.

3.3 Boundary Conditions

There are 12 time-stage nodes within the Midway Basin, representing the Lake Monroe boundary condition. Eleven of these nodes were also reflected in the original 1997 Midway study, though they used a static time-stage relationship. CDM Smith updated the boundary condition at Lake Monroe to represent more current data available from the SJRWMD and to reflect a dynamic condition where the peak lake level occurs at hour 48 for a 24-hour design event, as shown in **Table 3-4** and **Figure 3-4**. An additional time-stage node is located just south of SR 46 and represents a free outfall.

Table 3-4 Boundary Conditions at Lake Monroe

Hour	Design Events: Lake Monroe Stage (ft NAVD)					
	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
0[1]	1.94	1.94	1.94	1.94	1.94	1.94
12[1]	1.94	1.94	1.94	1.94	1.94	1.94
48[2]	3.16	4.69	5.59	6.65	7.38	8.09
144[1]	1.94	1.94	1.94	1.94	1.94	1.94

[1]Stage values at hours 0, 12, and 144 based on Lake Jesup Study; normal water level is approximately 1.94 ft NAVD.
[2]Stage values at hour 48 is based on design lake levels for Lake Monroe provided directly by SJRWMD. Values were converted to NAVD using the following conversion: NAVD = NGVD – 1.06 ft.

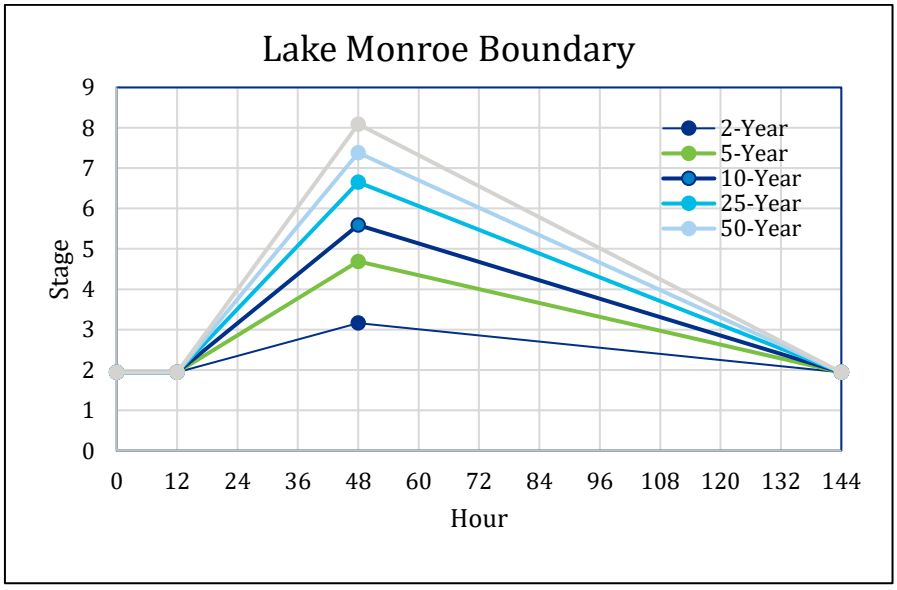


Figure 3-4 Lake Monroe Boundary Condition

3.4 Simulation Parameters and Rainfall

For the model simulations, the mean-annual, 10-year, 25-year, 50-year, and 100-year/24-hour design storm simulations were performed using the Florida Modified distribution using the rainfall depths shown in **Table 3-5**. Rainfall depths are consistent with other watershed studies within the County. Models were simulated under both existing and future conditions and results are summarized and discussed in further detail under Section 3.5 Level of Service Analysis.

Table 3-5 Model Rainfall Depths

Design Event	Rainfall Depth (in)
Mean-Annual/24-hour	4.5
10-year/24-hour	7.6
25-year/24-hour	8.6
50-year/24-hour	9.5
100-year/24-hour	10.6

3.5 Level-of-Service (LOS) Analysis

The resulting node peak stages across all five simulated design storm events for both the existing conditions and future conditions models are provided in **Appendix D**. The following sections describe the methodology used to assign and determine the Level-of-Service (LOS) in the unincorporated areas of the Midway Basin.

3.5.1 Service Level Criteria

The design storm criteria used for the LOS analysis is based from the 2001 Monroe Basin Engineering Study and Drainage Inventory Update, which assigns a design storm event for each Facility Type. Generally, streets and swales are evaluated using the 10-year/24-hour event, canals and ponds using the 25-year/24-hour event, and landlocked retention/detention basins using the 100-year/24-hour event.

In addition to assigning design storm criteria, service level descriptions were determined for each service level category (i.e., A, B, C, D) for each facility type and location. The service level category descriptions were based from the 2001 Monroe Basin study for street facilities and adapted for the additional facility types and locations. The design storm criteria and service level category descriptions are shown below in Figure 3-5 and Table 3-6.

Figure 3-5 Service Level Criteria

Table 3-6 Service Level Criteria for the Midway Basin

Facility Type	Assigned LOS Event	Service Level Category Description			
		A	B	C	D
Canals (Near Road and/or Structures)	25Y24H	Within Top of Bank	Within Overbank/ Right of Way	Outside of Channel, Below Crown	Structures Inundated
Canals (Near Road, No Structures)	25Y24H	Within Top of Bank	Within Overbank/ Right of Way	Outside of Channel, Below Crown	Above Crown
Canals (Rural)	25Y24H	Within Top of Bank	N/A	Outside of Channel	N/A
Retention/ Detention Basin (ROW or Positive Outfall)	25Y24H	Within Top of Bank	Within Overbank/ Right of Way	Within Yards, Below Crown	Structures Inundated/ Above Crown
Retention/ Detention Basin (Land Locked)	100Y24H	Within Top of Bank	Within Overbank/ Right of Way	Within Yards, Below Crown	Structures Inundated/ Above Crown
Roadside Swale	10Y24H	Within Top of Bank	Within Overbank/ Right of Way	Within Yards, Below Crown	Structures Inundated/ Above Crown
Street	10Y24H	Within Top of Grate/ Rim EL	Within Right of Way	Within Yards, Below Crown	Structures Inundated/ Above Crown

3.5.2 Service Level Category Descriptions and Critical Elevations

Subsequently, reference elevations were assigned to each Midway model node within unincorporated Seminole County for each service level category (i.e., A, B, C, D) based on the service level description. Critical Elevations were obtained from various sources such as development plans, survey data, and the project DEMs. Critical Elevation assignments were made for 227 existing conditions model nodes and an additional 18 future conditions model nodes.

3.5.3 LOS Analysis

To determine the resultant LOS for each facility, the assigned design storm event peak stage result for each node was compared to the assigned service level category elevations, as follows:

- LOS A: Nodes with design storm event peak stage less than or equal to LOS A Elevation
- LOS B: Nodes with design storm event peak stage less than or equal to LOS B Elevation but greater than LOS A Elevation
- LOS C: Nodes with design storm event peak stage less than or equal to LOS C Elevation but greater than LOS B Elevation (or in cases where no LOS D Elevation assigned, Nodes with event peak stage greater than LOS C Elevation)
- LOS D: Nodes with design storm event peak stage greater than LOS C Elevation.

A detailed comparison of the resulting LOS is provided in **Appendix E**. The LOS assignments are also superimposed over the existing and future conditions model schematics in **Figure 3-6** and **Figure 3-7**, respectively.

To validate the existing and build-out condition models and assess the reasonability of the model results, CDM Smith compared the LOS analysis to the catalog of known problem areas that was assembled during the data collection phase. Many of those model nodes which received an LOS designation of "D" correspond to an area of flood concern identified by local residents and/or County maintenance staff. For example, the area around the intersections of Midway Avenue and Center Street and Midway Avenue and Kings Street was identified by both County staff and local residents as an area susceptible to flooding. Node 23J5, which represents Midway Avenue at Center Street, received a LOS designation of "D", which would indicate flooding outside of the right-of-way in residents' yards and potentially encroaching upon structures. As such, the anecdotal evidence appears to generally validate model results in this area. Other clusters of LOS "D" nodes were identified in areas where County staff and residents had previously observed flooding, including around Lincoln Street, the Hughey Street outfall ditch, and the Washington Street outfall near Beardall Avenue. In general, the LOS analysis compared favorably to these anecdotal validation points; there were few flood complaint locations that could not be tied to a nearby deficient node.

Additionally, other clusters of LOS "D" nodes were located in areas not previously identified by staff or residents. This includes the CSX Ditch between Sipes and Beardall, which was noted for its anomalous hydraulics by CDM Smith staff during field inspection. These areas were also flagged for further investigation during the alternatives analysis described in the next section. **Table 3-7** includes a list of general flood prone areas identified by County staff, resident complaints, and the LOS analysis for subsequently evaluation in the alternatives analysis.

Table 3-7 Flood Prone Areas

Area	Identified by County Staff	Resident Complains	Contains Structures of LOS D
Midway Community	✓	✓	✓
Lincoln Street		✓	✓
CSX Ditch at Beardall Avenue			✓
Hughey/21st Street and Sipes Avenue	✓	✓	✓
Washington Street Outfall		✓	✓

Note: Flooding complaints in the Indian Mound Village area were not validated by the model results and indicate that these complaints may be tailwater influenced by the St. Johns River.

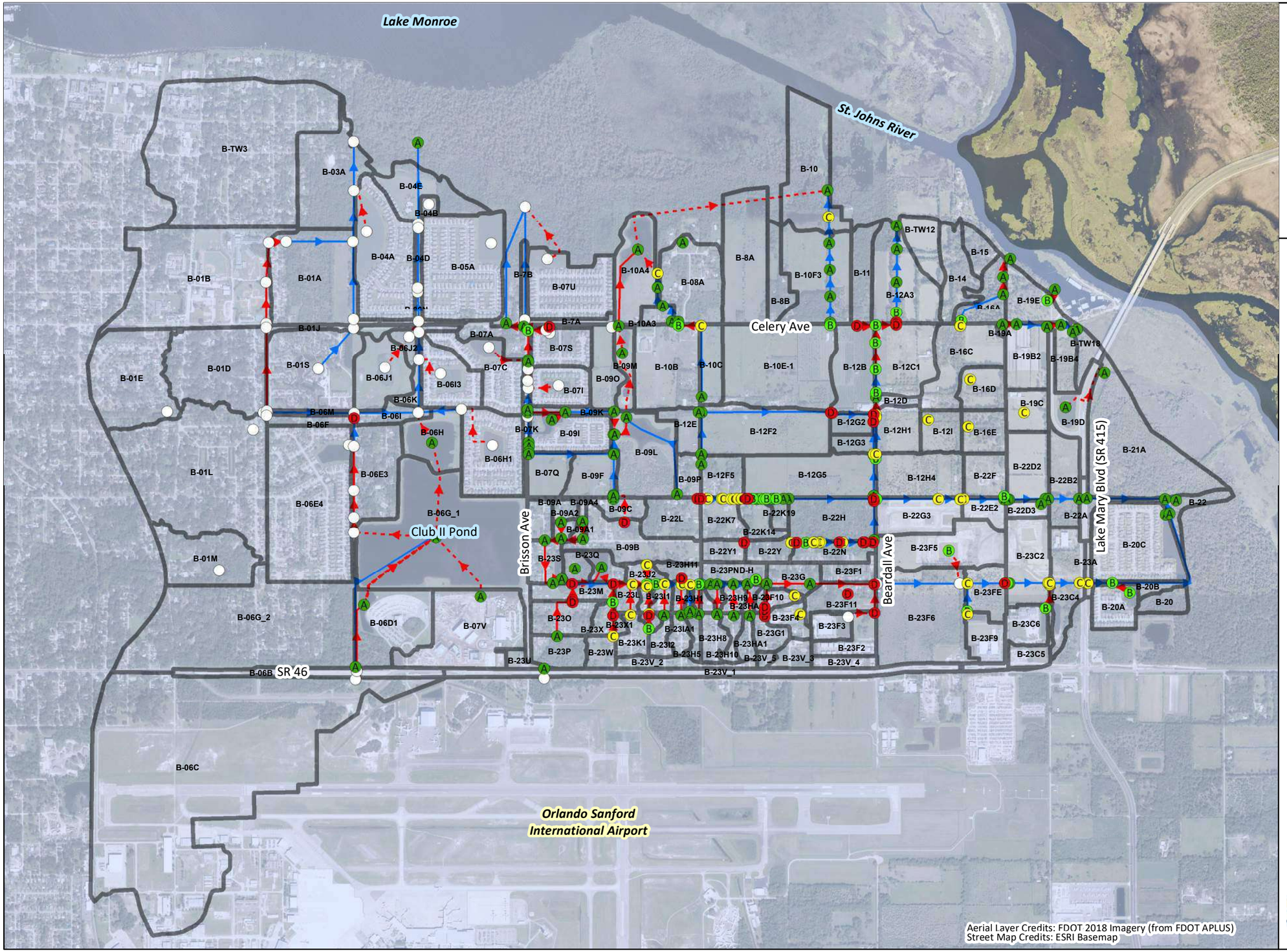


Figure 3-6 Existing Conditions LOS Results
Midway Basin Engineering Study
Seminole County, Florida

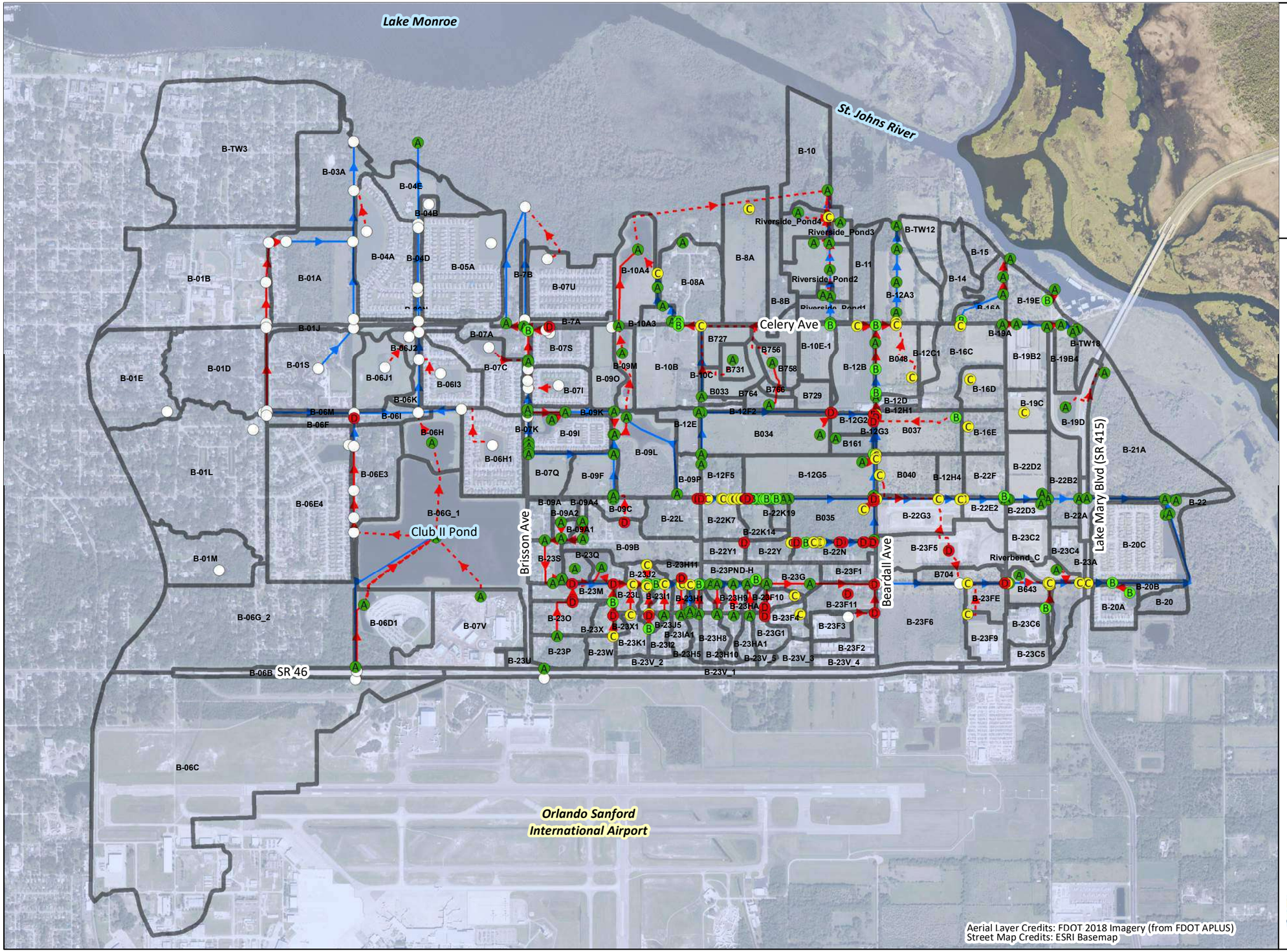
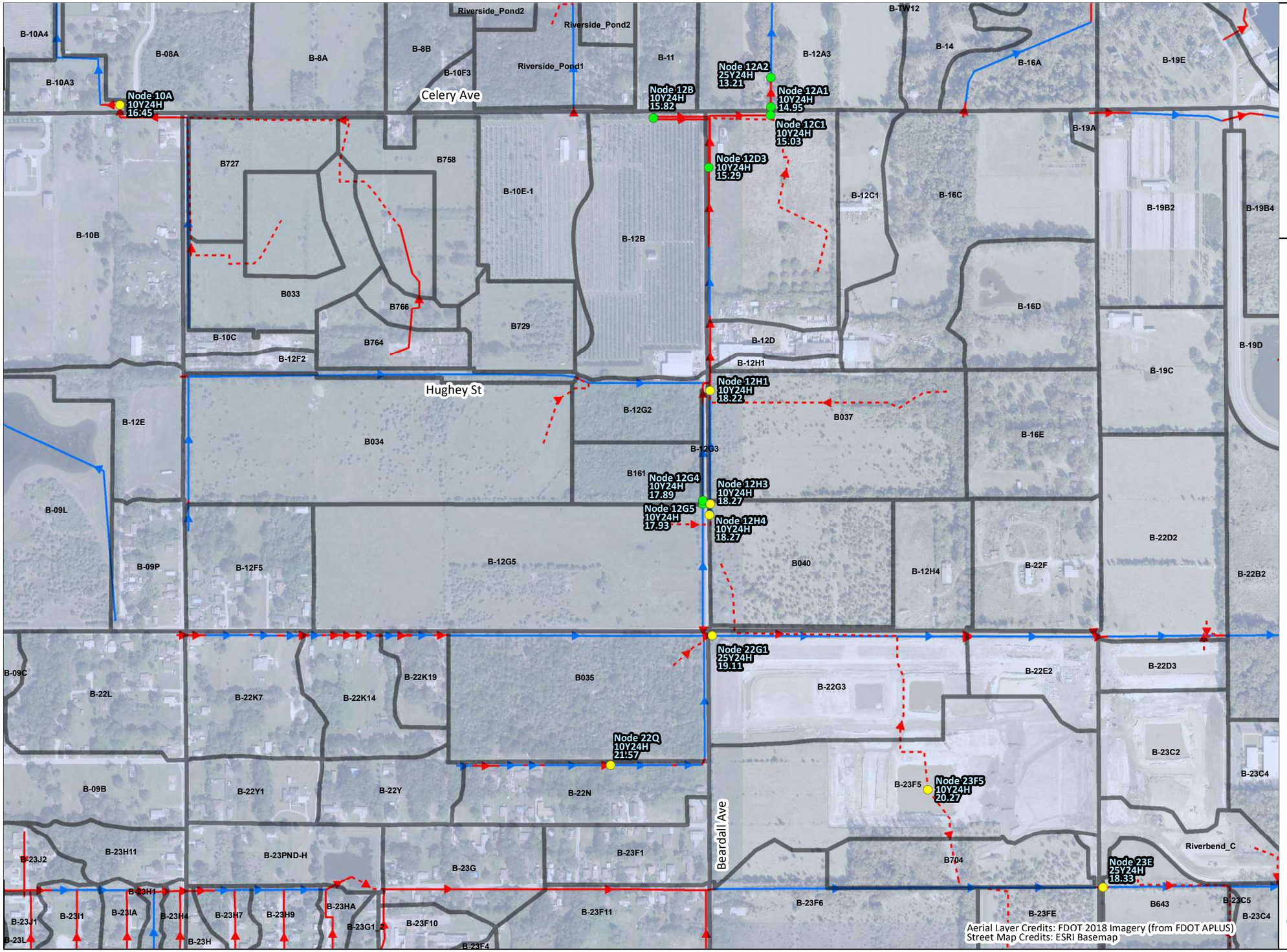


Figure 3-7 Future Conditions LOS Results
Midway Basin Engineering Study
Seminole County, Florida

A comparison was also performed between the existing and build-out condition model results to identify any area with potential changes in LOS as a result of anticipated changes in land use and stormwater infrastructure. Locations which see an improvement or degradation of LOS between existing and build-out conditions are summarized below in **Table 3-8** and shown in **Figure 3-8**. An area expected to see a LOS improvement in the build-out condition is around the intersection of Celery Avenue and Beardall Avenue, where the addition of retention ponds associated with the developments on both the south and north sides of Celery Avenue are expected to mitigate flows into the local outfalls. Similarly, new development needs to account for potential impacts from sheet flow runoff being redirected to existing offsite infrastructure that may not have adequate capacity. This study also identifies those flood risk areas that should be addressed as part of the land development approval process by the development community. One example of future flood capacity risk is the Washington Street outfall system. This outfall system may not have the needed capacity to meet the desired LOS goals of the County under the build out land use scenario without incorporation of additional stormwater infrastructure into the stormwater management system.

Table 3-8 Changes in LOS between Existing and Future Conditions Modes

Location Description	LOS Facility Type	Assigned LOS Event	Model Node	Existing Peak Stage	Existing LOS	Future Peak Stage	Future LOS	LOS Change
Washington Culvert at Cameron Avenue (E)	Canals	25Y24H	23E	17.8	B	18.3	C	Degrade
Riverbend Pond D	Street - Local	10Y24H	23F5	20.0	B	20.3	D	Degrade
Hughey Street at Beardall Avenue (E)	Canals	25Y24H	22G1	18.9	B	19.1	C	Degrade
Lincoln Street (8)	Roadside Swale	10Y24H	22Q	21.5	C	21.6	D	Degrade
Celery Avenue at Thoroughbred Trail (N)	Street - Arterial and Collector	10Y24H	10A	16.4	A	16.5	B	Degrade
Cameron Heights C1 at Beardall Avenue (S)	Roadside Swale	10Y24H	12G5	18.4	B	17.9	A	Improve
Cameron Heights C1 at Beardall Avenue (N)	Roadside Swale	10Y24H	12G4	18.3	C	17.9	B	Improve
Cameron Heights J at Beardall Avenue (1)	Roadside Swale	10Y24H	12H4	18.0	B	18.3	C	Degrade
Cameron Heights J at Beardall Avenue (2)	Roadside Swale	10Y24H	12H3	18.0	B	18.3	C	Degrade
Beardall Avenue at Cameron Heights D (S)	Street - Local	10Y24H	12H1	18.0	C	18.2	D	Degrade
Beardall Avenue at Suntera Park (4)	Street - Local	10Y24H	12D3	15.6	B	15.3	A	Improve
Celery Ave West of Beardall	Street - Arterial and Collector	10Y24H	12B	16.1	D	15.8	C	Improve
Celery Cross Drain East of Beardall (S)	Street - Arterial and Collector	10Y24H	12C1	15.3	D	15.0	C	Improve
Celery Cross Drain East of Beardall (N)	Street - Arterial and Collector	10Y24H	12A1	15.2	D	15.0	C	Improve
Celery Outfall East of Beardall (1)	Canals	25Y24H	12A2	14.3	B	13.2	A	Improve



N

0 250 500 750 1,000 Feet

1 in = 500 feet

Legend

City of Sanford

ICPR_BASIN Future

ICPR_NODE LOS Results

Degrade

Improve

ICPR_LINK Future

CHANNEL

DROP STRUCTURE

PIPE

Aerial Layer Credits: FDOT 2018 Imagery (from FDOT APLUS)
Street Map Credits: ESRI Basemap

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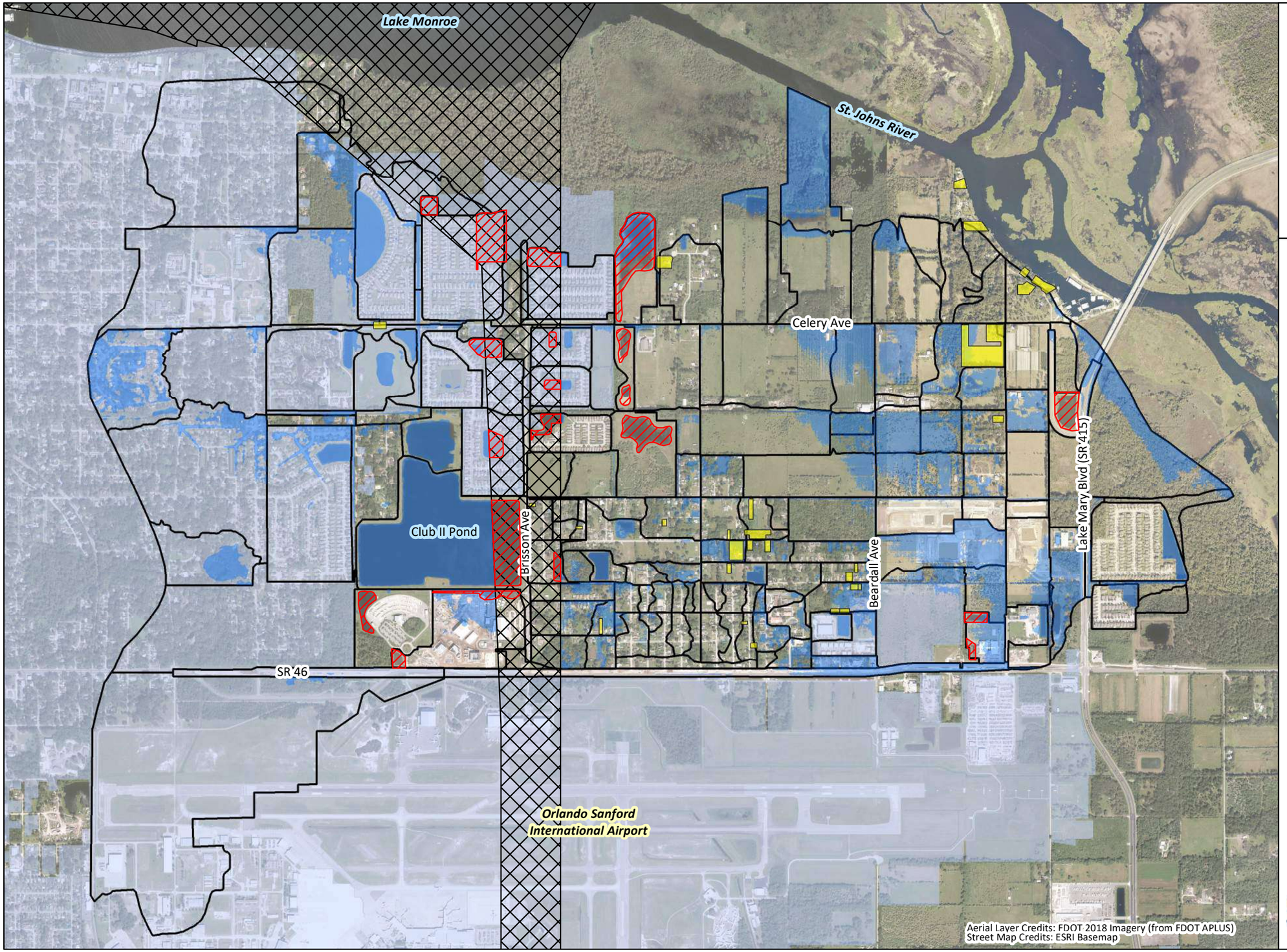
Figure 3-8 LOS Model Results Comparison
Midway Basin Engineering Study
Seminole County, Florida

3.6 Floodplain Mapping

Floodplains were delineated for each basin using the 2005 and 2009 DEMs where available for the existing and future conditions 10-year and 100-year design storm events as shown in **Figure 3-9** and **Figure 3-10** respectively. Raw inundation polygons were created using the ArcHydro GeoICPR Floodplain Delineation (Node) tool. The tool delineates level-pool floodplains for each basin polygon based on the peak stage elevation associated with the user-specified delineation node (typically the basin's loading node).

As noted in Section 2, a gap of coverage exists between the 2005 (western) and 2009 (eastern) DEMs. Additionally, due to the age of the DEM information, topographic voids exist due to new development. Approximated floodplains within topographic void areas are shown in Figures 3-8 and 3-9. A comparison of the 100-year existing conditions floodplain to the FEMA Special Flood Hazard Area is shown in **Figure 3-11**.



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Pond Topographic Void
- DEM Gap
- Public Meeting Comment Parcels
- Existing Conditions Floodplain (10 YR)
- ICPR_BASIN (Existing)
- City of Sanford

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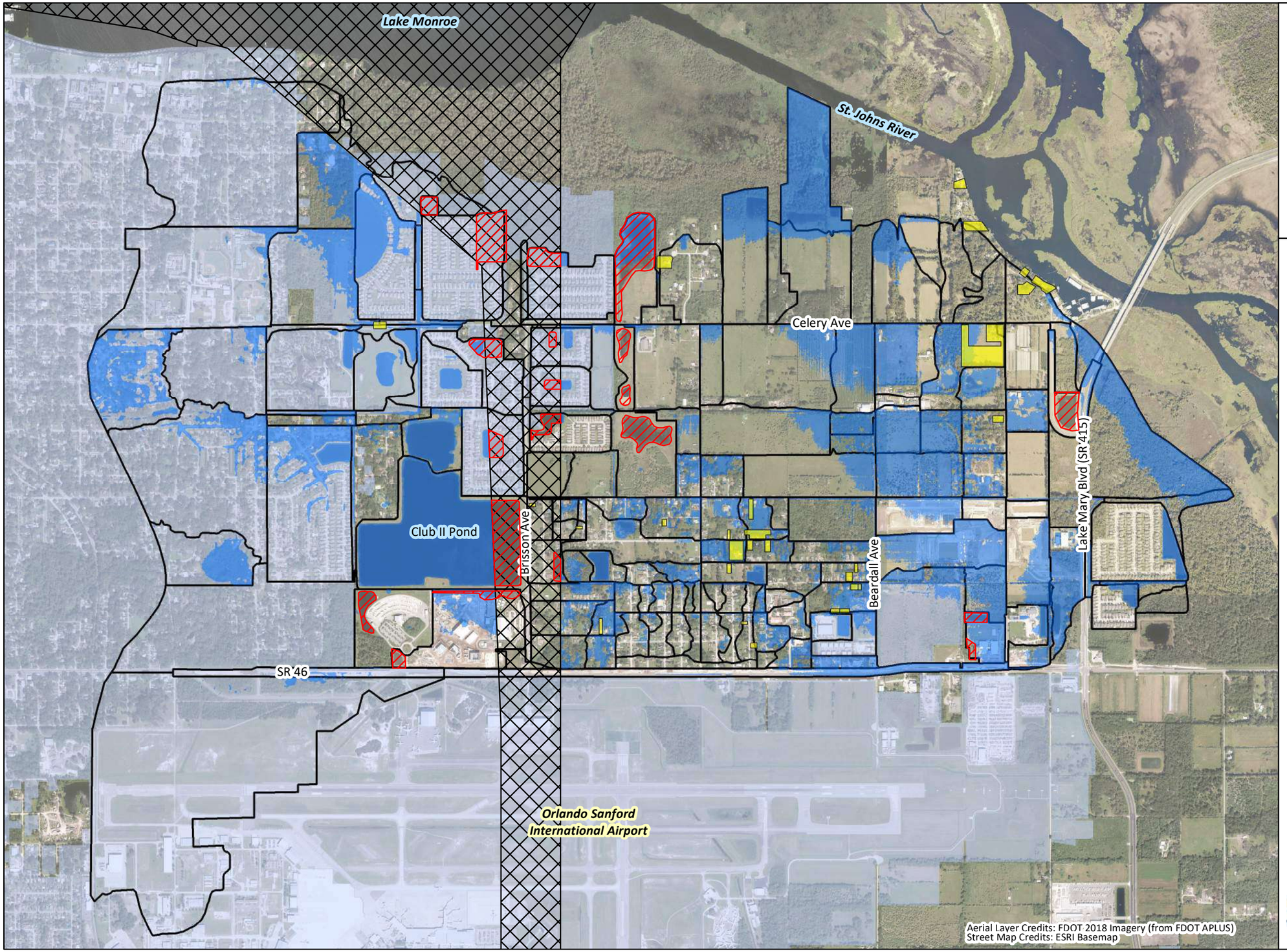
Figure 3-9 Existing Conditions 10-Year Floodplain
Midway Basin Engineering Study
Seminole County, Florida



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Pond Topographic Void
- DEM Gap
- Public Meeting Comment Parcels
- Existing Conditions Floodplain (100 YR)
- ICPR_BASIN (Existing)
- City of Sanford

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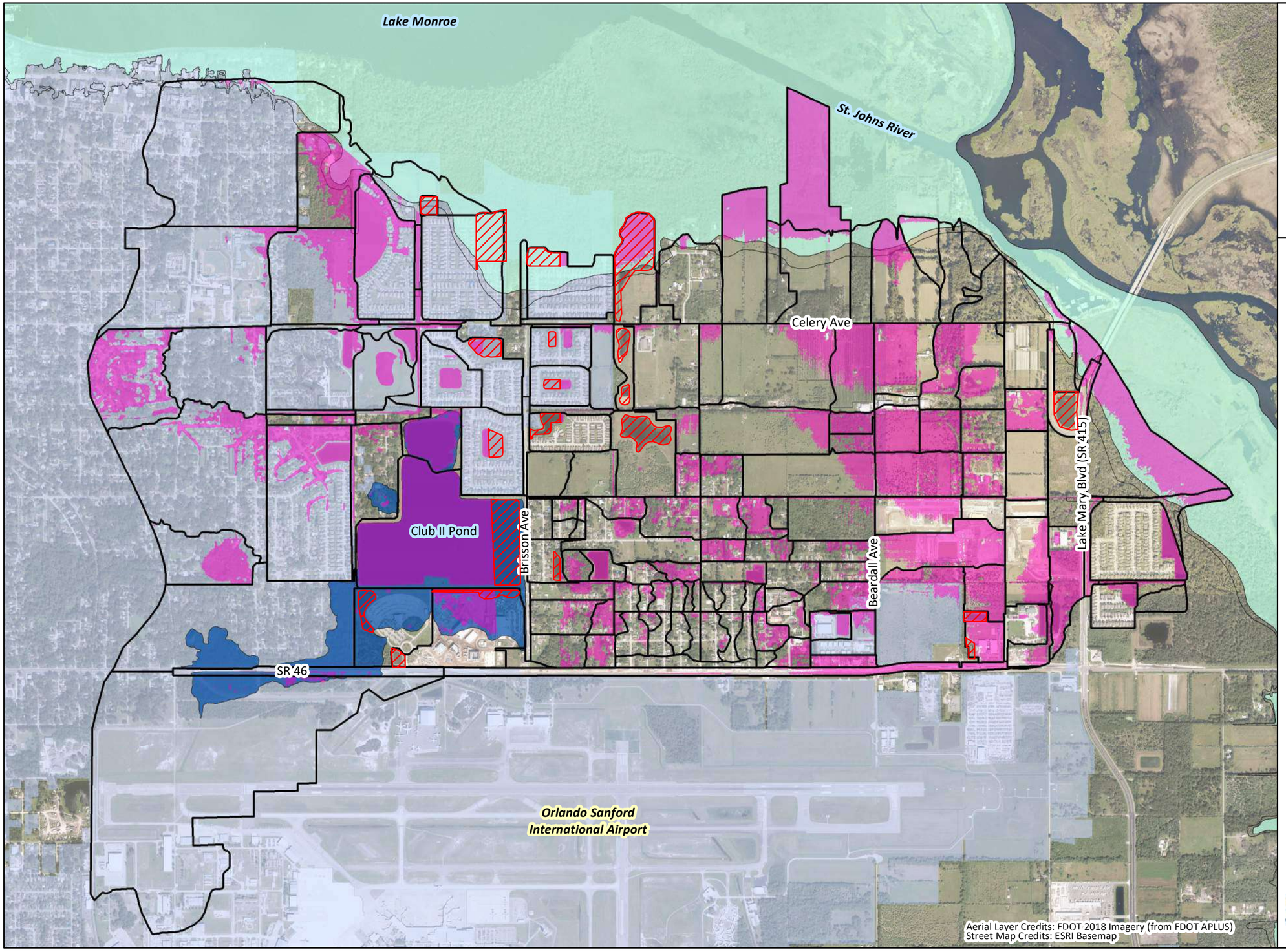
Figure 3-10 Existing Conditions 100-Year Floodplain
Midway Basin Engineering Study
Seminole County, Florida



N

0 750 1,500 2,250 3,000 Feet

1 in = 1,500 feet

Legend

- Pond Topographic Void
- Existing Conditions Floodplain (100 YR)
- ICPR_BASIN (Existing)
- City of Sanford

S_FLD_HAZ_AR

FEMA Flood Zone (Seminole County)

- A
- AE
- X

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Figure 3-11 100-Year Floodplain Comparison
Midway Basin Engineering Study
Seminole County, Florida

Section 4
Alternatives Analysis

The data collection and modeling efforts summarized in the previous sections identified several areas of the Midway Basin which may be deficient in the flood protection level-of-service. To assist the County in addressing these potential deficiencies, CDM Smith has developed a suite of conceptual capital improvements to reduce the magnitude and/or duration of flooding, as well as improve the quality of stormwater discharging to the St. Johns River and Lake Monroe. This section discusses the selection and evaluation of these conceptual alternatives, preliminary cost estimates, and an evaluation matrix to assess the feasibility of each alternative.

4.1 Conceptual Alternatives

Based on the LOS analysis presented in the previous Section, CDM Smith identified five general areas for development of alternatives illustrated in **Figure 4-1.** CDM Smith developed six conceptual alternatives to address the flood prone areas; this included two alternatives for the Midway Community area and one alternative for the remaining four areas. The alternatives were developed and refined with a goal of demonstrating improvement in the flood protection LOS from "D" to at least "B"; in areas where this was not possible, alternatives were refined to provide as much benefit as possible, and often demonstrated significant benefit for smaller storms like the mean annual/24-hour event. Furthermore, where appropriate, CDM Smith added water quality components to the conceptual design to provide compensating treatment and improve permitability of the concept and to provide pollutant load reductions in support of the County's goals and regulatory obligations.

4.1.1 Alternative 1 – Midway Community Drainage Improvements

A portion of the Midway community, generally defined as the area bounded by Granby Street on the west, SR 46 on the south, Jitway on the east, and the Childers Ditch on the north, has historically been a flood prone area with frequent resident complaints and requiring regular County maintenance. Both County staff and residents have specifically identified the areas around the intersections of Center Street and Kings Road and Center Street and Midway Avenue as flooding regularly after strong thunderstorms. The area is largely served by roadside ditches and storm sewer that drain to the Childers Ditch, which discharges to an existing wet pond at the corner of Jitway and Washington Street. County staff believe that the existing storm sewer and inlets are undersized; furthermore, residents believe (and available LiDAR supports) that yards in the area are built below the roadside drainage infrastructure, thus preventing yards from properly draining to outfalls and resulting in persistent standing water during the wet season.

Existing condition models verify LOS deficiencies in this area, with "D" LOS designations identified at Crawford Road and Granby Street, Center Street and Midway Avenue, Jitway, and along the Childers Ditch. This area is generally already built-out, and the future land use changes on the east side of the Midway Basin are far enough downstream such that there were few observed increases in model stages in the Midway community between the existing and build-out conditions.

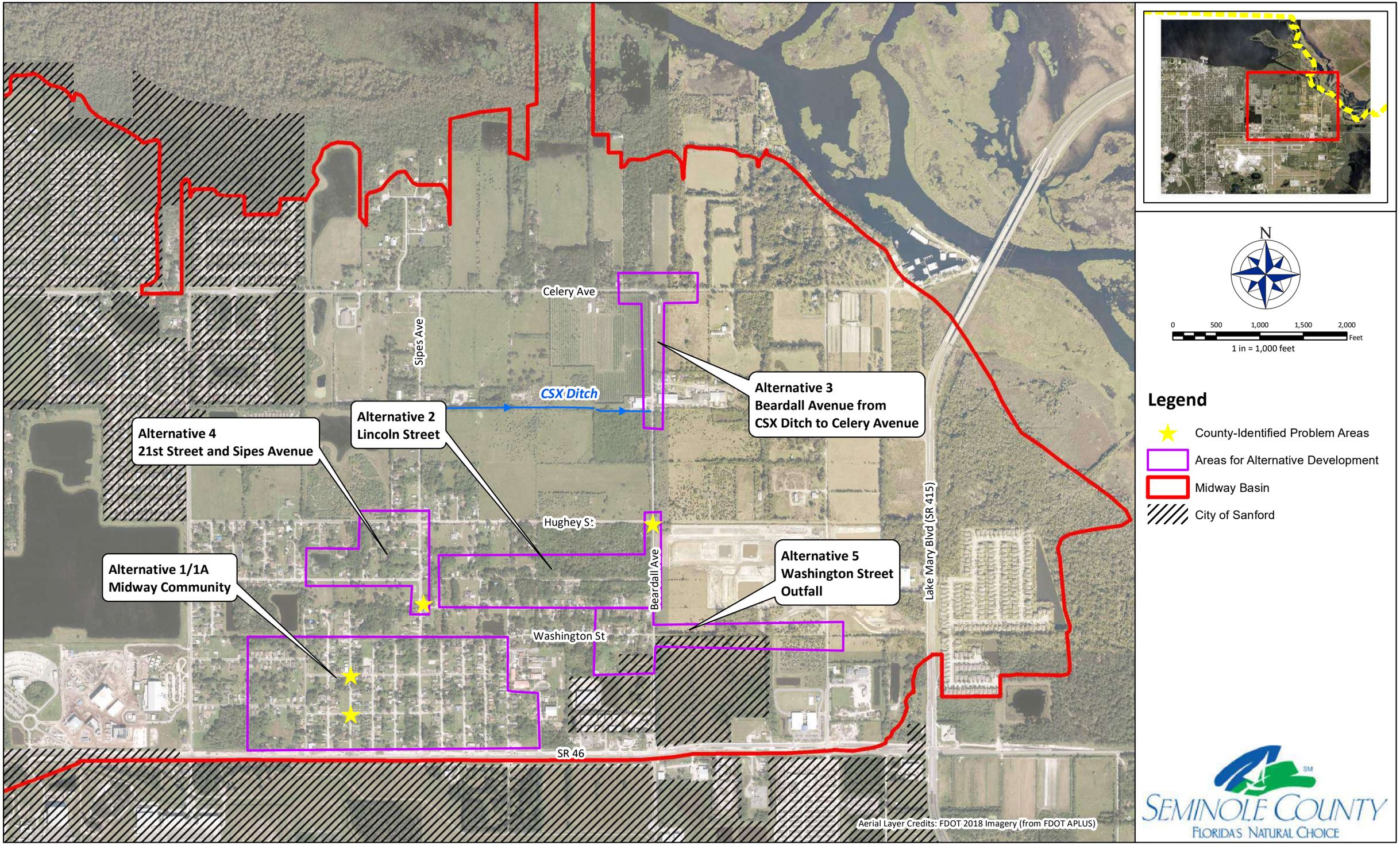

Figure 4-1 Areas for Alternatives Development
Midway Basin Engineering Study
Seminole County, Florida

Nodes identified with a "D" LOS designation in the build-out condition in this project area are listed in **Table 4-1** and are shown in **Figure 4-2**.

Table 4-1 Alternative 1 – LOS "D" Nodes in Project Area

Node ID	Location
23O	Crawford Avenue South
23N	Crawford Avene North
23M	Childers Ditch at Crawford Drive Outfall
23X	Granby Street at Midway Avenue
23L	Childers Ditch at Granby Street
23J5	Midway Avenue at Center Street (S)
23H11	Area North of Water Street at Washington Canal
23G1	Midway Avenue Cross Drain at Jitway (S)
23G2	Midway Avenue Cross Drain at Jitway (N)
23G3	Jitway North of Midway Avenue

As illustrated on Figure 4-2**,** CDM Smith identified several conceptual improvements for this problem area, including:

- Replacement and expansion of the existing roadway drainage infrastructure within the Midway community. For the purposes of modeling and cost estimation, CDM Smith assumed this would consist of approximately 16,000 linear feet (LF) of 24-inch storm sewer and accompanying curb inlets and manholes. This would improve the collection of local runoff and routing to the Childers Ditch.
- In order to alleviate the yard flooding associated with the existing topography, CDM Smith proposes outfitting the proposed storm sewer improvements with yard drain hookups; these hookups would consist of capped stubs of 12-inch plastic pipe terminating at the edge of County right-of-way. Residents who choose to install and maintain their own yard drains on their private property would be able to connect to these hookups and discharge their yard drainage into the proposed County storm sewer.
- CDM Smith proposes upgrades to the piped portions of the Childers Ditch; this would involve replacement of approximately 650 LF of 48-inch pipe with 43-inch by 68-inch elliptical reinforced concrete pipe (ERCP). Additionally, improvements are proposed to the open channel portions of the Childers Ditch including steeper side slopes and sand-cement rip-rap ditch lining to improve conveyance capacity in the available space.
- CDM Smith proposes expansion of the existing wet pond at the corner of Jitway and Washington Street. This would include acquisition of two vacant, undeveloped private parcels immediately west of the existing pond and increasing the pond area by approximately 1.5 acres. In addition to providing storage for flood control, this improvement would provide water quality benefits.

Upsize ~650-ft piped section of the Childers Ditch outfall to 43-in x 68-in ERCP

Improvements to open channel portion of Childers Ditch (approx. 1,500 LF total) to increase conveyance capacity to pond.

Acquire two vacant parcels and expand existing pond at Washington and Jitway by approx. 1.5-acres (Not included in Alternative 1A)

Install new storm sewer (typ. 24-in) and inlets throughout Midway Community (approx. 16,000 LF total)

Provide 12-inch yard drain hook-ups to storm sewer

Hughey St

Sipes Ave

Beardall Ave

SR 46

Orlando Sanford International Airport

Aerial Layer Credits: FDOT 2018 Imagery (from FDOT APLUS)

N

0 210 420 630 840 Feet

1 in = 430 feet

Legend

- County-Identified Problem Areas
- Proposed Pond
- Parcel to be Acquired
- Public Meeting Comments
- Midway Basin
- City of Sanford

Proposed Conveyance Improvements

- Open Channel
- Pipe
- Yard Drain Hookup

ICPR_NODE Future LOS

- A
- B
- C
- D
- City Jurisdiction

ICPR_LINK Future

- CHANNEL
- DROP STRUCTURE
- PIPE

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Figure 4-2 Alternative 1/1A - Midway Community Drainage
Midway Basin Engineering Study
Seminole County, Florida

Model results for the proposed Midway Community Drainage Improvements project are provided in **Table 4-2** for the LOS "D" nodes identified above. Model results indicate that the proposed improvements can provide some significant reduction in flood stages in certain identified problem areas within the project area. The problem areas closer to the proposed pond, including Midway Avenue and Center Street and Jitway Avenue, see the greatest benefit, with up to two feet reduction in peak flood stage modeled for the 10-year, 24-hour event. Some benefit in flood stages may be realized in the western portion of the study area for small storms; model results indicate flood stage reductions of 1.4 feet and 0.7 feet in the Childers Ditch at Granby Street and Crawford Avenue, respectively. However, model results indicate that the even the improved systems may be surcharged by larger storms; conveyance capacity restrictions in the Childers Ditch, even with improvements, as well as tailwater issues in the existing pond and the downstream Washington Street outfall system limit the benefit that can be provided to the western portion of the project area for larger storms.

Table 4-3 shows the modeled LOS improvement at deficient nodes within the project area. Node 23J5 at Midway Avenue and Center Street is expected to improve from a "D" to a "A" for its target 10-year/24-hour design storm, as are the nodes (23G1, 23G2, and 23G3) along Jitway south of the pond. Nodes further upstream along Childers Ditch (23L and 23M), and in the area around Granby Street and Crawford Avenue (23O, 23N, and 23X) are not expected to see an improvement in level-of-service for their assigned design storms.

Table 4-2 Alternative 1 Model Results

		Nodes (Upstream to Downstream)									
		23O	23N	23M	23X	23L	23J5	23H11	23G1	23G2	23G3
24 Hour Design Events Results:	Mean Annual Build-Out Stage (ft-NAVD)	29.2	29.1	27.1	29.2	27.0	29.1	26.6	26.3	26.1	25.7
	Mean Annual Reduction (ft)	0.1	0.0	0.7	0.4	1.4	2.7	0.0	2.0	2.2	1.9
	10-Year Build-Out Stage (ft-NAVD)	29.3	29.3	28.2	29.7	28.1	29.2	26.7	26.6	26.6	26.1
	10-Year Reduction ft)	0.0	0.0	0.4	0.3	0.4	2.1	0.0	1.3	1.6	1.5
	25-Year Build-Out Stage (ft-NAVD)	29.4	29.3	28.3	29.8	28.2	29.3	26.8	26.7	26.7	26.2
	25-Year Reduction (ft)	0.0	0.0	0.2	0.3	0.2	1.8	0.1	1.0	1.4	1.5
	50-Year Build-Out Stage (ft-NAVD)	29.4	29.3	28.3	29.9	28.2	29.3	27.0	26.8	26.8	26.3
	50-Year Reduction ft)	0.0	0.0	0.1	0.3	0.1	1.6	0.1	0.8	1.2	1.1
	100-Year Build-Out Stage (ft-NAVD)	29.4	29.3	28.4	30.0	28.2	29.3	27.1	26.8	26.8	26.4
	100-Year Reduction ft)	0.0	0.0	0.1	0.3	0.1	1.3	0.0	0.6	0.9	0.8

Table 4-3 Alternative 1 LOS Analysis

Node ID	Location	Design Storm	Reduction (ft)	Existing LOS	Proposed LOS
23O	Crawford Avenue South	10Y24H	0.0	D	D
23N	Crawford Avenue North	10Y24H	0.0	D	D
23M	Childers Ditch at Crawford Avenue Outfall	25Y24H	0.2	D	D
23X	Granby Street at Midway Avenue	10Y24H	0.3	D	D
23L	Childers Ditch at Granby Street	25Y24H	0.2	D	D
23J5	Midway Avenue at Center Street (S)	10Y24H	2.1	D	A
23H11	Area North of Water Street at Washington Canal	10Y24H	0.0	D	D
23G1	Midway Avenue Cross Drain at Jitway (S)	10Y24H	1.3	D	A
23G2	Midway Avenue Cross Drain at Jitway (N)	10Y24H	1.6	D	A
23G3	Jitway North of Midway Avenue	10Y24H	1.5	D	A

The opinion of conceptual capital cost for the proposed improvements is approximately $6.7 million. More details regarding the cost estimate can be found in **Table F-1** in **Appendix F**.

4.1.2 Alternative 1A

A variant of the previous Alternative 1 was evaluated to determine the benefits that may be realized with the drainage collection and conveyance improvements alone without the proposed pond expansion. This alternative therefore does not require the acquisition of private property and would therefore be expected to be more constructable than the full Alternative 1, though without water quality improvements it may be more difficult to permit. The proposed improvements therefore include:

- Replacement and expansion of the existing roadway drainage infrastructure within the Midway community. For the purposes of modeling and cost estimation, CDM Smith assumed this would consist of approximately 16,000 linear feet (LF) of 24-inch storm sewer and accompanying curb inlets and manholes. This would improve the collection of local runoff and routing to the Childers Ditch.
- In order to alleviate the yard flooding associated with the existing topography, CDM Smith proposes outfitting the proposed storm sewer improvements with yard drain hookups; these hookups would consist of capped stubs of 6-inch plastic pipe terminating at the edge of County right-of-way. Residents who choose to install their own yard drains on their private property would be able to connect to these hookups and discharge their yard drainage into the proposed County storm sewer.
- CDM Smith proposes upgrades to the piped portions of the Childers Ditch; this would involve replacement of approximately 650 LF of 48-inch pipe with 43-inch by 68-inch elliptical reinforced concrete pipe (ERCP). Additionally, improvements are proposed to the open channel portions of the Childers Ditch including steeper side slopes and sand-cement rip-rap ditch lining to improve conveyance capacity in the available space.

Model results for Alternative 1A are provided in **Table 4-4** for the LOS "D" nodes identified in Table 4-1 above. Model results are generally similar to those observed for the full Alternative 1 and indicate that the proposed improvements can provide some significant reduction in flood stages in certain identified problem areas within the project area. The problem areas closer to the proposed pond, including Midway Avenue and Center Street and Jitway Avenue, see the greatest benefit, with up to two feet reduction in peak flood stage modeled for the 10-year, 24-hour event. Some benefit in flood stages may be realized in the western portion of the study area for small storms; model results indicate flood stage reductions of 1.4 feet and 0.7 feet in the Childers Ditch at Granby Street and Crawford Avenue, respectively. However, model results indicate that the even the improved systems may be surcharged by larger storms; conveyance capacity restrictions in the Childers Ditch, even with improvements, as well as tailwater issues in the existing pond and the downstream Washington Street outfall system limit the benefit that can be provided to the western portion of the project area for larger storms.

Table 4-5 shows the modeled LOS improvement at deficient nodes within the project area. Node 23J5 at Midway Avenue and Center Street is expected to improve from a "D" to a "A" for its target 10-year/24-hour design storm, as are the nodes (23G1, 23G2, and 23G3) along Jitway south of the pond. Nodes further upstream along Childers Ditch (23L and 23M), and in the area around Granby Street and Crawford Avenue (23O, 23N, and 23X) are not expected to see an improvement in level-of-service for their assigned design storms.

Table 4-4 Alternative 1A Model Results

		Nodes (Upstream to Downstream)									
		23O	23N	23M	23X	23L	23J5	23H11	23G1	23G2	23G3
24 Hour Design Events Results:	Mean Annual Build-Out Stage (ft-NAVD)	29.2	29.1	27.1	29.2	27.0	29.1	26.6	26.3	26.1	25.7
	Mean Annual Reduction (ft)	0.1	0.0	0.7	0.4	1.4	2.7	0.0	2.0	2.2	1.9
	10-Year Build-Out Stage (ft-NAVD)	29.3	29.3	28.2	29.7	28.1	29.2	26.7	26.6	26.6	26.1
	10-Year Reduction (ft)	0.0	0.0	0.4	0.3	0.4	2.1	0.0	1.3	1.6	1.5
	25-Year Build-Out Stage (ft-NAVD)	29.4	29.3	28.3	29.8	28.2	29.3	26.8	26.7	26.7	26.2
	25-Year Reduction (ft)	0.0	0.0	0.2	0.3	0.2	1.8	0.1	0.9	1.2	1.0
	50-Year Build-Out Stage (ft-NAVD)	29.4	29.3	28.3	29.9	28.2	29.3	27.0	26.8	26.8	26.3
	50-Year Reduction (ft)	0.0	0.0	0.1	0.3	0.1	1.6	0.0	0.7	0.9	0.8
	100-Year Build-Out Stage (ft-NAVD)	29.4	29.3	28.4	30.0	28.2	29.3	27.1	26.8	26.8	26.4
	100-Year Reduction (ft)	0.0	0.0	0.1	0.3	0.1	1.3	0.0	0.5	0.6	0.5

Table 4-5 Alternative 1A LOS Analysis

Node ID	Location	Design Storm	Reduction (ft)	Existing LOS	Proposed LOS
23O	Crawford Avenue South	10Y24H	0.0	D	D
23N	Crawford Avenue North	10Y24H	0.0	D	D
23M	Childers Ditch at Crawford Avenue Outfall	25Y24H	0.2	D	D
23X	Granby Street at Midway Avenue	10Y24H	0.3	D	D
23L	Childers Ditch at Granby Street	25Y24H	0.2	D	D
23J5	Midway Avenue at Center Street (S)	10Y24H	2.1	D	A
23H11	Area North of Water Street at Washington Canal	10Y24H	0.0	D	D
23G1	Midway Avenue Cross Drain at Jitway (S)	10Y24H	1.3	D	A
23G2	Midway Avenue Cross Drain at Jitway (N)	10Y24H	1.6	D	A
23G3	Jitway North of Midway Avenue	10Y24H	1.5	D	A

The opinion of conceptual capital cost for the proposed improvements is approximately $5.8 million. More details regarding the cost estimate can be found in **Table F-2** in **Appendix F**.

4.1.3 Alternative 2 – Lincoln Street Drainage Improvements

Lincoln Street is accessed from Beardall Avenue south of Hughey Street. While the portion of Lincoln Street lying east of Deepwater Avenue is served by an existing drainage ditch, there is no existing drainage infrastructure along Lincoln Street west of Deepwater Avenue. Six properties abutting this western half of Lincoln Street provided comments and flood complaints at the June 2019 public meeting. The area drains to the east to the roadside ditch along Beardall Avenue, which drains north to the Hughey Street outfall. County staff reported that the Hughey outfall cross-drain under Beardall flooded during Hurricane Irma, though they believe it was primarily due to obstruction of the crossing from trash and debris.

Existing condition modeling verify level-of-service deficiencies in this area, with "D" LOS designations identified along Lincoln Street, both west of Deepwater Avenue and in the existing roadside drainage system east of Deepwater. Model results also resulted in a "D" LOS designation to the Hughey Street outfall cross-drain under Beardall Avenue. Build-out model results indicate that flood stages may increase slightly; for example, a LOS degradation is projected at Node 22Q due to a modeled 0.1-ft increase in flood stage between the existing and build-out conditions.

Nodes identified with a "D" LOS designation in the build-out condition in this project area are listed in **Table 4-6** and are shown in **Figure 4-3**.

Table 4-6 Alternative 2 – LOS "D" Nodes in Project Area

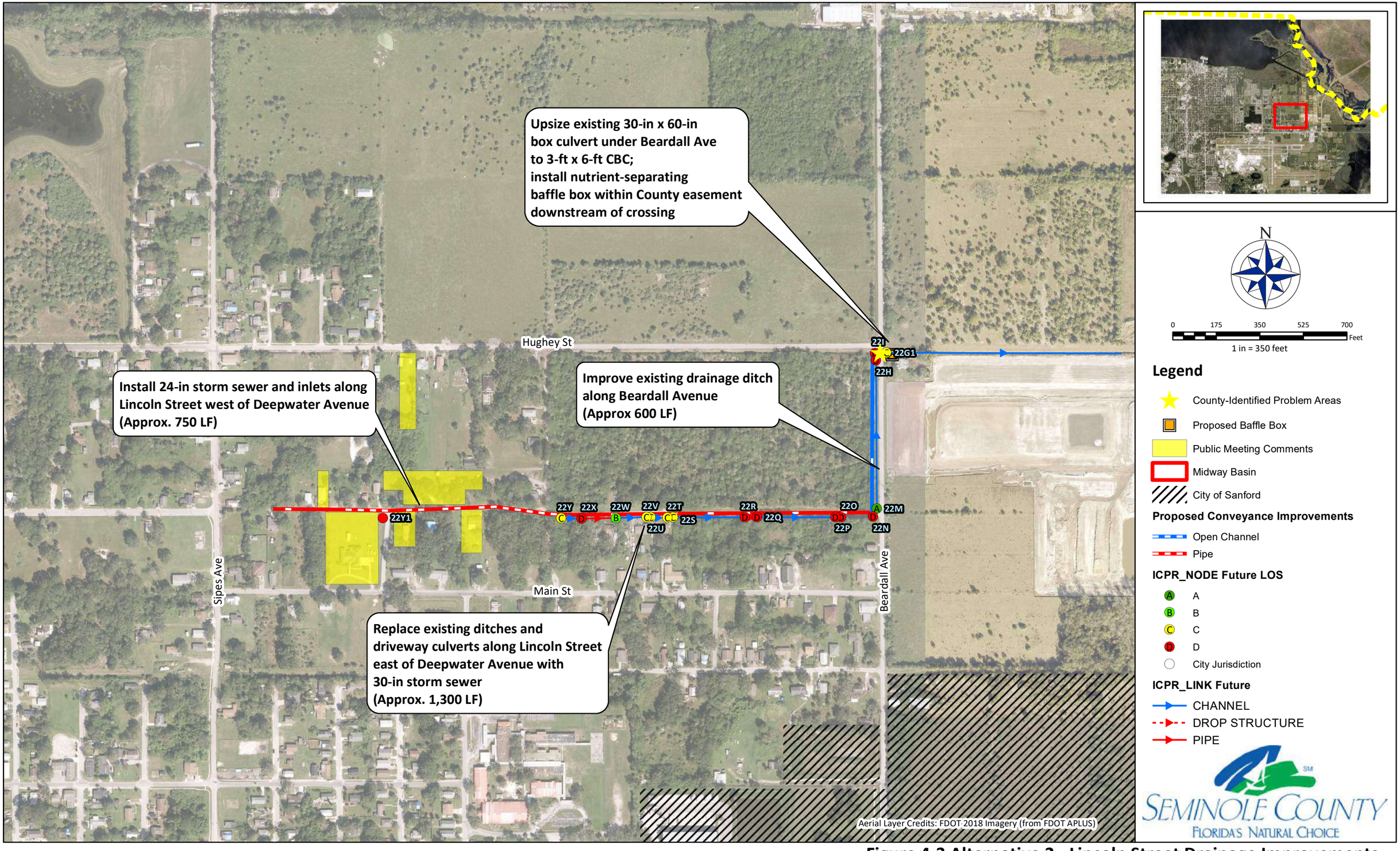
Node ID	Location
22Y1	Lincoln Street at Diesel Lane
22X	Lincoln Street (1)
22R	Lincoln Street (7)
22Q	Lincoln Street (8)
22P	Lincoln Street (9)

Node ID	Location
22O	Lincoln Street (10)
22N	Lincoln Street at Beardall Avenue (1)
22H	Beardall Avenue at Hughey Street (S)
22I	Hughey Street at Beardall Avenue (W)

As illustrated on Figure 4-3**,** CDM Smith identified several conceptual improvements for this problem area, including:

- Installation of drainage infrastructure along Lincoln Street west of Deepwater Avenue. This consists of approximately 750 LF of 24-inch storm sewer and accompanying inlets.
- Replacement of the existing drainage ditch along Lincoln Street east of Deepwater Avenue to Beardall Avenue. This includes approximately 1,300 LF of 30-inch storm sewer and accompanying inlets and structures.
- Excavation and improvements to approximately 600 LF of existing drainage ditch along Beardall Avenue between Lincoln Street and Hughey Street.
- Upsizing the existing Hughey Street outfall cross-drain under Beardall Avenue from 2.5-ft x 5-ft to a 3-ft x 6-ft concrete box culvert (CBC). The total length of this cross-drain is approximately 50 LF.
- To provide a water quality component for this conceptual alternative to improve permitability, CDM Smith proposes installing a nutrient-separating baffle box in the Hughey Street outfall immediately downstream of the proposed cross-drain.

Model results for the proposed Lincoln Street Drainage Improvements project are provided in **Table 4-7** for the LOS "D" nodes identified above. Several of the deficient model nodes listed above were removed from the model associated with the proposed enclosure of the existing Lincoln Street drainage ditch and driveway culverts west of Deepwater Avenue. Model results indicate that the proposed improvements can provide some significant reduction in flood stages along Lincoln Street, especially for smaller events. The western extent of Lincoln Street is expected to see a 4.2-ft reduction in flood stage for the mean annual, 24-hour design storm, and a 1.0-ft reduction in flood stage for the 10-year, 24-hour design storm. Model results also indicate that the existing culvert underneath Lincoln Street at its intersection with Beardall Avenue was significantly undersized, and that improving that culvert can decrease stages by nearly two feet for the 10-year storm. The realized benefits are more modest as the project reaches its downstream extent near the Hughey Street cross-drain under Beardall Avenue; at this location, flood control benefits are limited by conveyance constraints further downstream and permitting concerns associated with further increases in flows through the Hughey outfall.



CDM Smith

Figure 4-3 Alternative 2 - Lincoln Street Drainage Improvements
Midway Basin Engineering Study
Seminole County, Florida

Table 4-7 Alternative 2 Model Results

		Nodes (Upstream to Downstream)			
		22Y1	22Y	22N	22I
24 Hour Design Events Results:	Mean Annual Build-Out Stage (ft-NAVD)	25.9	23.2	20.1	17.8
	Mean Annual Reduction (ft)	4.2	3.1	2.0	0.0
	10-Year Build-Out Stage (ft-NAVD)	26.0	24.0	21.6	18.8
	10-Year Reduction (ft)	1.0	0.8	1.9	0.0
	25-Year Build-Out Stage (ft-NAVD)	26.1	24.1	21.8	19.6
	25-Year Reduction (ft)	0.9	0.9	0.9	0.0
	50-Year Build-Out Stage (ft-NAVD)	26.1	24.2	22.0	20.3
	50-Year Reduction (ft)	0.8	1.0	0.4	0.0
	100-Year Build-Out Stage (ft-NAVD)	26.1	24.2	22.1	20.5
	100-Year Reduction (ft)	0.7	1.0	0.2	0.0

Table 4-8 shows the modeled LOS improvement at deficient nodes within the project area. Node 22Y1 at the far upstream end is expected to improve from a "D" to a "B" for its target 10-year/24-hour design storm, and the culvert at Beardall Avenue and Lincoln Street (node 22N) is expected to improve from a "D" to an "A". Nodes closer to the Hughey outfall (22I) are not expected to see an improvement to their LOS due to the limitations described above.

Table 4-8 Alternative 2 LOS Analysis

Node ID	Location	Design Storm	Reduction (ft)	Existing LOS	Proposed LOS
22Y1	Lincoln Street at Diesel Lane	10Y24H	1.0	D	B
22Y	Lincoln Street at Deepwater Avenue	10Y24H	0.8	C	B
22N	Lincoln Street at Beardall Avenue	10Y24H	1.9	D	A
22I	Hughey Street at Beardall Avenue	25Y24H	0.0	D	D

The opinion of conceptual capital cost for the proposed improvements is approximately $1.2 million. More details regarding the cost estimate can be found in **Table F-3** in **Appendix F**.

4.1.4 Alternative 3 – Beardall Avenue Drainage Improvements

CDM Smith investigated the Beardall Avenue drainage system from the CSX Ditch north to Celery Avenue for potential improvements based on field reconnaissance and model results. It was observed during field reconnaissance that the CSX Ditch lacks a positive outfall to the north to Lake Monroe due to small pipe sizes and negative grading of the Beardall Avenue drainage pipes and ditches. Furthermore, it was determined that the drainage systems on the north end of Beardall Avenue and at Celery Avenue drain east to an unmaintained outfall that lies on private property.

Existing conditions model results verify LOS deficiencies on the CSX Ditch and at Beardall Avenue at the CSX Ditch, and on Celery Avenue east of Beardall Avenue at the cross-drain serving the private outfall. Under the build-out condition, planned stormwater infrastructure, including new storage elements in areas around Beardall Avenue and Celery Avenue, are expected to improve the level-of-service at Celery Avenue. Therefore, the remaining points of flooding concern in the build-out condition are concentrated in the area of the CSX Ditch.

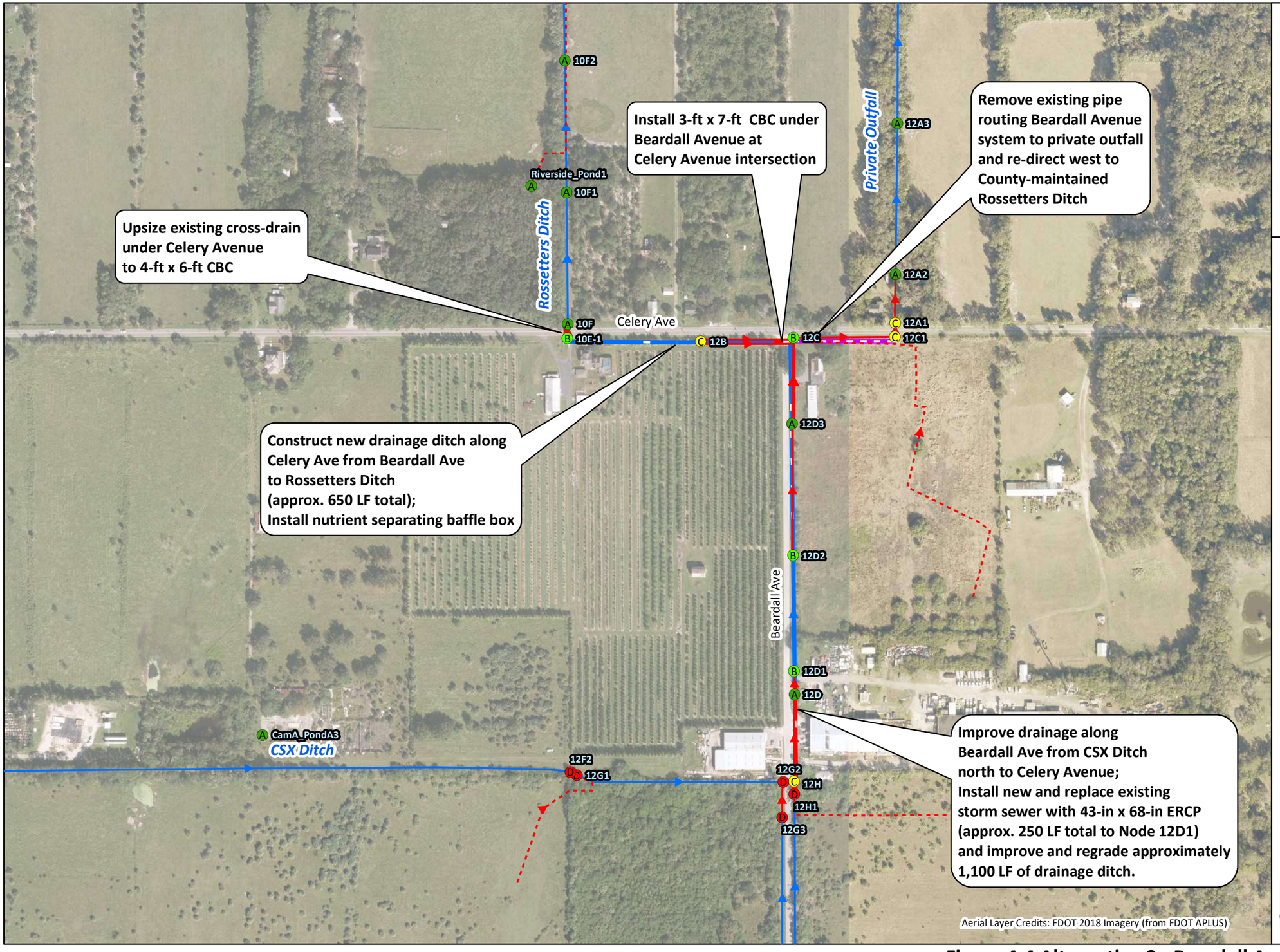
Nodes identified with a "D" LOS designation in the build-out condition in this project area are listed in **Table 4-9** and are shown in **Figure 4-4**.

Table 4-9 Alternative 3 – LOS "D" Nodes in Project Area

Node ID	Location
12F2	CSX Culvert (W)
12G1	CSX Culvert (E)
12G3	Beardall Avenue at Future Warehouse (S)
12G2	CSX Ditch at Beardall
12H1	Beardall Avenue at Cameron Heights D (S)

As illustrated on Figure 4-4**,** CDM Smith identified several conceptual improvements for this problem area, including:

- Replacement and/or improvement of the existing drainage infrastructure along Beardall Avenue, in order to provide a positive outfall for the CSX Ditch to the north. The includes approximately 250 LF of 43-inch by 68-inch elliptical reinforced concrete pipe (ERCP) and accompanying inlets and structures running north from the CSX Ditch cross-drain under Beardall Avenue. North of this pipe section, excavation and improvements to existing drainage ditches are proposed for approximately another 1,100 LF north to the Celery Avenue.
- Removal of the existing culverts along Celery Avenue east of Beardall Avenue to reduce flow to the private outfall.
- Rerouting of the drainage at Beardall Avenue and Celery Avenue to the west to the County-maintained Rosseters Ditch, to an outfall into Lake Monroe. This includes approximately 60-LF of 3-foot by 7-foot CBC cross-drain under Beardall Avenue, 650 LF of new drainage ditch along Celery Avenue running west from Beardall Avenue to the Rosseters Ditch cross-drain, and replacing the existing Rosseters Ditch cross-drain with approximately 45 LF of 4-foot x 6-foot CBC.
- To provide a water quality component for this conceptual alternative to improve permitability, CDM Smith proposes installing a nutrient-separating baffle box on Celery Avenue immediately upstream of the proposed Rosseters Ditch cross-drain.



N

0 150 300 450 600 Feet

1 in = 300 feet

Legend

- Public Meeting Comments
- Midway Basin
- City of Sanford

Proposed Conveyance Improvements

- Open Channel
- Pipe
- Pipe to be Removed

ICPR_NODE Future LOS

- A
- B
- C
- D
- City Jurisdiction

ICPR_LINK Future

- CHANNEL
- DROP STRUCTURE
- PIPE

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Figure 4-4 Alternative 3 - Beardall Avenue Drainage Improvements
Midway Basin Engineering Study
Seminole County, Florida

Model results for the proposed Beardall Avenue Drainage Improvements project are provided in **Table 4-10** for the LOS "D" nodes identified above. Model results indicate that the greatest benefit this project will provide will be for smaller storms like the mean annual event, where the provision of a continuous positive outfall to the north in stage reductions of around two feet near the Beardall Avenue crossing of the CSX Ditch, and up to a 0.9-ft reduction in the CSX Ditch itself further to the west. This should reduce the occurrence of nuisance flooding in the area. More modest benefits are observed for the 10-year event and larger, as the long distances from the CSX Ditch to the proposed outfall to the north limit the conveyance capacities that can be feasibly provided within the available right-of-way along Beardall Avenue. At the CSX Ditch cross-drain, stage reductions of 0.8-ft and 0.6-ft are observed for the 10-year and 25-year/24-hour design storms, respectively. Further upstream in the CSX Ditch, and further south along Beardall Avenue, these reductions are less than 0.3-ft; further evaluation of potential improvements to the CSX Ditch itself and local drainage along Beardall Avenue may be warranted to provide additional benefit in this project area.

Table 4-11 shows the modeled LOS improvement at deficient nodes within the project area. Nodes near the CSX Ditch cross-drain (12G3 and 12G2) are expected to improve from a "D" to a "B" for their respective target design storms. Nodes further west in the CSX Ditch (12F2, 12G1) and further south of the CSX Ditch cross-drain along Beardall Avenue (12H1) are not expected to see an improvement to their LOS due to the limitations described above.

Table 4-10 Alternative 3 Model Results

		Nodes (Upstream to Downstream)				
		12F2	12G1	12G3	12G2	12H1
24 Hour Design Events Results:	Mean Annual Build-Out Stage (ft-NAVD)	17.8	17.8	17.7	17.7	17.8
	Mean Annual Reduction (ft)	0.8	0.9	2.1	2.1	2.0
	10-Year Build-Out Stage (ft-NAVD)	18.4	18.4	17.9	17.9	18.2
	10-Year Reduction (ft)	0.3	0.3	0.8	0.9	0.1
	25-Year Build-Out Stage (ft-NAVD)	18.5	18.5	18.1	17.9	18.3
	25-Year Reduction (ft)	0.2	0.3	0.6	0.6	0.1
	50-Year Build-Out Stage (ft-NAVD)	18.6	18.6	18.1	18.0	18.3
	50-Year Reduction (ft)	0.2	0.4	0.2	0.4	0.0
	100-Year Build-Out Stage (ft-NAVD)	18.7	18.7	18.4	18.2	18.4
	100-Year Reduction (ft)	0.1	0.2	0.3	0.4	0.1

Table 4-11 Alternative 3 LOS Analysis

Node ID	Location	Design Storm	Reduction (ft)	Existing LOS	Proposed LOS
12F2	CSX Culvert (W)	25Y24H	0.2	D	D
12G1	CSX Culvert (E)	25Y24H	0.3	D	D
12G3	Beardall Avenue at Future Warehouse (S)	10Y24H	0.8	D	B
12G2	CSX Ditch at Beardall	25Y24H	0.6	D	B
12H1	Beardall Avenue at Cameron Heights D (S)	10Y24H	0.1	D	D

The opinion of conceptual capital cost for the proposed improvements is approximately $1.4 million. More details regarding the cost estimate can be found in **Table F-4** in **Appendix F**.

4.1.5 Alternative 4 – 21st Street Treatment Facility

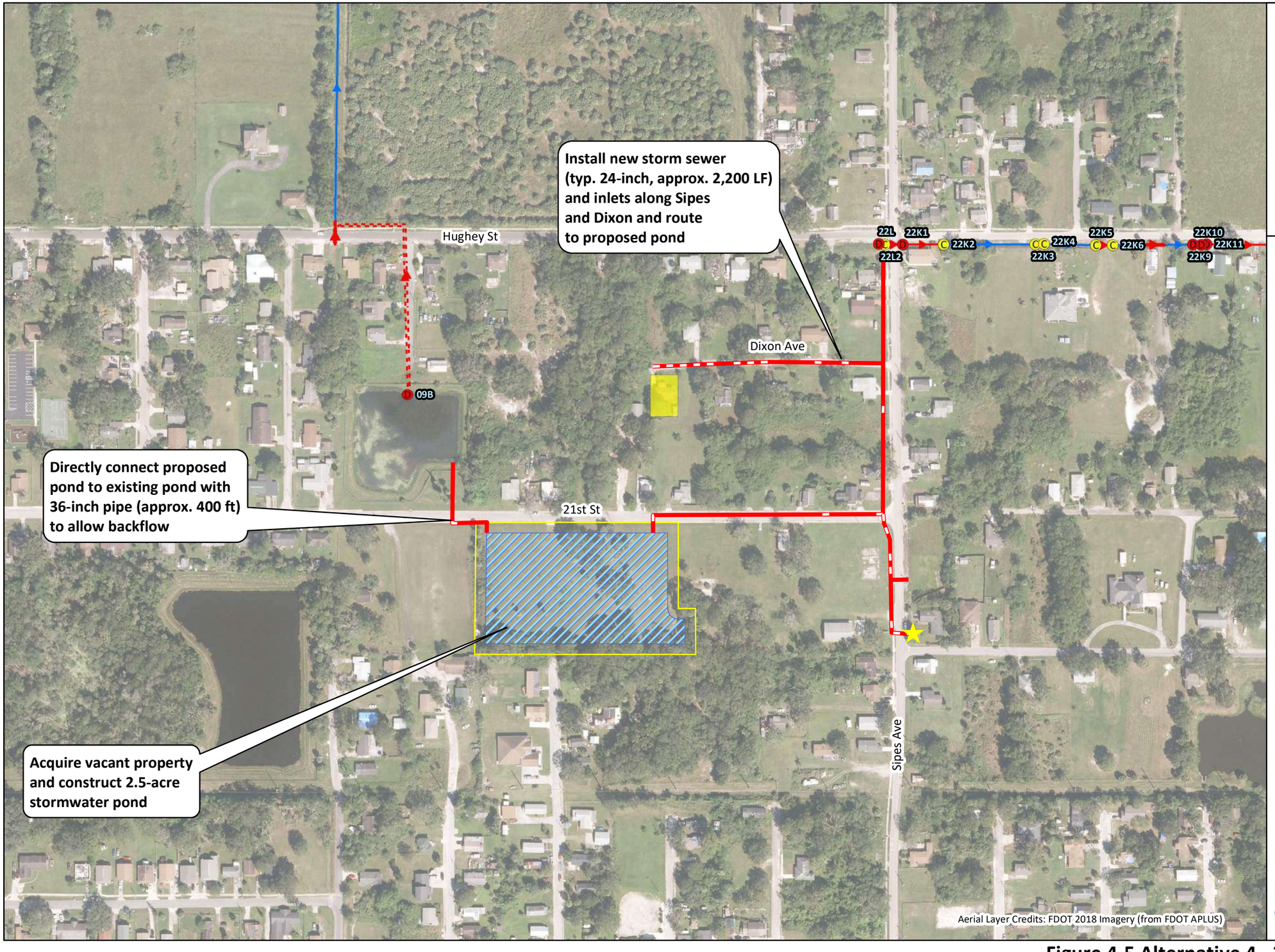
The area around the intersection of 21st Street and Sipes Avenue was identified as a problem area through a combination of resident complaints, County staff knowledge, and model results. A resident at the west end of Dixon Avenue reported flooding; review of this area indicates a lack of stormwater infrastructure on Dixon Avenue. County staff reported frequent nuisance flooding near the corner of Sipes Avenue and Main Street.

Existing condition modeling identified several potential LOS deficiencies in this area. The existing wet pond on 21st Street east of Ruff Road was assigned a "D" LOS; field reconnaissance performed in July 2019 indicated that the water level in this pond was elevated and encroaching into adjacent properties. Additionally, model results indicate that the Hughey Street ditch at Sipes Avenue is undersized and was assigned an LOS of "D". Negligible differences in flood stages between existing and build-out conditions were noted in this area of the Midway Basin

Nodes identified with a "D" LOS designation in the build-out condition in this project area are listed in **Table 4-12** and are shown in **Figure 4-5**.

Table 4-12 Alternative 4 – LOS "D" Nodes in Project Area

Node ID	Location
09B	Pond at Jack Court
22L	20th Street at Sipes Avenue (1)
22K1	Hughey at Sipes Avenue
22K9	Hughey Street Driveway D (W)
22K10	Hughey Street Driveway D (E)
22K11	Hughey Street Driveway E (W)



N

0 110 220 330 440 Feet

1 in = 230 feet

Legend

- County-Identified Problem Areas
- Proposed Baffle Box
- Proposed Pipe
- Proposed Pond
- Parcel to be Acquired
- Public Meeting Comments
- Midway Basin
- City of Sanford

ICPR_NODE Future LOS

- A
- B
- C
- D
- City Jurisdiction

ICPR_LINK Future

- CHANNEL
- DROP STRUCTURE
- PIPE

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Figure 4-5 Alternative 4 - 21st Street Treatment Facility
Midway Basin Engineering Study
Seminole County, Florida

To address these LOS deficiencies, CDM Smith developed a conceptual alternative that expands the available storage in this area through acquisition of vacant, undeveloped private property and construction of a new wet pond. New local drainage systems would be routed to this pond, thus removing some drainage area from the Hughey Street outfall. As illustrated on Figure 4-5**,** CDM Smith identified several conceptual improvements for this problem area, including:

- Acquisition of a vacant, undeveloped private property on 21st Street across from the existing 21st Street pond and construction of a new approximately 2.5-acre treatment facility. This facility is expected to provide water quality benefits in additional to improvement in flood control LOS.
- Direct hydraulic connection from the new pond to the existing 21st Street pond by way of approximately 400-ft of 36-inch pipe. This pond will continue to outfall to the north through the IFAS Midway Treatment Facility.
- Construction of new drainage infrastructure (approx. 2,200 LF of 24-in RCP storm sewer) along Dixon Street and replacement of existing drainage along Sipes Avenue and 21st Street to discharge into the proposed pond.

Model results for the proposed 21st Street Treatment Facility project are provided in **Table 4-13** for the LOS "D" nodes identified above. Model results indicate that the proposed project can provide significant reduction in flood stages at the upstream end of the Hughey Street ditch for up to the 25-year event. At the upstream side of the Hughey Street cross-drain under Sipes Avenue, peak stages are reduced by 2.7-ft for the mean annual-24-hour design storm to 1.6-ft for the 25-year/24-hour design storm. The reduction in discharge to the Hughey Street outfall is also expected to provide benefit further downstream in the system, lowering flood stages at several deficient driveway culverts along the ditch without requiring direct replacement or modification of the culverts. At these driveway culverts, peak stage reductions ranging from 0.5 to 0.8 feet were observed for the mean annual through 25-year/24-hour events. At the existing pond at Jack Court, modest reductions in flood stage were noted, up to 0.4-ft for the 10-year/24-hour event. The reductions are limited as the benefits that would be expected through the addition of new, directly-connected storage are partially offset by the increased drainage area to the combined ponds.

Table 4-14 shows the modeled LOS improvement at deficient nodes within the project area. Nodes near the Hughey Street cross-drain under Sipes Avenue (22L and 22K1) are expected to improve from a "D" to a "B" for their target 25-year/24-hour design storm. LOS improvements are noted further downstream in the Hughey Street ditch, with node 22K9 improving from a "D" to a "C" and nodes 22K10 and 22K11 improving from a "D" to a "B". Given the limitations described above, the LOS improvement achieved at the pond at Jack Court (09B) is from a "D" to a "C".

Table 4-13 Alternative 4 Model Results

		Nodes (Upstream to Downstream)					
		09B	22L	22K1	22K9	22K10	22K11
24 Hour Design Events Results:	Mean Annual Build-Out Stage (ft-NAVD)	24.4	24.0	22.8	22.1	21.8	21.8
	Mean Annual Reduction (ft)	0.1	2.7	1.5	0.9	0.8	0.8
	10-Year Build-Out Stage (ft-NAVD)	25.3	24.8	24.1	23.5	23.3	23.3
	10-Year Reduction (ft)	0.4	2.0	1.3	0.7	0.8	0.8
	25-Year Build-Out Stage (ft-NAVD)	25.4	24.9	24.6	23.7	23.7	23.7
	25-Year Reduction (ft)	0.2	1.6	1.2	0.5	0.8	0.8
	50-Year Build-Out Stage (ft-NAVD)	25.5	25.0	24.9	24.1	24.1	24.1
	50-Year Reduction (ft)	0.1	0.4	1.0	0.6	0.8	0.8
	100-Year Build-Out Stage (ft-NAVD)	25.6	25.1	25.1	24.3	24.3	24.3
	100-Year Reduction (ft)	0.2	0.1	0.2	0.3	0.3	0.3

Table 4-14 Alternative 4 LOS Analysis

Node ID	Location	Design Storm	Reduction (ft)	Existing LOS	Proposed LOS
09B	Pond at Jack Court	10Y24H	0.4	D	C
22L	20th Street at Sipes Avenue (1)	25Y24H	1.6	D	B
22K1	Hughey at Sipes Avenue	25Y24H	1.2	D	B
22K9	Hughey Street Driveway D (W)	25Y24H	0.5	D	C
22K10	Hughey Street Driveway D (E)	25Y24H	0.6	D	B
22K11	Hughey Street Driveway E (W)	25Y24H	0.6	D	B

The opinion of conceptual capital cost for the proposed improvements is approximately $2.0 million. More details regarding the cost estimate can be found in **Table F-5** in **Appendix F**.

4.1.6 Alternative 5 – Washington Street Outfall Improvements

The Washington Street outfall consists of a large stretch of 72-inch pipe which flows east from the existing pond at the corner of Jitway and Washington Street to the crossing under Beardall Avenue. East of Beardall Avenue, the outfall is ditched, with another 72-inch cross-drain under Cameron Avenue. The outfall continues east under East Lake Mary Boulevard and discharges into the St. Johns River.

At the June 2019 public meeting, CDM Smith received a cluster of resident flooding complaints in the vicinity of Washington Street and Beardall Avenue, with several on Washington Street itself and others on nearby streets which drain towards the Washington Street outfall. Existing condition model results appear to verify potential issues with the capacity of this outfall, as the

cross-drains at both Beardall Avenue and Cameron Avenue received a "D" LOS designation. Furthermore, model results also indicate that flood stages in the Washington Street outfall are expected to increase between the existing and build-out conditions as a result of proposed land use changes and planned stormwater infrastructure.

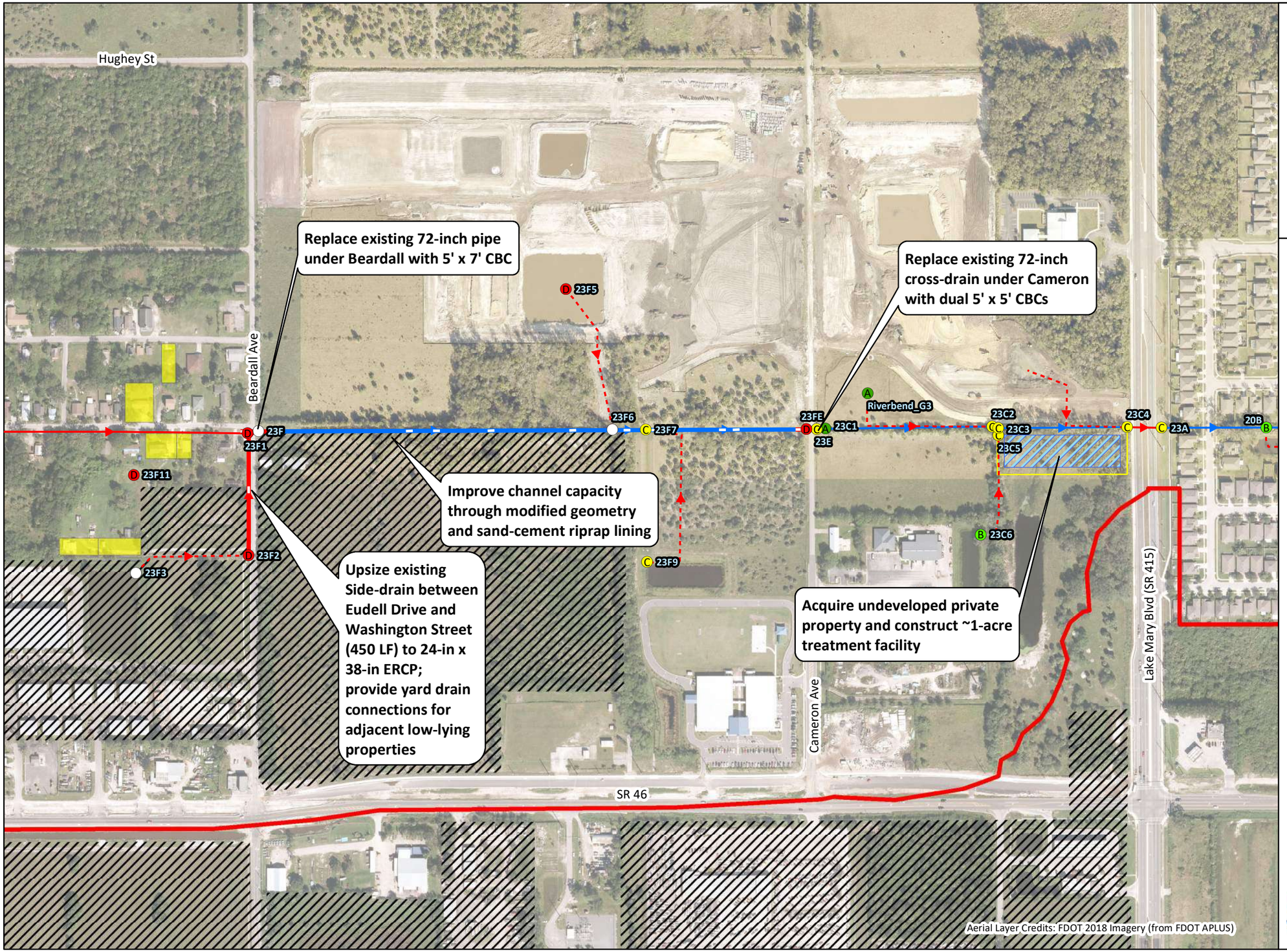
Nodes identified with a "D" LOS designation in the build-out condition in this project area are listed in **Table 4-15** and are shown in **Figure 4-6**.

Table 4-15 Alternative 5 – LOS "D" Nodes in Project Area

Node ID	Location
23F11	Property South of Washington, North of Eudell Drive
23F2	Beardall Avenue at Eudell Drive
23F1	Beardall Avenue at Washington Street
23F5	Riverbend Pond D
23FE	Washington Street at Cameron Avenue (W)

To improve LOS along the outfall, CDM Smith proposes a series of conveyance and storage improvements. The improvements are illustrated in Figure 4-6 and include:

- Upsizing of the existing 18-in side drain along Beardall Avenue from Eudell Drive to the Washington Street outfall to 24-in x 38-in ERCP, and provide a 12-in yard drain connection for low-lying areas at the southeast corner of Beardall Avenue and Washington Street to drain into the upgraded side-drain system.
- Upsizing of the existing 72-in cross-drain under Beardall Avenue with a 5-ft x 7-ft CBC.
- Modifications of the open channel portion of the Washington Street outfall between Beardall Avenue and Cameron Avenue. This includes reshaping the channel with steeper side slopes and articulated concrete block revetment channel lining to improve conveyance capacity within the available space.
- Upsizing of the existing 72-in cross-drain under Cameron Avenue with dual 5-ft x 5-ft CBCs.
- Acquisition of a vacant, undeveloped parcel just west of SR 415 and construction of a 1-acre treatment facility to attenuate upstream flows and pollutant loads. This parcel is designated as part of a planned unit development but to date no development plans have been located that indicate any plans to develop the parcel.



N

0 175 350 525 700 Feet

1 in = 350 feet

Legend

- Parcel to be Acquired
- Proposed Pond
- Public Meeting Comments
- Midway Basin
- City of Sanford

Proposed Conveyance Improvements

- Open Channel
- Pipe

ICPR_NODE Future LOS

- A
- B
- C
- D
- City Jurisdiction

ICPR_LINK Future

- CHANNEL
- DROP STRUCTURE
- PIPE

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Figure 4-6 Alternative 5 - Washington Street Outfall Improvements
Midway Basin Engineering Study
Seminole County, Florida

Model results for the proposed Washington Street Outfall Improvements project are provided in **Table 4-16** for the LOS "D" nodes identified above. Model results indicate that the proposed improvements can provide significant reduction in flood stages around the Beardall Avenue cross-drain, especially for smaller events. At the Beardall Avenue cross-drain, a reduction in peak stage of 1.7-ft is modeled for the mean annual/24-hour design storm, and 1.2-ft of reduction is expected for the 25-year/24-hour design storm. The benefits extend south to Eudell Drive, where reductions of 1.7-ft and 0.9-ft are modeled for the mean annual and 10-year/24-hour design storms, respectively. For Node 23F11, which represents a closed, private property with no identified positive drainage to a County-maintained system, the ability to connect to the County system is not expected to provide significant reduction in peak stages, but will significantly reduce duration of inundation.

Further downstream, the improvements are expected to provide benefit for the Riverbend Pond D which will discharge to the Washington Street Outfall, as well as the cross-drain under Cameron Avenue. A reduction of 1.0-ft is modeled for Riverbend Pond D for the 10-year/24-hour design storm, while a 1.0-ft reduction is modeled at the Cameron Avenue cross-drain for the 25-year/24-hour cross-drain.

Table 4-17 shows the modeled LOS improvement at deficient nodes within the project area. Node 23F1 at the Beardall Avenue cross-drain (23F1) is expected to improve from a "D" to an "A" and the side-drain at Eudell Drive (23F2) is expected to improve from a "D" to a "B". Node 23F11 does not improve from its "D" classification based on flood stage, but as noted above should be significant benefit in the reduction of flood duration. The Riverbend Pond D (23F5) is also expected to improve from a "D" to an "A". While seeing a significant reduction in flood stage for its target 25-year/24-hour design storm, not enough of a reduction is expected to improve the build-out LOS classification for the Cameron Avenue cross-drain (23FE).

Table 4-16 Alternative 5 Model Results

		Nodes (Upstream to Downstream)				
		23F11	23F2	23F1	23F5	23FE
24 Hour Design Events Results:	Mean Annual Build-Out Stage (ft-NAVD)	22.0	22.2	20.3	18.2	19.2
	Mean Annual Reduction (ft)	0.2	1.7	1.7	0.6	1.2
	10-Year Build-Out Stage (ft-NAVD)	22.2	22.8	21.7	20.3	20.4
	10-Year Reduction (ft)	0.1	0.9	1.4	1.0	0.8
	25-Year Build-Out Stage (ft-NAVD)	22.2	22.9	21.9	20.6	20.6
	25-Year Reduction (ft)	0.1	0.5	1.2	0.8	1.0
	50-Year Build-Out Stage (ft-NAVD)	22.3	22.9	22.0	20.8	20.7
	50-Year Reduction (ft)	0.1	0.2	1.0	0.7	0.8
	100-Year Build-Out Stage (ft-NAVD)	22.3	23.0	22.2	21.1	20.8
	100-Year Reduction (ft)	0.1	0.2	0.8	0.6	0.5

Table 4-17 Alternative 5 LOS Analysis

Node ID	Location	Design Storm	Reduction (ft)	Existing LOS	Proposed LOS
23F11	Property South of Washington, North of Eudell Drive	25Y24H	0.1	D	D
23F2	Beardall Avenue at Eudell Drive	10Y24H	0.9	D	B
23F1	Beardall Avenue at Washington Street	25Y24H	1.2	D	A
23F5	Riverbend Pond D	10Y24H	1.0	D	A
23FE	Washington Street at Cameron Avenue (W)	25Y24H	1.0	D	D

The opinion of conceptual capital cost for the proposed improvements is approximately $1.4 million. More details regarding the cost estimate can be found in **Table F-6** in **Appendix F**.

4.2 Water Quality Benefits

As part of the assessment, CDM Smith evaluated BMP alternatives with the objective of reducing pollutant loads to Lake Monroe. Lake Monroe was identified as impaired for nutrients and dissolved oxygen in October 2009. A TMDL has been established for Lake Monroe and St. Johns River above Lake Monroe (WBID 2893D + 2893E) for both total nitrogen (TN) and total phosphorus (TP) at 4,171,255 lbs/yr and 315,512 lbs/yr, respectively. The two primary pollutant reducing technologies employed in the alternatives are the use of a biosorption activated media (BAM) upflow filter within a baffle box and excavation of new or expanded wet detention ponds.

Wet ponds, or wet detention facilities, are the most commonly applied stormwater management techniques throughout the State of Florida, particularly in areas with high groundwater tables. The SJRWMD defines a wet detention system as, “The collection and temporary storage of stormwater in a permanently wet impoundment in such a manner as to provide for treatment through physical, chemical, and biological processes with subsequent gradual release of the stormwater” (SJRWMD, 2006). Wet ponds are designed to include a permanent pool of water for water quality benefits. These permanently wet ponds are also designed to slowly release collected runoff through an outlet structure. Pollutant removal processes in wet detention systems occur through a variety of mechanisms, including physical processes such as sedimentation, chemical processes such as precipitation and adsorption, and biological uptake from algae, bacteria, and rooted vegetation. These systems operate like a natural lake system.

According to the 2010 Florida Baffle Box Monitoring Study by FDEP (FDEP 2010), a baffle box is a structural stormwater treatment device that contains a series of settling chambers separated by baffles as shown on **Figure 4-7**. The unit processes utilized are screening and sedimentation. In Florida, baffle boxes are commonly used in retrofit scenarios where typical new development BMPs cannot be employed. A baffle box can be used with single or multiple inflow pipes as well as in offline or online designs. Pollutant removal within baffle boxes can be improved by including a BAM up-flow filter at the downstream end. BAM is a functionalized soil amendment that is designed to mimic natural physicochemical and biogeochemical processes which facilitates and enhances nutrient removal (O’Reilly, 2012). It is designed to function by combined sorption and biodegradation processes and is “activated” by microorganisms under wet conditions. The BAM media is designed to achieve enhanced nutrient removal while maintaining flood control

requirements. Typical BAM aggregate includes tire crumb, expanded clay, and existing soil. For baffle boxes with media filtration applications, the increase in head needed to convey flows across the filter should be considered in design.

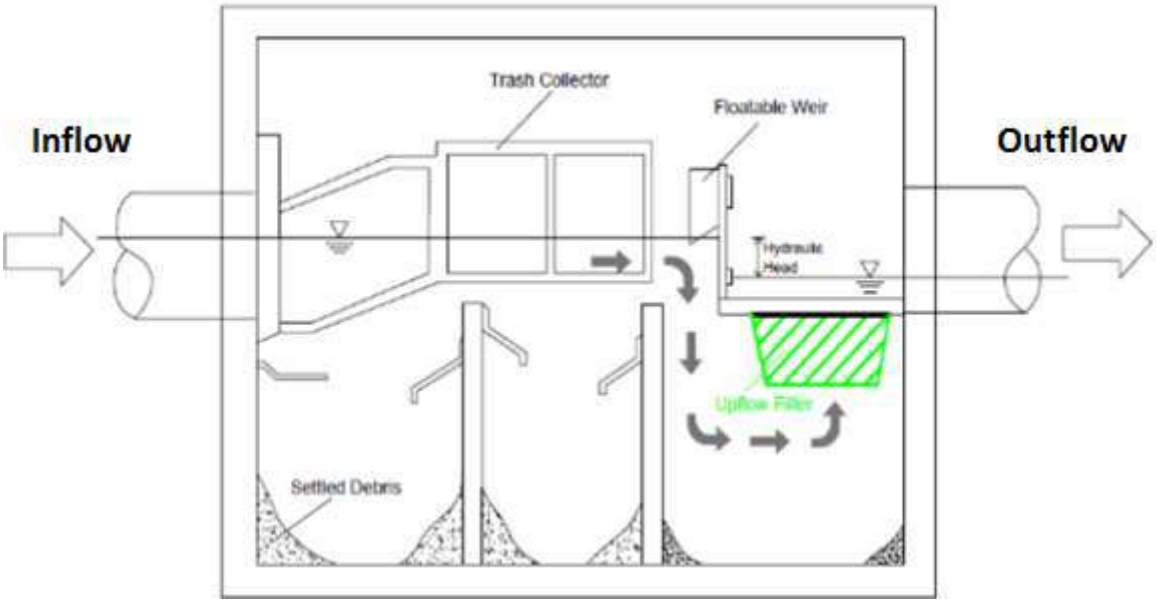


Figure 4-7 Baffle Box with Sorption Media Upflow Filter (UCF 2014)

To evaluate the benefits provided by the recommended BMPs, the pollutant load reduction was estimated and quantified by CDM Smith for the four alternatives with a water quality benefit. CDM Smith used the BMPTRAINS Model (Version 8.6) developed by the Stormwater Management Academy at the University of Central Florida. The tool is a Microsoft® Excel spreadsheet model that is used to evaluate stormwater runoff nutrient loads as well as treatment efficiencies of BMPs based on the findings of studies conducted in recent years within the State of Florida.

The calculations in the BMPTRAINS model consist of two major parts. The first part estimates annual pollutant loads. The model first estimates annual runoff volumes, which are computed based on the project meteorological zone location, watershed area, mean annual rainfall depth, non-DCIA Curve Number, and DCIA percentage input. In the watershed characteristics, the user is allowed to set catchment configurations to assign portions of the subbasin to a BMP, based on the proposed BMP configuration. The annual nitrogen and phosphorus loadings are then calculated based on the annual runoff volumes and EMCs for the pre- and post-development conditions. The second part the BMPTRAINS tool analyzes individual or multiple BMPs to evaluate their effectiveness in the defined watershed. Several of the methodologies for the calculation of the nitrogen and phosphorus removal efficiency are consistent with those documented in the "Evaluation of Current Stormwater Design Criteria within the State of Florida" (Harper, 2007), including retention systems and wet detention systems.

The effectiveness assessment of wet detention systems in the model is based on the residence time efficiency equations published by Harvey Harper in 2007. Wet detention residence times were calculated by the following equation:

$$Residence\ Time\ (days) = \frac{PPV}{RO} \times \frac{365\ days}{year}$$

where:

PPV = permanent pool volume (ac-ft)
RO = annual runoff input (ac-ft/yr)

Permanent pool volume was calculated by adding the existing wet detention pond's permanent pool to the additional permanent pool volume proposed in the alternative. The annual runoff to the pond is calculated by BMPTRAINS using the mean annual rainfall depth (52 inches), non-DCIA Curve Number, and DCIA percentage. The additional volume increased the residence time of Alternative 1 by four days and by 20 days for Alternative 4.

The BAM removal efficiency values are empirically derived and are pre-defined based on published studies. Each BAM application has an associated study, and all sources are provided within the BMPTRAINS tool. Media mixes and their removal rates are predefined in BMPTRAINS. The media mix used in the baffle box is B&G ECT (Expanded Clay, Tire Chips). **Table 4-18** summarizes the performance measures for BMPs selected for the proposed alternatives.

Table 4-18 BMPTRAINS Removal Efficiency for Selected BMPs

Alternative	Water Quality Benefit Description	Average Retention Depth (Inch) or Residence time (days) [2]	Contributing Area (acres)	TN Removal	TN Removal Efficiency	TP Removal	TP Removal Efficiency
1	Expand existing wet detention pond	8 days	105.5	59 lb/yr[1]	8%[1]	6 lb/yr[1]	5%[1]
2	Baffle box with BAM upflow filter	0.5 inch	72.8	208 lb/yr	36%	39 lb/yr	43%
3	Baffle box with BAM upflow filter	0.5 inch	150.7	427 lb/yr	34%	85 lb/yr	40%
4	Expand existing wet detention pond	33 days	34.2	19 lb/yr[1]	6%[1]	3 lb/yr[1]	7%[1]

1 Both wet detention pond alternatives increase the treatment volume capacity of an existing wet detention pond; Therefore, the nutrient removal amounts and percentages are the net improvement in reduction performance to the existing system.
2 Retention depths for upflow filters have been assumed as 0.5 inches. Design of diversion weir to upflow filter not included in this analysis. Residence times calculated assumes there are no modifications to the existing wet pond's control structure.

Based on the results, Alternative 2 demonstrates the greatest percentages of TN and TP removal (36% and 43%, respectively), but due to the greater contributing area Alternative 3 shows the greatest total removal of TN (427 lbs/year) and TP (85 lbs/year). Alternatives 2 and 3 show considerably greater TN and TP removal amounts because the stormwater runoff within these basins is currently untreated; while Alternative 1 and Alternative 4 provide additional treatment to systems already receiving pollutant removal by wet detention facilities; The increase in residence time for these ponds does not provide a significant improvement to the pollutant removal already occurring.

The BMPTRAINS summary worksheets for each of the proposed projects have been included in **Appendix G**.

It is important to note that BMP performance may change upon additional analysis during design and implementation. Several factors including flow rates and hydraulic head losses must be considered to confirm BMP configuration and resulting treatment effectiveness.

4.3 Public and Stakeholder Feedback and Revised Alternatives Analysis

In September 2020, CDM Smith presented the alternatives outlined in Section 4.1 to the residents and representatives of the Midway Basin in a virtual public meeting. Viewers had the opportunity to review a video summarizing the project findings and review the Draft Report. There was significant feedback from residents, particularly in the Midway Community (around the locations of Alternatives 1, 2, and 4), regarding the recommendations that would require the acquisition of vacant private residential or commercial property in the community. Following the public meeting, CDM Smith met with members of the Seminole County Board of County Commissioners and community representatives to identify other potential alternatives than those previously recommended. CDM Smith performed a desktop review of available public lands and County ROW and developed preliminary revisions to Alternatives 1, 2, and 4 which reduced the need for private property acquisition and may be more acceptable to the public. These were presented to the Board of County Commissioners in November 2020. At the direction of the County, CDM Smith re-evaluated Alternatives 1, 2, and 4 to include proposed conditions modeling, cost estimates, and an updated ranking of projects and recommendations. Additionally, CDM Smith re-evaluated Alternative 3 to improve its flood control level of service performance.

4.3.1 Revised Alternative 1 – Midway Community Drainage Improvements

Alternative 1 was revised to reduce the need for acquisition of private property to expand the existing pond at Washington Street and Jitway Avenue. It was determined that the County owned two properties adjacent to the Childers Ditch dedicated for drainage purposes. Furthermore, at the request of County officials and staff, CDM Smith evaluated the possibility of using a portion of the old Midway Elementary School property for use as a stormwater facility. Additional value engineering of previous recommendations for upgrade of secondary drainage systems in the Midway Community was performed to reduce the overall costs of improvements.

As illustrated on **Figure 4-8,** CDM Smith developed a significantly revised set of improvements, to be implemented in four phases:

- Phase 1 would include the construction of a new 2.7-acre stormwater pond on the old Midway Elementary School property. The pond will be located on the eastern portion of the property in former play fields with minimal impact to the existing buildings on the property and will outfall to the Washington Street outfall. Also included in Phase 1 would be the construction of a new 36-inch RCP primary stormwater trunkline along Midway Avenue, which would collect and route runoff from the area west of the proposed pond to Sipes Avenue, south of Midway Avenue. Local drainage improvements discharging to the new trunkline are proposed on Jitway and Sipes Avenue to address modeled and reported local flooding concerns.

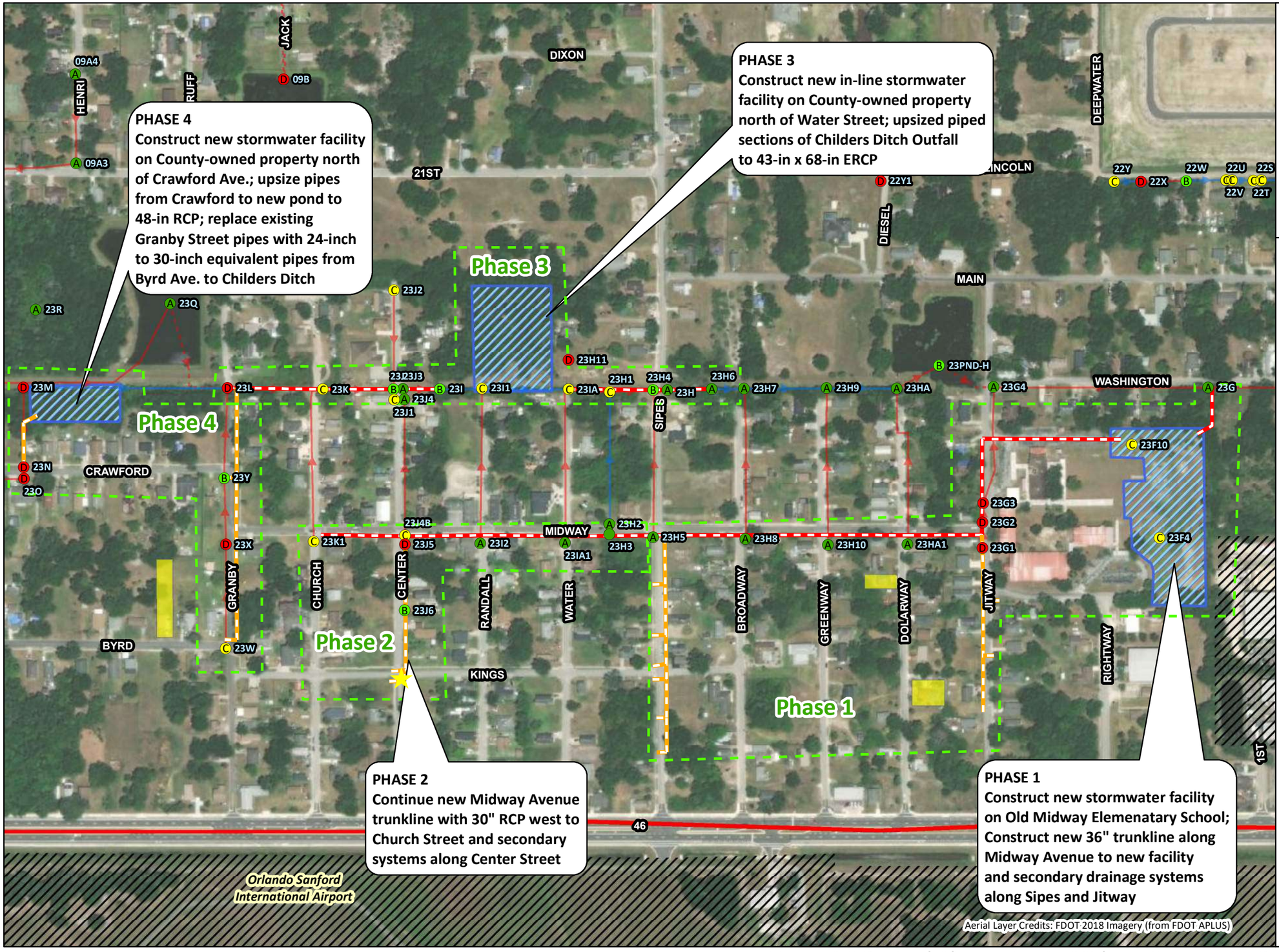


Figure 4-8 Revised Alternative 1 - Midway Community Drainage Improvement Program
Midway Basin Engineering Study
Seminole County, Florida

CDM Smith

- Phase 2 would extend the Midway Avenue trunkline west to Church Street with 30-inch RCP, along with local drainage improvement along Center Street south of Midway Avenue to address documented and modeled flooding concerns around Kings Road and Center Street.
- Phase 3 would include the construction of a new 1.8-acre in-line stormwater pond on County-owned property located northwest of the north end of Water Street. Improvements to the Childers Ditch are included in this phase through the upsizing of the existing piped sections of the outfall to 43-inch x 68-inch ERCP.
- Phase 4 would include the construction of a new 0.7-acre stormwater pond on County-owned property location north of Crawford Drive at the upstream end of the Childers Ditch. Also proposed in this phase are local drainage improvements at Crawford Drive to improve conveyance to the new pond, as well as local drainage improvements along Granby Street. It is recommended that a 15-foot drainage easement be acquired over the existing pipe from Crawford Drive to the Childers Ditch to facilitate construction and maintenance.

Table 4-19 shows the revised LOS analysis at deficient nodes within the project area. The revised Alternative 1 improvements are expected to provide significant flood control LOS improvements throughout the Midway Community. Compared to the original Alternative 1 results, the revised Alternative 1 provides a greater reduction in flood stages in the western extents of the Midway Community.

Table 4-19 Revised Alternative 1 LOS Analysis

Node ID	Location	Design Storm	Reduction (ft)	Existing LOS	Proposed LOS
23O	Crawford Avenue South	10Y24H	1.1	D	A
23N	Crawford Avenue North	10Y24H	1.2	D	B
23M	Childers Ditch at Crawford Avenue Outfall	25Y24H	0.3	D	D
23X	Granby Street at Midway Avenue	10Y24H	0.9	D	C
23L	Childers Ditch at Granby Street	25Y24H	0.3	D	D
23J5	Midway Avenue at Center Street (S)	10Y24H	2.3	D	A
23H11	Area North of Water Street at Washington Canal	10Y24H	1.0*	D	D
23G1	Midway Avenue Cross Drain at Jitway (S)	10Y24H	2.1	D	A
23G2	Midway Avenue Cross Drain at Jitway (N)	10Y24H	2.3	D	A
23G3	Jitway North of Midway Avenue	10Y24H	2.0	D	A

*Node orphaned in Alternatives model and reported as node 23IA

The total opinion of conceptual capital cost for the proposed improvements is approximately $6.0 million. More details regarding the cost estimate can be found in **Tables F-9** through **F-12** in **Appendix F**. The costs of the individual phases is broken out below:

- Phase 1: $2.7 million
- Phase 2: $0.6 million

- Phase 3: $2.0 million
- Phase 4: $0.7 million

4.3.2 Revised Alternative 2 – Lincoln Street and Hughey Street Outfall Drainage Improvements

Alternative 2 was significantly revised to remove the recommended acquisition of private property along Lincoln Street for stormwater treatment and instead provide lineal detention along the Hughey Street outfall, as well as propose private property acquisition further to the east to propose a regional floodplain compensation pond to attenuate flows from large storm events. The scope and conceptual cost estimate of the improvements for the revised Alternative 2 is considerably greater than the original alternative but are expected to provide greater regional flood control benefits.

As illustrated on **Figure 4-9,** CDM Smith developed an expanded set of recommendations for Alternative 2, to include:

- Installation of drainage infrastructure along Lincoln Street west of Deepwater Avenue. This consists of approximately 1,100 LF of 18-inch storm sewer and accompanying inlets. Given the very limited County ROW along Lincoln Street west of Deepwater Avenue, it is recommended to obtain a 15-foot drainage easement along the properties on the south side of the road from the western-most extent of the improvements to Deepwater Avenue.
- Replacement of the existing drainage ditch along Lincoln Street east of Deepwater Avenue to Beardall Avenue. This includes approximately 1,300 LF of 24-inch storm sewer and accompanying inlets and structures.
- Construction of a new 34-inch x 53-inch storm sewer along the east side of Beardall Avenue from Lincoln Street to the Hughey Street Outfall. The County has limited right of way along Beardall Avenue and it appears that the east side of Beardall has more room available for the construction of drainage improvements.
- Widening the open channel portion of the Hughey Street Outfall from Beardall Avenue to Cameron Avenue. Over the approximately 1,950 LF of the channel between their respective crossings, the County has considerable ROW of which much is used for an approximate 30-foot wide maintenance berm. CDM Smith proposes halving the width of the maintenance berm within the ROW to widen the channel by an average of 15-feet. This provides improved conveyance for flood control as well as lineal detention to attenuate flows.

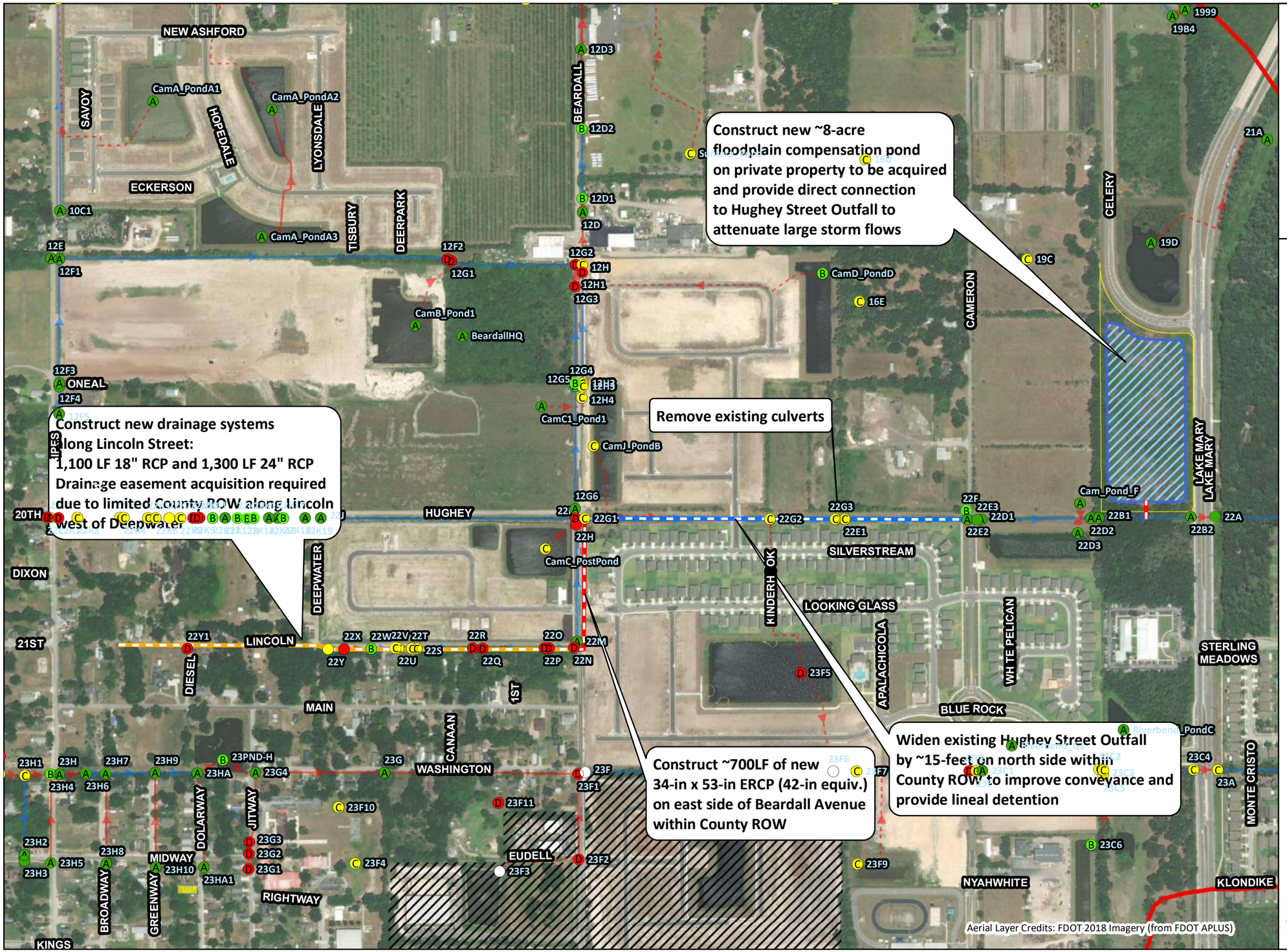


Figure 4-9 Revised Alternative 2 - Lincoln Street and Hughey Street Outfall Drainage Improvements
Midway Basin Engineering Study
Seminole County, Florida

CDM Smith

- Acquisition of private, undeveloped land on the north side of the Hughey Street outfall just upstream of the crossing under Lake Mary Boulevard, and construction of a floodplain compensation pond. This property is undeveloped and no development plans have been located for it to date. Due to anticipated groundwater conditions, the construction of a normal wet detention pond on this site appears infeasible, and CDM Smith recommends that a dry, shallow pond be constructed with a direct hydraulic connection to the Hughey Street outfall to allow for attenuation of high flows. Diversion of low flows into the pond does not appear to be hydraulically feasible and as such the proposed pond is not expected to provide significant water quality benefit. This can be offset through compensating treatment elsewhere (such as the IFAS-Midway Treatment Facility in the revised Alternative 4 below). If not already recorded, a drainage easement over the Hughey Street outfall adjacent to the proposed pond is also recommended.

Table 4-20 shows the revised LOS analysis at deficient nodes within the project area. The proposed improvements are expected to provide similar if not improved performance over the original Alternative 2 improvements, especially within the Hughey Street Outfall itself in the areas around the Beardall Avenue crossing.

Table 4-20 Alternative 2 LOS Analysis

Node ID	Location	Design Storm	Reduction (ft)	Existing LOS	Proposed LOS
22Y1	Lincoln Street at Diesel Lane	10Y24H	0.6	D	C
22Y	Lincoln Street at Deepwater Avenue	10Y24H	0.9	C	B
22N	Lincoln Street at Beardall Avenue	10Y24H	3.2	D	A
22I	Hughey Street at Beardall Avenue	25Y24H	1.5	D	A
22G1	Hughey Street at Beardall Avenue (E)	25Y24H	1.1	C	A
22G2	Channel at Riverbend (1)	25Y24H	1.1	C	A

The opinion of conceptual capital cost for the proposed improvements is approximately $4.3 million. More details regarding the cost estimate can be found in **Table F-13** in **Appendix F**.

4.3.3 Alternative 3 – Beardall Avenue/CSX Ditch Drainage Improvements

CDM Smith did not recommend the original Alternative 3 improvements as they demonstrated little benefit for the cost. During the revisit of Alternatives 1, 2, and 4, CDM Smith also re-evaluated Alternative 3 to determine if its performance could be improved in the vicinity of the CSX Ditch, which will serve as an outfall to proposed development in the area. An undeveloped industrial parcel was identified adjacent to the CSX Ditch for which no development plans have been identified; CDM Smith proceeded to propose an in-line stormwater pond on the property and revisit the proposed conveyance improvements between the CSX Ditch, Celery Avenue, and the two outfalls north of Celery Avenue that convey discharge to Lake Monroe.

As illustrated on **Figure 4-10,** CDM Smith proposed several revised conceptual improvements for this problem area, including:

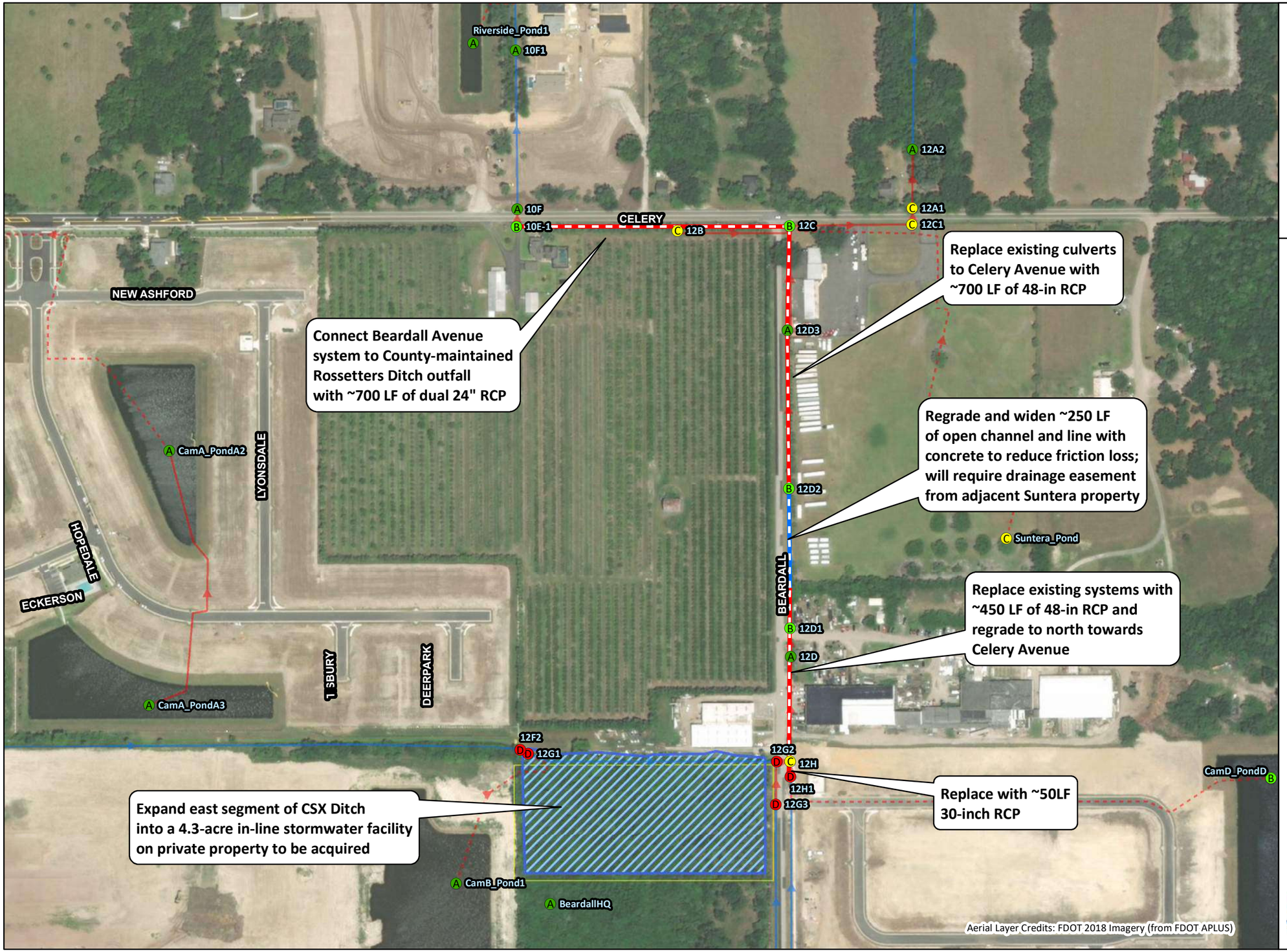


Figure 4-10 Revised Alternative 3 - Beardall Avenue and CSX Ditch Drainage Improvements
Midway Basin Engineering Study
Seminole County, Florida

- Construction of a new, in-line stormwater facility on vacant, undeveloped industrial property just south of the CSX Ditch adjacent to Beardall Avenue. The proposed 4-acre facility will incorporate the eastern end of the CSX Ditch and provide storage and attenuation of runoff prior to discharge across the existing 48-inch culvert under Beardall to the drainage systems on the east side of Beardall Avenue. CDM Smith recommends the purchase of the full property shown on Figure 4-10, as well as acquisitions of easements on the CSX Ditch traversing the adjacent property to the north, if not already recorded
- Improvements to the existing culverts on the east side of Beardall Avenue in the vicinity of the CSX Ditch crossing. This includes: 1) upsizing the existing pipe south of the crossing to a 30-inch RCP; 2) upsizing the pipes north of the crossing to 48-inch RCPs; and, 3) regrading to provide positive drainage to the north towards Celery Avenue.
- Improvements to the open channel section of the Beardall Avenue outfall north towards Celery Avenue. This includes widening the existing roadside swale on the east side of Beardall, regrading to provide positive drainage to the north, and lining the ditch with concrete to reduce friction and encourage northward conveyance. CDM Smith recommends the County negotiate the acquisition of a 20-foot drainage easement along the western edge of the Suntera property as part of the development review process to facilitate the construction and maintenance of the roadside ditches and culverts along Beardall Avenue, which has limited County ROW.
- Replacement of the culverts on the north end of Beardall Avenue connecting to the Celery Avenue system with 48-inch RCP.
- Providing a connection with dual 24-inch RCPs from the existing junction box at the corner of Celery Avenue and Beardall Avenue to the existing, County-maintained Rosseters Ditch cross-drain. This represents a change in design intent from the original Alternative 3 which sought to disconnect the existing system draining to the existing private, unmaintained outfall east of Rosseters Ditch in favor of allowing interchange between the two outfalls as capacity is available.

Table 4-21 shows the revised LOS analysis at deficient nodes within the project area. The revised Alternative 3 provides an increased benefit for flood control LOS in the vicinity of the CSX Ditch at Beardall Avenue. The addition of storage near the problem area provides considerable flood control benefit while also attenuating flows such that the proposed conveyance improvements along Beardall are not expecting to result in any adverse impacts at the existing outfalls at Celery Avenue.

Table 4-21 Revised Alternative 3 LOS Analysis

Node ID	Location	Design Storm	Reduction (ft)	Existing LOS	Proposed LOS
12F2	CSX Culvert (W)	25Y24H	1.0	D	B
12G1	CSX Culvert (E)	25Y24H	1.0*	D	B
12G3	Beardall Avenue at Future Warehouse (S)	10Y24H	0.8	D	B
12G2	CSX Ditch at Beardall	25Y24H	0.4	D	C
12H	Beardall Avenue at Cameron Heights D (N)	25Y24H	0.5	C	B
12H1	Beardall Avenue at Cameron Heights D (S)	10Y24H	0.2	D	C

The opinion of conceptual capital cost for the proposed improvements is approximately $3.2 million. More details regarding the cost estimate can be found in **Table F-14** in **Appendix F**.

4.3.4 Revised Alternative 4 – 20th Street/Sipes Avenue Drainage Improvements

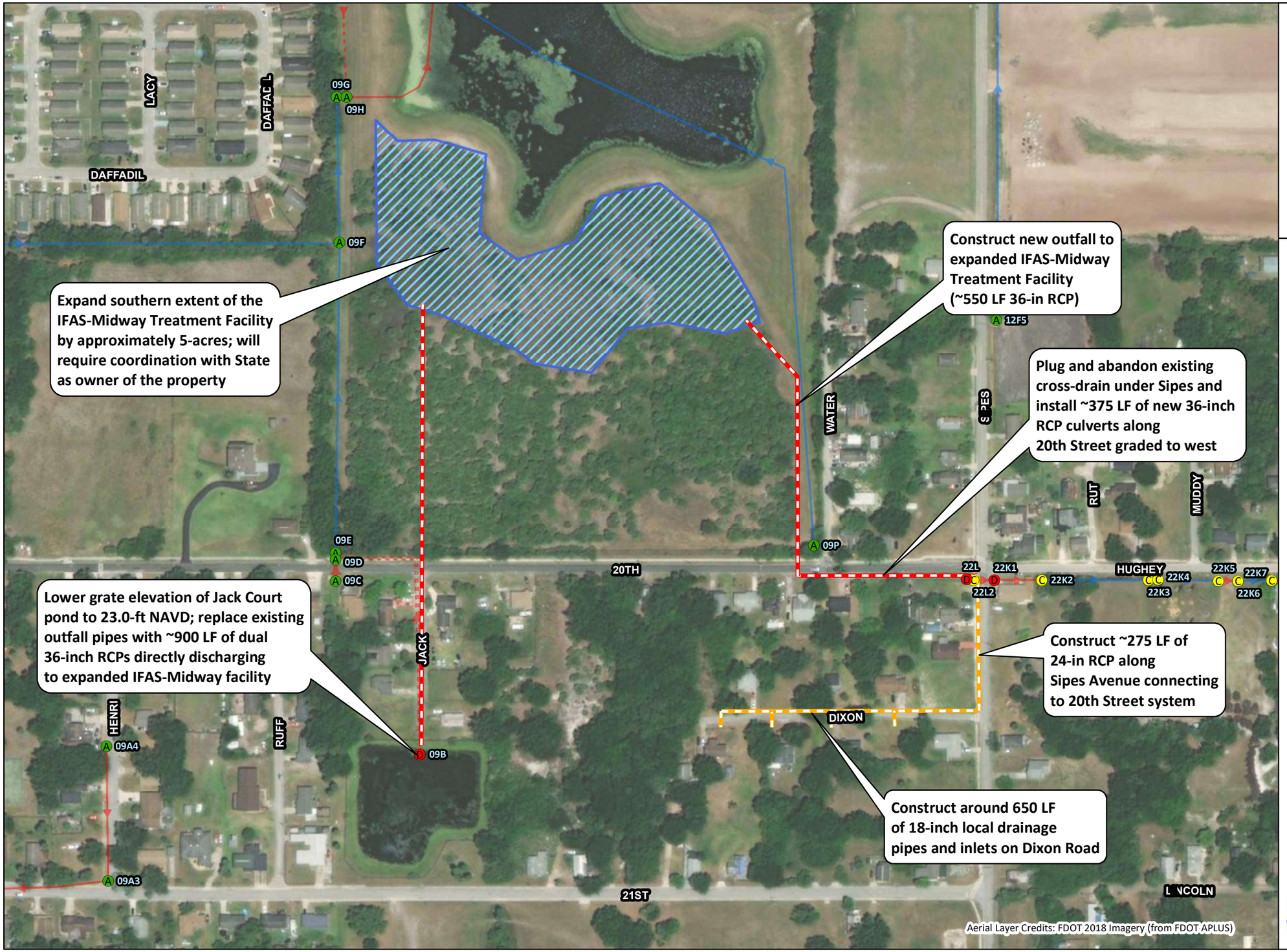
The intent of the original Alternative 4 was to address modeled deficiencies with the existing pond at the south end of Jack Court as well as other modeled and reported problem areas in Basin B-22L by constructing a new pond on the south side of 21st Street, across the street from the existing pond, and providing a direct connection between the two. This property was one among several that received objections from local residents regarding its proposed use for stormwater management. CDM Smith re-evaluated this area and proposed a series of improvements intended to take advantage of the existing IFAS-Midway Treatment Facility lying to the north of the problem area, and in so doing improve that facility to provide excess treatment capacity that can be used as compensating treatment for other improvements throughout the Midway Basin which may encounter permitting concerns regarding increased pollutant loads to receiving waters (such as the revised Alternative 2).

As illustrated on **Figure 4-11,** CDM Smith proposed several revised improvements for this problem area, including:

- Expansion of the IFAS-Midway Treatment Facility to accommodate new and increased loadings from the Midway Community to the south, as well as future discharges from the surrounding basin. Under this conceptual alternative, CDM Smith proposes expanding the southern treatment area by 5 acres, though there appears to be additional room for further expansion in the future. The property on which the facility lies is owned by the State of Florida, and it is recommended that the County coordinate with FDEP or SJRWMD to determine any requirements for modification of the facility. The County has recent experience partnering with State agencies in the use of State-owned (i.e., SJRWMD) lands for a County-led effort (specifically, the Salt Creek Stream Restoration Project in Black Hammock).

- Modification of the control structure of the existing Jack Court pond to lower the overflow elevation to 23.0-ft NAVD, and the replacement of the existing outfall pipes with dual 36-inch RCPs that rather than connect to the existing outfall ditch running along the west side of the IFAS-Midway Treatment Facility would instead discharge directly across 20th Street through the IFAS property into the expanded treatment facility. Any water quality volume lost through modification of the control structure would be more than compensated by the proposed expansion of the IFAS-Midway facility.

- Construction of new drainage infrastructure along Dixon Avenue and Sipes Avenue which would be routed north to 20th Street. The existing cross-drain under Sipes Avenue directing flow east into the Hughey Street Outfall would be plugged and abandoned and a new system constructed on 20th Street draining west and north to a new outfall into the expanded IFAS-Midway Treatment Facility. Due to limited County ROW along the west side of Sipes Avenue and the south side of 20th Street, it is recommended that the County obtain at least a 10-ft easement on those frontages to facilitate construction and maintenance of the proposed system.



N

0 100 200 300 400 Feet

1 in = 200 feet

Legend

- County-Identified Problem Areas
- Public Meeting Comments
- City of Sanford

Proposed Conveyance

- Open Channel, Primary
- Pipe, Primary
- Pipe, Secondary
- Proposed Storage

ICPR_NODE Future LOS

- A
- B
- C
- D
- City Jurisdiction

ICPR_LINK Future

- CHANNEL
- DROP STRUCTURE
- PIPE
- Midway Basin

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Figure 4-11 Revised Alternative 4 - 20th Street and Sipes Avenue Drainage Improvements
Midway Basin Engineering Study
Seminole County, Florida

Table 4-22 shows the revised LOS analysis at deficient nodes within the project area. The revised Alternative 4 demonstrates considerably better performance than the original proposed improvements. Modifying the control structure at the Jack Court pond and transferring its water quality treatment needs to the regional facility significantly benefits the flood control LOS in the area, and the re-routing of flows around Basin B-22L north to IFAS-Midway also significantly improves expected flood control LOS in the basin, as well as propagating benefits downstream in the Hughey Street Outfall through reduced discharges.

Table 4-22 Revised Alternative 4 LOS Analysis

Node ID	Location	Design Storm	Reduction (ft)	Existing LOS	Proposed LOS
09B	Pond at Jack Court	10Y24H	1.7	D	A
22L	20th Street at Sipes Avenue (1)	25Y24H	3.3	D	A
22K1	Hughey at Sipes Avenue	25Y24H	1.2	D	B
22K9	Hughey Street Driveway D (W)	25Y24H	0.5	D	C
22K10	Hughey Street Driveway D (E)	25Y24H	0.8	D	B
22K11	Hughey Street Driveway E (W)	25Y24H	0.8	D	B

The opinion of conceptual capital cost for the proposed improvements is approximately $2.8 million. More details regarding the cost estimate can be found in **Table F-5** in **Appendix F**.

A map displaying the proposed property and easement acquisition recommendations for the revised Alternatives 1-4, as well as the original Alternative 5 (which remains unchanged) is provided in **Figure 4-12**.

4.4 Project Ranking

To assist in the development of a capital improvement plan (CIP), CDM Smith developed a framework to prioritize and rank conceptual projects based on a selected set of criteria that meets the overall goals of improving flood control LOS and water quality in the Midway Basin. This framework, adapted from guidance used to evaluate projects in previous watershed management plans throughout Florida, assesses each of the individual projects described above based on seven relevant criteria including:

- Flood control LOS improvement
- Conceptual capital cost estimate
- Water quality benefit
- Operation and Maintenance costs
- Permittability
- Implementability/constructability
- Public benefit

Alternative 3 (Revised):
Negotiate 20-ft drainage easement along western edge of Suntera property

Alternative 3 (Revised):
Acquire full Parcel 3319313000019A0000
Obtain easement on CSX Ditch on adjacent parcel (if not already recorded)

Alternative 4 (Revised):
Obtain 10-ft drainage easements over multiple properties on Sipes Ave and 20th St

Alternative 2 (Revised):
Obtain 15-ft drainage easements over multiple properties on Lincoln west of Deepwater

Alternative 2 (Revised):
Acquire full Parcel 241931300001A0000
Obtain easement on Hughey Street Ditch on adjacent parcel (if not already recorded)

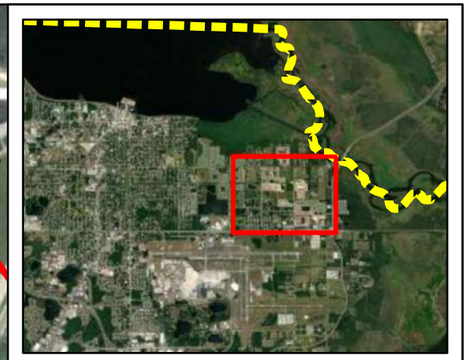
Alternative 5:
Acquire full Parcel 341931300002F0000

Alternative 1 (Revised):
Obtain 15-ft drainage easements over existing pipe from Crawford to Childers Ditch

Alternative 1 (Revised):
Acquire ~3.4 acres of Old Midway Elementary property from SCPS;
Acquire 15-ft drainage easement for outfall pipe to Washington St.

BELLA ROSA
ADONCIA
BELLA ROSA
PISA SANTA FE
LILI
PETAL
TULIP
VALLEY
VINEYARD
CELERY PALM
THOROUGHBRED
NEW ASHFORD
SAVOY
HOPEDALE
LYONSDALE
CELERY
CHICKASAW
PENINSULA
PENINSULA
DEERPARK
ASBURY
CAMERON
LAKE MARY
LAKE MARY
DAFFADIL
LACY
ONEAL
WATER
RUT
MUDDY
GARBO JACK
20TH
JACK
SIPES
HURSTON
HENRI
RUFF
DIXON
21ST
HUGHEY
DEEPWATER
DIESEL
LINCOLN
MAIN
1ST
CANAAN
WASHINGTON
BEARDALL
SILVERSTREAM
KINDERH OK
LOOKING GLASS
NICOLA
WH TE PELICAN
STERLING MEADOWS
BLUE ROCK
MONTE CRISTO
CRAWFORD
GRANBY
CHURCH
RANDALL
WATER
BROADWAY
GREENWAY
DOLARWAY
JITWAY
RIGHTWAY
EUDELL
NASEEM
1ST
2ND
AHWHITE
KLONDIKE
BYRD
KINGS
46

Aerial Layer Credits: FDOT 2018 Imagery (from FDOT APLUS)



N

0 325 650 975 1,300 Feet

1 in = 650 feet

Legend

- City of Sanford
- Proposed Easement Acquisition
- Proposed Property Acquisition
- Midway Basin

Legend
City of Sanford

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CDM Smith

Figure 4-12 Proposed Easement and Property Acquisitions
Midway Basin Engineering Study
Seminole County, Florida

Table 4-23 displays the scores assigned to each project for each of the above criteria, as well as the projects' cumulative scores. The criteria have been expanded upon in further detail within the following subsections. The rankings only include the revised versions of Alternatives 1 through 4, as well as the original Alternative 5.

Table 4-23 Project Scoring and Raking Matrix

Scoring	Project Name				
	Revised Alt 1 Midway Community	Revised Alt 2 Lincoln Street	Revised Alt 3 Beardall Avenue	Revised Alt 4 20th Street	Alt 5 Washington Street
FLOOD CONTROL LOS IMPROVEMENT					
Improved LOS by 3 Levels (20)	20	20		20	20
Improved LOS by 2 Levels (12)			12		
Improved LOS by 1 Levels (4)					
Improved LOS by 0 Levels (0)					
WATER QUALITY BENEFIT					
High (10)	10			10	
Moderate (5)			5		
Low to None (0)		0			0
CONCEPTUAL COST ESTIMATE					
<$1,000,000 (10)					
$1,000,000-$2,000,000 (8)					8
$2,000,000-$3,000,000 (6)				6	
$3,000,000-$4,000,000 (4)			4		
>$4,000,000 (2)	2	0			
ANNUAL OPERATION AND MAINTENANCE COSTS					
<$5,000 (5)					
$5,000-$10,000 (4)					
$10,000-$15,000 (3)			3	3	3
$15,000-$20,000 (2)					
>$20,000 (1)	1	1			
PERMITTABILITY					
Routine (6)	6			6	
Moderate (3)		3	3		3
Complex (0)					
IMPLENTABILITY/CONSTRUCTABILITY					
Routine Methods/Minimal Land Acquisition (8)					
Complex Methods/Moderate Land Acquisition (4)	4		4		4
Very Complex Methods/High Land Acquisition (0)		0		0	
PUBLIC BENEFIT					
More than 120 Properties Benefiting from Project (20)	20				
90-120 Properties Benefiting from Project (16)					
60-90 Properties Benefiting from Project (12)		12		12	
30-60 Properties Benefiting from Project (8)					8
Less than 30 Properties Benefiting from Project (4)			4		
TOTAL	**63**	**36**	**35**	**57**	**46**
RANK	**1**	**4**	**5**	**2**	**3**

4.4.1 Floodplain Level-of-Service Improvement

This criterion is related to the modeled improvement in LOS in the problem area. A score of 20 represents an improvement in LOS of 3 levels from D to A and was assigned to Revised Alternatives 1, 2, and 4, and the original Alternative 5. A score of 12 was assigned to Revised Alternative 3, which represents a 2-level increase in LOS from D to B at the CSX Ditch problem area. In general, all five alternatives evaluated in this ranking matrix demonstrate the ability to significantly benefit flood control level of service in the Midway Basin.

4.4.2 Conceptual Capital Cost Estimate

This criterion is related to the estimated capital costs associated with each project and was scaled to reflect the range of developed estimates specific to this project. The highest score assigned among these five alternatives was Alternative 5 (Washington Street Outfall Improvements) which received a score of 8 as the lowest cost alternative. The low score of 2 was assigned to those projects with an estimated capital cost in excess of $4 million, which included Revised Alternatives 1 (Midway Community Drainage Improvements) and 2 (Lincoln Street and Hughey Street Outfall Drainage Improvements).

4.4.3 Water Quality Benefit

This criterion is related to the estimated water quality benefit provided by each project; as the revised alternatives were not quantified in their pollutant removal efficiencies using BMPTRAINS, this criterion represents a qualitative evaluation of the expected water quality benefit of each alternative. Revised Alternatives 1 and 4, containing new and/or expanded off-line wet detention ponds, are expected to provide the greatest water quality benefit and receive a score of 10. Revised Alternative 3 with its in-line facility receives a “moderate” rating and a score of 5, as these facilities have lower pollutant removal efficiencies. Revised Alternative 2 and Alternative 5, containing ponds at the downstream extents of their respective outfalls which serve more to attenuate high design storm flows rather than retain first flushes from smaller events, are not expected to provide a great deal of water quality benefit and receive a score of 0.

4.4.4 Operation and Maintenance Costs

This criterion is related to the level of effort (cost and frequency) needed to keep the proposed improvements in operable condition. Annual O&M costs were estimated for each project and a scaled scoring system was developed specific to the range of O&M costs observed in this effort. A high score of 5 was assigned to those projects expected to have annual O&M costs under $5,000, which largely included those alternatives consisting mainly of short lengths of gravity conveyance. A low score of 1 was assigned to those projects with estimated annual O&M costs in excess of $20,000, which included Revised Alternatives 1 and 2 due to the large number of proposed structures and facilities requiring regular maintenance.

4.4.5 Permitability

It is anticipated that all of the proposed projects will have to undergo permitting processes at the federal, state, and local levels. Based on knowledge and experience of the regulatory environment, CDM Smith included this criterion to assess the relative anticipated permitting efforts for each project. A score of 6 was assigned to those projects with more conventional primary elements, such as the storage facilities in Revised Alternatives 1 and 4, that should be

subject to routine permitting requirements. Those projects lacking water quality elements may require more robust permitting and were assigned a score of 3.

4.4.6 Implementability/Constructability

The proposed projects include varying challenges and degrees thereof with regard to the ability to implement the projects as conceived. Some can be implemented relatively easily, with conventional construction methods and minimal land acquisition, while some face significant construction hurdles and the requirement to obtain large tracts of land or easements. All of these projects are expected to face some hurdles in this regard, with land and easement acquisition expected for all of them. Revised Alternatives 1 and 3, as well as Alternative 5 received a score of 4; Revised Alternatives 2 and 4, the former requiring the largest land purchase as well as negotiating easements on Lincoln Street with its very narrow ROW, and the latter requiring coordination with the State on the use of their lands to expand the IFAS-Midway Treatment Facility, received a score of 0.

4.4.7 Public Acceptance

The final criterion considers the public benefits of the proposed project based on the number of parcels within the project area directly benefiting from the improvements. This was assigned as a sliding scale with those projects directly benefiting more than 120 properties receiving the highest score of 20, and those benefiting less than 30 properties receiving the lowest score of 4.

Section 5
Summary and Conclusions

The Midway Basin Engineering Study serves as a comprehensive planning tool for the management of stormwater in the study area. An extensive compilation of data relevant to the conditions and operations of primary stormwater management systems in the Midway Basin was conducted and summarized in Section 2; the electronic deliverable accompanying this report contains the compiled data and information in a single, unified dataset. CDM Smith subsequently developed a comprehensive update to the existing and build-out condition hydrologic and hydraulic models for the Midway Basin using recently-developed tools including ICPR4 and GWIS, and model results compared favorably to the experiences of County staff and local residents. Using these updated models, CDM Smith developed and evaluated several potential capital improvements to benefit flood control and water quality in the Midway Basin. This study accomplishes the County's goals of developing a plan to serve the residents of the Midway Basin by addressing their flooding concerns while providing water quality improvements.

This section discusses recommended alternatives and a conceptual capital improvement plan and further recommendations for future maintenance and refinement of this study.

5.1 Recommended Alternatives

Based on the project ranking matrix, model results, and conceptual cost estimates, CDM Smith has developed a prioritized conceptual capital improvement plan for the Midway Basin incorporating five alternatives:

- Revised Alternative 1, the Midway Community Drainage Improvements Program, consisting of four phased projects, is recommended as the highest-scoring alternative in the project scoring and ranking matrix as shown in Table 4-19. The project is expected to have wide public acceptance as it directly addresses known areas of concern to the County and local residents, and specifically is expected to improve flood control LOS along the flood prone Center Street from "D" to "A", as well as improve flood control LOS in other problem areas throughout the community. These benefits may be realized for a conceptual cost estimate of $6.0 million.

- Revised Alternative 4, the 20th Street and Sipes Avenue Drainage Improvements Project, is recommended as the second highest-scoring alternative in the project scoring and ranking matrix as shown in Table 4-23. The proposed expansion of the IFAS-Midway Treatment Facility, modification of the Jack Court pond outfall and accompanying drainage infrastructure alleviates flooding along the Hughey Street outfall and addresses known problem areas along Sipes Avenue and provides relief for persistent elevated water levels in the Jack Court pond. The expanded storage in the regional facility provides significant flood control as well as water quality benefits, and excess water quality volume provided in the expansion may be available as compensating treatment for other improvements in the Midway Basin for which water quality benefits cannot be feasibly

realized. A potential complication with the implementation of this alternative will be coordination with the State of Florida on the use of their lands to expand the IFAS-Midway Treatment Facility, but the County has successfully partnered with a State agency (SJRWMD) in the recent past to implement a collaborative stormwater retrofit. These benefits may be realized for a conceptual cost estimate of $2.8 million.

- Alternative 5, the Washington Street Outfall Improvements, is recommended as the third highest-scoring alternative in the project scoring and ranking matrix as shown in Table 4-23. Model results indicate that the alternative will improve flood control LOS in the area around Washington Street and Beardall Avenue, directly addressing a cluster of resident complaints. These benefits may be realized for a conceptual cost estimate of $1.4 million.

- Revised Alternative 2, the Lincoln Street and Hughey Street Outfall Drainage Improvements, is recommended as the fourth highest-scoring alternative as shown in Table 4-23. The improvements on Lincoln Street are expected to directly address a cluster of resident flooding complaints, and the improvements along the Hughey Street Outfall are expected to provide significant flood control benefit in known problem areas around the outfall, as well as complement the stormwater management systems of planned developments that will discharge to the outfall. These benefits may be realized for a conceptual cost estimate of $4.3 million.

- Revised Alternative 3, the Beardall Avenue Drainage Improvements, is recommended as the fifth highest-scoring alternative in the project scoring and ranking matrix as shown in Table 4-23. Following the revisions to Alternative 3 under recent modeling efforts, the proposed improvements are expected to provide more benefit to the anticipated problem area around Beardall Avenue at the CSX Ditch, which as it stands lacks a positive outfall to Lake Monroe and will be subject to surrounding development pressures. The conceptual cost estimate of the revised improvements is $3.2 million.

In addition to these recommended capital improvements shown in **Table 5-1**, proactive maintenance of the County's stormwater infrastructure in the basin is recommended to ensure the full drainage capacity of the system is available to accommodate runoff. Pursuit of drainage easements as resources allow to assist in the facilitation of construction and maintenance of the drainage systems is highly recommended.

Table 5-1 Recommended Alternatives and Prioritized Conceptual Capital Improvement Plan

Alternative	Project Name	Cost
1 (Revised)	Midway Community Drainage Improvements	$6,040,000
4 (Revised)	20th Street/Sipes Avenue Drainage Improvements	$2,827,000
5	Washington Street Outfall Drainage Improvements	$1,631,000
2 (Revised)	Lincoln Street and Hughey Street Outfall Drainage Improvements	$4,341,000
3 (Revised)	Beardall Avenue/CSX Ditch Drainage Improvements	$3,218,000
Total		**$18,057,000**

5.2 Recommendations for Future Study Maintenance

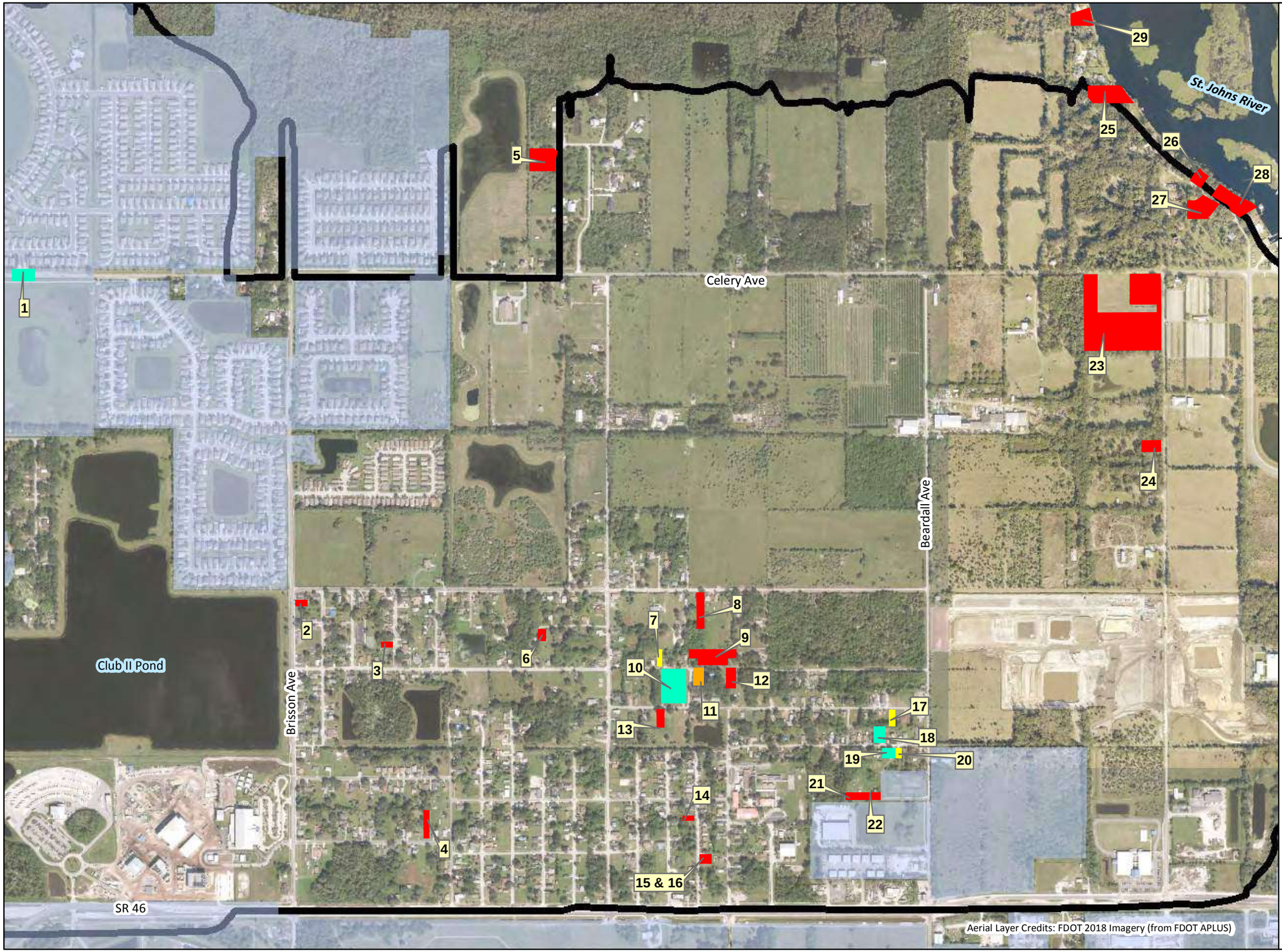
Throughout the course of this study, several limitations were identified for future consideration and refinement by the County. These include:

- As discussed in Section 2.4.4, CDM Smith developed a prioritized survey plan for this effort to address identified data gaps and verify questionable information. Allocated resources for this effort only allowed for collection of those elements assigned a "high" priority. As such, the GWIS database and ICPR4 models include several assumptions for structure and conduit parameters for those elements that could not be surveyed. It is recommended that additional survey be performed on the "medium" and "low" priority elements identified in the survey plan to further refine the County's geodatabases and models as resources allow.

- As shown in Figure 3-9, available topographic data includes a significant area of "voids" either not covered by available DEMs, or outdated and no longer reflective of actual topography subsequent to recent or soon-to-be constructed developments. These voids limit the applicability of the floodplains delineated under this effort. As newer DEMs become available, it is recommended that the geodatabases, models, and floodplains be updated to reflect the best available data. It is expected that new LiDAR data will become available to Seminole County in 2021 as part of an ongoing state-wide effort undertaken by the Florida Department of Emergency Management. This new data may also be augmented with CADD surface features prepared for development plans for the various new developments expected to be constructed within the basin within the next few years.

Appendix A

Public and BOCC Meetings



N

0 410 820 1,230 1,640 Feet

1 in = 822 feet

Legend

- Midway Basin
- City of Sanford

Comment Locations

- Location referenced in other comment.
- Resident provided both comment card and comments at computer station.
- Resident provided comment card only
- Resident provided comments at computer station only.

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

CDM Smith

Figure A-1: Public Meeting Comment Card Locations
Midway Basin Engineering Study
Seminole County, Florida

Table A-1 Midway Public Meeting Comments and Locations

Corres-ponding Figure A-1 ID	Survey Question						
	"Have you experienced flooding in your yard?"	"If yes, describe the nature of the flooding"	"Have you experienced flooding in your house/structure?	"If yes, describe the nature of the flooding"	"Have you observed other flooding in the area (e.g., roadway)?	"Have you observed other flooding in the area (e.g., roadway)?"	Other Comments
1	Location referenced in comment "(flooding occurs) in front of Celery Key Neighborhood entrance on Celery Ave"						
2	n/a	n/a	n/a	n/a	n/a	n/a	Trees in R/W
3	Yes	The flooding is on both sides of our lots and between land. That is because there is it center behind us and water comes off that on our property. Every time there is a storm.	n/a	n/a	Yes	The drains do not drain completely and are always full, and when it storms we have to clean our own drains & roads and debris up ourselves.	n/a
4	Yes	Flooding of the entire roads, front yard and backyard. With bad weather conditions the flooding causes the septic system to not work.	Yes	The water comes through my side glass door.	Yes	Roadway throughout Midway. You ride in Midway now you will see flooding.	
5	Yes	Some low spots in my lawn are my problem. Roads do not flood in our neighborhood and run and drain well north.	No	n/a	Yes	In front of Celery Key Neighborhood entrance on Celery Ave.	Ponds along west side working well.
6	Yes	Due to no drainage water has nowhere to go. The property next to me is a river during rainy season.	n/a	Dixon Ave in Midway Sipes/and Dixon Ave	Yes	I lived here 63 years really no change except around us.	
7	Yes	Water all around our house and road.	No	n/a	Yes	The house right in front of my house in the field is like a boat in a river when it rains.	n/a
8	Yes	Flooding in front and back yards. Each time there is heavy rainfall.	No	n/a	Yes	Most roadways in area become flooded with heavy rainfall.	n/a
9	Yes	The road drains to the back of our property. The entire backyard is prone to flooding. Depth 3-4 inches of standing water. The water is there for about weeks during rainy season.	No	n/a	Yes	There is no drainage on the road. Lincoln Street. It puddles on the side of road. We need pipe drainage or some form of drainage on the street.	n/a
10	Location referenced in other comment. "The house right in front of my house in the field is like a boat in a river when it rains."						
11	Yes	n/a	No	n/a	Yes	n/a	All in yard flooding from road, front yard and side yard. Ditch on west side overflows into yard.
12	n/a	n/a	n/a	n/a	Yes	From my home 3481 Lincoln St. west to Sipes Ave there is no pipe system to run water out of area.	n/a
13	n/a	n/a	n/a	n/a	n/a	n/a	Please send me a copy of tonight's Power Point
14	No	Not yet.	No	Loss of debeift (sp.?)	No	n/a	n/a
15	Yes	Between my house and neighbor's yard because there is a big oak tree and the root is in my yard.	No	n/a	Yes	We have the swale on our street, that kept it down somewhat.	n/a
16	Yes	With a shower like we are experiencing, this will bring about three to six inches before it over flows into the swale leading to the manhole in into the retention pond on opposite end of street.	Yes	Going up into driveway.	Yes	Three to five inches.	Being as I have in the area over seventy seven or more years, I am assuming that there are many contaminants that have settled in the area due to storms, hurricanes, farming residue pesticides, etc.
17	Yes	Front driveway, water settles, average depth 8"	No	n/a	Yes	On street in front of house, 8"	n/a
18	Location referenced in comment. "(Flooding at) 3724 Main Street whenever it storms"						
19	Location referenced in comment. "Flooding starts from my neighbors backyard.."						
20	Yes	Water in the right-away. In the front yard.	No	n/a	Yes	Flooding starts from my neighbors backyard and runs into my yard.	I need storm drainage.
21	Yes	Flooding in front and backyard water running down from Old Midway School.	Yes	Water holding under the house.	Yes	n/a	n/a

	Survey Question						
22	Yes	My yard is holding much water. Main St, Beardall, Celery & Sipes.	n/a	n/a	n/a	n/a	n/a
23	Yes	n/a	n/a	n/a	n/a	n/a	The ditch north of Celery Ave. Is completely filled in water has nowhere to go.
24	Yes	n/a	No	n/a	n/a	n/a	Resident trees along road. Canal on back of property; willing to entertain pond on property.
25	Yes	Every radical weather change increases the level which covers our seawall and the water comes within 20' of our wall.	Yes	2004 Charlie, 9/2004 Francis, 2017 Michael, Irma: Invaded the wall of our living room	Yes	Powhatan Drive under water 9/1960. Donna - able to fish in Reed's side/front yard all the way to the Garafaic point.	n/a
26	No	n/a	No	n/a	Yes	Local flooding.	n/a
27	Yes	We have a historic home and due to the increasing growth flooding has been a constant issue we deal with. It has affected our foundation.	Yes	n/a	Yes	Severe flooding and issues with our neighbors.	n/a
28	Yes	We have a historic home and due to the increasing growth flooding has been a constant issue we deal with. It has affected our foundation.	Yes	n/a	Yes	Severe flooding and issues with our neighbors.	n/a
29	Yes	Our street has no drains or curbs and main flooding in our backyard comes from the cow pasture directly behind us - it can be two feet of standing water during storms and heavy rainfall for a week.	No	Worst problems happened in Tropical Depression Fay in 2008; water 3' deep for over 8 months.	Yes	Rain for more than 1 hour floods Celery Ave, Cameron Road, and Powhatan Drive.	n/a
n/a	n/a	n/a	n/a	n/a	Yes	State Road 46 is higher than Midway, All the water comes down in the community. The County needs to prevent water flood.	n/a

Midway Basin Engineering Study

Virtual Public Meeting

Ben Pernezny, PE

September 2020

CDM Smith

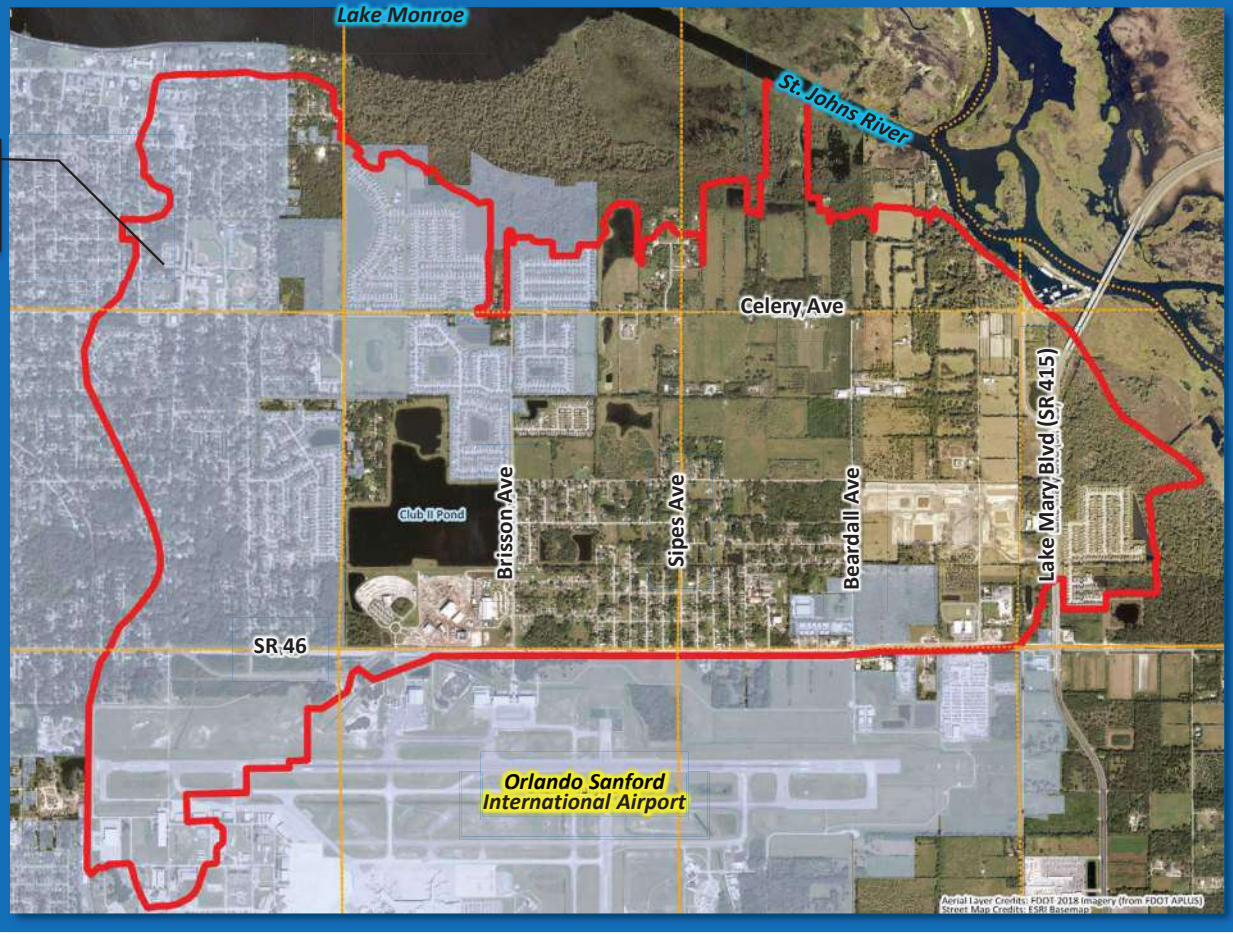
Presentation Goals

- Project Overview
- Share Study Results
- Present Flood Improvement Projects
- Solicit final input from residents and stakeholders

Number of mailers sent to residents: 1,214

Midway Basin Location

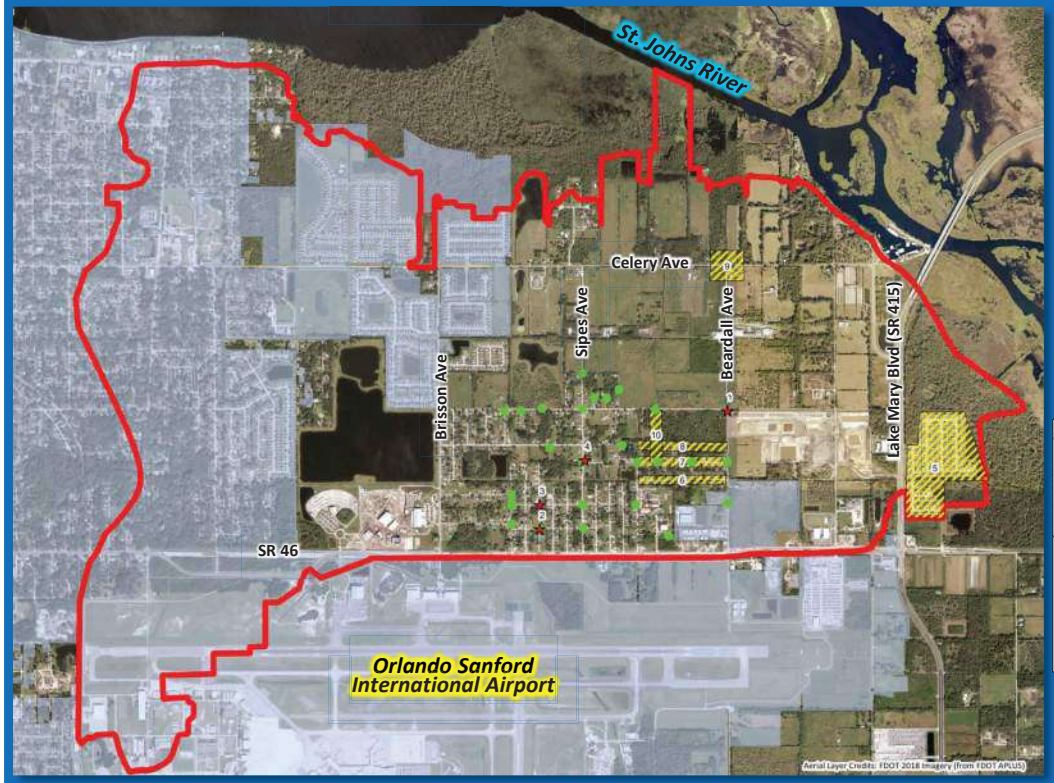
Blue Shaded = City Limits (outside unincorporated County)



Legend

- Section-Township-Range
- Midway Basin (4.3 square miles, 2.4 square miles unincorporated)
- City of Sanford (1.9 square miles within Midway Basin)

Midway Basin Flooding Impacts



Legend

- Midway Basin
- City of Sanford
- 2019 Field Recon Problem Areas
- Locations Previously Identified by Residents*
- Flood Prone Areas (Identified in 2018 SWMP)

Source	Description
2019 Field Recon/County Maintenance Staff Input	Outfall ditch typically contains lots of debris; box culvert at Beardall clogged during Irma, with water flowing over Beardall and backing up to Sipes. No issues when cleared of debris.
	County reports undersized/damaged pipes and inlets at this intersection resulting in frequent nuisance flooding.
	County reports undersized/damaged pipes and inlets at this intersection resulting in frequent nuisance flooding.
	Buried side drain restricting drainage to the north causing nuisance flooding at this intersection.
2018 SWMP	Recurring flooding within the Sterling Meadows Subdivision along Klondike Place, Monte Cristo Way, Lone Eagle Place, Krueger Rand Cove, Bullion Loop, and Trommel Way.
	From Tropical Storm Fay, flooding occurred in the Canaan area, along Washington Street from Jitway to Beardall Ave.
	From Tropical Storm Fay, flooding occurred in the Canaan area, along Main Street from Jitway to Beardall Ave.
	From Tropical Storm Fay, flooding occurred in the Canaan area, along Lincoln Street from Jitway to Beardall Ave.
	From Hurricane Irma, flooding was observed near the intersection of Beardall Ave and Celery Ave.
	From Hurricane Irma, flooding was observed at Deepwater Avenue, just north of the Canaan area.

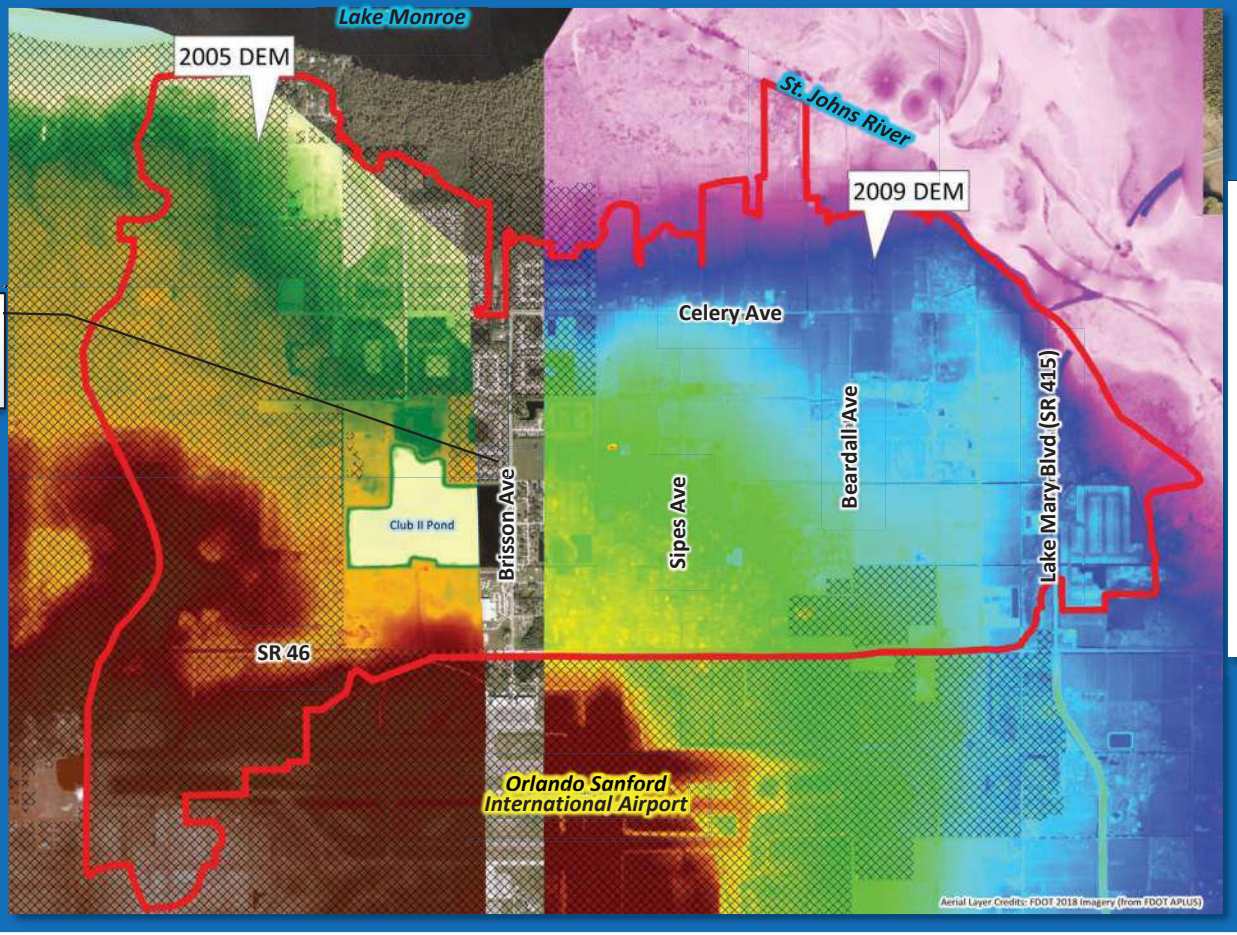
Project Purpose and Objectives

Within the **unincorporated areas** of the Midway Basin

- Assembly and Evaluation of Watershed Data
- Stormwater Model Development
  - 1997 Model
  - Existing and Future Conditions
- Identify and assess flooding problems
- Develop conceptual improvements to reduce flooding (LOS Improvement Alternatives Analysis)
- Establish 100-year floodplains
- Public Meetings to involve stakeholders

Topographic Elevation Data Obtained

Topographic Data Gap between 2005 DEM (West) and 2009 DEM (East)



Legend

- Midway Basin
- City of Sanford

DEM 2005

High : 71.5 feet

Low : 1.3

DEM 2009

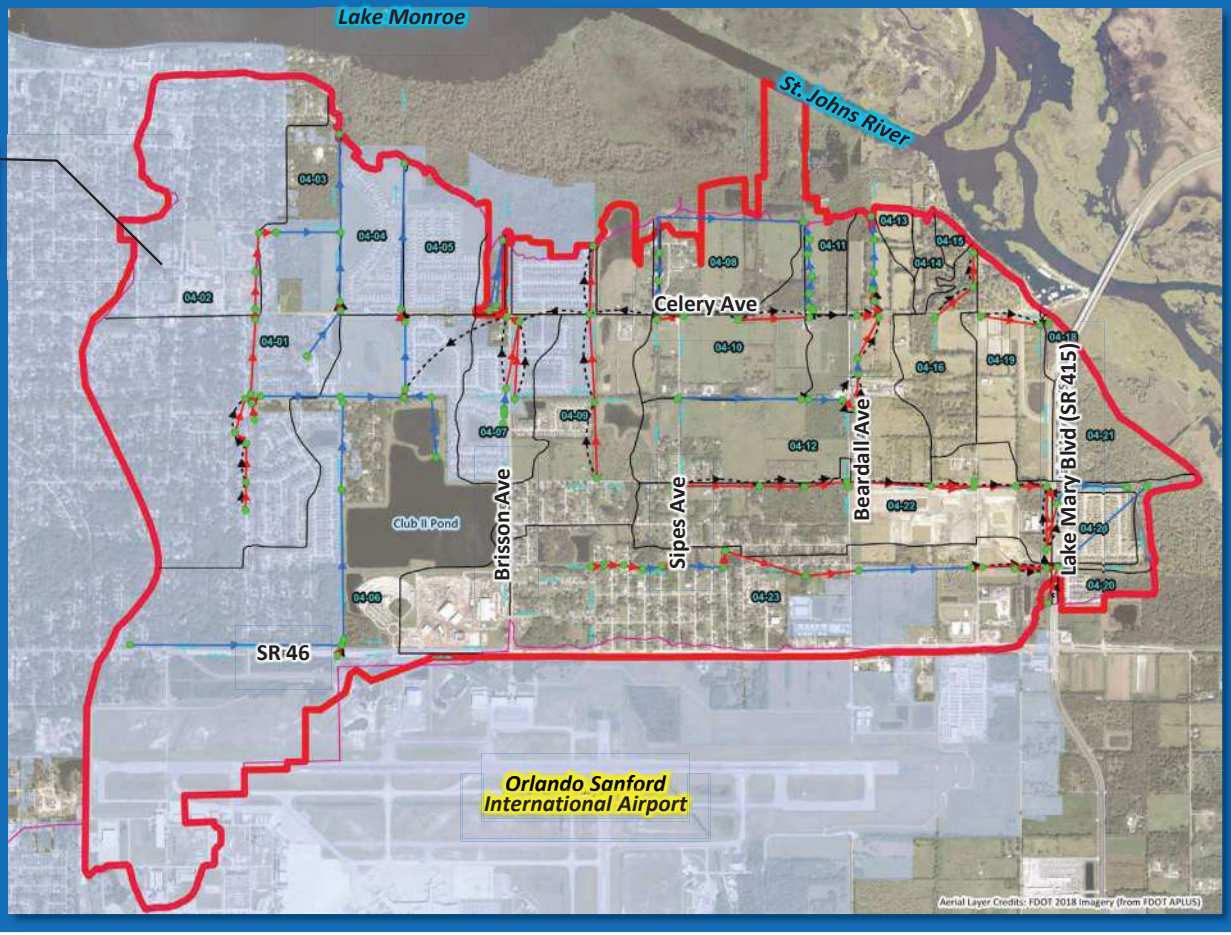
High : 59.9 feet

Low : -0.9

(DEM = Digital Elevation Model)

Existing 1997 Model (Approximated Schematic)

Blue Shaded = City Limits (outside unincorporated County)



Legend

- Midway Basin
- City of Sanford

1997 Model Connectivity

- CHANNEL
- PIPE
- WEIR
- ICPR_NODE (Approximated)

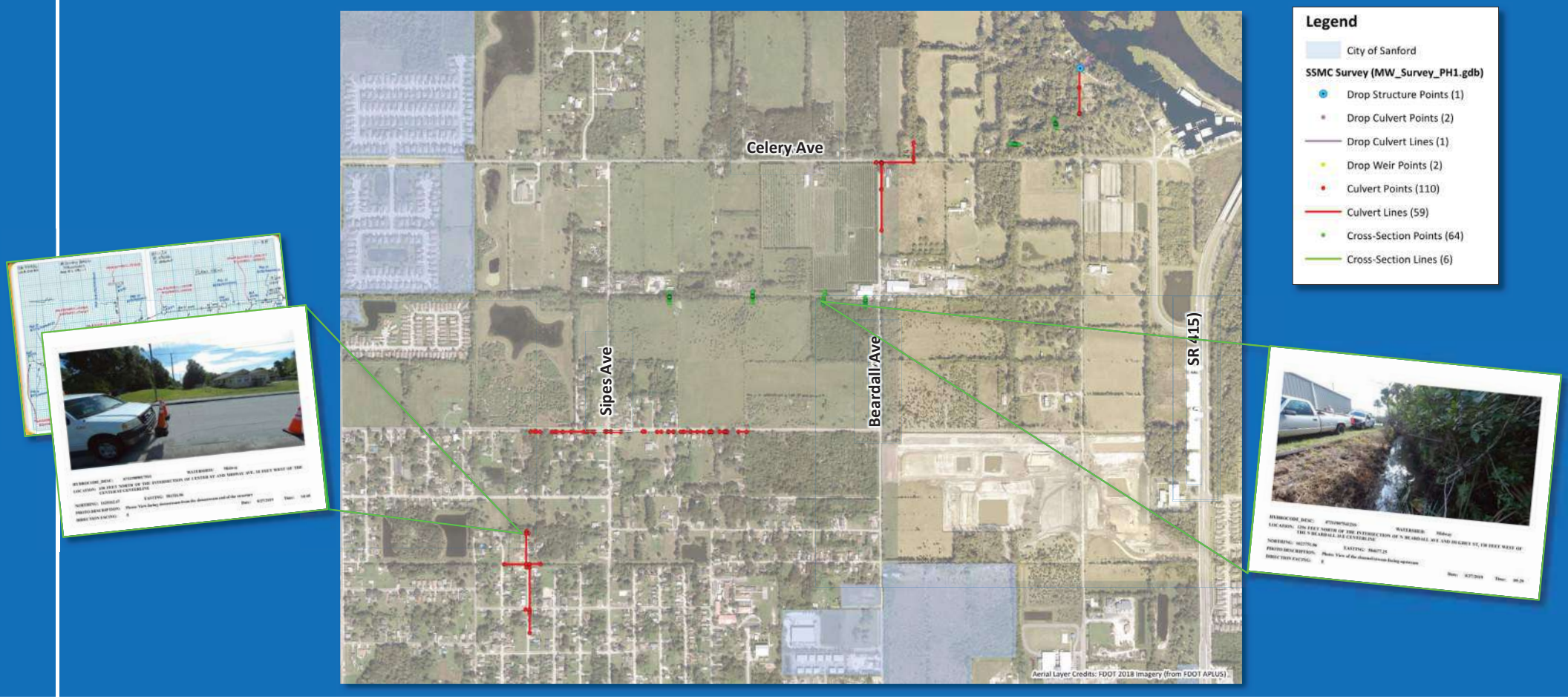
1997 CADD Linework

- BASIN
- FLOWARROWS
- SUB-BASINS

Field Verification Efforts

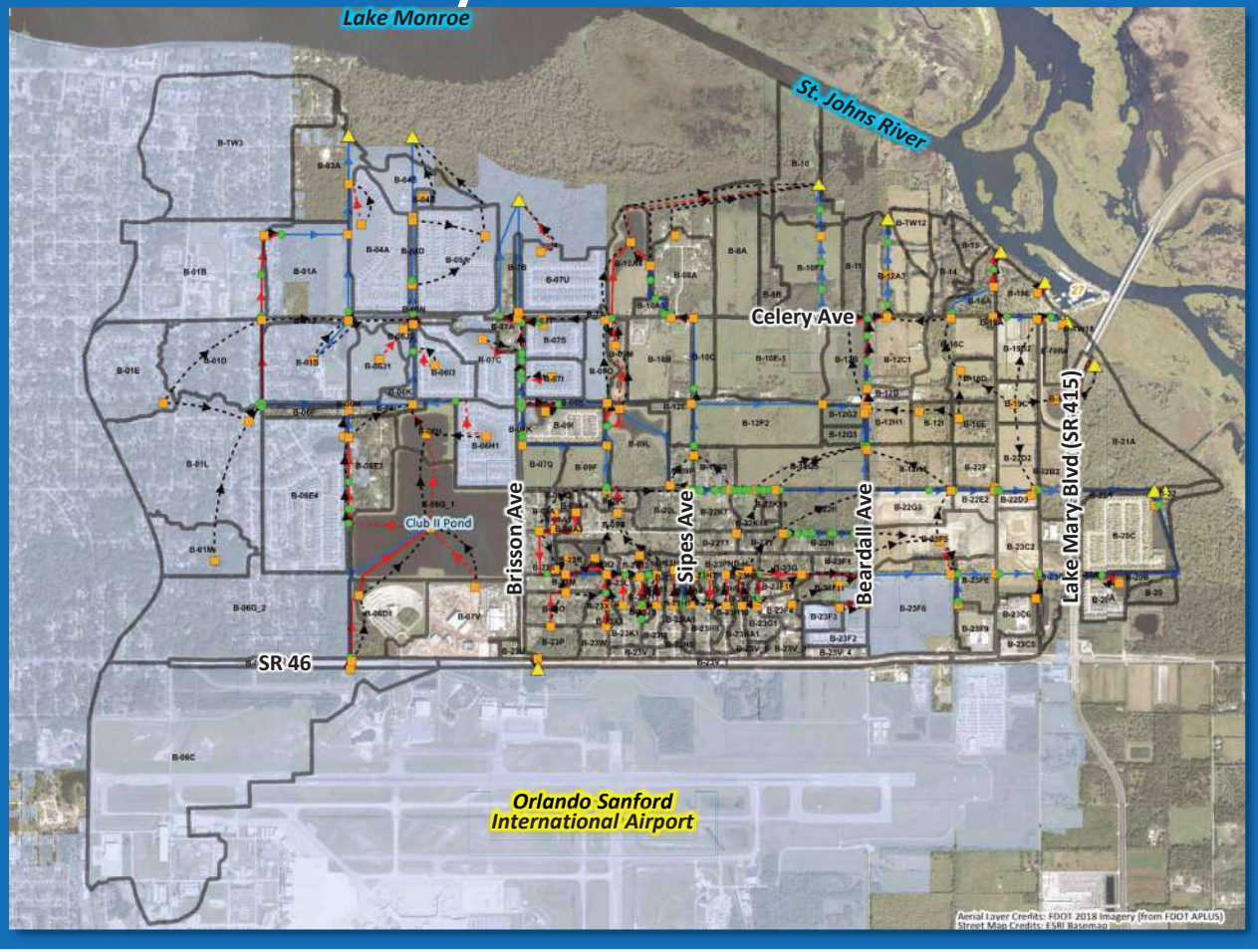
- Confirm drainage patterns and contributing areas
- Field inspection of drainage infrastructure
- Inspect reported flooding problem locations
- Subconsultant Southeastern Surveying
  - Culverts/Pipes
  - Drainage Structures (inlets and manholes)
  - Channel cross-sections (canals, ditches)
  - Photo documentation
  - Limited Conditions Assessment

Survey Obtained (To Address Data Gaps)



Existing Conditions Analysis

- Develop Existing Conditions Model
- Evaluate performance of drainage systems
- Storm events up to 100-year/24-hour

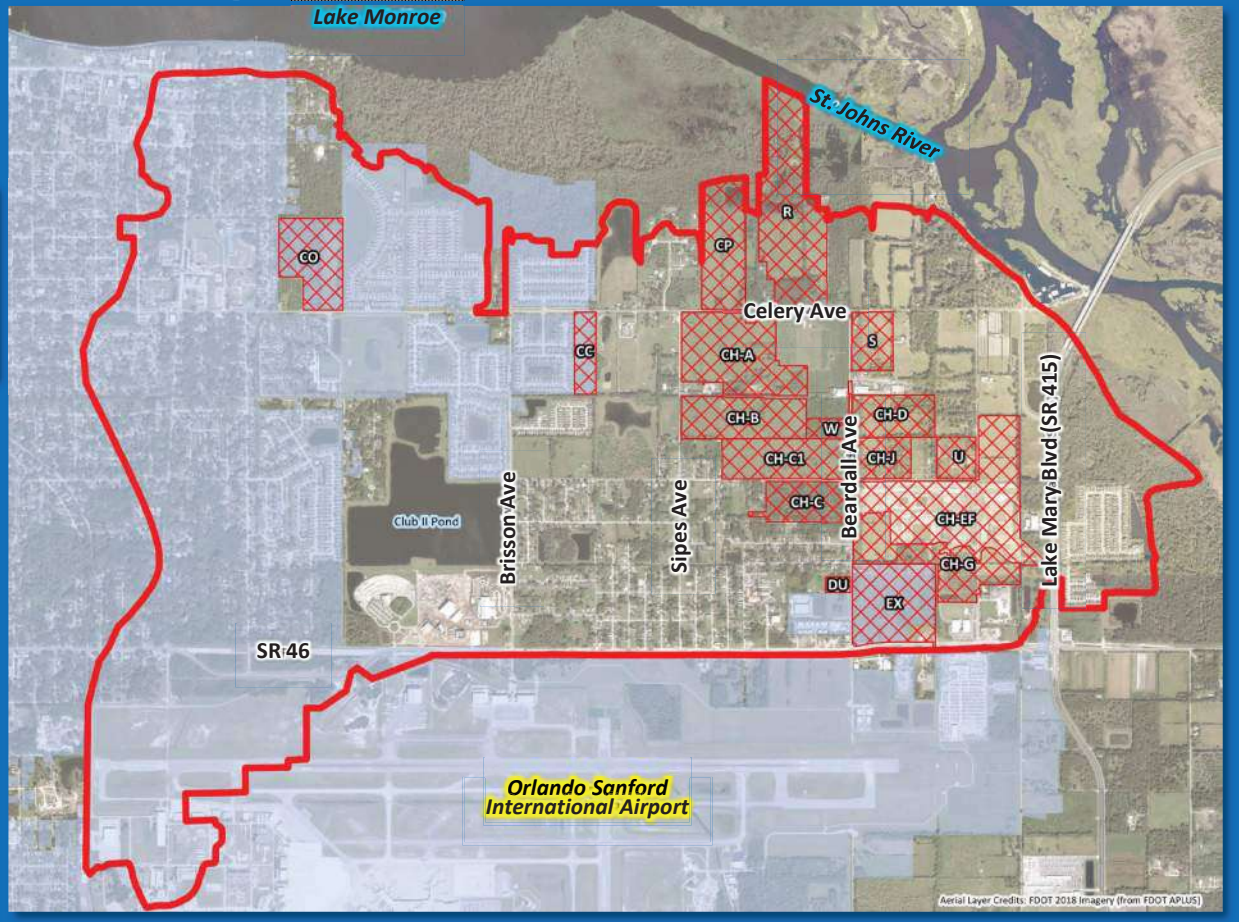


Planned/Ongoing Development

Plans Reviewed*

- Cameron Heights (CH-A-F, J)
- Riverbend (CH-G)
- Celery Cove (CC)
- Celery Oaks (CO)
- Celery Pointe (CP)
- Danus Utilities (DU)
- Extruders (EX)
- Riverside Oaks (R)
- Suntera Park (S)
- United Infrastructure Group (U)
- Office/Warehouse (W)

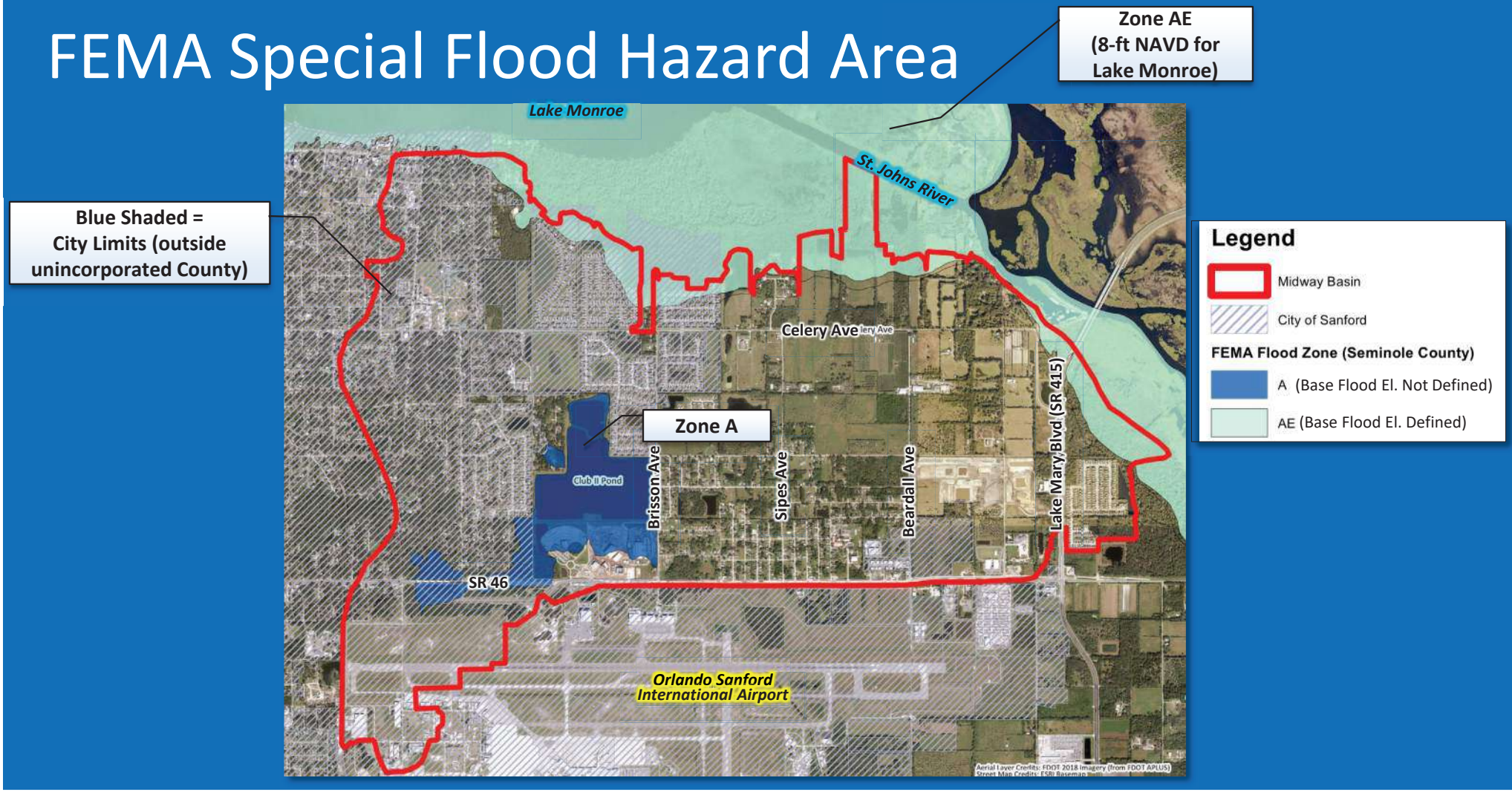
*Based on approved plans obtained from County and/or ERPs. Current names of development may differ from those reviewed.



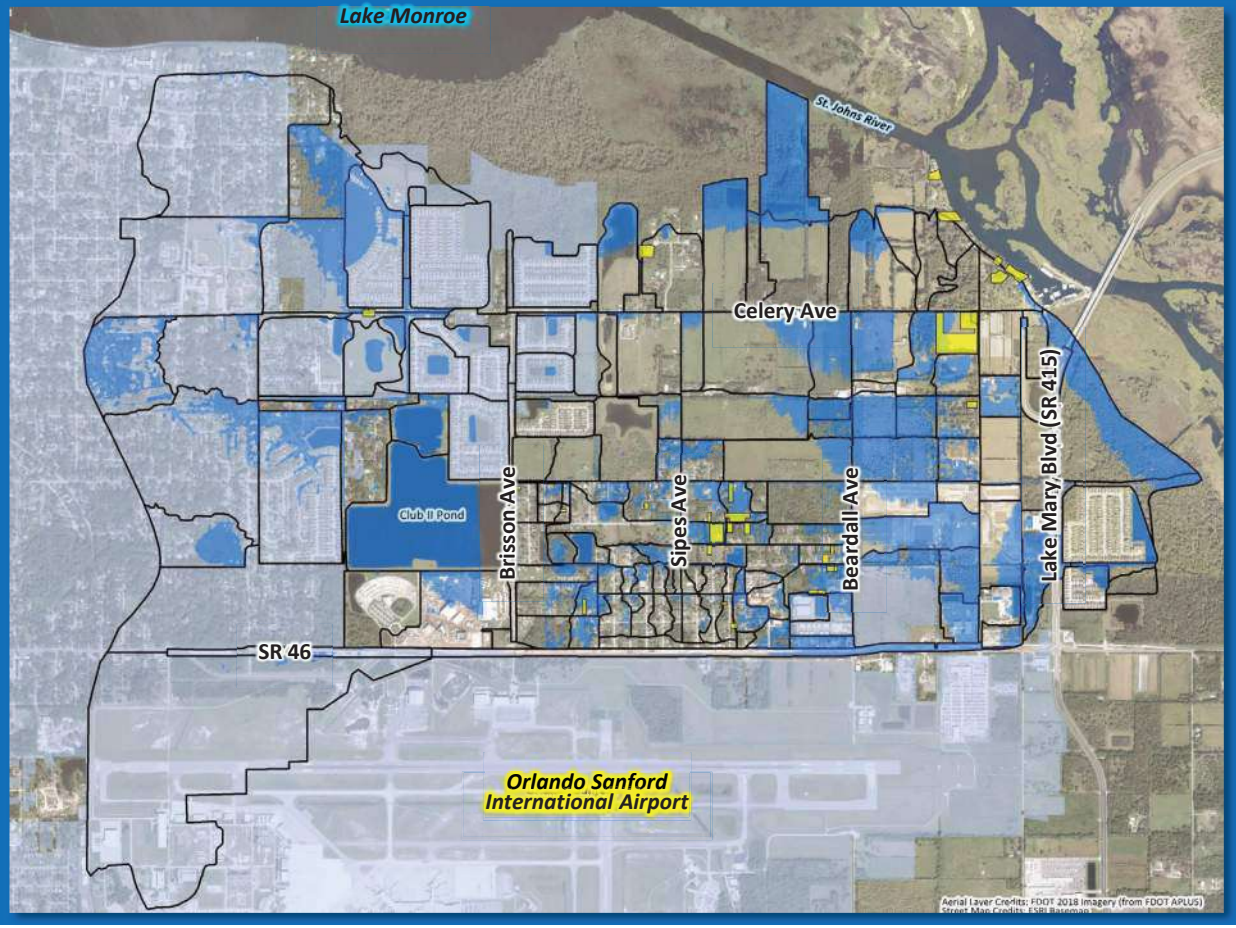
Floodplain Mapping

- Current FEMA Floodplains
  - Within Midway Basin, Zone A in areas proximal to the Club II Pond
  - Majority of the unincorporated County outside FEMA 100-year
  - Many improvements/development not mapped
- Updated/Modeled Floodplains
  - Includes additional areas in unincorporated Seminole County
  - Include new ponds/new development
  - Floodplain delineated based on plans and collected data where topographic voids

FEMA Special Flood Hazard Area



Floodplain Mapping – Existing Conditions Modeling

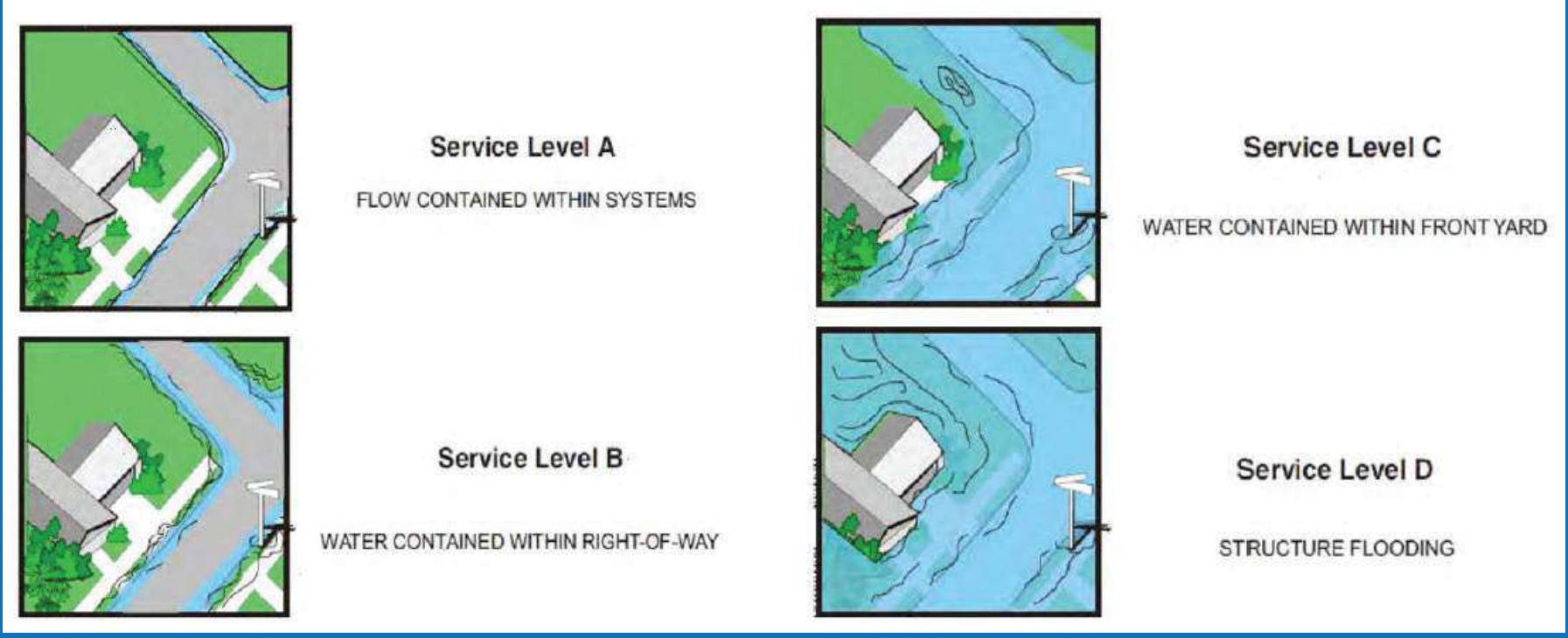


Proposed Flood Improvement Locations

- 5 areas selected for further evaluation
- 4 of these areas selected for recommended improvements
  - Observed/reported flooding and validated model results
  - Improve flood control level-of-service to greatest extent practicable
  - Evaluate opportunities for water quality improvement
  - Constructability/permitability
  - Public benefit and impact
  - Capital and maintenance costs
- Aside from recommended purchase of vacant parcels for storage pond construction, all improvements proposed in existing County Rights Of Way (R/W) to improve level-of-service within R/W.

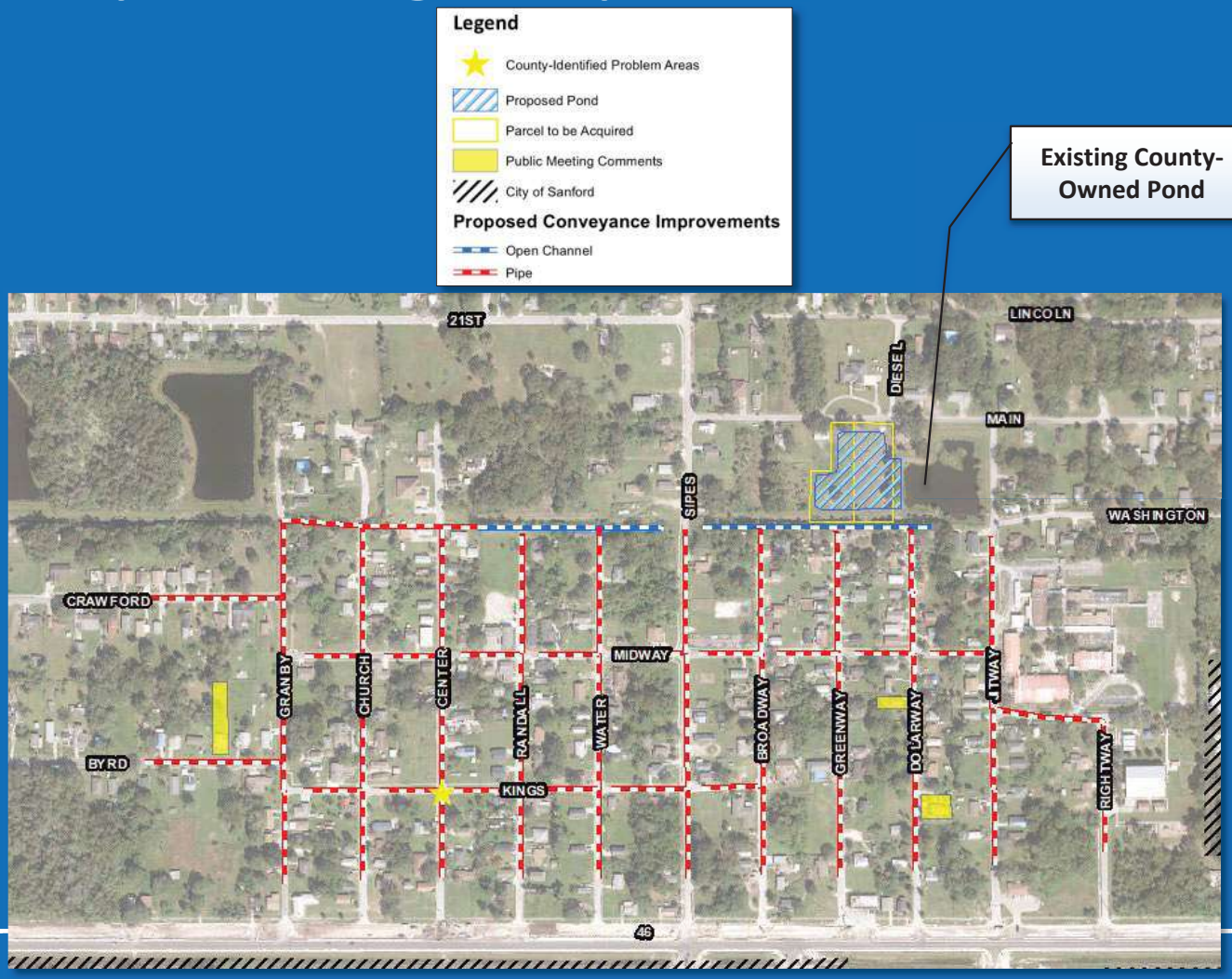
Flood Control Level-of-Service Improvement

- Goal to improve “C” or “D” model nodes to “A” or “B”



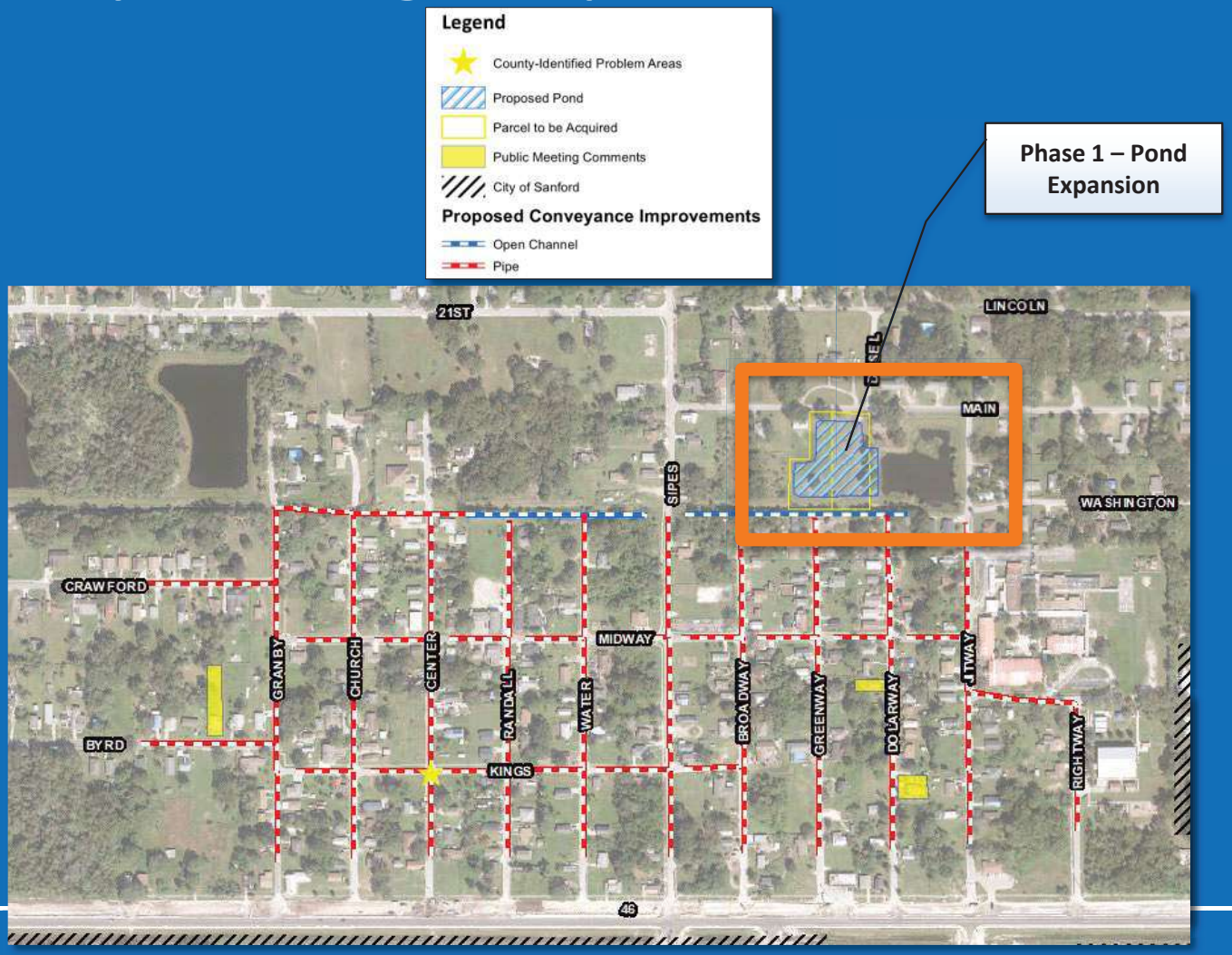
Midway Community Drainage Improvements (Alternative 1)

- Frequent street flooding (Kings and Center)
- Limited conveyance capacity
- Four phases of improvements proposed



Midway Community Drainage Improvements (Alternative 1)

- Phase 1 – Expand pond at Washington and Jitway
- Benefits
  - Flood storage
  - Water Quality
  - Permitability of other phases



Midway Community Drainage Improvements (Alternative 1)

- Phase 2 – Childers Ditch Improvements
- Improve conveyance to pond

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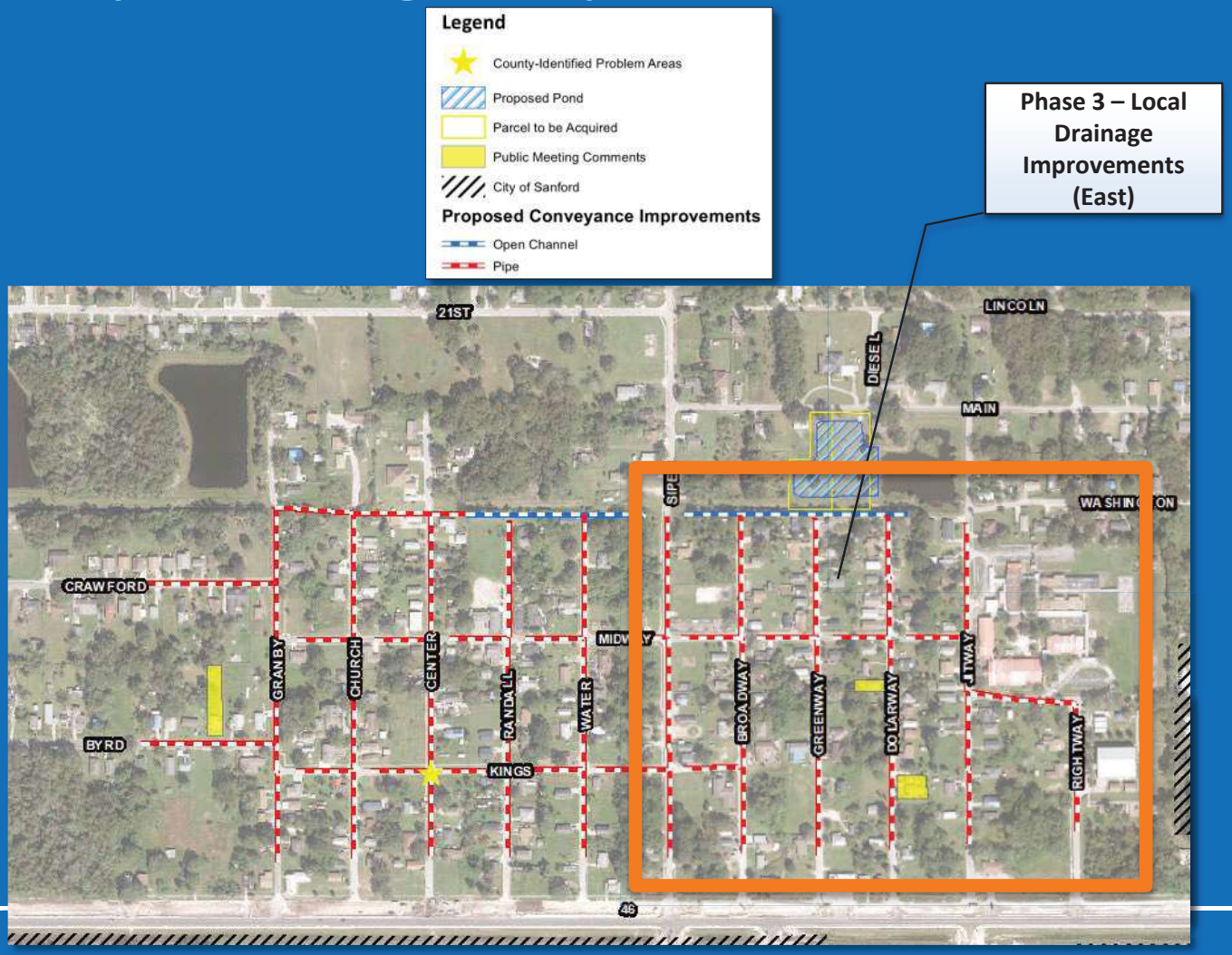
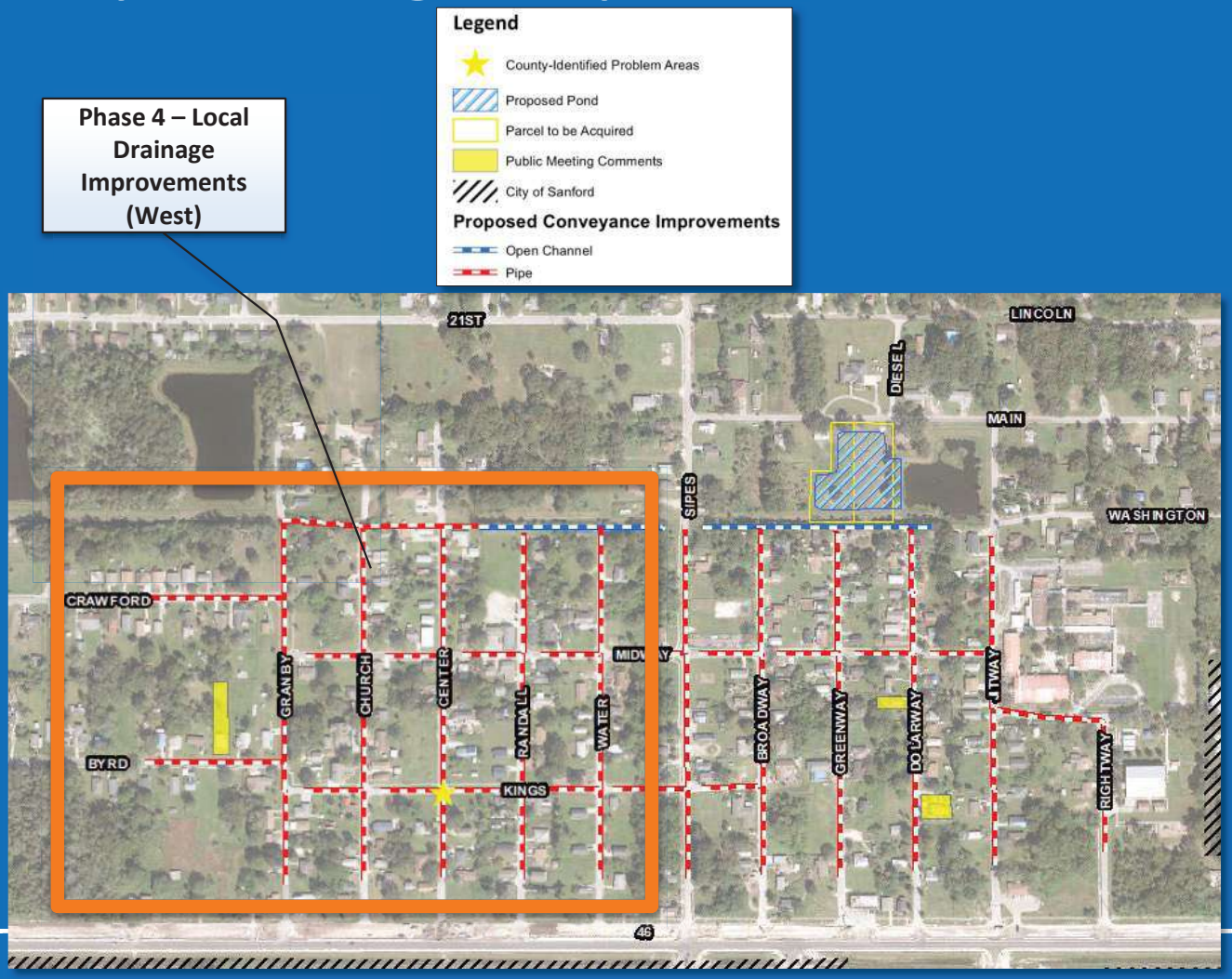
- Phase 3 – Local drainage improvements east of Sipes Avenue
- Directly address street flooding within County R/W only



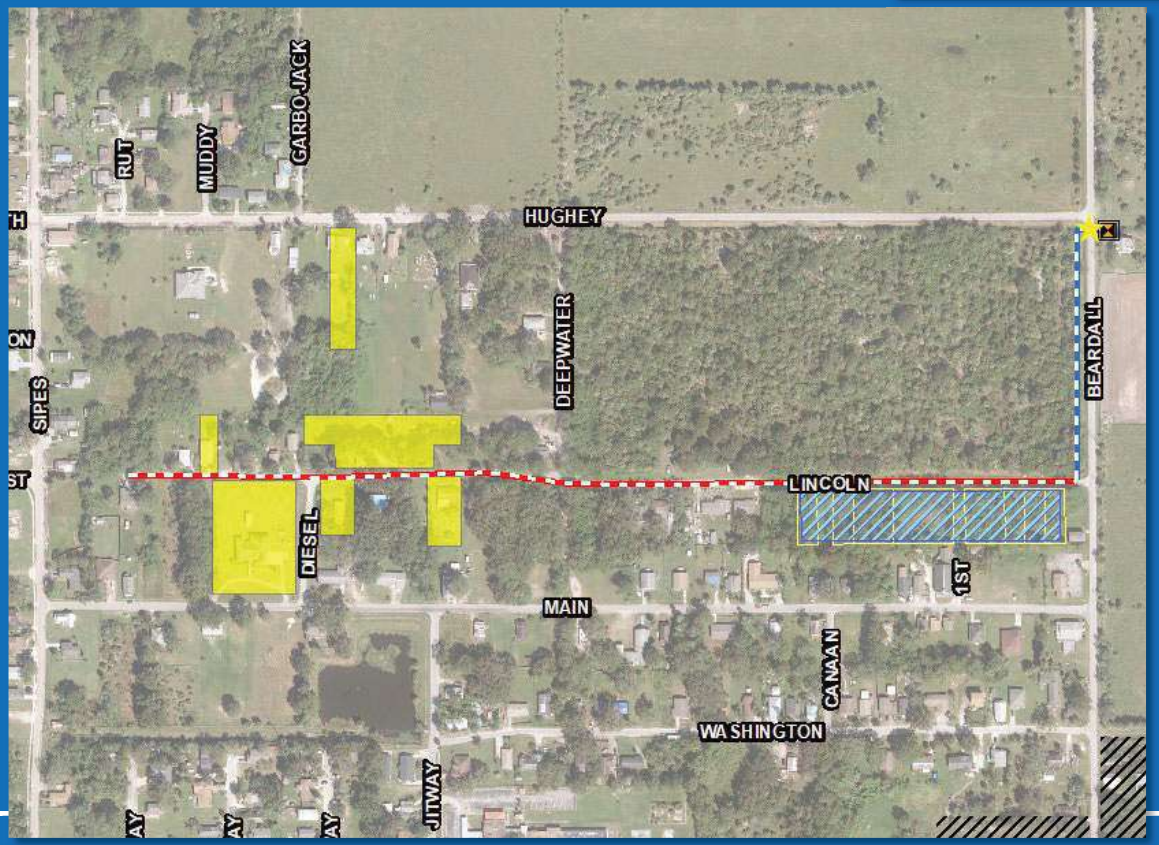
Midway Community Drainage Improvements (Alternative 1)

- Phase 4 – Local drainage improvements west of Sipes Avenue
- Overall project cost estimated at $7.4 million
- County pursuing CDBG funds to implement



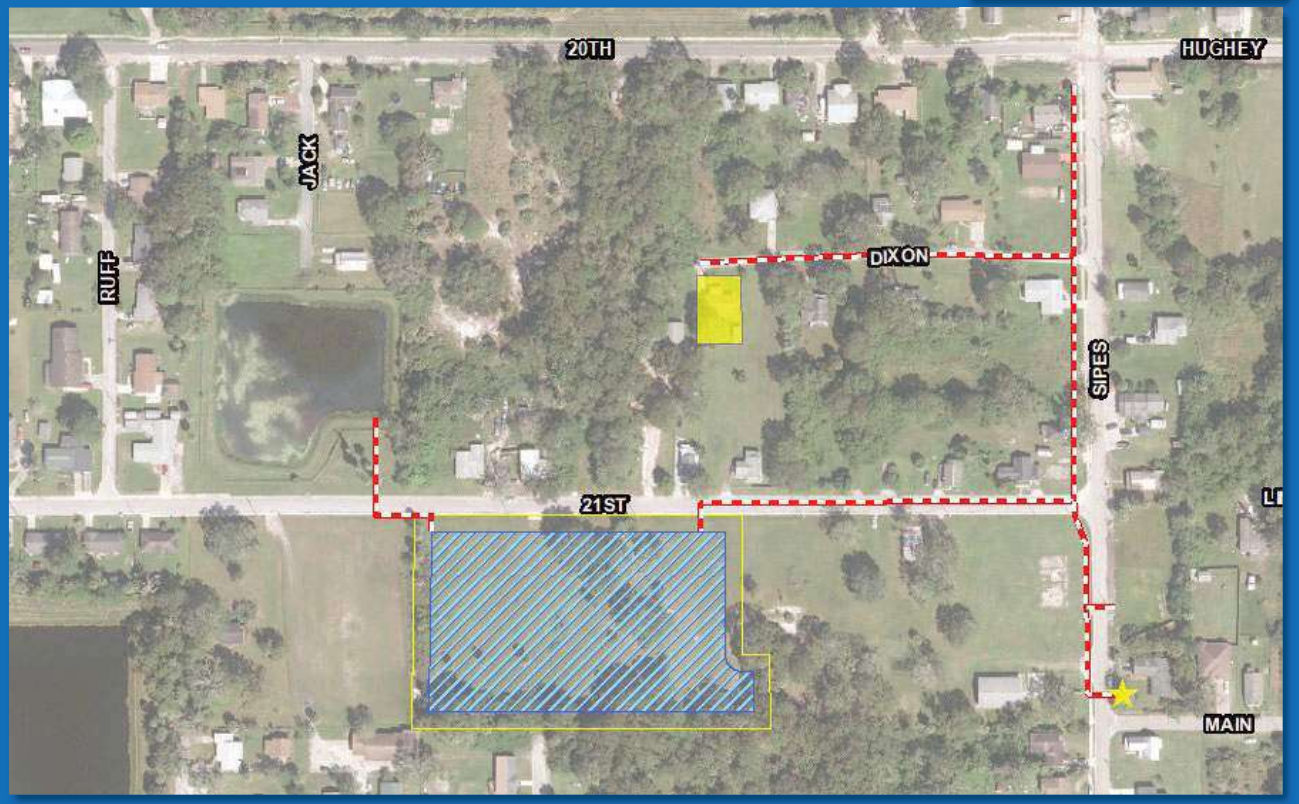
Lincoln Street Drainage Improvements (Alternative 2)

- Several flood complaints
- Lack of existing drainage
- Conveyance, storage, water quality improvements
- Cost estimated at $2.0 million



21st Street Drainage Improvements (Alternative 4)

- Resident flood complaints; County knowledge
- Existing pond undersized
- Conveyance and storage improvements
- Cost estimated at $2.1 million

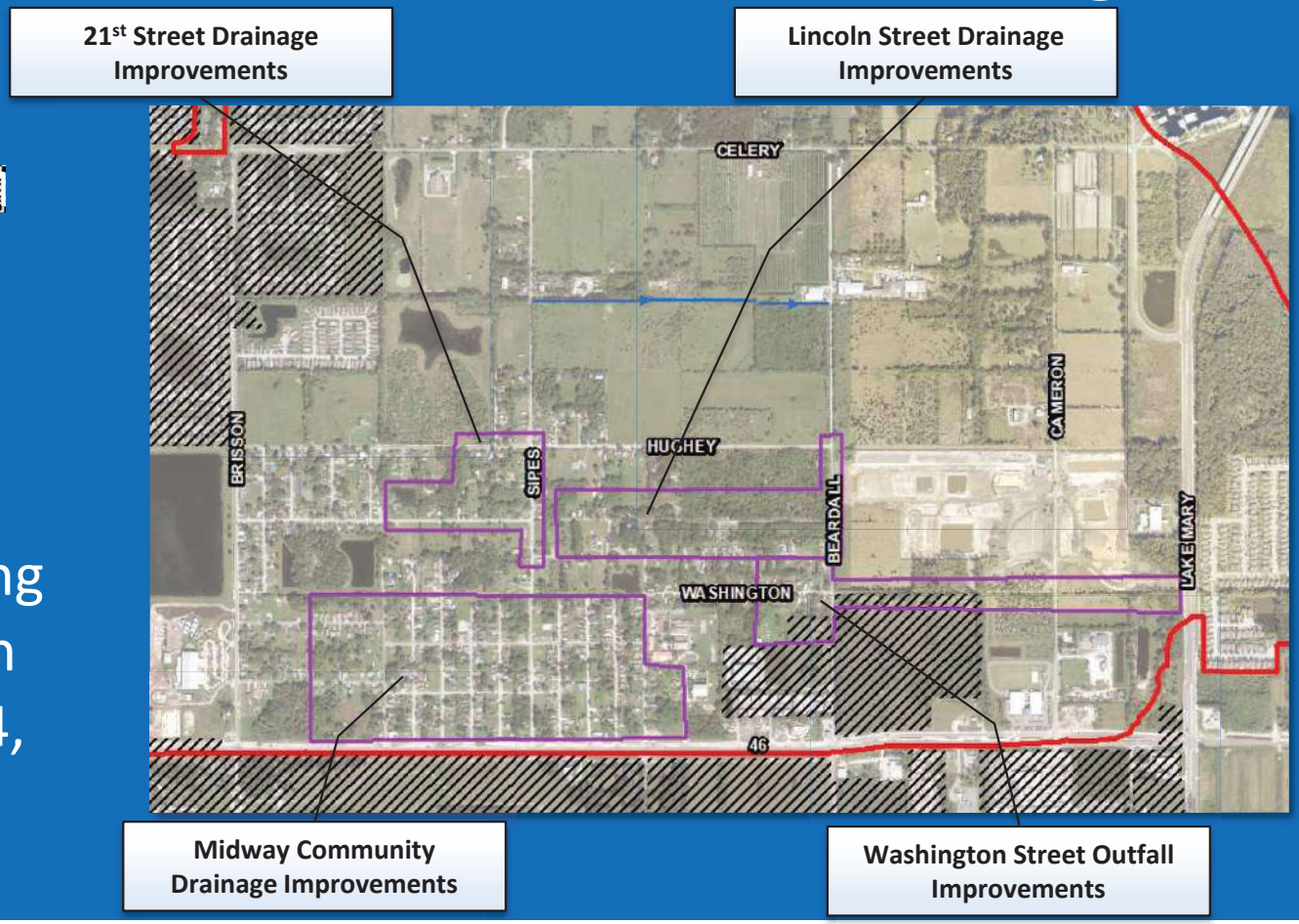


Washington Street Outfall Improvements (Alternative 5)

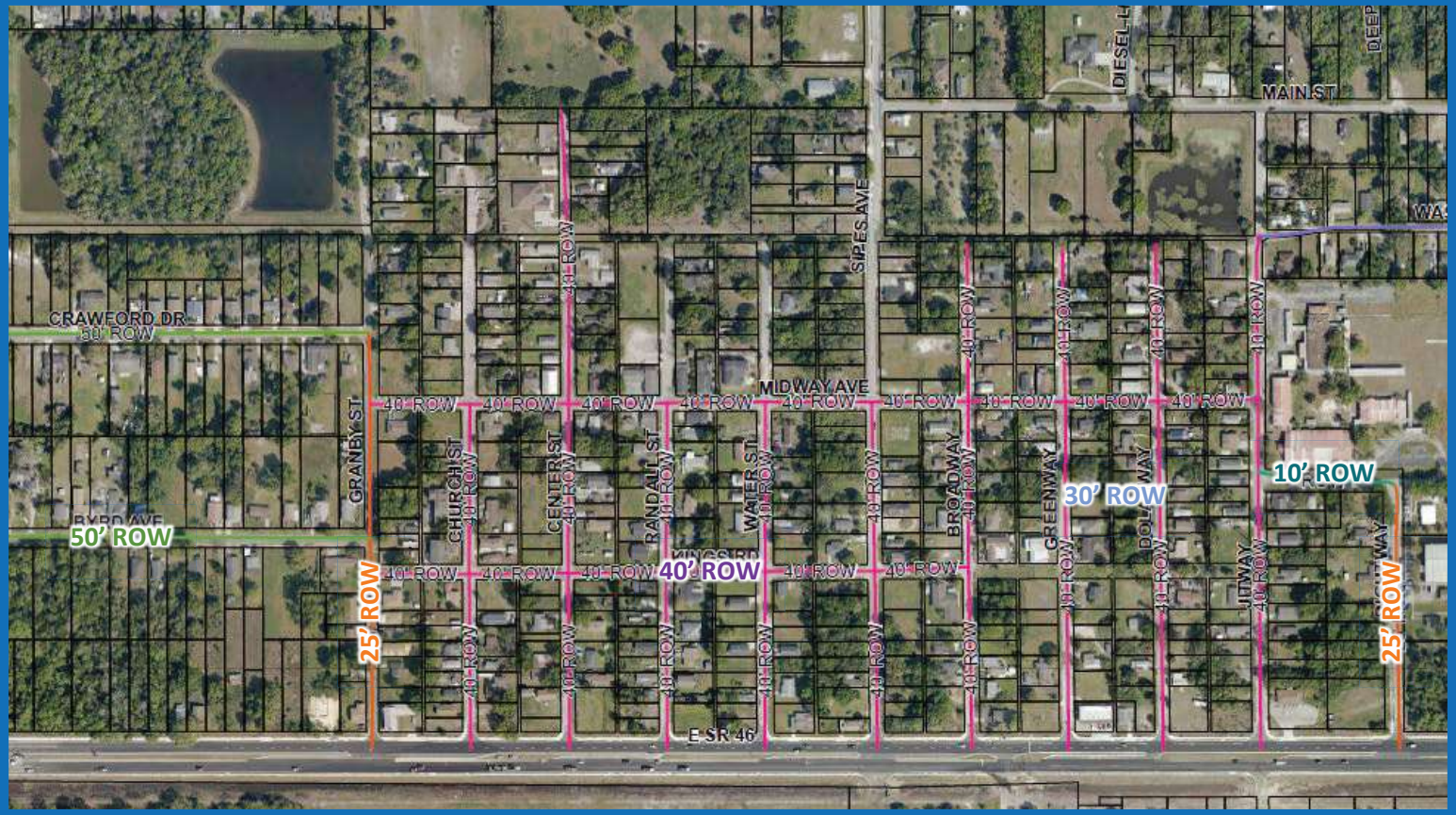
- Resident flood complaints; verified with model
- Improve outfall capacity
- Conveyance and storage improvements
- Cost estimated at $1.6 million

Proposed Improvements and Grant Funding

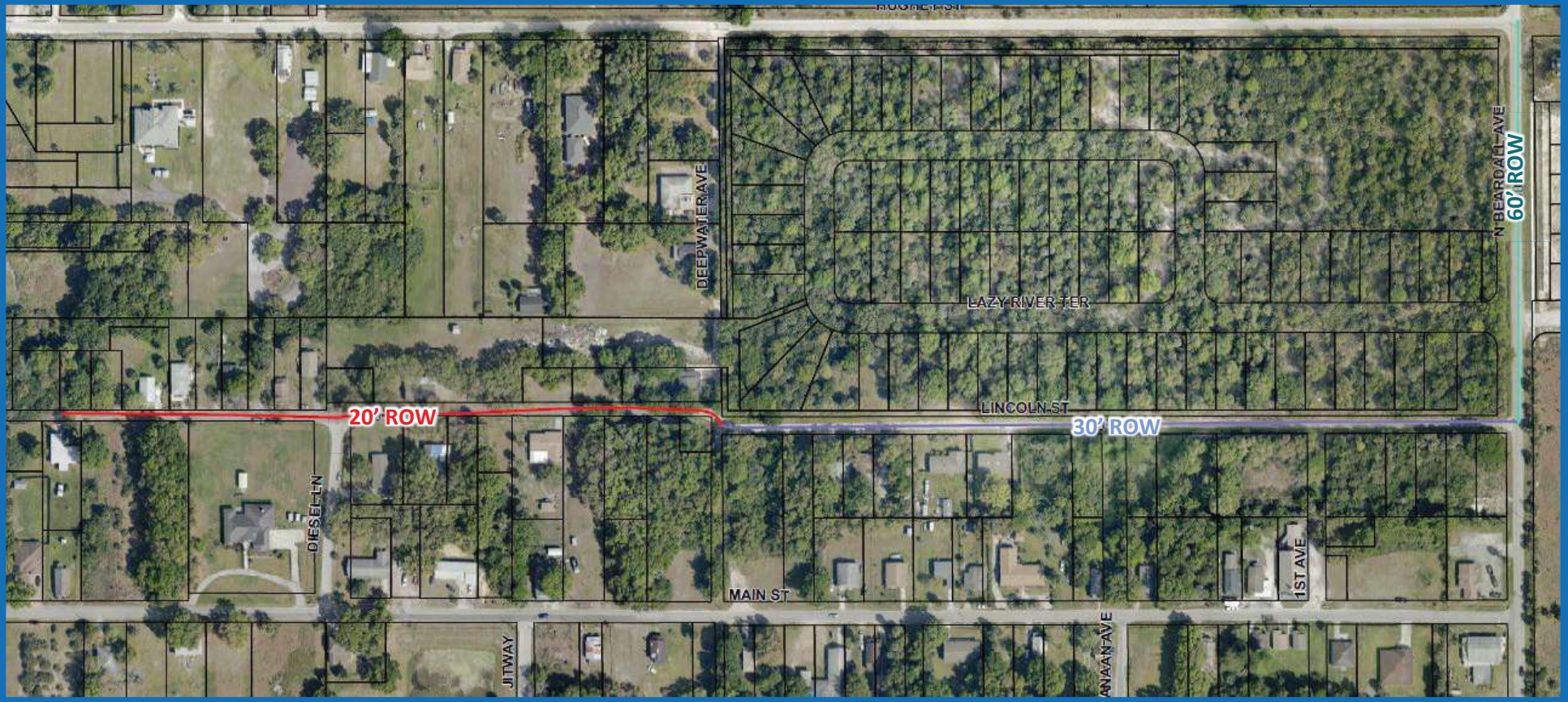
- Total: $13.1M
  - Midway: $7.4M
  - Lincoln: $2.0M
  - 21st: $2.1M
  - Washington: $1.6M
- County submitting CDBG application by September 14, 2020.



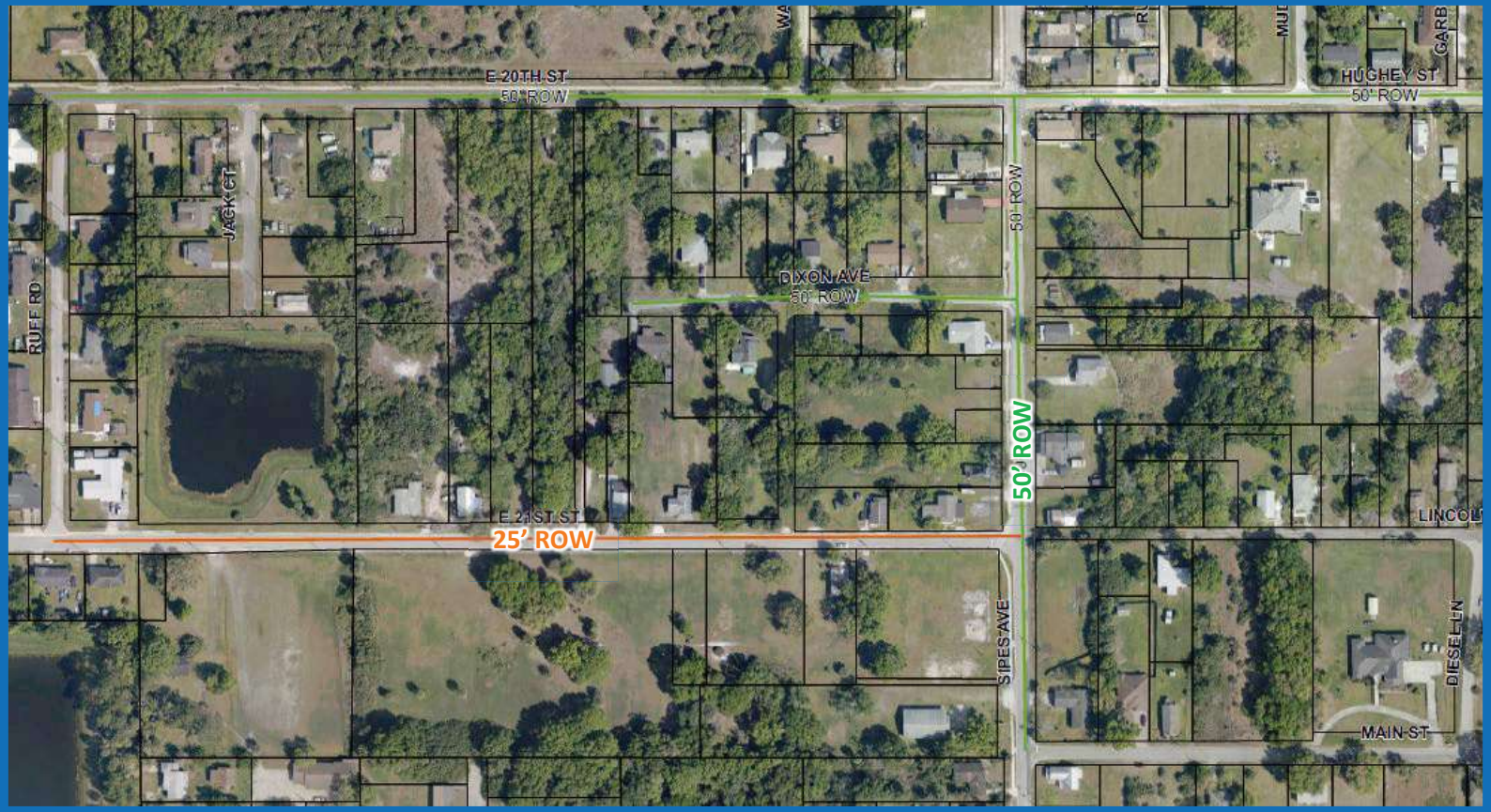
Existing Street Right-of-Way – Alternative 1



Existing Street Right-of-Way – Alternative 2



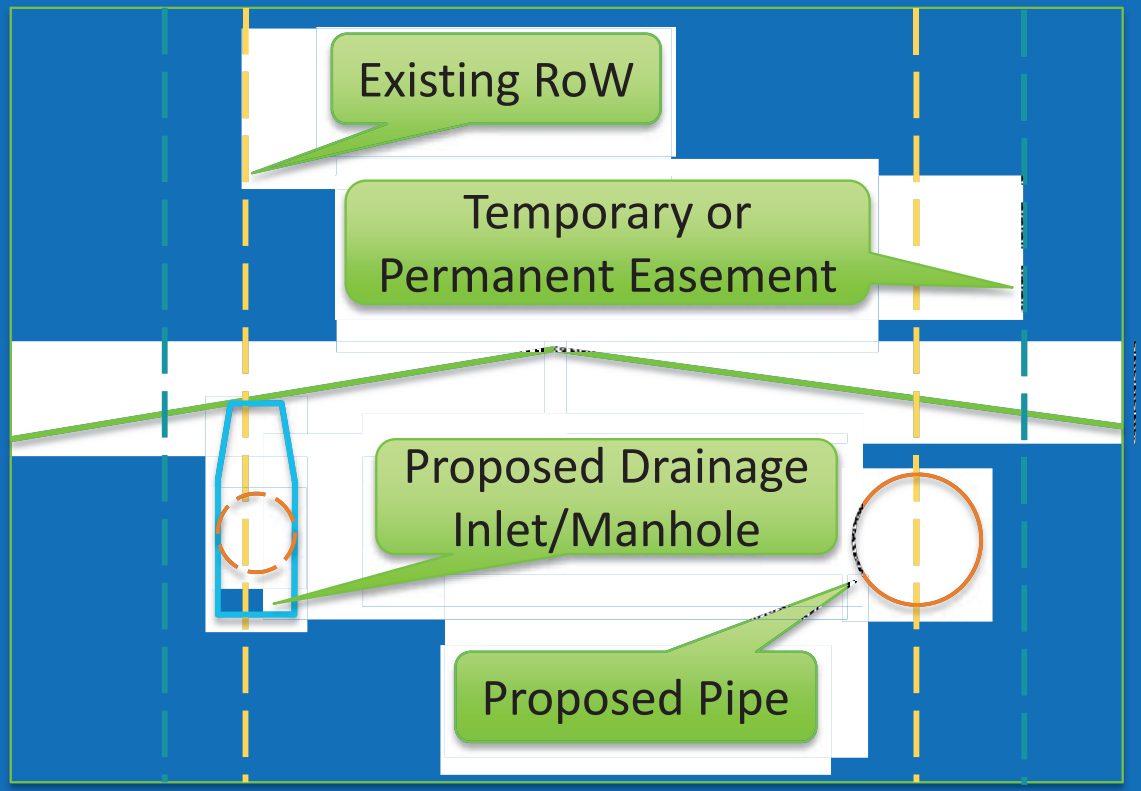
Existing Street Right-of-Way – Alternative 4



Existing Street Right-of-Way – Alternative 5

Right-of-Way Requirements (If Needed)

- Limited County RoW in project areas presents challenge
- Intent to construct entirely within R/W where possible (most cases)
- In restricted R/W, temporary or permanent easements may be necessary to construct (see exhibit to right)



Project Status and What's Next

- Completed
  - Initial Public Meeting (June 25, 2019)
  - Existing Conditions Analysis
  - Future Conditions Analysis
  - Improvement Alternative Analysis
  - Floodplain Mapping
  - Draft Report
- Current: Final Public Meeting
- Next Steps
  - BOCC Meeting
  - Final Report (estimated December 2020)

Ways to Provide Your Comments

- During the Zoom virtual project update meeting on Tuesday, September 15, 2020 from 6:00 pm to 8:00 pm.
- Those unable to participate on Zoom meeting encouraged to attend broadcast at Midway Safe Harbor Center.
- Using the online “Feedback Form” on the project webpage www.seminolecountyfl.gov/cip01907081 (comments will be received through September 20, 2020)

Ways to Provide Your Comments

- **Ben Pernezny, P.E.**

  Consultant Project Manager
  CDM Smith
  Phone: (407) 660-6303
  Email: PerneznyBJ@cdmsmith.com

- **Tuan Huynh, P.E.**

  Seminole County Public Works
  Engineering Division
  Phone: (407) 665-5770
  Email: thuynh@seminolecountyfl.gov

Please include "Midway Basin – Public Feedback" in the email subject line.

Ways to Provide Your Comments

- **By Mail:**

  Seminole County Public Works Department
  Attn: Tuan Huynh, P.E. – Midway Basin
  Engineering Division
  100 East 1st Street
  Sanford, FL 32771

Acknowledgements

- **Seminole County Board of Commissioners**
- **Midway Coalition Community Leaders & Residents**
- **Seminole County Public Works Department**
- **CDM Smith**

Thank You

Midway Basin Engineering Study

Board of County Commissioners Presentation

Ben Pernezny, PE

November 2020

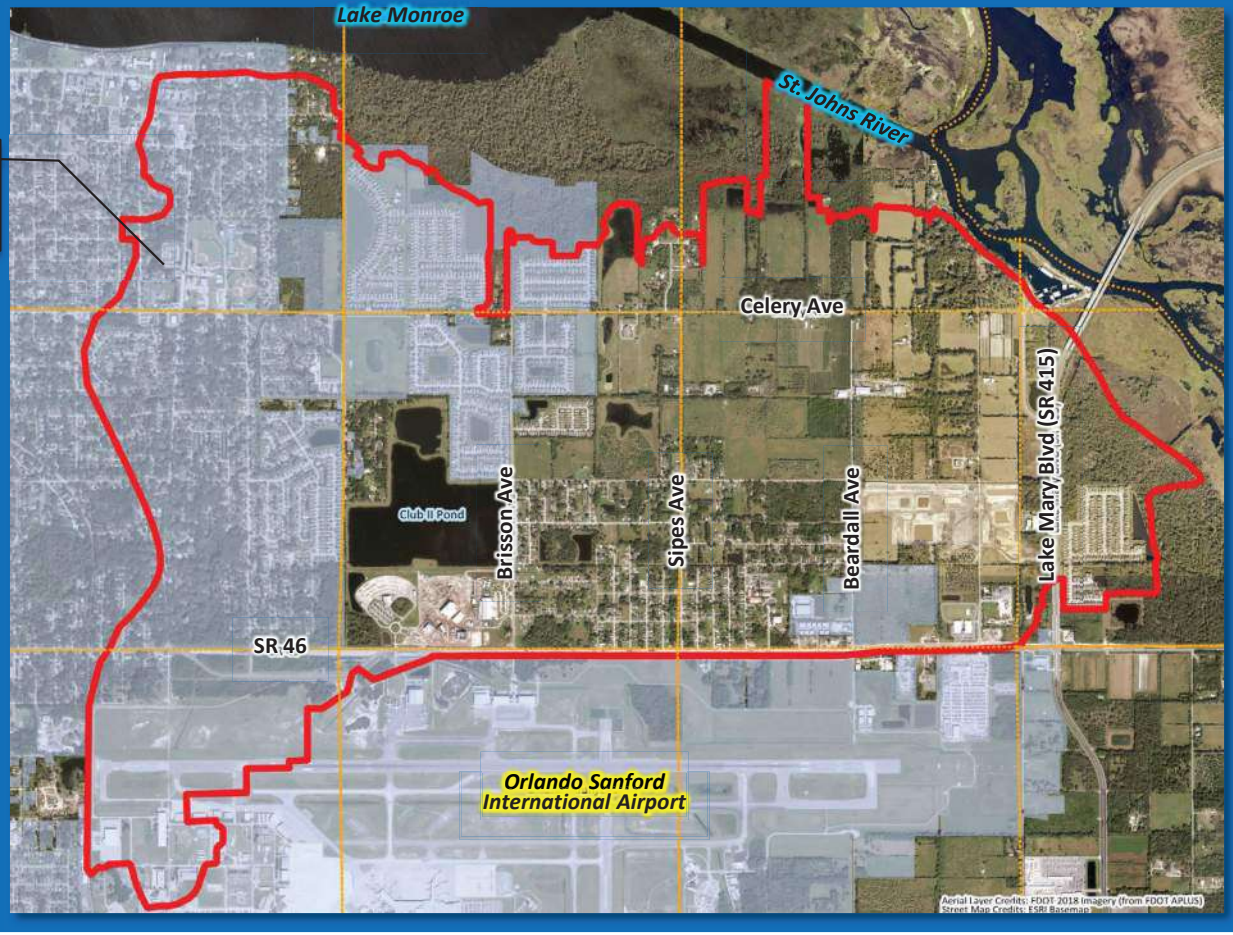
CDM Smith

Presentation Goals

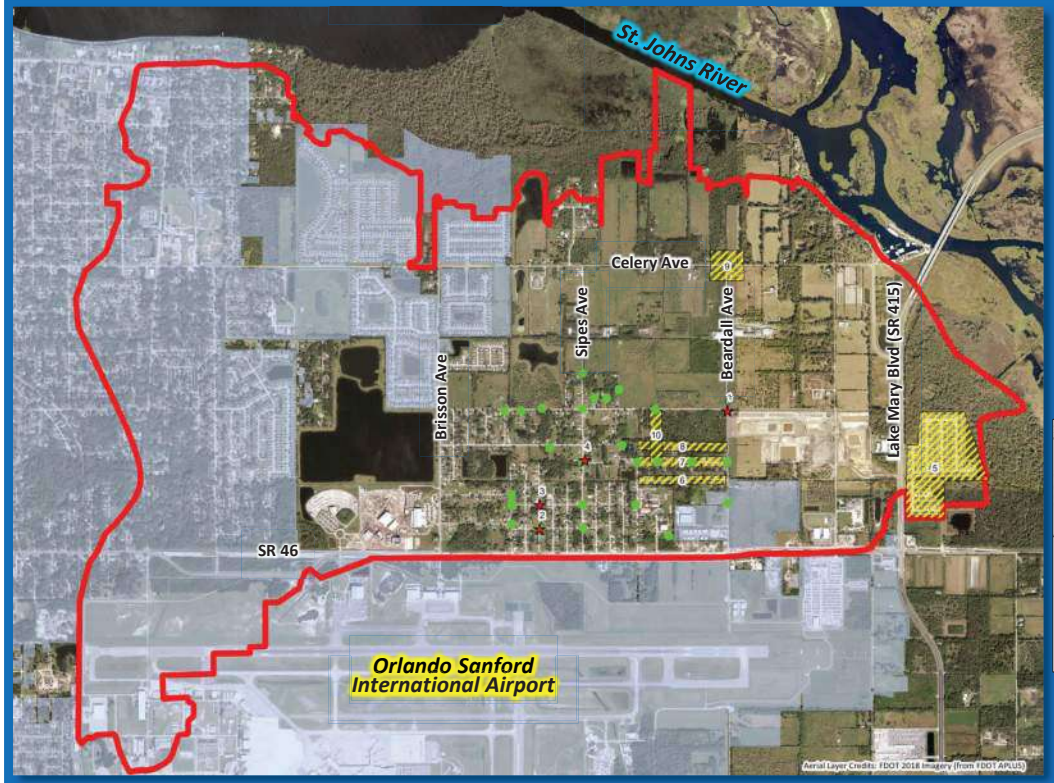
- Project Overview
- Share Study Results
- Present Flood Improvement Projects
- Discuss input from residents and stakeholders
- Ongoing evaluation and next steps

Midway Basin Location

Blue Shaded = City Limits (outside unincorporated County)



Midway Basin Flooding Impacts



Legend

- Midway Basin
- City of Sanford
- 2019 Field Recon Problem Areas
- Locations Previously Identified by Residents*
- Flood Prone Areas (Identified in 2018 SWMP)

Source	Description
2019 Field Recon/County Maintenance Staff Input	Outfall ditch typically contains lots of debris; box culvert at Beardall clogged during Irma, with water flowing over Beardall and backing up to Sipes. No issues when cleared of debris.
	County reports undersized/damaged pipes and inlets at this intersection resulting in frequent nuisance flooding.
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	Buried side drain restricting drainage to the north causing nuisance flooding at this intersection.
2018 SWMP	Recurring flooding within the Sterling Meadows Subdivision along Klondike Place, Monte Cristo Way, Lone Eagle Place, Krueger Rand Cove, Bullion Loop, and Trommel Way.
	From Tropical Storm Fay, flooding occurred in the Canaan area, along Washington Street from Jitway to Beardall Ave.
	From Tropical Storm Fay, flooding occurred in the Canaan area, along Main Street from Jitway to Beardall Ave.
	From Tropical Storm Fay, flooding occurred in the Canaan area, along Lincoln Street from Jitway to Beardall Ave.
	From Hurricane Irma, flooding was observed near the intersection of Beardall Ave and Celery Ave.
	From Hurricane Irma, flooding was observed at Deepwater Avenue, just north of the Canaan area.

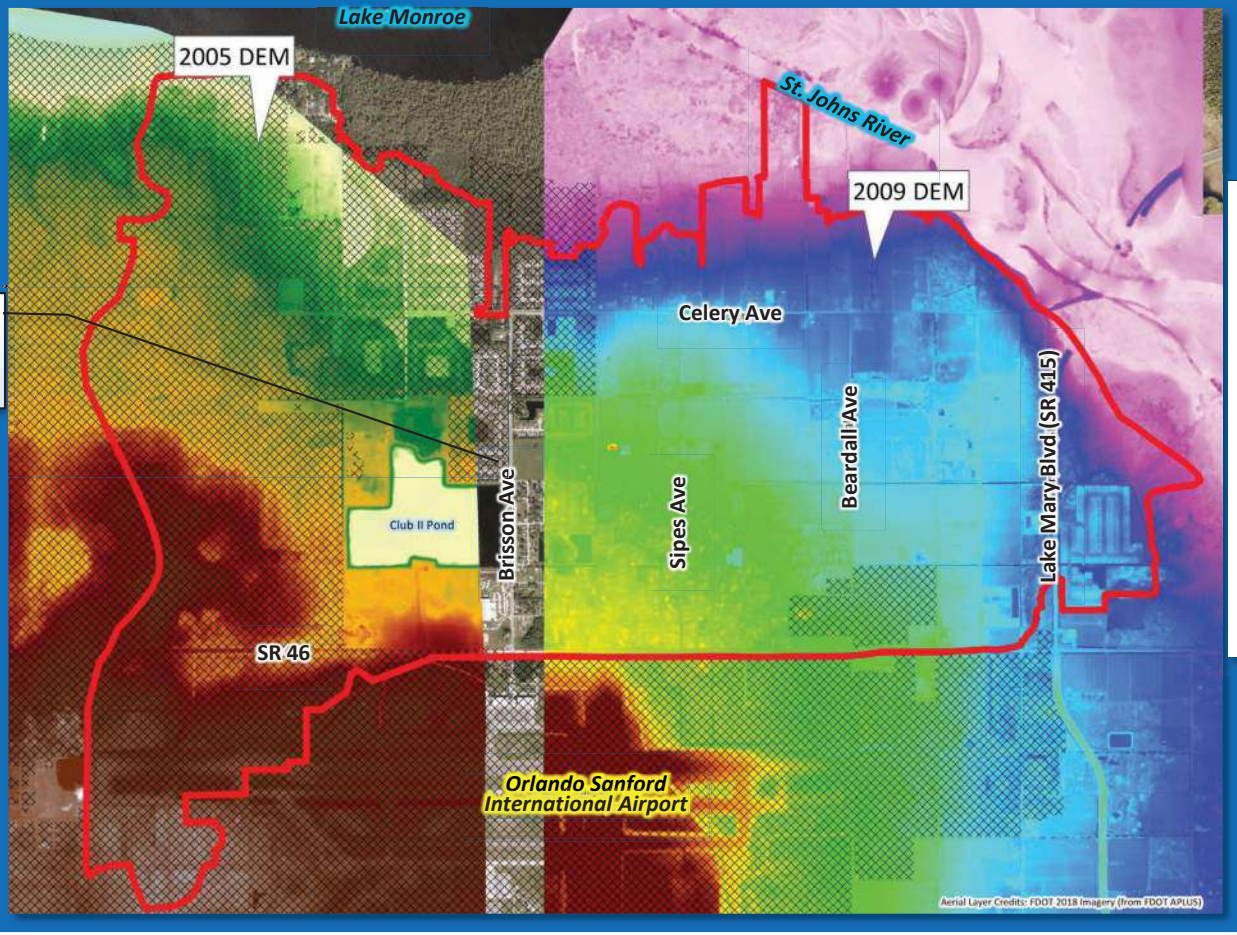
Project Purpose and Objectives

Within the **unincorporated areas** of the Midway Basin

- Assembly and Evaluation of Watershed Data
- Stormwater Model Development
  - 1997 Model
  - Existing and Future Conditions
- Identify and assess flooding problems
- Develop conceptual improvements to reduce flooding (LOS Improvement Alternatives Analysis)
- Establish 100-year floodplains
- Public Meetings to involve stakeholders

Topographic Elevation Data Obtained

Topographic Data Gap between 2005 DEM (West) and 2009 DEM (East)



Legend

- Midway Basin
- City of Sanford

DEM 2005

High : 71.5 feet

Low : 1.3

DEM 2009

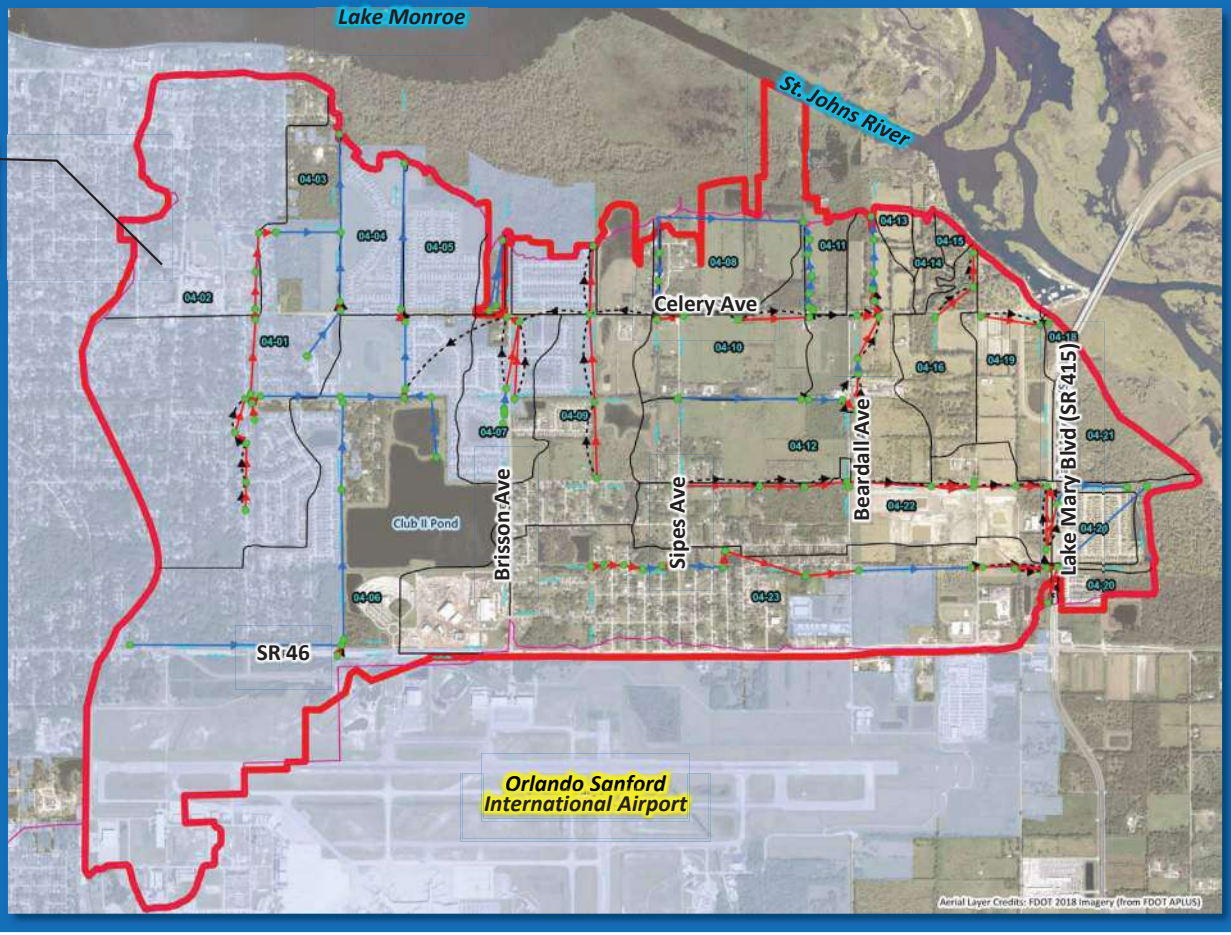
High : 59.9 feet

Low : -0.9

(DEM = Digital Elevation Model)

Existing 1997 Model (Approximated Schematic)

Blue Shaded = City Limits (outside unincorporated County)



Legend

- Midway Basin
- City of Sanford

1997 Model Connectivity

- CHANNEL
- PIPE
- WEIR
- ICPR_NODE (Approximated)

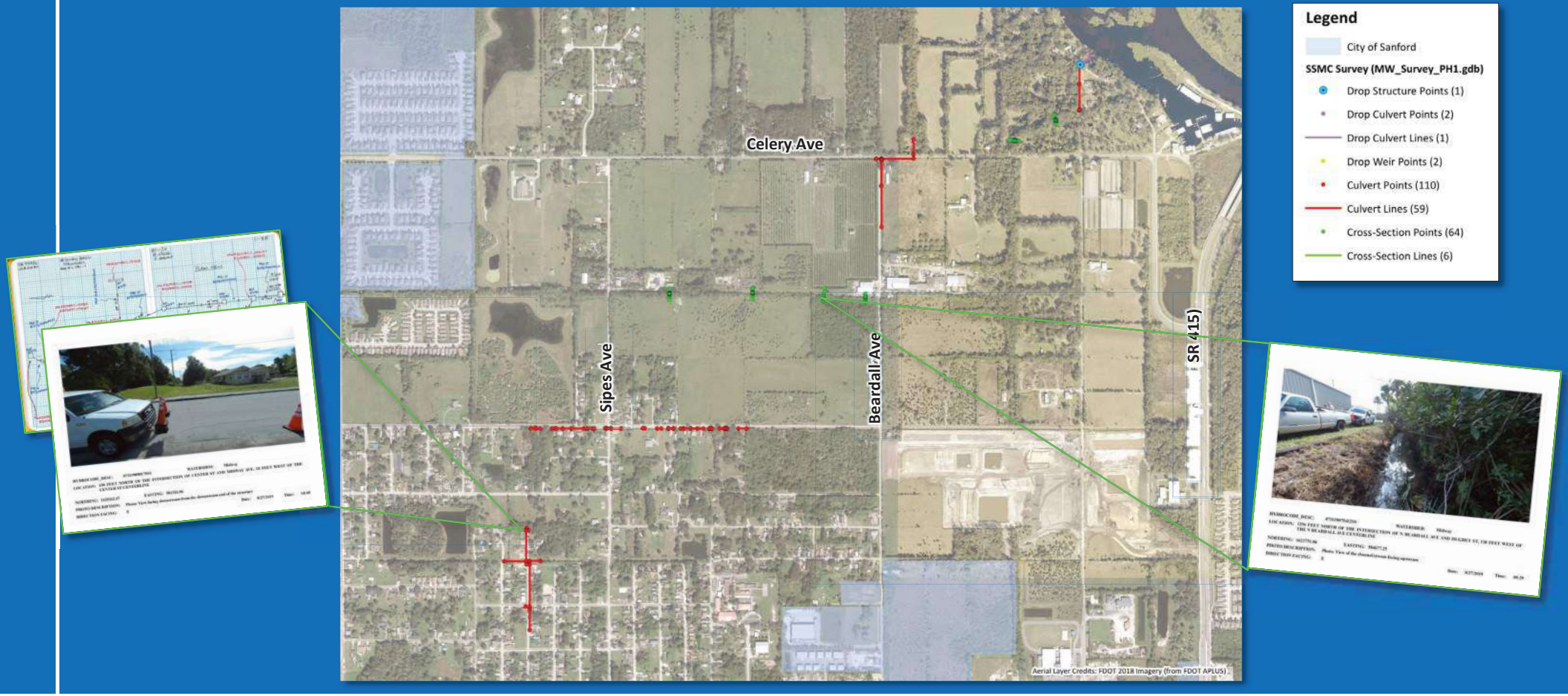
1997 CADD Linework

- BASIN
- FLOWARROWS
- SUB-BASINS

Field Verification Efforts

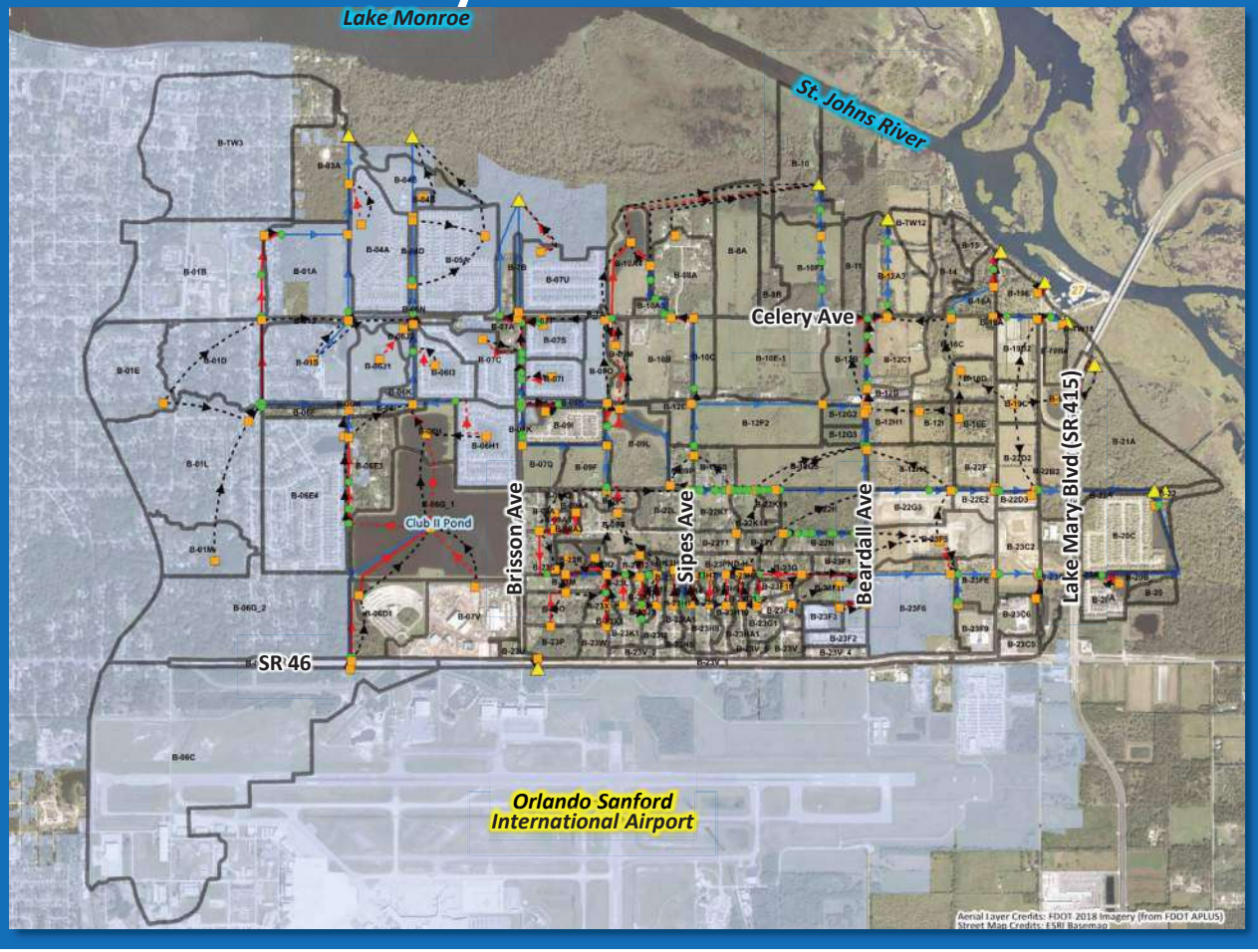
- Confirm drainage patterns and contributing areas
- Field inspection of drainage infrastructure
- Inspect reported flooding problem locations
- Subconsultant Southeastern Surveying
  - Culverts/Pipes
  - Drainage Structures (inlets and manholes)
  - Channel cross-sections (canals, ditches)
  - Photo documentation
  - Limited Conditions Assessment

Survey Obtained (To Address Data Gaps)



Existing Conditions Analysis

- Develop Existing Conditions Model
- Evaluate performance of drainage systems
- Storm events up to 100-year/24-hour

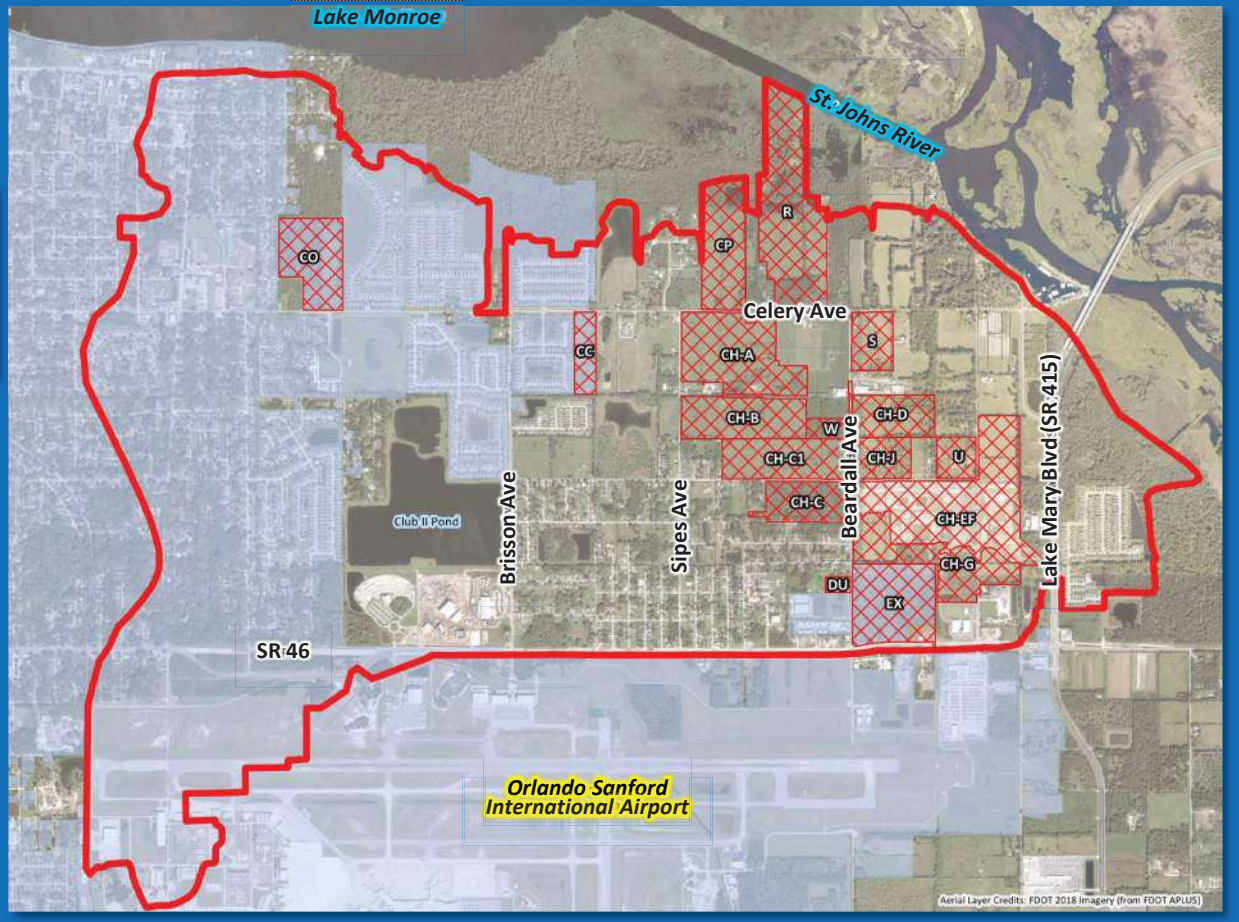


Planned/Ongoing Development

Plans Reviewed*

- Cameron Heights (CH-A-F, J)
- Riverbend (CH-G)
- Celery Cove (CC)
- Celery Oaks (CO)
- Celery Pointe (CP)
- Danus Utilities (DU)
- Extruders (EX)
- Riverside Oaks (R)
- Suntera Park (S)
- United Infrastructure Group (U)
- Office/Warehouse (W)

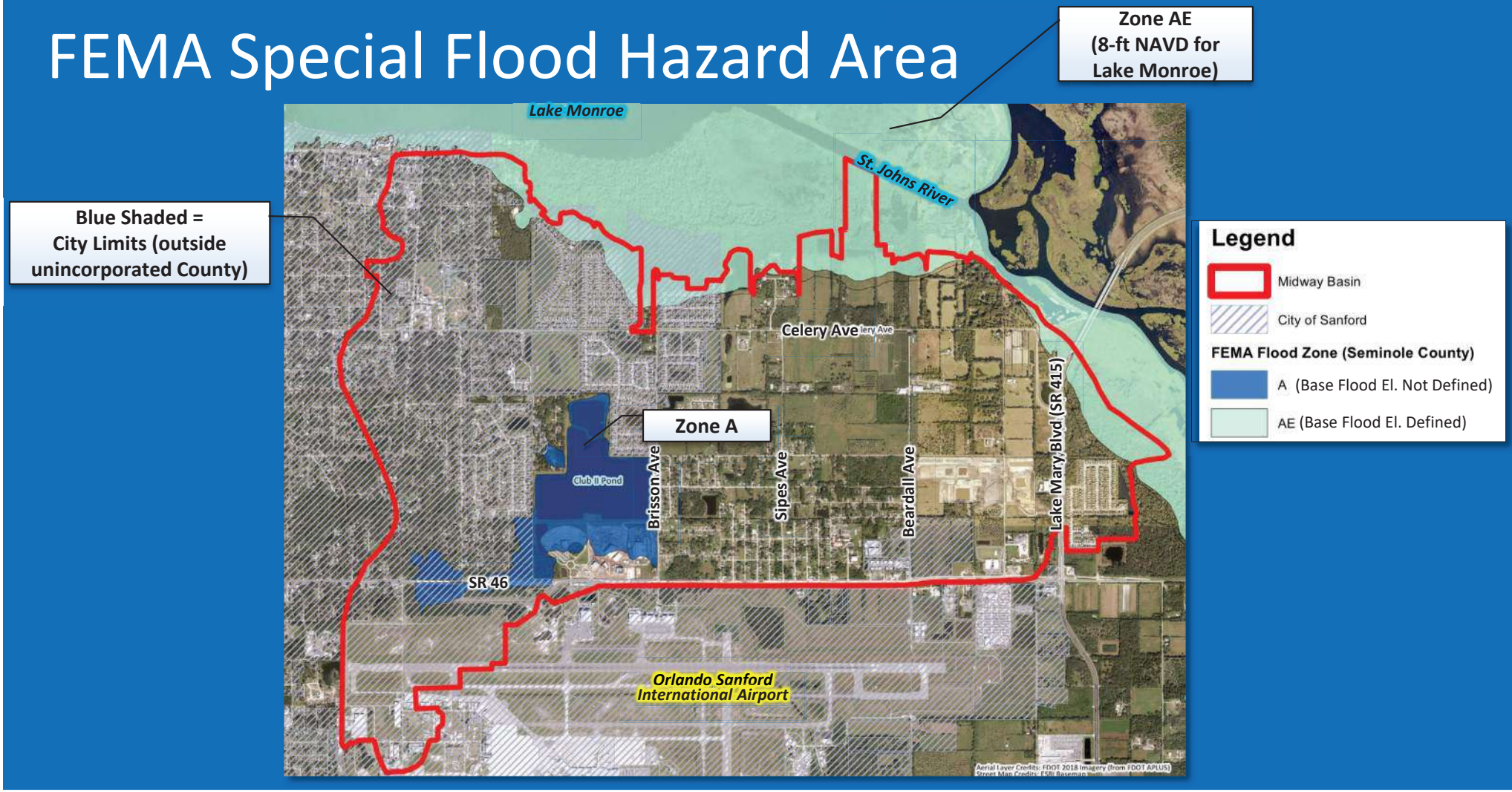
*Based on approved plans obtained from County and/or ERPs. Current names of development may differ from those reviewed.



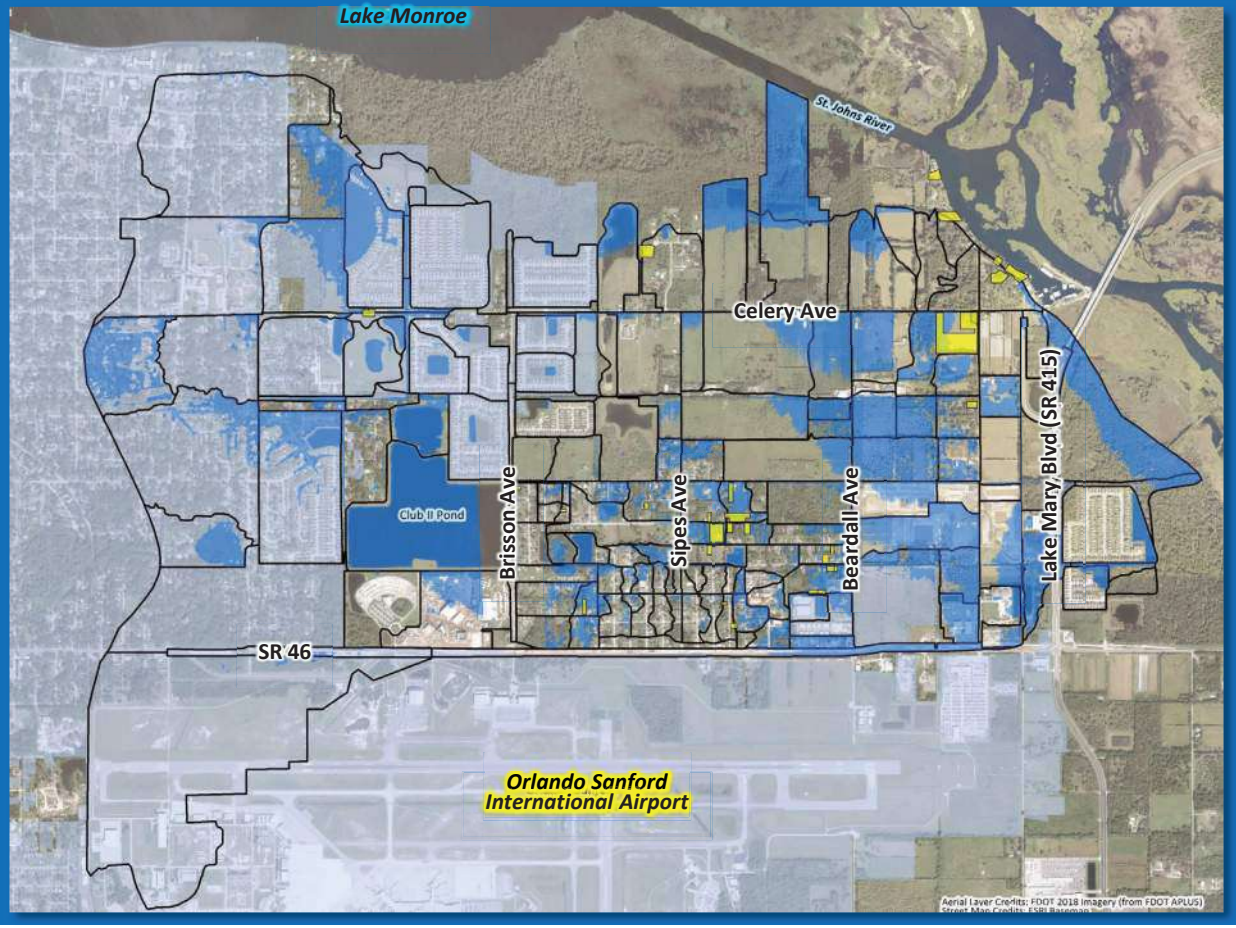
Floodplain Mapping

- Current FEMA Floodplains
  - Within Midway Basin, Zone A in areas proximal to the Club II Pond
  - Majority of the unincorporated County outside FEMA 100-year
  - Many improvements/development not mapped
- Updated/Modeled Floodplains
  - Includes additional areas in unincorporated Seminole County
  - Include new ponds/new development
  - Floodplain delineated based on plans and collected data where topographic voids

FEMA Special Flood Hazard Area



Floodplain Mapping – Existing Conditions Modeling

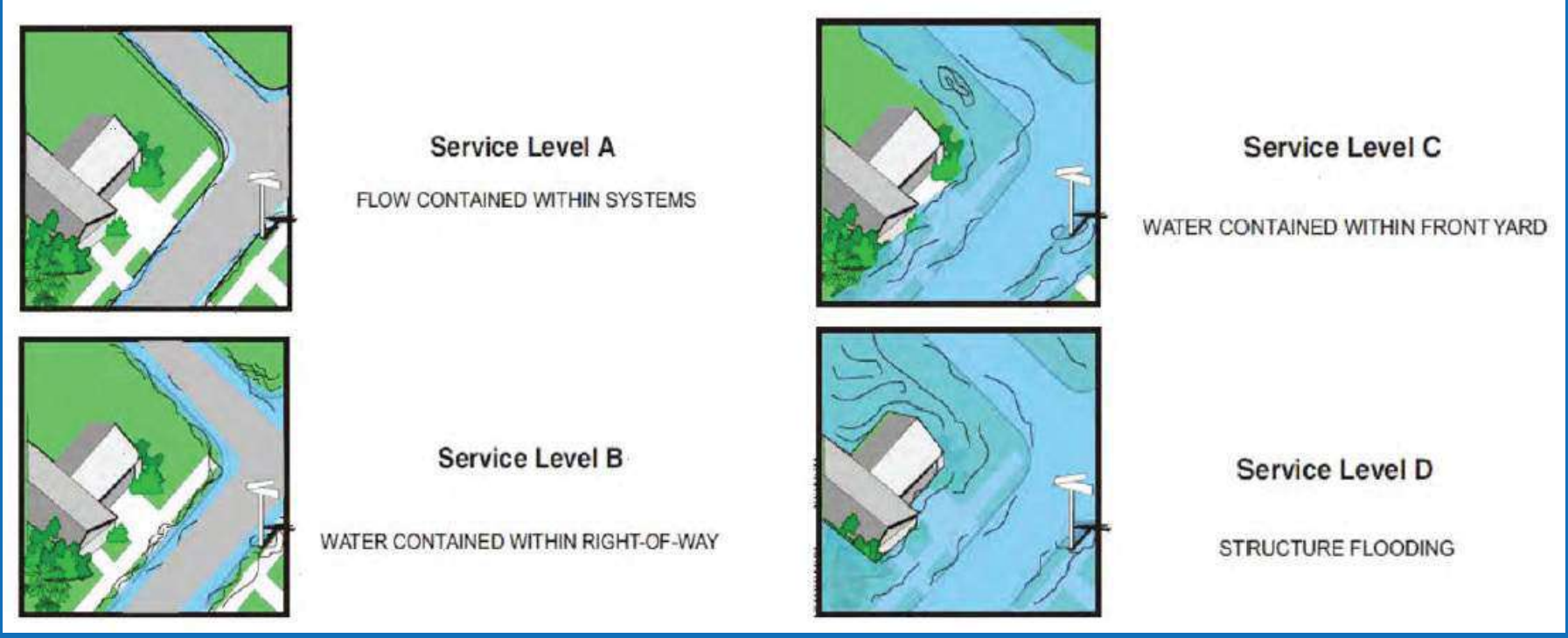


Proposed Flood Improvement Locations

- 5 areas selected for further evaluation
- 4 of these areas selected for recommended improvements
  - Observed/reported flooding and validated model results
  - Improve flood control level-of-service to greatest extent practicable
  - Evaluate opportunities for water quality improvement
  - Constructability/permitability
  - Public benefit and impact
  - Capital and maintenance costs
- Aside from recommended purchase of vacant parcels for storage pond construction, all improvements proposed in existing County Rights Of Way (R/W) to improve level-of-service within R/W.

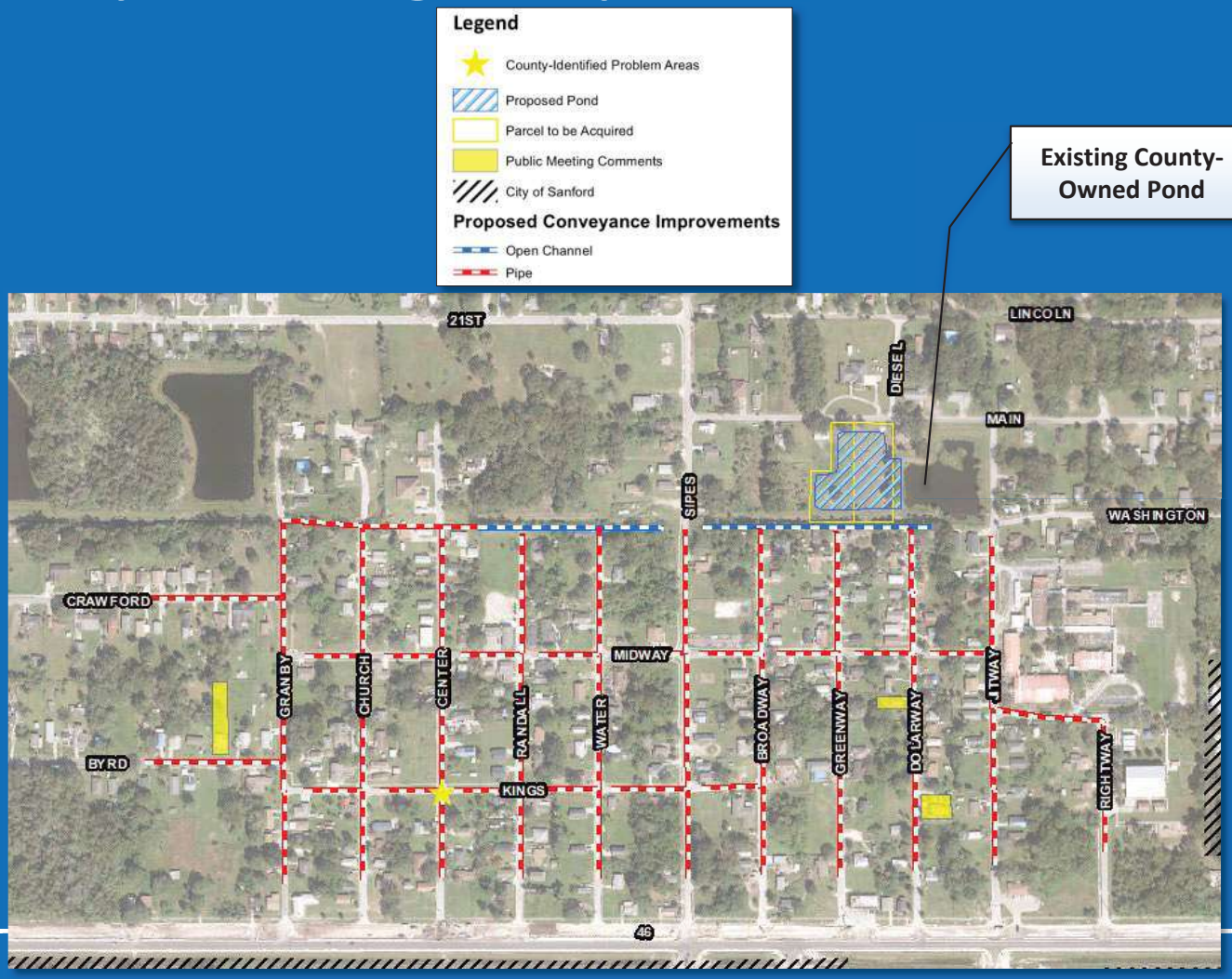
Flood Control Level-of-Service Improvement

- Goal to improve “C” or “D” model nodes to “A” or “B”



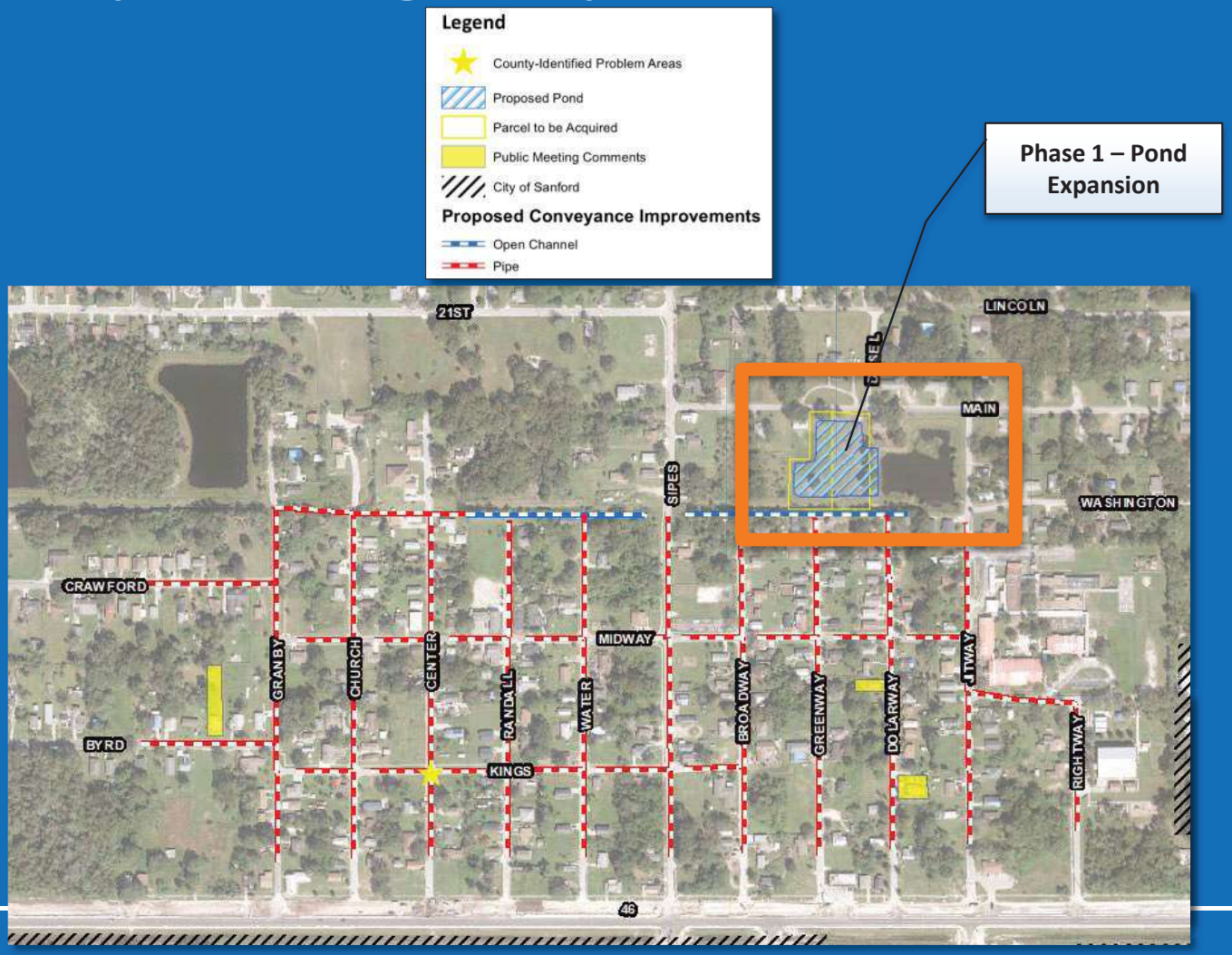
Midway Community Drainage Improvements (Alternative 1)

- Frequent street flooding (Kings and Center)
- Limited conveyance capacity
- Four phases of improvements proposed



Midway Community Drainage Improvements (Alternative 1)

- Phase 1 – Expand pond at Washington and Jitway
- Benefits
  - Flood storage
  - Water Quality
  - Permitability of other phases



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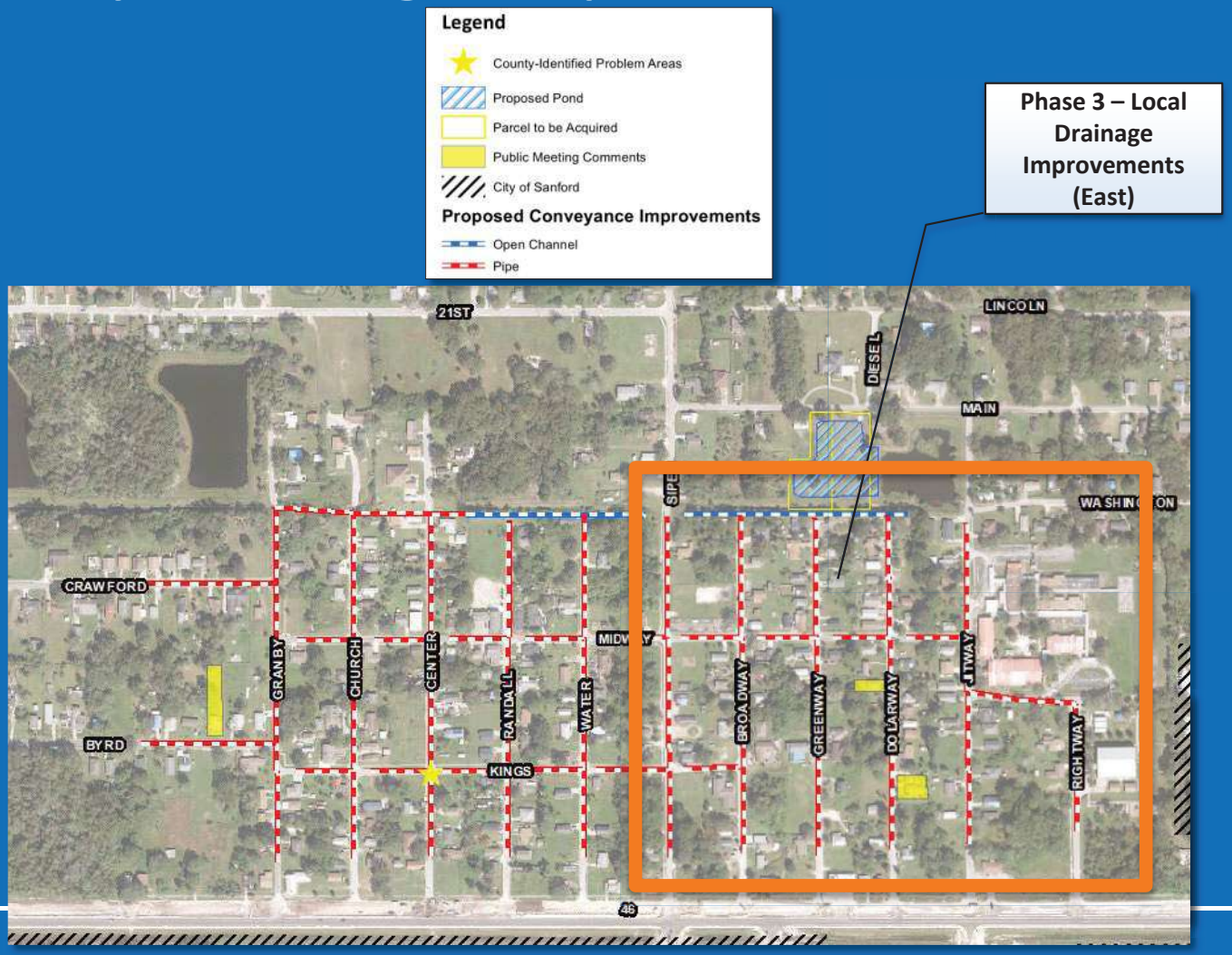

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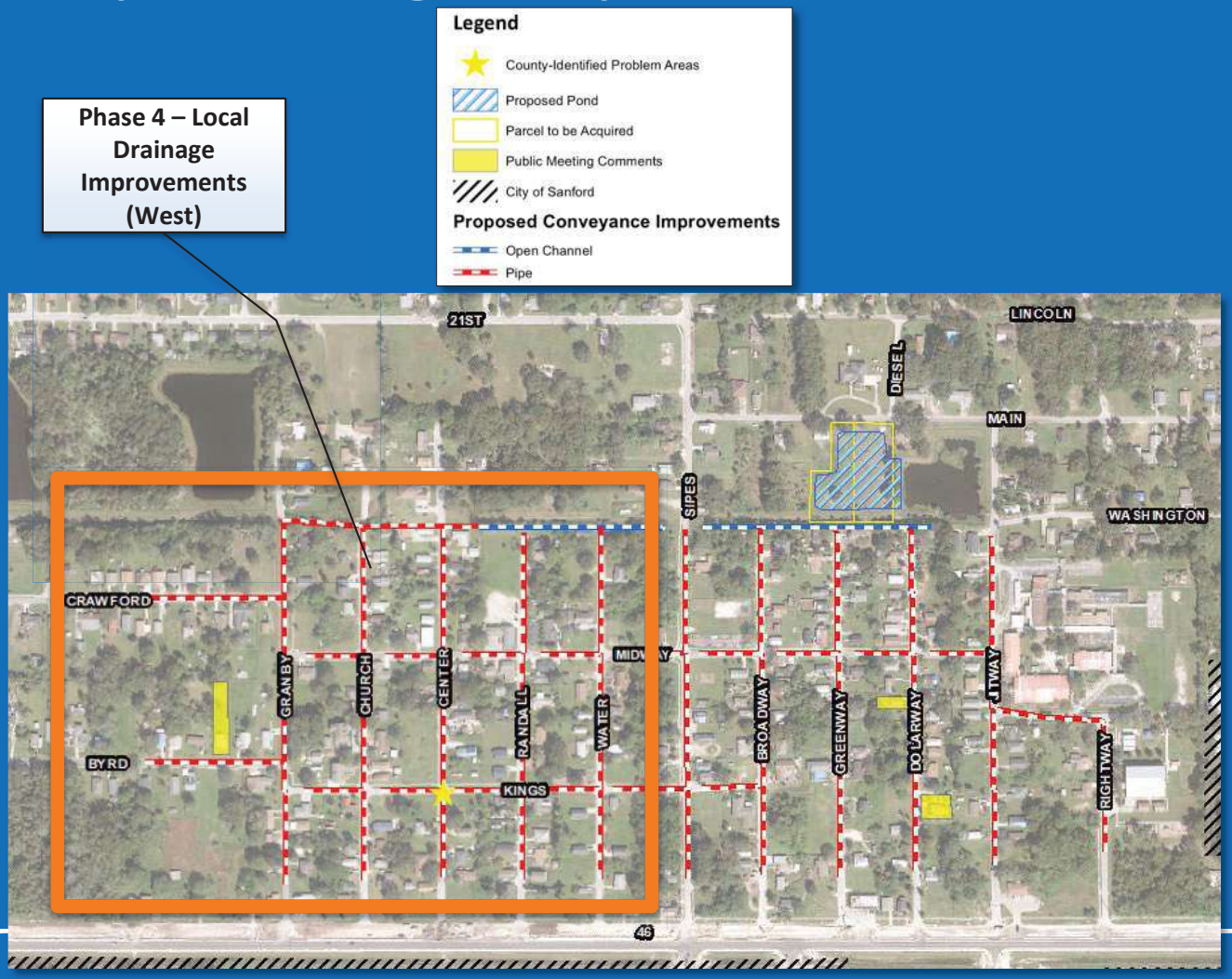
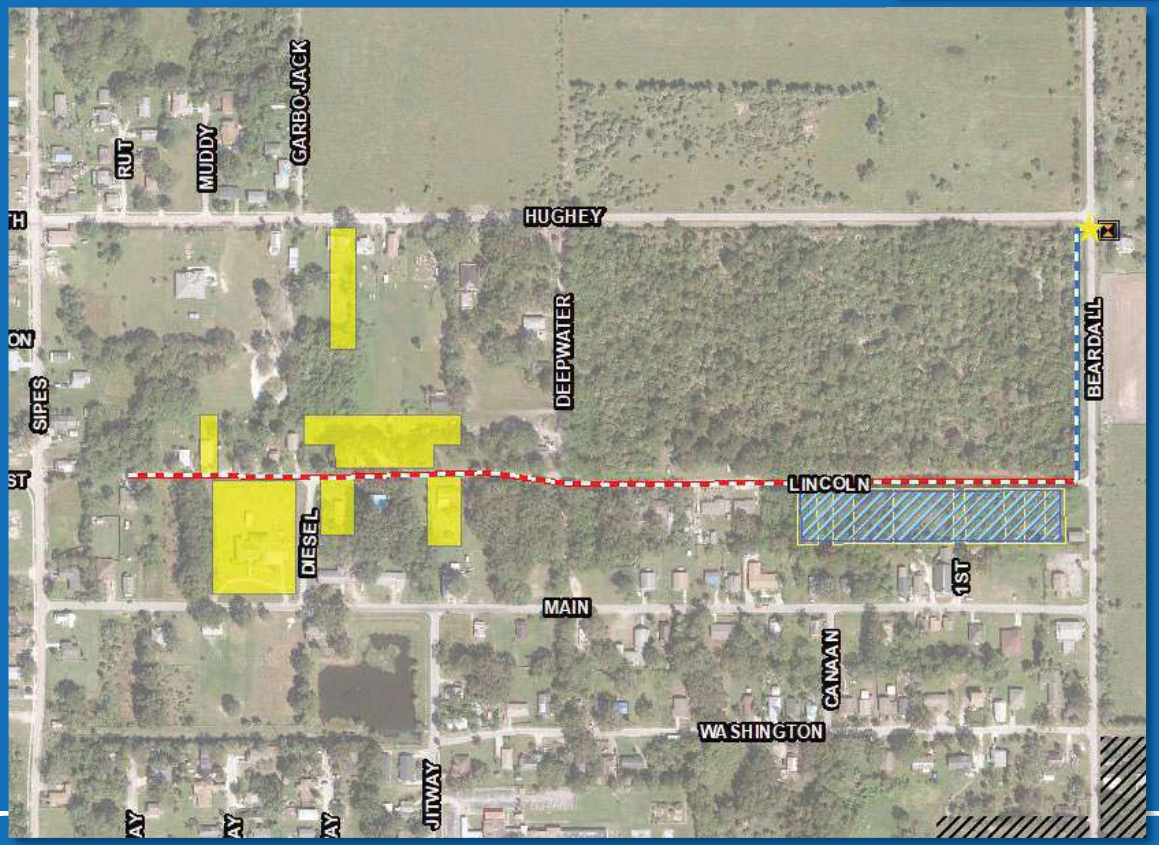


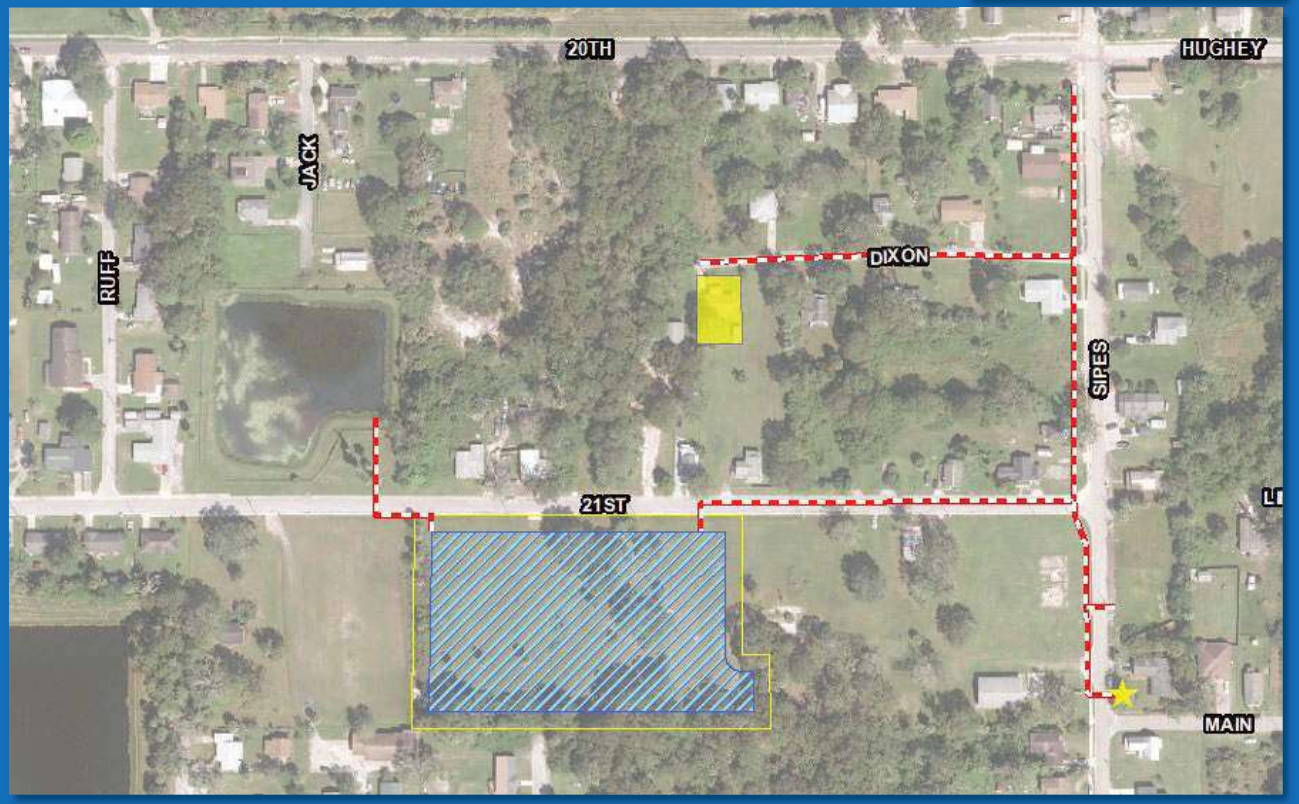
Lincoln Street Drainage Improvements (Alternative 2)

- Several flood complaints
- Lack of existing drainage
- Conveyance, storage, water quality improvements
- Cost estimated at $2.0 million



21st Street Drainage Improvements (Alternative 4)

- Resident flood complaints; County knowledge
- Existing pond undersized
- Conveyance and storage improvements
- Cost estimated at $2.1 million

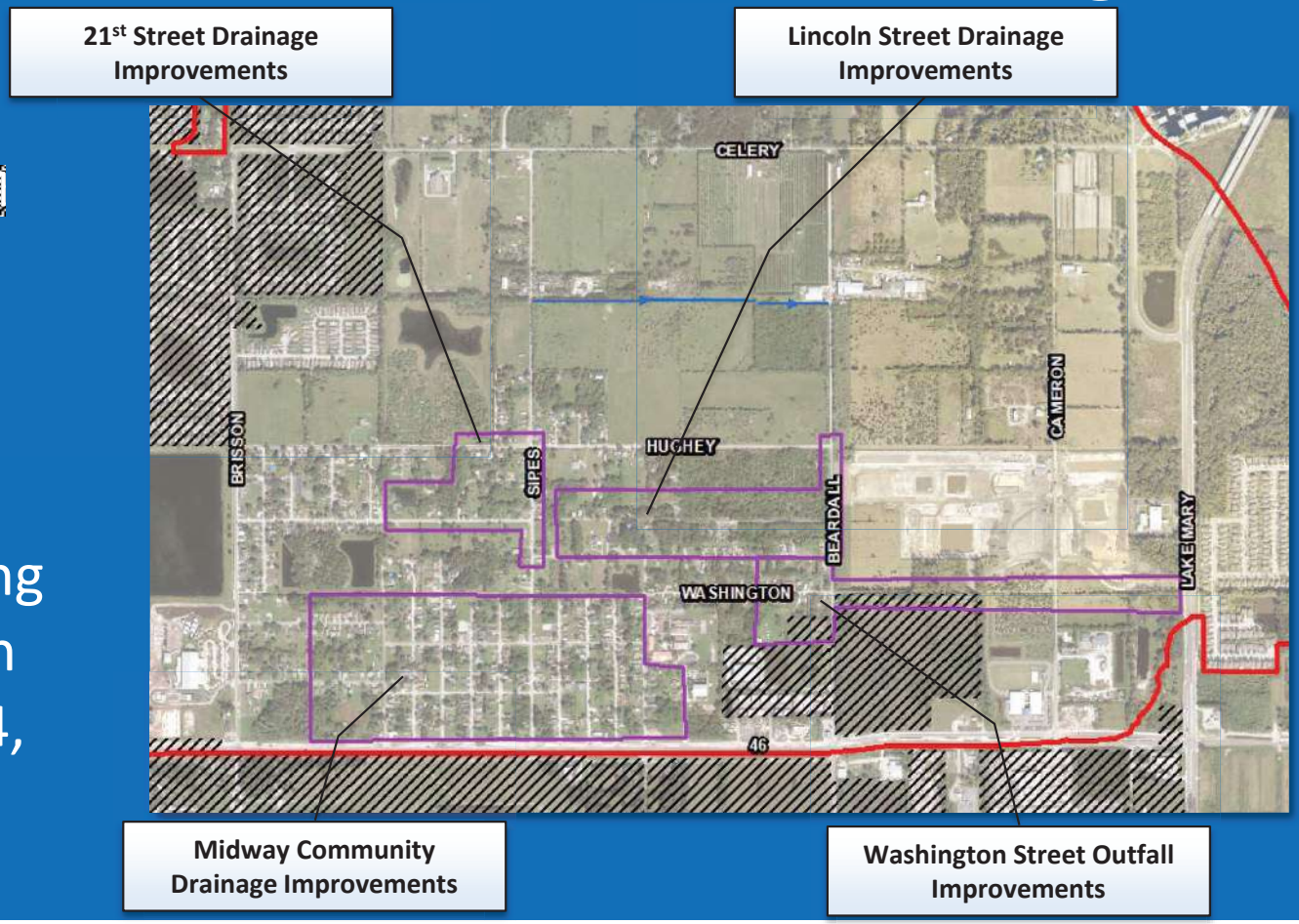


Washington Street Outfall Improvements (Alternative 5)

- Resident flood complaints; verified with model
- Improve outfall capacity
- Conveyance and storage improvements
- Cost estimated at $1.6 million

Proposed Improvements and Grant Funding

- Total: $13.1M
  - Midway: $7.4M
  - Lincoln: $2.0M
  - 21st: $2.1M
  - Washington: $1.6M
- County submitting CDBG application by September 14, 2020.



Public Meeting Feedback

- Website live from September 10 to September 20, 2020, with video presentation and study materials for review and comment
- Zoom public meeting on September 15, 2020
  - Attended by 37 people, in addition to crowd of around 30 viewing at Midway Safe Harbor Center.
  - Comments from residents focused on initial selections of private property for acquisition, role of development in perceived worsening of historic flooding issues.
- Subsequent discussions with County and Midway Coalition community leadership identified potential modifications to Alternatives 1, 2, and 4 which may increase public acceptance of recommendations.

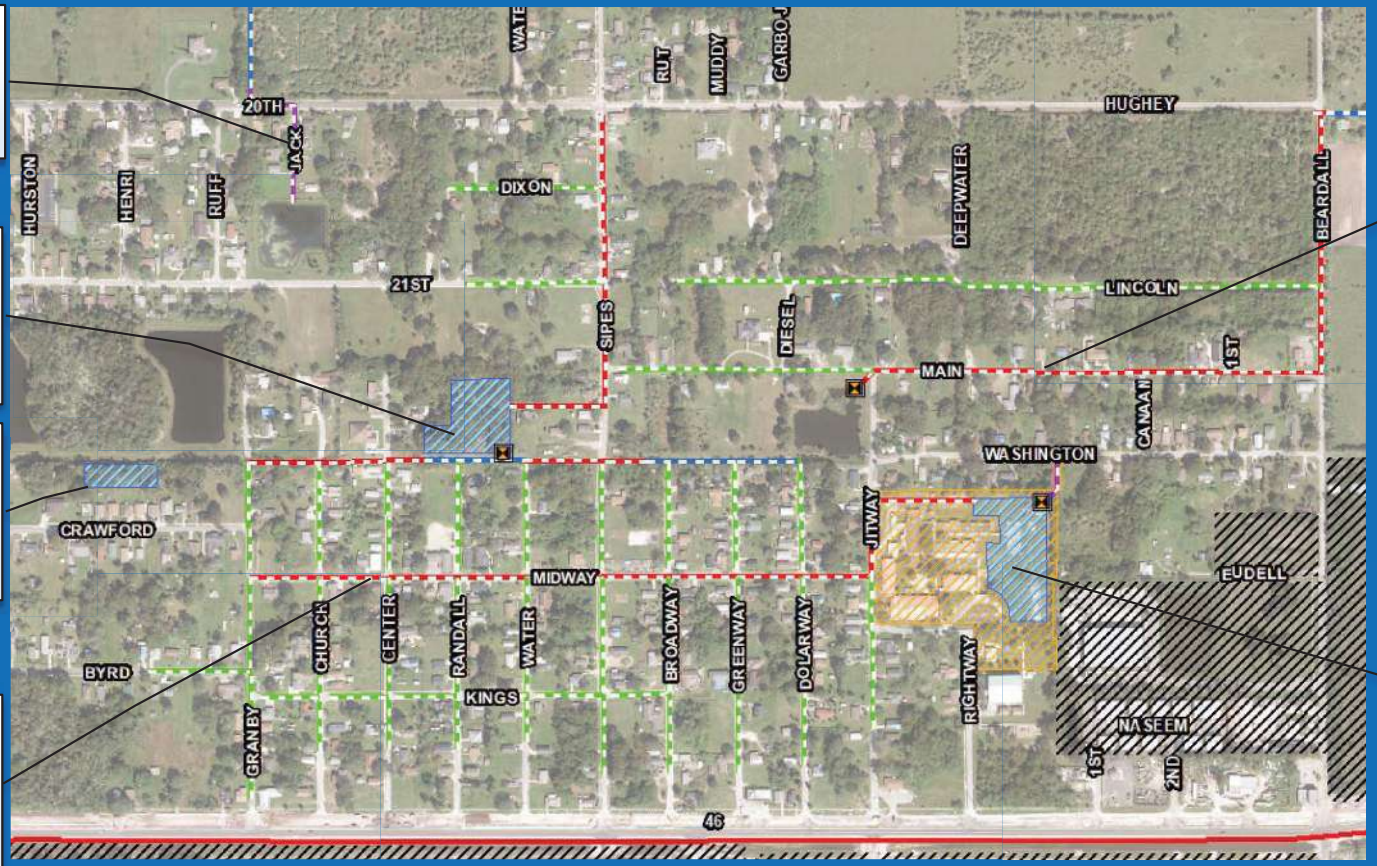
Revised Alternative 1, 2, and 4

(Alt 4) Improve discharge from existing pond to IFAS-Midway

(Alt 4) Construct 1.7-acre stormwater pond on County-owned property

(Alt 1)Construct 0.5-acre stormwater pond on County-owned property

(Alt 1) Construct new primary storm sewer along Midway Avenue



(Alt 2) New outfall from existing pond along Main Street/Beardall Avenue to Hughey Street Outfall

Legend

- Midway Basin
- City of Sanford
- Proposed Channel Improvements
- Proposed Pond Inflow
- Proposed Pond Outfall
- Proposed Primary Conveyance
- Proposed Secondary Conveyance
- Proposed Storage
- Proposed Easements/Property Acquisition

(Alt 1) Construct 2.1-acre stormwater pond on old Midway Elementary property (SCPS-owned)

Revised Alternative 1, 2, and 4

Improve Hughey Street Outfall from Beardall Ave to Lake Mary Blvd

Construct 8-acre regional stormwater facility on Wilke property

Legend

- Midway Basin
- City of Sanford
- Proposed Channel Improvements
- Proposed Pond Inflow
- Proposed Pond Outfall
- Proposed Primary Conveyance
- Proposed Secondary Conveyance
- Proposed Storage
- Proposed Easements/Property Acquisition

Revised Alternatives 1, 2, and 4

- Advantages (over original Alternatives):
  - Eliminates acquisition of private properties within Midway Community
  - Maximizes use of public land
  - May eliminate need for Alternative 5 improvement or reduce intensity of improvements
- Status
  - CDM Smith to perform stormwater modeling of revised alternatives, develop cost estimate, coordinate with SJRWMD for permitting review
  - Draft report (Sep 2020) will be finalized following completion of the additional alternatives re-evaluation and will incorporate the findings and discussions of this meeting.

Revised Alternatives 1, 2, and 4 – Cost Estimates

- Alternative 1 - $6.1M
  - Original Alternative 1 - $7.4M
  - Cost decrease due to removal of property acquisition and refinement of storm sewer installation costs
- Alternative 2 - $5.9M
  - Original Alternative 2 - $2.0M
  - Cost increase due to new proposed outfall along Main Street, new proposed improvements to Hughey Street outfall, and new regional treatment pond near SR 415.
- Alternative 4 - $1.9M
  - Original Alternative 4 - $2.1M
  - Cost decrease due to removal of property acquisition and less pond excavation

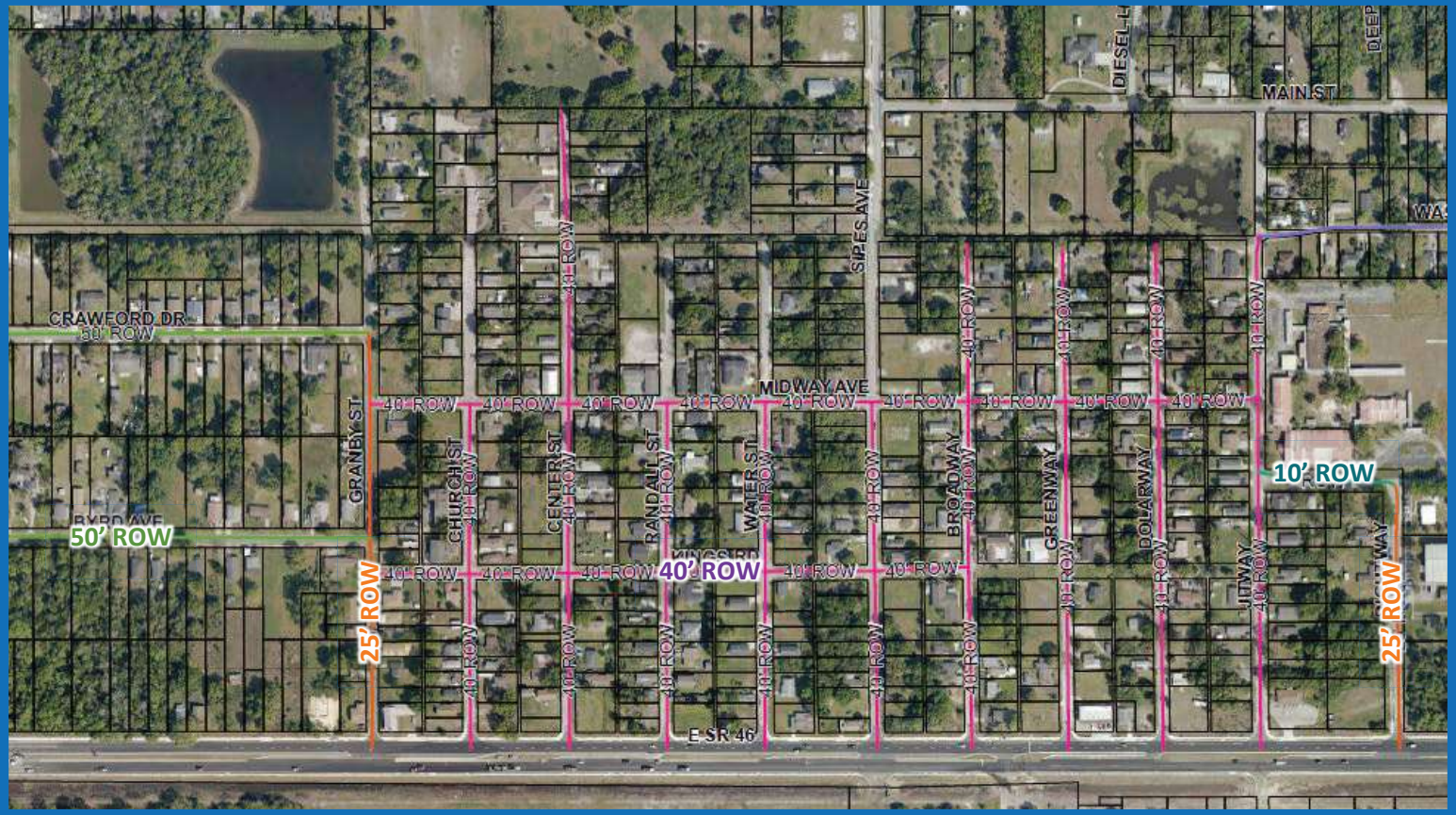
Revised Alternatives – Cost Estimates

- Original Alternatives
  - Total: $13.1M
    - Alt 1 - Midway: $7.4M
    - Alt 2 - Lincoln: $2.0M
    - Alt 4 - 21st: $2.1M
    - Alt 5 – Washington: $1.6M
- Revised Alternatives
  - Total: $15.5M
    - Alt 1 - Midway*: $6.1M
    - Alt 2 – Lincoln: $5.9M
    - Alt 4 - 21st: $1.9M
    - Alt 5 – Washington: $1.6M**

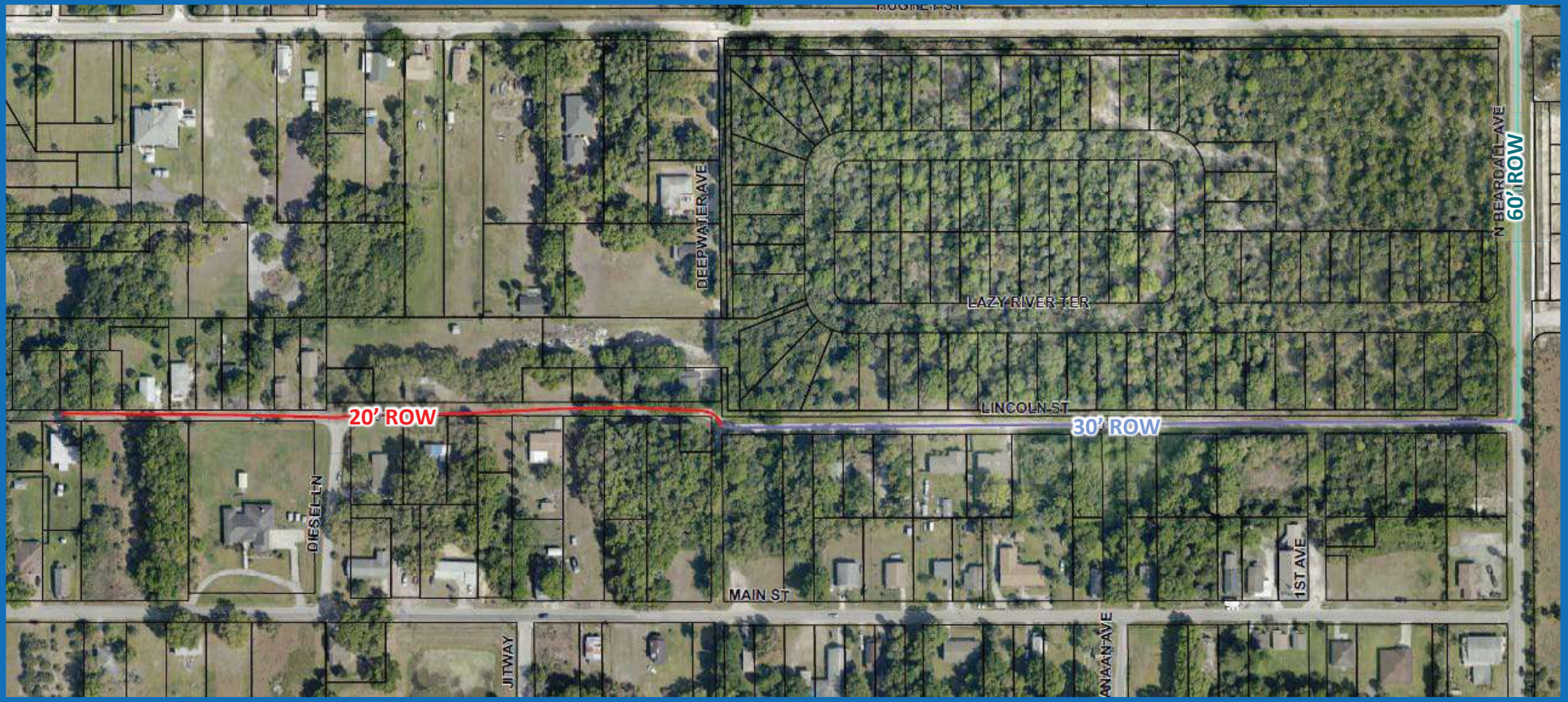
*Revised Alternative 1 cost estimate does not include cost to acquire former Midway Elementary School parcel from Seminole County Public Schools

**Alternative 5 remains unchanged but may be scaled back or eliminated based on results of revised analysis of Alternatives 1, 2, and 4

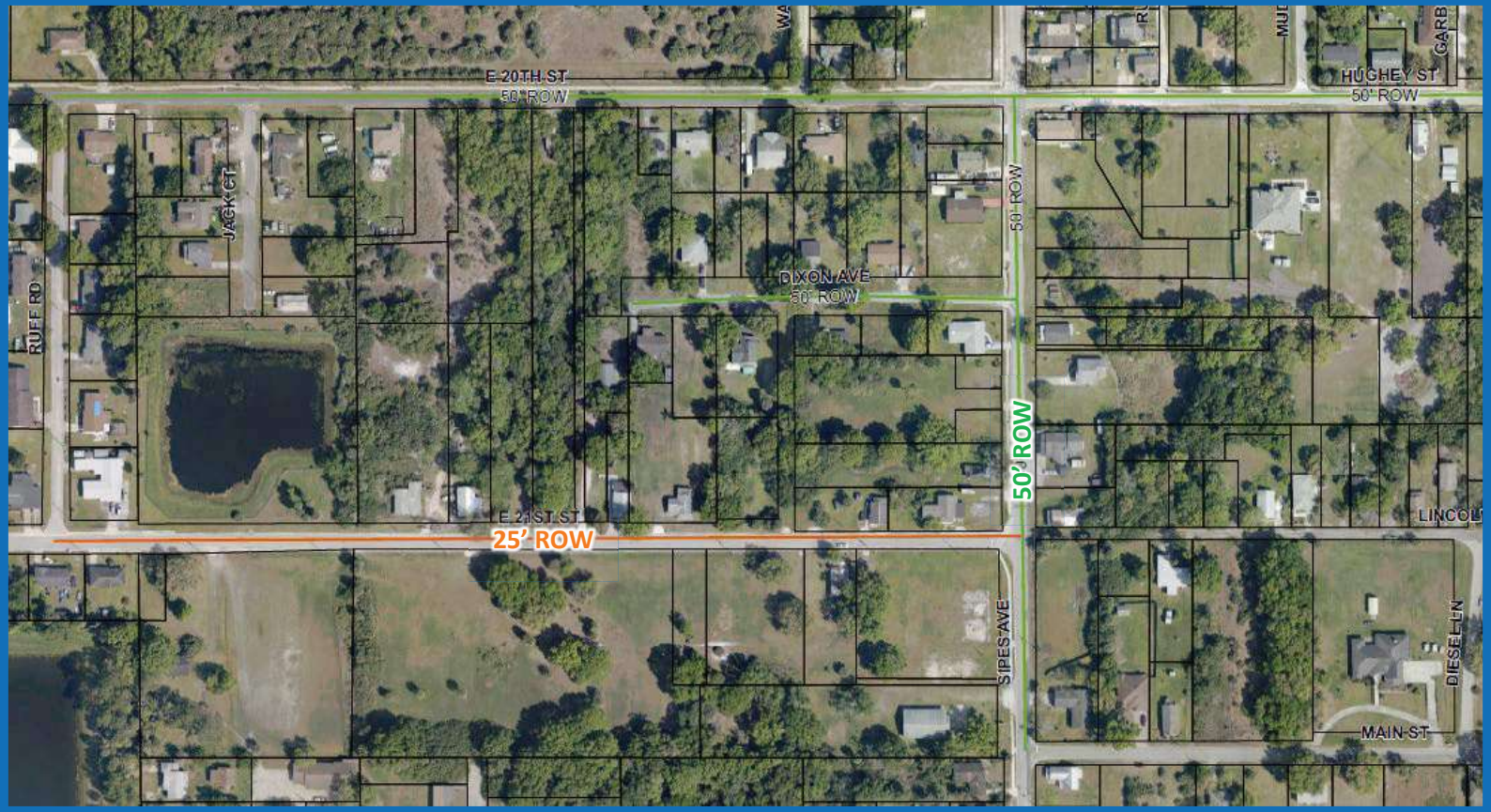
Existing Street Right-of-Way – Alternative 1



Existing Street Right-of-Way – Alternative 2



Existing Street Right-of-Way – Alternative 4



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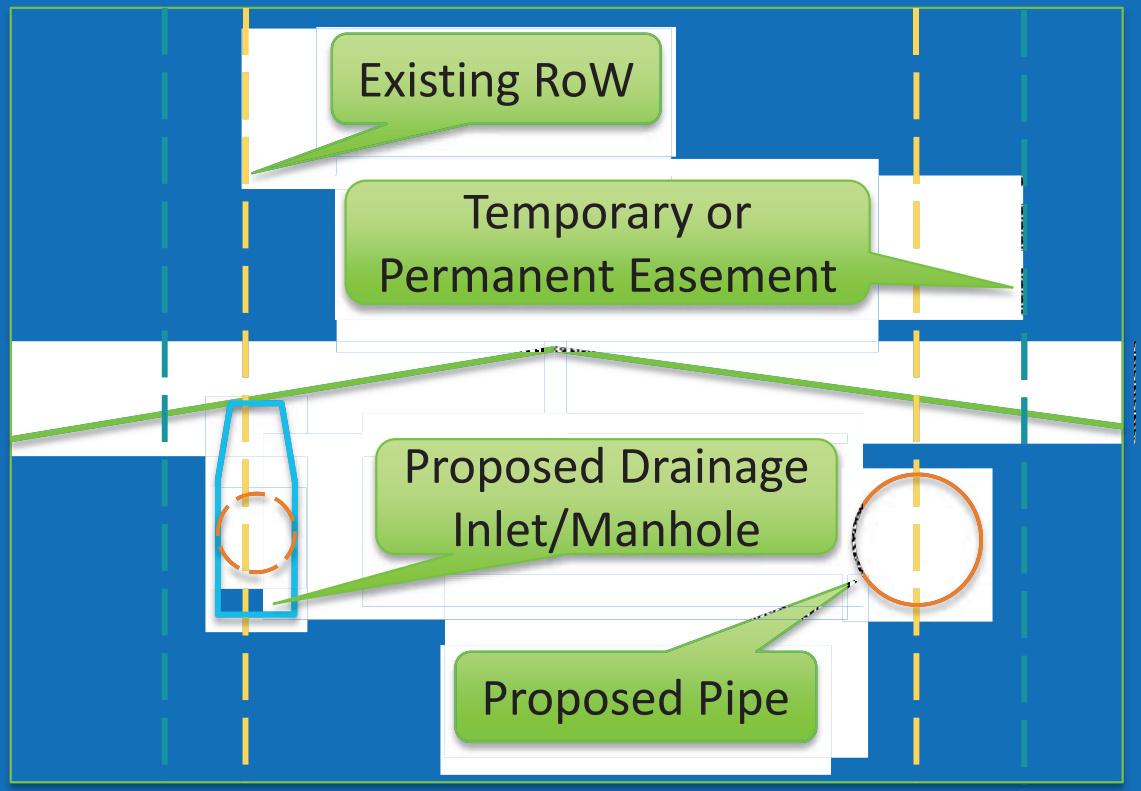

Project Status and What's Next

- Completed
  - Initial Public Meeting (June 25, 2019)
  - Existing Conditions Analysis
  - Future Conditions Analysis
  - Improvement Alternative Analysis
  - Floodplain Mapping
  - Draft Report
  - Virtual Zoom 2nd Community Public Meeting (September 15, 2020)
- Current: BOCC Meeting scheduled for November 10, 2020
- Next Steps
  - Complete re-evaluation of alternatives
  - Final Report (estimated January 2021)

Acknowledgements

- **Seminole County Board of Commissioners**
- **Midway Coalition Community Leaders & Residents**
- **Seminole County Public Works Department/Engineering Division**
- **CDM Smith**

Contact Information

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  Engineering Division
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Thank You

Appendix B

ERPs Reviewed

Table B-1 Environmental Resource Permits Reviewed

ERP	Project Name	Files Obtained	Applicability
22050-1	WASHINGTON STREET DRNG IMPRVM	Yes	Superseded by County Plans
22192-22	Seminole County Sheriff's Juvenile Extension Center (J.E.C.)	Yes	TBD (Airport)
22192-24	Building 515 Orlando-Sanford Airport	Yes	Historical - Oversized Drawings
22192-27	Orlando Sanford Airport Hangar No. 517	Yes	TBD (Airport)
22192-30	Orlando-Sanford International Airport Stormwater Master Plan	Yes	TBD (Airport)
22192-46	Aeronautical Restoration and Maintenance Facility	Yes	TBD (Airport)
22192-47	Hill Dermaceuticals, 3rd Building Addition & Parking (ltr mod)	Yes	PAC Drawings
22192-51	OSIA Membrane Hangar / Office Site	Yes	Original Signed and Sealed Plans
22192-52	SR 46 Detour Road - Remainder Segments	Yes	TBD (Airport)
22192-53	Perimeter Security Road Improvements	Yes	Superseded by 22192-5
22192-54	Perimeter Security Road Improvements	Yes	TBD (Airport)
22192-62	Orlando-Sanford International Airport Stormwater Master Plan	Yes	Conceptual Permit no Detailed Information
22192-63	Orlando-Sanford International Airport Stormwater Master Plan	Yes	TBD (Airport)
22192-64	SR 46 Detour Road - Remainder Segments - Permit Extension	No	Superseded by Other Information
28874-3	NTM Homes E. 30 Acres	Yes	Superseded by Other Information
28874-4	New Tribes Mission	Yes	RAI Response Plans
29157-1	PALM POINT SUBDIVISION	Yes	Superseded by County Plans
29179-1	21ST STREET PAVING AND DRAINAGE IMPROVEMENTS	Yes	Historical - Oversized Drawings
29179-2	Midway Street Paving, Dixie, Hurston, Henri, Granby & Jack Streets	Yes	Historical - Oversized Drawings
29179-3	Midway Sidewalk Project	Yes	Historical - Oversized Drawings
29238-2	Central Florida Family Health Clinic	No	Superseded by Other Information
29238-3	Central Florida Family Health Clinic	Yes	Original Signed and Sealed Plans
29280-1	MIDWAY CDBG	Yes	Plans Not Available on ePermitting
29280-2	Midway CDBG Project: Water St, Randall St, Center St, Church St	Yes	Historical - Oversized Drawings
48727-3	ADESA Auto Auction	No	Superseded by Other Information
48727-4	ADESA Auto Auction Lot Addition	No	Superseded by Other Information
48727-5	ADESA Auto Auction Dealer Parking Lot-North	Yes	Superseded by Other Information
49717-1	Hopper ESE Center	Yes	Historical - Oversized Drawings
51666-1	River Run	No	Superseded by Other Information
51666-2	Sterling Meadows	Yes	Historical - Oversized Drawings
51666-3	Sterling Meadows Incidental Site Activities	Yes	Permit Revision 51666-3 for Drawings
64660-2	Celery Plantation	Yes	Historical - Oversized Drawings (As-Built Information)
67219-1	Sanford Memorial Stadium	Yes	Within City Limits

ERP	Project Name	Files Obtained	Applicability
70479-1	Dixon Ave., 18th St., Dixie Ave., Lingard Ave., Ruff Rd., Water St. "C", 1st., 2nd St., Lincoln St.,	Yes	Plans Not Available on ePermitting
70750-1	Cameron Office Complex	Yes	Historical - Oversized Drawings
81844-1	Vihlen Road, Kentucky Avenue, Grandby Street, Jack Ct.	Yes	Plans Not Available on ePermitting
82694-1	Seminole Co. Administration Parking Lot Design	Yes	Historical - Oversized Drawings
83661-1	Celery Manor	Yes	Historical - Oversized Drawings
84910-1	Cedar Hill	Yes	Historical - Oversized Drawings
88965-1	Midway Regional Stormwater and Recreational Facility	Yes	Compliance Submittal Supporting Document (As-Built Information)
88965-2	Midway Regional Stormwater and Recreational Facility (Ltr Mod)	Yes	Superseded
88965-3	Midway Regional Stormwater and Recreational Facility - Ditch Diversion	Yes	Permitted Plans
89329-2	Dirt Road Paving Program - Center Drive Group	Yes	No Drawings
90209-1	SR 46 Resurfacing	No	Superseded by Other Information
93155-1	Midway Safe Harbor	Yes	Historical - Oversized Drawings
94195-1	Empire Windows Warehouse	Yes	Superseded by Other ERPs
94675-1	Celery Estates North	Yes	Final Documents (Final Plans)
94675-2	Celery Estates North	No	Superseded by Other Information
94675-3	Celery Estates South (south parcel)	Yes	Project Correspondence Construction Plans)
94675-4	Celery Estates South (north parcel)	Yes	Superseded by Other ERPs
95925-6	SR 46 (Mellonville Rd to SR 415), FPID 240216-2-52-01	Yes	Original Signed and Sealed Plans
96895-1	FDEP IFAS-Sanford CFREC Remediation Program	No	Superseded by Other Information
96895-2	FDEP IFAS-Sanford CFREC Remediation Program	No	Superseded by Other Information
98010-1	CR 415 (Celery Ave.) Culvert Extension	Yes	Compliance Supporting Document (Roadway Plans)
98010-2	CR 415 (Celery Ave.) Culvert Replacement	Yes	Superseded by Other ERPs
98010-3	CR 415 (Celery Ave.) @ Brisson Ave	Yes	RAI Response (Roadway Plans)
101436-1	Celery Avenue Improvement	Yes	Within City Limits
101864-1	Club II Regional Stormwater Facility (RSF) Phase 1 and 2 Drainage Improvements	Yes	Historical - Oversized Drawings
101864-2	Brisson Ave Improvements from SR 46 to Pinefield Dr	Yes	RAI Response Bound (Revised Construction Plans)
102078-1	New Midway Elementary School	No	Superseded by Other Information
102078-2	New Midway Elementary School	No	ERP Application Withdrawn
104394-1	Delphini Industrial Park	Yes	Post Development Basin Map
105665-1	Cameron Heights	Yes	Superseded by Other ERPs
105665-2	Cameron Heights (Ltr Modification)	No	ERP Application Withdrawn
105665-3	Cameron Heights	No	ERP Application Withdrawn
105665-4	Cameron Heights Phase 1 and 2	No	ERP Application Withdrawn
105665-5	Cameron Heights	No	ERP Application Withdrawn

ERP	Project Name	Files Obtained	Applicability
105665-6	Cameron Heights Phases 1 thru 4	Yes	Superseded by Other Information
105665-7	Cameron Heights Phase II Conceptual Drainage Plan	Yes	Superseded by Other ERPs
105665-8	Cameron Heights Phases 1 thru 4 (Transfer)	Yes	Original Signed and Sealed Plans
105665-9	Cameron Heights Phase II Conceptual Drainage Plan (Transfer)	No	Transfer of Ownership
105665-10	Cameron Heights/Riverbend, Village G	Yes	Final Documents - PAC Plans
105665-11	Cameron Heights, Village A	Yes	Existing Topographic Survey (2/5/2018) & PAC Plans (Not Constructed)
105665-12	Cameron Heights Village B	Yes	Existing Topographic Survey (9/19/2006) & Revised Construction Plans (Not Constructed)
105665-13	Cameron Heights, Village J	Yes	Existing Topographic Survey (11/17/2004) & Original Signed and Sealed Plans (Not Constructed)
105665-14	Cameron Heights-Village C	Yes	Existing Topographic Survey (8/29/2018) & Revised Plans (Not Constructed)
105665-15	Cameron Heights, Village D	Yes	Existing Topographic Survey (8/28/2018) & Permitted Plans (Not Constructed)
109788-3	SR 415 (SR 46 to SJR), FPID 407355-1-52-01	Yes	Superseded by Other Information
109788-4	SR 415 from SR 46 to the bridge over the St. Johns River	Yes	Original Signed and Sealed Plans
109788-8	SR 415 (SR 46 to SJR), FPID 407355-1-52-01: 5-yr extension	No	Permit Extension Request
109788-9	SR 415 (SJR to Reed Ellis Rd); FPID 407355-3-52-01: 5-year Extension-WITHDRAWN	No	Permit Extension Request
113488-1	Beardall Avenue Improvements	No	ERP Application Withdrawn
114841-1	Naturally Fresh Warehouse Phase 1	Yes	PAC Drawings
114841-2	Naturally Fresh Warehouse Phase 1	Yes	Superseded by Other Information
114841-3	Naturally Fresh Warehouse Phase 1- Parking Addition	Yes	Final Documents - Plans
119133-1	Elementary School K - Midway	No	Superseded by Other Information
119133-2	Elementary School K - Midway	No	Superseded by Other Information
119133-3	Midway Transportation Facility	Yes	RAI Response (Original Signed and Sealed Plans)
119133-4	New Millennium MS / Midway ES Addition	Yes	Final Documents (RAI Response - Plans)
128870-1	1401 Celery Avenue Daycare	No	ERP Application Withdrawn
130712-1	St. James House of Prayer	Yes	Ten-Two Self Certification
131770-1	St. James House of Prayer of the Apostolic Faith - Church Construction	No	Ten-Two Self Certification
132159-1	St. James House of Prayer of the Apostolic Faith, Inc.	No	Ten-Two Self Certification
136885-1	8,320 SF Bldg W/Related Improv	Yes	Within City Limits
138395-1	Office/Warehouse	Yes	Existing Topographic Survey (2/4/2014) & Plans (Not Constructed)
141532-1	Mydelights Christian Bible School	Yes	Plans (Not Constructed)
141943-1	United Infrastructure Group Site Improvements	Yes	Existing Topographic Survey (5/11/2015) & Plans (Not Constructed)
144208-1	Celery Cove	No	Superseded by Other Information
144208-2	Celery Cove	Yes	Not Constructed

ERP	Project Name	Files Obtained	Applicability
145285-1	Galileo Charter School	Yes	Final Documents - PAC Plans
145285-2	Galileo Charter School (Transfer)	No	Transfer of Ownership
145285-3	Galileo Charter School - Recreational Court	Yes	Superseded by Other ERPs
145285-4	Galileo Charter School - Race Track	Yes	Final Documents - RAI Response Plans
145774-1	Suntera Park	Yes	ERP Application Withdrawn
151723-1	Danus Utilities	Yes	Existing Topographic Survey (1/21/2016) & Plans (Not Constructed)
154888-1	Riverside Oaks	Yes	Existing Topographic Survey (1/27/2018) & Revised Construction Plans (Not Constructed)
155853-1	Extruders	Yes	Existing Topographic Survey (6/22/2018) & Revised Engineering Plans (Not Constructed)
156589-1	Celery Oaks	Yes	Existing Topographic Survey (9/12/2017) & Plans (Not Constructed)
22050-1	WASHINGTON STREET DRNG IMPRVM	Yes	Superseded by County Plans
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22192-51	OSIA Membrane Hangar / Office Site	Yes	Original Signed and Sealed Plans
22192-52	SR 46 Detour Road - Remainder Segments	Yes	TBD (Airport)
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49717-1	Hopper ESE Center	Yes	Historical - Oversized Drawings
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51666-2	Sterling Meadows	Yes	Historical - Oversized Drawings
51666-3	Sterling Meadows Incidental Site Activities	Yes	Permit Revision 51666-3 for Drawings
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94195-1	Empire Windows Warehouse	Yes	Superseded by Other ERPs
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105665-4	Cameron Heights Phase 1 and 2	No	ERP Application Withdrawn
105665-5	Cameron Heights	No	ERP Application Withdrawn
105665-6	Cameron Heights Phases 1 thru 4	Yes	Superseded by Other Information
105665-7	Cameron Heights Phase II Conceptual Drainage Plan	Yes	Superseded by Other ERPs
105665-8	Cameron Heights Phases 1 thru 4 (Transfer)	Yes	Original Signed and Sealed Plans
105665-9	Cameron Heights Phase II Conceptual Drainage Plan (Transfer)	No	Transfer of Ownership
105665-10	Cameron Heights/Riverbend, Village G	Yes	Final Documents - PAC Plans
105665-11	Cameron Heights, Village A	Yes	Existing Topographic Survey (2/5/2018) & PAC Plans (Not Constructed)
105665-12	Cameron Heights Village B	Yes	Existing Topographic Survey (9/19/2006) & Revised Construction Plans (Not Constructed)
105665-13	Cameron Heights, Village J	Yes	Existing Topographic Survey (11/17/2004) & Original Signed and Sealed Plans (Not Constucted)
105665-14	Cameron Heights-Village C	Yes	Existing Topographic Survey (8/29/2018) & Revised Plans (Not Constructed)
105665-15	Cameron Heights, Village D	Yes	Existing Topographic Survey (8/28/2018) & Permitted Plans (Not Constructed)
109788-3	SR 415 (SR 46 to SJR), FPID 407355-1-52-01	Yes	Superseded by Other Information
109788-4	SR 415 from SR 46 to the bridge over the St. Johns River	Yes	Original Signed and Sealed Plans
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109788-9	SR 415 (SJR to Reed Ellis Rd); FPID 407355-3-52-01: 5-year Extension-WITHDRAWN	No	Permit Extension Request
113488-1	Beardall Avenue Improvements	No	ERP Application Withdrawn
114841-1	Naturally Fresh Warehouse Phase 1	Yes	PAC Drawings
114841-2	Naturally Fresh Warehouse Phase 1	Yes	Superseded by Other Information
114841-3	Naturally Fresh Warehouse Phase 1- Parking Addition	Yes	Final Documents - Plans
119133-1	Elementary School K - Midway	No	Superseded by Other Information
119133-2	Elementary School K - Midway	No	Superseded by Other Information
119133-3	Midway Transportation Facility	Yes	RAI Response (Original Signed and Sealed Plans)
119133-4	New Millennium MS / Midway ES Addition	Yes	Final Documents (RAI Response - Plans)
128870-1	1401 Celery Avenue Daycare	No	ERP Application Withdrawn
130712-1	St. James House of Prayer	Yes	Ten-Two Self Certification

ERP	Project Name	Files Obtained	Applicability
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132159-1	St. James House of Prayer of the Apostolic Faith, Inc.	No	Ten-Two Self Certification
136885-1	8,320 SF Bldg W/Related Improv	Yes	Within City Limits
138395-1	Office/Warehouse	Yes	Existing Topographic Survey (2/4/2014) & Plans (Not Constructed)
141532-1	Mydelights Christian Bible School	Yes	Plans (Not Constructed)
141943-1	United Infrastructure Group Site Improvements	Yes	Existing Topographic Survey (5/11/2015) & Plans (Not Constructed)
144208-1	Celery Cove	No	Superseded by Other Information
144208-2	Celery Cove	Yes	Not Constructed
145285-1	Galileo Charter School	Yes	Final Documents - PAC Plans
145285-2	Galileo Charter School (Transfer)	No	Transfer of Ownership
145285-3	Galileo Charter School - Recreational Court	Yes	Superseded by Other ERPs
145285-4	Galileo Charter School - Race Track	Yes	Final Documents - RAI Response Plans
145774-1	Suntera Park	Yes	ERP Application Withdrawn
151723-1	Danus Utilities	Yes	Existing Topographic Survey (1/21/2016) & Plans (Not Constructed)
154888-1	Riverside Oaks	Yes	Existing Topographic Survey (1/27/2018) & Revised Construction Plans (Not Constructed)
155853-1	Extruders	Yes	Existing Topographic Survey (6/22/2018) & Revised Engineering Plans (Not Constructed)
156589-1	Celery Oaks	Yes	Existing Topographic Survey (9/12/2017) & Plans (Not Constructed)

Appendix C

Plans Obtained from County

Table C-1 Construction/Development Plans Obtained from County

Project Name	Parent Folder	Date
Midway Elem Sidewalk	Midway Elementary School\Midway Elem Sidewalk\	9/23/2011
Midway Phase II Drainage Plans	Midway Drainage Plans 1990\	12/10/1990
Celery Key Subdivision Ditch Improvements	Midway Search Results\Celery Key Subdivision Ditch Improvements\	7/11/2003
Indian Mound Village	Indian Mound Village\Neighborhood Retrofit\	6/8/2000
20th street	20th St\	10/17/2012
Avenue Improvements	Brisson Ave\Avenue Improvements\	10/22/2012
Sidewalk Improvements	Brisson Ave\Sidewalk Improvements\	8/31/2005
Cameron Ave Stormwater Quality Improvements	Cameron Ave\Cameron Ave Stormwater Quality Improvements\	10/21/2002
Cameron Heights A	Cameron Heights\Cameron Heights A\	11/15/2018
Cameron Heights B	Cameron Heights\Cameron Heights B\	3/28/2019
Cameron Heights C	Cameron Heights\Cameron Heights C\	2/1/2019
Cameron Heights C1	Cameron Heights\Cameron Heights C1\	5/2/2019
Cameron Heights D	Cameron Heights\Cameron Heights D\	2/4/2019
Cameron Heights E&F	Cameron Heights\Cameron Heights E&F\	1/22/2016
Cameron Heights J	Cameron Heights\Cameron Heights J\	10/18/2018 and 3/22/2019
sidewalk drainage	Celery Ave\sidewalk drainage\	3/27/2003
Realignment	Celery Ave\Realignment\	3/1/2003
New Tribes	Celery Ave\New Tribes\	6/19/2003
Celery Ave Outfall	Celery Ave\Celery Ave Outfall\	1/1/1994
Celery and Brisson	Celery Ave\Celery and Brisson\	6/2/2005
192010	Celery Ave\192010\	1/1/2004
191618	Celery Ave\191618\	10/15/2003
1627	Celery Ave\1627\	8/12/2004
1514	Celery Ave\1514\	3/14/2005
1510	Celery Ave\1510\	1/5/2001
800	Celery Ave\800\	9/29/1999
13th St	Celery Ave\13th St\	2/24/1994
Celery Pointe	Celery Pointe\Drawings_248715\	12/1/2018
CINGULAR WIRELESS - MIDWAY	CINGULAR WIRELESS - MIDWAY\	10/20/2004

Project Name	Parent Folder	Date
Intersection Improvements	E Lake Mary Blvd\Intersection Improvements\	8/18/2010
Race Trac A-Built	E Lake Mary Blvd\Race Trac A-Built\	12/13/2009
Fire Station 41-Midway	Fire Station 41 - Midway\	12/3/1979
IFAS Midway Regional Stormwater Treatment Facility	IFAS Midway Regional Stormwater Treatment Facility\	1/25/2010
Marvania	Marvania\	8/11/2016
Midway CDBG Project 1997	Midway CDBG\	5/1/1997
Midway CDBG Project 1999	Midway CDBG\	1/14/1999
Midway CDBG Project 2000	Midway CDBG\	5/19/2000
Washington Street Drainage Canal 1990	Midway CDBG\Washington Street Drainage Canal 1990\	12/10/1990
Midway Community Drainage Project 1977	Midway Community Drainage Project 1977\	10/7/1977
Midway Drainage Phase 2	Midway Drainage Phase 2\	2/1/1990
Midway Drainage Study	Midway Drainage Study\	10/7/1991
Midway Lincoln St	Midway Lincoln St\	4/2/1990
Midway Paving and Drainage 20th and 21st Street	Midway Paving and Drainage 20th and 21st Street\	9/1/1995
Midway Paving and Sidewalk 1993	Midway Paving and Sidewalk 1993\	9/24/1993
Midway Paving Project	Midway Paving Project\	12/13/2002
Midway Phase II	Midway Phase II\	12/3/1993
Midway Road and Sipes Ave 1996	Midway Road and Sipes Ave 1996\	4/1/1996
Midway Safe Harbor	Midway Safe Harbor\	6/28/2004
CDBG	Midway Search Results\CDBG\	5/10/1990
NTMNew Tribes Mission Ditch Improvements	Midway Search Results\NTMNew Tribes Mission Ditch Improvements\	7/11/2003
Drainage Study	Midway Search Results\Drainage Study\	1/31/2001
Midway Water Lines	Midway Water Lines\	7/14/1983
Midway-Byrd Ave Drainage	Midway-Byrd Ave Drainage\	1/11/1994
Palm Point	Palm Point\	1/1/1995
Riverbend	Riverbend\Approved Drawings_273851\	10/12/2018
Riverside Oaks	Riverside Oaks\Drawings_4222120\	8/24/2018
2nd & 3rd Drive Stormwater Proj	Roseland Park\2nd & 3rd Drive Stormwater Proj\	4/1/1992
Burrows Lane	Roseland Park\Burrows Lane\	4/1/1988
Rosseberry Lane Reconstruction	Roseland Park\Paving and Drainage Project\	6/1/1990

Project Name	Parent Folder	Date
Sanford Trails Estates	Sanford Trails Estates\	3/30/1990
Seedco-Midway Project	Seedco-Midway Project\	6/21/1979
Sipes Ave	Sipes Ave\	2/27/2006
SR 46 and Midway	SR 46 and Midway\	4/17/1990
Sterling Meadows	Sterling Meadows\	2/8/2005
Suntera Park	Suntera Park\Drawings_1737949\	5/6/2016
Town of Midway Drainage	Town of Midway Drainage\	2/11/1994
Washington Street Midway Canal	Washington Street Midway Canal\	10/1/1987

Appendix D

Modeled Peak Stages

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Appendix D Table D-1
Predicted Peak Water Surface Elevations in NAVD88

Peak Stage Decrease
Peak Stage Increase
Within City or Existing/Future Scenario Only

Location Description	Model Node	Existing Conditions Mean Annual/ 24 Hour Design Storm	Future Conditions Mean Annual/ 24 Hour Design Storm	Existing Conditions 10 Year/ 24 Hour Design Storm	Future Conditions 10 Year/ 24 Hour Design Storm	Existing Conditions 25 Year/ 24 Hour Design Storm	Future Conditions 25 Year/ 24 Hour Design Storm	Existing Conditions 50 Year/ 24 Hour Design Storm	Future Conditions 50 Year/ 24 Hour Design Storm	Existing Conditions 100 Year/ 24 Hour Design Storm	Future Conditions 100 Year/ 24 Hour Design Storm	Node Scenario(s)
Henri Avenue	09A4	23.1	23.1	26.6	26.6	27.0	27.0	27.3	27.3	27.6	27.6	Both Existing And Future
Henri Avenue at 21st Street	09A3	23.1	23.1	26.5	26.5	27.0	27.0	27.3	27.3	27.6	27.6	Both Existing And Future
Hurston Avenue	09A2	23.1	23.1	26.6	26.6	27.1	27.1	27.5	27.5	27.7	27.7	Both Existing And Future
Hurston Avenue at 21st Street	09A1	23.1	23.1	26.5	26.5	27.0	27.0	27.3	27.3	27.5	27.5	Both Existing And Future
21st Street at Dixie Avenue	09A	23.1	23.1	26.5	26.5	26.8	26.8	26.9	26.9	27.0	27.0	Both Existing And Future
Dixie Avenue Pond	23S	23.1	23.1	26.5	26.5	26.7	26.7	26.8	26.8	26.9	26.9	Both Existing And Future
Wetland between Dixie Ave and Granby Street	23R	26.2	26.2	26.4	26.4	26.6	26.6	26.7	26.7	26.8	26.8	Both Existing And Future
Granby Street Pond	23Q	22.2	22.2	25.3	25.3	25.9	25.9	26.3	26.3	26.7	26.7	Both Existing And Future
Dixie Avenue at Lingard Avenue	23T	23.1	23.1	26.5	26.5	26.7	26.7	26.8	26.8	26.9	26.9	Both Existing And Future
Childers Ditch at Crawford Drive Outfall	23M	27.1	27.1	28.2	28.2	28.3	28.3	28.3	28.3	28.4	28.4	Both Existing And Future
Childers Ditch at Granby Street	23L	27.0	27.0	28.1	28.1	28.2	28.2	28.2	28.2	28.2	28.2	Both Existing And Future
Childers Culvert at Church Street	23K	26.7	26.7	28.0	28.0	28.1	28.1	28.2	28.2	28.2	28.2	Both Existing And Future
Childers Culvert at Center Street (W)	23J	26.4	26.4	27.6	27.6	27.8	27.8	27.8	27.8	27.9	27.9	Both Existing And Future
Childers Culvert at Center Street (E)	23J3	26.3	26.3	27.5	27.5	27.7	27.7	27.8	27.8	27.8	27.8	Both Existing And Future
Childers Culvert at Center Street (Outfall)	23I	26.0	26.0	27.0	27.0	27.2	27.2	27.3	27.3	27.3	27.3	Both Existing And Future
Childers Ditch at Randall Street	23I1	25.9	25.9	27.0	27.0	27.1	27.1	27.2	27.2	27.3	27.3	Both Existing And Future
Childers Culvert at Water Street	23IA	25.3	25.3	26.8	26.8	26.9	26.9	27.0	27.0	27.1	27.1	Both Existing And Future
Childers Culvert between Water Street and Sipes Avenue	23H1	24.9	24.9	26.5	26.5	26.8	26.8	27.0	27.0	27.1	27.1	Both Existing And Future
Childers Culvert at Sipes Avenue (W)	23H4	24.6	24.6	25.9	25.9	26.2	26.2	26.5	26.5	26.7	26.8	Both Existing And Future
Childers Culvert at Sipes Avenue (E)	23H	24.3	24.3	25.4	25.4	25.7	25.7	26.0	26.0	26.2	26.3	Both Existing And Future
Childers Culvert at Sipes Avenue (Outfall)	23H6	23.4	23.4	24.2	24.2	24.5	24.5	24.7	24.8	25.0	25.0	Both Existing And Future
Childers Ditch at Broadway	23H7	23.1	23.1	24.0	24.1	24.3	24.4	24.6	24.7	24.9	24.9	Both Existing And Future
Childers Ditch at Greenway	23H9	22.5	22.5	23.7	23.8	24.1	24.2	24.4	24.5	24.7	24.8	Both Existing And Future
Childers Ditch at Dolarway	23HA	21.9	21.9	23.5	23.6	23.9	24.1	24.3	24.4	24.6	24.7	Both Existing And Future
Byrd Avenue	23P	29.2	29.2	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.4	Both Existing And Future
Crawford Avenue South	23O	29.2	29.2	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.4	Both Existing And Future
Crawford Avenue North	23N	29.1	29.1	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	Both Existing And Future
Granby Street at Byrd Ave	23W	29.7	29.7	30.1	30.1	30.3	30.3	30.3	30.3	30.4	30.4	Both Existing And Future
Granby Street at Midway Ave	23X	29.2	29.2	29.7	29.7	29.8	29.8	29.9	29.9	30.0	30.0	Both Existing And Future
Granby Street at Crawford Ave	23Y	28.3	28.3	28.6	28.6	28.7	28.7	28.7	28.7	28.8	28.8	Both Existing And Future
Center Street Washington (West)	23J1	26.6	26.6	28.1	28.1	28.3	28.3	28.4	28.4	28.5	28.5	Both Existing And Future
Center Street Washington (East)	23J4	26.4	26.4	27.5	27.5	27.7	27.7	27.8	27.8	27.8	27.8	Both Existing And Future
Center Street North of Childers Culvert	23J2	26.9	26.9	27.2	27.2	27.2	27.2	27.3	27.3	27.3	27.3	Both Existing And Future
Midway Ave at Church Street	23K1	27.2	27.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	Both Existing And Future
Center Street South of Midway Ave	23J6	29.1	29.1	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	Both Existing And Future
Midway Ave at Center Street (S)	23J5	29.1	29.1	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	Both Existing And Future
Midway Ave at Center Street (N)	23J4B	28.8	28.8	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	Both Existing And Future
Midway Ave at Randall Street	23I2	26.2	26.2	27.9	27.9	28.5	28.5	28.7	28.7	28.7	28.7	Both Existing And Future
Midway Ave at Water Street	23IA1	25.6	25.6	27.7	27.7	28.1	28.1	28.1	28.1	28.1	28.1	Both Existing And Future
Midway Ave Cross Drain West of Sipes (S)	23H3	24.9	24.9	26.5	26.5	26.8	26.8	27.0	27.0	27.1	27.1	Both Existing And Future
Midway Ave Cross Drain West of Sipes (N)	23H2	24.9	24.9	26.5	26.5	26.8	26.8	27.0	27.0	27.1	27.1	Both Existing And Future
Midway Ave at Sipes Avenue	23H5	24.6	24.6	25.9	25.9	26.3	26.3	26.6	26.6	26.9	26.9	Both Existing And Future
Midway Ave at Broadway	23H8	23.7	23.7	26.4	26.4	26.9	26.9	27.2	27.2	27.4	27.4	Both Existing And Future
Midway Ave at Greenway	23H10	22.9	22.9	25.0	25.0	25.9	25.9	26.4	26.4	26.6	26.6	Both Existing And Future
Midway Ave at Dolarway	23HA1	22.2	22.2	24.5	24.5	25.4	25.4	26.1	26.1	26.5	26.5	Both Existing And Future
Area North of Water Street at Washington Canal	23H11	26.6	26.6	26.7	26.7	26.8	26.8	26.9	27.0	27.1	27.1	Both Existing And Future
Midway Ave Cross Drain at Jitway (S)	23G1	26.3	26.3	26.6	26.6	26.7	26.7	26.8	26.8	26.8	26.8	Both Existing And Future
Midway Ave Cross Drain at Jitway (N)	23G2	26.1	26.1	26.6	26.6	26.7	26.7	26.8	26.8	26.8	26.8	Both Existing And Future
Jitway North of Midway Ave	23G3	25.7	25.7	26.1	26.1	26.2	26.2	26.3	26.3	26.4	26.4	Both Existing And Future
Jitway Pond	23PND-H	21.4	21.5	23.3	23.5	23.8	23.9	24.1	24.2	24.4	24.5	Both Existing And Future
Jitway at Washington Street	23G4	21.1	21.2	23.1	23.2	23.5	23.7	23.8	23.9	24.1	24.2	Both Existing And Future
Washington Street at Canaan Ave	23G	20.7	20.8	22.6	22.8	22.9	23.1	23.1	23.2	23.2	23.3	Both Existing And Future
Beardall Avenue at Washington Street	23F1	20.2	20.3	21.5	21.7	21.7	21.9	21.7	22.0	21.8	22.2	Both Existing And Future

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Appendix D Table D-1 (continued)
Predicted Peak Water Surface Elevations in NAVD88

Location Description	Model Node	Existing Conditions Mean Annual/ 24-Hour Design Storm	Future Conditions Mean Annual/ 24-Hour Design Storm	Existing Conditions 10-Year/ 24-Hour Design Storm	Future Conditions 10-Year/ 24-Hour Design Storm	Existing Conditions 25-Year/ 24-Hour Design Storm	Future Conditions 25-Year/ 24-Hour Design Storm	Existing Conditions 50-Year/ 24-Hour Design Storm	Future Conditions 50-Year/ 24-Hour Design Storm	Existing Conditions 100-Year/ 24-Hour Design Storm	Future Conditions 100-Year/ 24-Hour Design Storm	Node Scenario(s)
Washington Canal at Galileo Outfall	23F7	19.2	19.4	20.1	20.6	20.2	20.8	20.3	20.9	20.4	21.0	Both Existing And Future
Washington Culvert at Cameron Avenue (W)	23FE	18.9	19.2	19.8	20.4	20.0	20.6	20.2	20.7	20.3	20.8	Both Existing And Future
Washington Culvert at Cameron Avenue (E)	23E	16.7	16.9	17.6	18.0	17.8	18.3	17.9	18.7	18.0	19.2	Both Existing And Future
Washington Culvert at Cameron Avenue (Outfall)	23C1	15.6	15.7	16.6	16.9	16.8	17.1	16.9	17.4	17.0	17.7	Both Existing And Future
Washington Culvet between Cameron Ave and SR-415 (W	23C2	15.4	15.5	16.5	16.8	16.7	17.1	16.8	17.3	17.0	17.6	Both Existing And Future
Washington Culvet between Cameron Ave and SR-415 (E	23C3	15.4	15.5	16.4	16.7	16.6	17.0	16.8	17.2	16.9	17.5	Both Existing And Future
Washington Canal at SR-415 (W)	23C4	15.4	15.4	16.4	16.7	16.6	17.0	16.7	17.2	16.8	17.5	Both Existing And Future
Washington Canal at SR-415 (E)	23A	15.1	15.1	15.9	16.2	16.1	16.3	16.2	16.4	16.2	16.6	Both Existing And Future
Washington Canal at Sterling Meadows Pond 102	20B	14.0	14.0	15.1	15.3	15.3	15.4	15.3	15.5	15.4	15.6	Both Existing And Future
Pond 101 at Sterling Meadows Outfall	22Z	8.6	8.6	9.6	9.7	9.8	9.9	10.0	10.1	10.3	10.3	Both Existing And Future
Midway Community Center (North)	23F4	24.6	24.6	24.7	24.7	24.7	24.7	24.8	24.8	24.8	24.8	Both Existing And Future
Midway Community Center (South)	23F10	24.3	24.3	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	Both Existing And Future
Property South of Washington, North of Eudell Drive	23F11	22.0	22.0	22.2	22.2	22.2	22.2	22.3	22.3	22.3	22.3	Both Existing And Future
Beardall Avanue at Eudell Drive	23F2	22.2	22.2	22.8	22.8	22.9	22.9	22.9	22.9	23.0	23.0	Both Existing And Future
Pond at Galileo Charter School	23F9	19.2	19.5	20.1	20.6	20.2	20.7	20.4	20.9	20.5	21.0	Both Existing And Future
Galileo Charter School Outfall (Existing)	23F8	19.2		20.1		20.2		20.3		20.4		Existing Only
Riverbend Pond G	Riverbend_G3		17.6		18.4		18.5		18.7		18.9	Future Only
Riverbend Pond D	23F5	17.6	18.2	20.0	20.3	20.1	20.6	20.1	20.8	20.2	21.1	Both Existing And Future
Cameron Office Complex Pond	23C6	16.7	16.7	17.0	17.0	17.1	17.1	17.1	17.2	17.1	17.5	Both Existing And Future
Cameron Office Complex Outfall	23C5	15.4	15.5	16.4	16.7	16.6	17.0	16.8	17.2	16.9	17.5	Both Existing And Future
Cameron Heights E&F Pond C at Lake Mary Boulevard	Riverbend_PondC		16.4		16.9		17.0		17.2		17.5	Future Only
Pond 102 at Sterling Meadows	20A	14.0	14.0	15.1	15.3	15.3	15.4	15.3	15.5	15.4	15.6	Both Existing And Future
Pond 101 at Sterling Meadows	20C	11.6	11.6	12.6	12.6	12.9	12.9	13.1	13.1	13.3	13.3	Both Existing And Future
20th Street at Sipes Ave (1)	22L	24.0	24.0	24.8	24.8	24.9	24.9	25.0	25.0	25.1	25.1	Both Existing And Future
20th Street at Sipes Ave (2)	22L2	22.9	22.9	24.2	24.2	24.6	24.6	24.9	24.9	25.1	25.1	Both Existing And Future
Hughey at Sipes Ave	22K1	22.8	22.8	24.1	24.1	24.6	24.6	24.9	24.9	25.1	25.1	Both Existing And Future
Hughey at Sipes Ave Outfall	22K2	22.4	22.4	23.8	23.8	24.4	24.4	24.9	24.9	25.0	25.0	Both Existing And Future
Hughey Street Driveway A (W)	22K3	22.4	22.4	23.8	23.8	24.4	24.4	24.9	24.9	25.0	25.0	Both Existing And Future
Hughey Street Driveway A (E)	22K4	22.3	22.3	23.7	23.8	24.2	24.2	24.6	24.6	24.8	24.8	Both Existing And Future
Hughey Street Driveway B (W)	22K5	22.3	22.3	23.7	23.7	24.2	24.2	24.6	24.6	24.8	24.8	Both Existing And Future
Hughey Street Driveway B (E)	22K6	22.2	22.2	23.7	23.7	24.0	24.0	24.3	24.3	24.4	24.4	Both Existing And Future
Hughey Street Driveway C (W)	22K7	22.2	22.2	23.7	23.7	24.0	24.0	24.3	24.3	24.4	24.4	Both Existing And Future
Hughey Street Driveway C (E)	22K8	22.1	22.1	23.5	23.5	23.7	23.7	24.1	24.1	24.3	24.3	Both Existing And Future
Hughey Street Driveway D (W)	22K9	22.1	22.1	23.5	23.5	23.7	23.7	24.1	24.1	24.3	24.3	Both Existing And Future
Hughey Street Driveway D (E)	22K10	21.8	21.8	23.3	23.3	23.7	23.7	24.1	24.1	24.3	24.3	Both Existing And Future
Hughey Street Driveway E (W)	22K11	21.8	21.8	23.3	23.3	23.7	23.7	24.1	24.1	24.3	24.3	Both Existing And Future
Hughey Street Driveway E (Mid 1)	22K12	21.6	21.6	23.0	23.0	23.4	23.4	23.8	23.8	24.1	24.1	Both Existing And Future
Hughey Street Driveway E (Mid 2)	22K12B	21.3	21.3	22.6	22.6	23.0	23.0	23.4	23.3	24.0	24.0	Both Existing And Future
Hughey Street Driveway E (E)	22K13	21.2	21.2	22.5	22.5	22.9	22.9	23.2	23.2	23.9	23.9	Both Existing And Future
Hughey Street Driveway F (W)	22K14	21.2	21.2	22.5	22.5	22.9	22.9	23.2	23.2	23.9	23.9	Both Existing And Future
Hughey Street Driveway F (E)	22K15	20.8	20.8	21.8	21.8	22.0	22.0	22.1	22.1	22.9	22.9	Both Existing And Future
Hughey Street Driveway G (W)	22K16	20.7	20.7	21.7	21.8	22.0	22.0	22.1	22.1	22.9	22.9	Both Existing And Future
Hughey Street Driveway G (Mid)	22K17	20.6	20.6	21.6	21.6	21.9	21.9	22.0	22.0	22.6	22.6	Both Existing And Future
Hughey Street Driveway G (E)	22K18	20.5	20.5	21.4	21.4	21.6	21.6	21.8	21.8	22.2	22.2	Both Existing And Future
Hughey Street at Deepwater Avenue (W)	22K19	20.4	20.4	21.3	21.3	21.6	21.6	21.7	21.8	22.1	22.1	Both Existing And Future
Hughey Street at Deepwater Avenue (E)	22J	18.6	18.5	19.5	19.2	19.7	19.8	19.9	20.4	20.2	20.7	Both Existing And Future
Hughey Street at Beardall Avenue (W)	22I	18.1	17.8	19.1	18.8	19.4	19.6	19.7	20.3	20.0	20.5	Both Existing And Future
Hughey Street at Beardall Avenue (E)	22G1	17.9	17.7	18.7	18.6	18.9	19.1	19.1	19.5	19.3	19.7	Both Existing And Future
Channel at Riverbend (1)	22G2	17.7	17.5	18.5	18.4	18.7	18.9	18.9	19.3	19.0	19.4	Both Existing And Future
Channel at Riverbend (2)	22G3	17.2	16.8	18.1	17.9	18.4	18.4	18.6	18.7	18.7	18.9	Both Existing And Future
Channel at Riverbend (3)	22E1	17.2	16.8	18.1	17.9	18.4	18.4	18.6	18.7	18.7	18.9	Both Existing And Future
Riverbend Channel at Cameron Avenue (1)	22E2	15.7	15.3	16.6	16.2	16.8	16.8	17.1	17.3	17.4	17.6	Both Existing And Future
Riverbend Channel at Cameron Avenue (2)	22E3	15.0	14.6	16.4	15.5	16.6	16.5	17.0	17.1	17.2	17.4	Both Existing And Future
Riverbend Channel at Cameron Avenue (3)	22D1	14.5	14.1	15.5	15.1	15.7	15.5	15.8	15.9	16.0	16.1	Both Existing And Future
Channel at Cameron Heights A (1)	22D2	13.6	13.0	14.9	14.4	15.2	14.9	15.4	15.3	15.7	15.6	Both Existing And Future
Channel at Cameron Heights A (2)	22B1	13.0	12.6	14.1	13.6	14.3	14.0	14.5	14.4	14.7	14.6	Both Existing And Future
Channel at SR-415 (W)	22B2	11.3	10.6	12.9	12.2	13.3	12.7	13.6	13.2	13.8	13.5	Both Existing And Future

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Appendix D Table D-1 (continued)
Predicted Peak Water Surface Elevations in NAVD88

Location Description	Model Node	Existing Conditions Mean Annual/ 24-Hour Design Storm	Future Conditions Mean Annual/ 24-Hour Design Storm	Existing Conditions 10-Year/ 24-Hour Design Storm	Future Conditions 10-Year/ 24-Hour Design Storm	Existing Conditions 25-Year/ 24-Hour Design Storm	Future Conditions 25-Year/ 24-Hour Design Storm	Existing Conditions 50-Year/ 24-Hour Design Storm	Future Conditions 50-Year/ 24-Hour Design Storm	Existing Conditions 100-Year/ 24-Hour Design Storm	Future Conditions 100-Year/ 24-Hour Design Storm	Node Scenario(s)
Channel at SR-415 (E)	22A	11.2	10.6	12.5	12.0	12.8	12.3	13.0	12.7	13.2	12.9	Both Existing And Future
Lincoln Street at Diesel Lane	22Y1	25.9	25.9	26.0	26.0	26.1	26.1	26.1	26.1	26.1	26.1	Both Existing And Future
Lincoln Street at Deepwater Avenue	22Y	23.3	23.3	24.0	24.0	24.1	24.1	24.2	24.2	24.2	24.2	Both Existing And Future
Lincoln Street (1)	22X	23.2	23.2	24.0	24.0	24.1	24.1	24.2	24.2	24.2	24.2	Both Existing And Future
Lincoln Street (2)	22W	22.0	22.0	22.5	22.5	22.5	22.5	22.6	22.6	22.6	22.6	Both Existing And Future
Lincoln Street (3)	22V	21.9	21.9	22.5	22.5	22.5	22.5	22.5	22.5	22.6	22.6	Both Existing And Future
Lincoln Street (4)	22U	21.3	21.3	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.5	Both Existing And Future
Lincoln Street (5)	22T	21.3	21.3	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.5	Both Existing And Future
Lincoln Street (6)	22S	20.9	20.8	22.1	22.1	22.1	22.1	22.1	22.2	22.2	22.2	Both Existing And Future
Lincoln Street (7)	22R	20.8	20.6	22.0	22.1	22.1	22.1	22.1	22.1	22.1	22.2	Both Existing And Future
Lincoln Street (8)	22Q	20.5	20.3	21.5	21.6	21.6	21.8	21.6	22.0	21.7	22.1	Both Existing And Future
Lincoln Street (9)	22P	20.5	20.3	21.5	21.6	21.6	21.8	21.6	22.0	21.7	22.1	Both Existing And Future
Lincoln Street (10)	22O	20.4	20.1	21.5	21.6	21.6	21.8	21.6	22.0	21.7	22.1	Both Existing And Future
Lincoln Street at Beardall Avenue (1)	22N	20.4	20.1	21.5	21.6	21.6	21.8	21.6	22.0	21.7	22.1	Both Existing And Future
Lincoln Street at Beardall Avenue (2)	22M	19.4	18.8	19.9	19.8	20.0	20.1	20.0	20.5	20.1	20.8	Both Existing And Future
Cameron Heights J Pond B	CamJ_PondB		17.5		18.5		19.0		19.3		19.6	Future Only
Cameron Avenue at Hughey Street	22F	17.2	17.2	17.8	17.8	18.0	18.0	18.1	18.1	18.2	18.2	Both Existing And Future
Cameron Heights E&F Pond E	22D3	14.4	15.3	14.8	16.2	15.1	16.5	15.2	16.7	15.5	17.0	Both Existing And Future
Cameron Heights E&F Pond F	Cam_Pond_F		15.0		15.4		15.8		16.2		16.5	Future Only
Brisson Avenue at Palm Point (1)	07Q	23.2	23.2	23.6	23.6	23.6	23.6	23.7	23.7	23.8	23.8	Both Existing And Future
Brisson Avenue at Palm Point (2)	07P	22.8	22.8	23.0	23.0	23.0	23.0	23.1	23.1	23.2	23.2	Both Existing And Future
Brisson Avenue at Palm Point (3)	07O	22.5	22.5	22.8	22.8	22.9	22.9	22.9	22.9	23.0	23.0	Both Existing And Future
Brisson Avenue at Palm Point (4)	07N	21.8	21.8	22.0	22.0	22.1	22.1	22.1	22.1	22.1	22.1	Both Existing And Future
Brisson Avenue at Palm Point (5)	07K	19.4	19.4	20.0	20.0	20.2	20.2	20.4	20.4	20.5	20.5	Both Existing And Future
Brisson Avenue at Palm Point (6)	07J	17.7	17.7	19.6	19.6	19.7	19.7	19.8	19.8	19.8	19.8	Both Existing And Future
Brisson Avenue at Celery Estates South (1)	07E	13.1	13.1	14.7	14.7	15.1	15.1	15.3	15.3	15.6	15.6	Both Existing And Future
Brisson Avenue at Celery Estates South (2)	07D	10.5	10.5	12.8	12.8	13.4	13.4	13.8	13.8	14.0	14.0	Both Existing And Future
Brisson Avenue at Celery Avenue	07B	10.4	10.4	12.5	12.5	13.0	13.0	13.3	13.3	13.5	13.5	Both Existing And Future
Celery Avenue at Pisa Avenue	07T	11.8	11.8	14.2	14.2	14.6	14.6	14.9	14.9	15.2	15.2	Both Existing And Future
Celery Avenue at Brisson Avenue	07A	9.1	9.1	10.5	10.5	10.9	10.9	11.1	11.1	11.4	11.4	Both Existing And Future
Celery Avenue Outfall at Brisson Avenue (W)	0777	9.0	9.0	10.0	10.0	10.2	10.2	10.6	10.6	10.6	10.6	Both Existing And Future
Water Street at Hughey Street	09P	22.5	22.5	23.0	23.0	23.2	23.2	23.4	23.4	23.7	23.7	Both Existing And Future
Midway Regional SWF Pond 1	09L	17.3	17.3	18.5	18.5	19.2	19.2	19.7	19.7	20.2	20.2	Both Existing And Future
Midway Regional SWF Pond 2	09M	13.4	13.4	15.2	15.2	15.3	15.3	15.3	15.3	15.4	15.4	Both Existing And Future
Celery Avenue at Midway Regional SWF Pond 2	09N	7.5	7.9	9.2	9.4	9.6	9.7	9.8	9.9	10.1	10.2	Both Existing And Future
Midway Regional SWF Pond 4	10A4	7.5	7.9	8.7	8.8	8.9	9.0	9.0	9.1	9.1	9.2	Both Existing And Future
Pond at Jack Court	09B	24.4	24.4	25.3	25.3	25.4	25.4	25.5	25.5	25.6	25.6	Both Existing And Future
20th Street Cross Drain (S)	09C	22.8	22.8	24.4	24.4	25.1	25.1	25.4	25.4	25.6	25.6	Both Existing And Future
20th Street Cross Drain (N)	09D	22.8	22.8	24.1	24.1	24.5	24.5	24.7	24.7	24.8	24.8	Both Existing And Future
20th Street Outfall	09E	22.6	22.6	23.5	23.5	23.7	23.7	23.8	23.8	23.9	23.9	Both Existing And Future
20th Street Outfall (2)	09F	21.9	21.9	22.5	22.5	22.7	22.7	23.0	23.0	23.4	23.4	Both Existing And Future
20th Street Outfall at MRSWF	09G	19.8	19.8	21.3	21.3	22.2	22.2	22.7	22.7	23.2	23.2	Both Existing And Future
Palm Point Pond	09I	22.5	22.5	22.9	22.9	23.0	23.0	23.1	23.1	23.3	23.3	Both Existing And Future
Palm Point Outfall Ditch (1)	09J	20.8	20.8	21.4	21.4	21.9	21.9	22.2	22.2	22.6	22.6	Both Existing And Future
Palm Point Outfall Ditch (2)	09K	19.5	19.5	21.1	21.1	21.8	21.8	22.2	22.2	22.6	22.6	Both Existing And Future
Palm Point Outfall to MRSWF (Tie In Node)	09H	17.3	17.3	20.1	20.1	20.9	20.9	21.3	21.3	21.7	21.7	Both Existing And Future
Celery Avenue at Thoroughbred Trail (S)	10B	17.4	17.4	17.4	17.4	17.5	17.5	17.5	17.5	17.5	17.5	Both Existing And Future
Celery Avenue at Thoroughbred Trail (N)	10A	16.4	16.4	16.4	16.5	16.5	16.5	16.5	16.5	16.5	16.5	Both Existing And Future
Sanford Trails Outfall (1)	10B1	13.6	13.6	13.8	13.8	13.9	13.9	13.9	14.0	14.0	14.1	Both Existing And Future
Sanford Trails Outfall (2)	10A1	12.2	12.2	12.4	12.5	12.5	12.5	12.5	12.6	12.6	12.7	Both Existing And Future
Sanford Trails Outfall (3)	10A2	10.7	10.8	11.3	11.3	11.4	11.5	11.4	11.6	11.5	11.7	Both Existing And Future
Sanford Trails Outfall at MRSWF	10A3	10.1	10.2	11.0	11.1	11.1	11.2	11.2	11.3	11.3	11.4	Both Existing And Future
Sipes Ave North of CSX	10C1	18.0	18.3	18.2	18.8	18.4	18.9	18.5	18.9	18.7	19.1	Both Existing And Future
Sipes Ave at Celery Avenue	10C	17.7	18.3	18.3	18.8	18.4	18.9	18.5	18.9	18.7	19.1	Both Existing And Future
Cameron Heights A Pond A1	CamA_PondA1		19.7		20.8		21.2		21.5		21.7	Future Only
Cameron Heights A Pond A2	CamA_PondA2		18.4		19.4		19.7		20.0		20.2	Future Only
Cameron Heights A Pond A3	CamA_PondA3		18.4		19.4		19.7		20.0		20.3	Future Only

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Appendix D Table D-1 (continued)
Predicted Peak Water Surface Elevations in NAVD88

Location Description	Model Node	Existing Conditions Mean Annual/ 24-Hour Design Storm	Future Conditions Mean Annual/ 24-Hour Design Storm	Existing Conditions 10-Year/ 24-Hour Design Storm	Future Conditions 10-Year/ 24-Hour Design Storm	Existing Conditions 25-Year/ 24-Hour Design Storm	Future Conditions 25-Year/ 24-Hour Design Storm	Existing Conditions 50-Year/ 24-Hour Design Storm	Future Conditions 50-Year/ 24-Hour Design Storm	Existing Conditions 100-Year/ 24-Hour Design Storm	Future Conditions 100-Year/ 24-Hour Design Storm	Node Scenario(s)
Thoroughbred Trail Outfall	08A	8.4	8.4	8.5	8.5	8.6	8.6	8.6	8.6	8.6	8.6	Both Existing And Future
Sipes Ave at CSX (W)	12E	21.3	21.3	21.9	21.9	22.0	22.0	22.1	22.1	22.2	22.2	Both Existing And Future
Sipes Ave at CSX (E)	12F1	20.5	20.5	20.8	20.8	20.9	20.9	20.9	20.9	21.1	21.1	Both Existing And Future
CSX Culvert (W)	12F2	18.1	17.8	18.5	18.4	18.6	18.5	18.7	18.6	18.7	18.7	Both Existing And Future
CSX Culvert (E)	12G1	17.9	17.8	18.4	18.4	18.5	18.5	18.6	18.6	18.7	18.7	Both Existing And Future
Sipes Avenue North of Hughey	12F5	22.0	22.0	22.6	22.6	22.8	22.8	22.9	22.9	22.9	22.9	Both Existing And Future
Sipes Ave at Oneal (S)	12F4	22.0	22.0	22.6	22.6	22.8	22.7	22.9	22.9	22.9	22.9	Both Existing And Future
Sipes Ave at Oneal (N)	12F3	20.7	20.7	20.9	20.9	21.0	21.0	21.0	21.0	21.2	21.2	Both Existing And Future
Cameron Heights B Pond 1	CamB_Pond1		19.1		19.8		20.1		20.3		20.6	Future Only
Beardall Office/Warehouse (Future)	BeardallHQ		17.8		18.4		18.6		18.7		18.8	Future Only
Cameron Heights at Beardall Avenue	CamC_PostPond		18.7		19.8		20.2		20.5		20.8	Future Only
Beardall Avenue at Hughey Street (S)	22H	19.4	18.6	19.9	19.7	19.9	20.0	20.0	20.3	20.1	20.6	Both Existing And Future
Beardall Avenue at Hughey Street (N)	12G6	18.1	17.7	18.5	18.2	18.6	18.4	18.6	18.5	18.7	19.1	Both Existing And Future
Cameron Heights C1 Pond	CamC1_Pond1		18.5		19.2		19.5		19.7		20.0	Future Only
Cameron Heights C1 at Beardall Avenue (S)	12G5	18.1	17.7	18.4	17.9	18.5	18.1	18.5	18.1	18.6	18.4	Both Existing And Future
Cameron Heights C1 at Beardall Avenue (N)	12G4	17.9	17.7	18.3	17.9	18.3	17.9	18.4	18.0	18.5	18.2	Both Existing And Future
Beardall Avenue at Future Warehouse (S)	12G3	17.9	17.7	18.2	17.9	18.3	17.9	18.3	18.0	18.4	18.2	Both Existing And Future
CSX Ditch at Beardall	12G2	17.7	17.7	17.9	17.9	18.0	17.9	18.0	18.0	18.0	18.0	Both Existing And Future
Cameron Heights J at Beardall Avenue (1)	12H4	17.7	17.8	18.0	18.3	18.1	18.4	18.3	18.4	18.6	18.5	Both Existing And Future
Cameron Heights J at Beardall Avenue (2)	12H3	17.7	17.8	18.0	18.3	18.1	18.4	18.3	18.4	18.6	18.5	Both Existing And Future
Cameron Heights J at Beardall Avenue (3)	12H2	17.7	17.8	18.0	18.3	18.1	18.3	18.3	18.4	18.5	18.5	Both Existing And Future
Beardall Avenue at Cameron Heights D (S)	12H1	17.7	17.8	18.0	18.2	18.1	18.3	18.2	18.3	18.4	18.4	Both Existing And Future
Beardall Avenue at Cameron Heights D (N)	12H	17.7	17.7	17.9	17.9	17.9	18.0	18.0	18.0	18.1	18.1	Both Existing And Future
Beardall Avenue at Suntera Park (1)	12D	14.6	13.7	15.6	15.5	15.9	15.7	16.0	15.8	16.2	16.0	Both Existing And Future
Beardall Avenue at Suntera Park (2)	12D1	14.5	13.6	15.6	15.4	15.8	15.5	16.0	15.7	16.2	15.9	Both Existing And Future
Beardall Avenue at Suntera Park (3)	12D2	14.5	13.5	15.6	15.4	15.8	15.5	16.0	15.7	16.2	15.9	Both Existing And Future
Beardall Avenue at Suntera Park (4)	12D3	14.4	13.4	15.6	15.3	15.8	15.5	16.0	15.6	16.2	15.9	Both Existing And Future
Beardall Avenue at Celery Avenue	12C	14.4	13.3	15.5	15.2	15.8	15.4	16.0	15.6	16.1	15.9	Both Existing And Future
Undeveloped Pond East of Cameron Avenue	19C	18.5	18.6	18.6	18.7	18.6	18.7	18.6	18.7	18.6	18.7	Both Existing And Future
Undeveloped Pond West of Cameron Avenue (1)	16E	17.8	17.8	17.9	17.9	17.9	17.9	17.9	18.0	18.0	18.1	Both Existing And Future
Undeveloped Pond West of Cameron Avenue (2)	16D	16.7	16.7	16.9	16.9	17.0	17.0	17.0	17.1	17.1	17.2	Both Existing And Future
Undeveloped Pond West of Cameron Avenue (3)	12I	17.7		18.0		18.1		18.2		18.3		Existing Only
Cameron Heights D Pond D	CamD_PondD		17.8		18.2		18.2		18.3		18.4	Future Only
Celery Ave West of Beardall	12B	15.1	13.5	16.1	15.8	16.3	16.0	16.4	16.1	16.5	16.3	Both Existing And Future
Suntera Park Pond	Suntera_Pond		15.2		16.8		17.3		17.8		18.1	Future Only
Celery Cross Drain East of Beardall (S)	12C1	14.3	13.2	15.3	15.0	15.6	15.2	15.7	15.4	15.9	15.6	Both Existing And Future
Celery Cross Drain East of Beardall (N)	12A1	14.2	13.2	15.2	15.0	15.5	15.1	15.7	15.2	15.9	15.5	Both Existing And Future
Celery Outfall East of Beardall (1)	12A2	12.2	11.8	13.0	12.6	14.3	13.2	14.5	13.4	14.6	14.4	Both Existing And Future
Celery Outfall East of Beardall (2)	12A3	10.4	10.1	11.2	11.2	12.2	11.8	12.3	12.1	12.5	12.2	Both Existing And Future
Celery Outfall East of Beardall (3)	12A4	8.8	8.6	9.6	9.6	10.5	9.7	10.7	10.4	10.9	10.6	Both Existing And Future
Meriwether Farms at Celery Avenue (S)	10E-1	14.5	12.8	16.1	15.5	16.3	16.0	16.4	16.1	16.5	16.3	Both Existing And Future
Meriwether Farms at Celery Avenue (N)	10F	13.7	12.7	14.3	14.1	14.3	14.2	14.4	14.3	14.4	14.4	Both Existing And Future
Meriwether Farms/Riverside Oaks Ditch (1)	10F1	11.3	10.5	11.9	11.7	11.9	11.8	11.9	11.9	11.9	11.9	Both Existing And Future
Meriwether Farms/Riverside Oaks Ditch (2)	10F2	8.3	7.6	8.9	8.6	8.9	8.7	8.9	8.8	8.9	8.8	Both Existing And Future
Meriwether Farms/Riverside Oaks Ditch (3)	10F3	7.2	5.8	7.9	7.0	7.9	7.1	8.0	7.4	8.1	8.1	Both Existing And Future
Meriwether Farms/Riverside Oaks Ditch (4)	10F4	5.7	4.4	6.4	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
Riverside Oaks Pond 1	Riverside_Pond1		12.8		13.9		14.2		14.3		14.5	Future Only
Riverside Oaks Pond 2	Riverside_Pond2		5.2		6.4		6.8		7.4		8.1	Future Only
Riverside Oaks Pond 3	Riverside_Pond3		6.0		6.6		6.7		7.4		8.1	Future Only
Riverside Oaks Pond 4	Riverside_Pond4		4.8		5.7		6.6		7.4		8.1	Future Only
Celery Pointe Pond	CeleryPt_Propond		7.0		8.8		9.3		9.8		10.3	Future Only
Celery Ave Crossing at Indian Mound Channel (S)	16C	15.8	15.8	16.5	16.6	16.5	16.7	16.6	16.9	16.6	17.0	Both Existing And Future
Celery Ave Crossing at Indian Mound Channel (N)	16B	15.8	15.8	16.3	16.4	16.4	16.6	16.5	16.7	16.5	16.8	Both Existing And Future
Indian Mound Channel at Cameron Ave	16A2	11.4	11.4	11.9	12.0	12.0	12.3	12.0	13.3	12.4	14.3	Both Existing And Future
Cameron Ave south of Chickasaw Drive	16A	9.8	9.8	10.6	10.6	10.7	11.4	11.5	11.9	11.9	12.4	Both Existing And Future
Chickasaw Drive	19E	5.1	5.1	7.5	7.5	7.8	7.8	7.9	7.9	8.1	8.1	Both Existing And Future
Cameron Avenue at Celery Avenue (W)	19A	15.0	15.0	15.2	15.2	15.2	15.2	15.3	15.3	15.3	15.3	Both Existing And Future

Appendix D Table D-1 (continued)
Predicted Peak Water Surface Elevations in NAVD88

Location Description	Model Node	Existing Conditions Mean Annual/ 24-Hour Design Storm	Future Conditions Mean Annual/ 24-Hour Design Storm	Existing Conditions 10-Year/ 24-Hour Design Storm	Future Conditions 10-Year/ 24-Hour Design Storm	Existing Conditions 25-Year/ 24-Hour Design Storm	Future Conditions 25-Year/ 24-Hour Design Storm	Existing Conditions 50-Year/ 24-Hour Design Storm	Future Conditions 50-Year/ 24-Hour Design Storm	Existing Conditions 100-Year/ 24-Hour Design Storm	Future Conditions 100-Year/ 24-Hour Design Storm	Node Scenario(s)
Cameron Avenue at Celery Avenue (E)	19B1	14.5	14.5	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	Both Existing And Future
Celery Avenue at Chickasaw Drive	19B2	7.3	7.3	8.8	8.8	9.3	9.4	9.8	10.0	10.4	11.0	Both Existing And Future
Celery Avenue at Peninsula Drive (1)	19B3	5.3	5.3	6.0	6.0	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
Celery Avenue at Peninsula Drive (2)	19B4	4.4	4.4	5.8	5.8	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
FL-46 at Midway Transporation Complex	06D	30.2	30.2	30.8	30.8	31.0	31.0	31.1	31.1	31.3	31.3	Both Existing And Future
Pond at Midway Transportation Facility	06D1	29.2	29.2	29.7	29.7	29.8	29.8	29.8	29.8	29.9	29.9	Both Existing And Future
Dry Pond A at Midway Elementary School	07V	30.6	30.6	30.9	30.9	31.0	31.0	31.1	31.1	31.1	31.1	Both Existing And Future
Club II Pond South Cell	06G	23.4	23.4	24.7	24.7	25.1	25.1	25.3	25.3	25.5	25.5	Both Existing And Future
Club II Pond North Cell	06H	21.8	21.8	22.0	22.0	22.2	22.2	22.7	22.7	23.2	23.2	Both Existing And Future
Burrows Lane at 1st Drive	06F	23.3	23.3	24.8	24.8	24.9	24.9	25.0	25.0	25.1	25.1	Both Existing And Future
FL-46 at Brisson Avenue	23U	29.5	29.5	30.1	30.1	30.4	30.4	30.7	30.7	31.0	31.0	Both Existing And Future
SR-415 Pond B at Celery Avenue	19D	12.4	12.4	12.9	12.9	13.0	13.0	13.1	13.1	13.2	13.2	Both Existing And Future
Celery Manor	699	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
Chickasaw Drive Outfall	19F	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
Meriwether Farms/Riverside Oaks Ditch Outfall	1099	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
Channel at Sterling Meadows Pond 101	2399	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
Canal Outfall at Chickasaw Drive	99	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
Lake Mary Boulevard	21A	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
Celery Outfall East of Beardall Outfall	1299	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
Sterling Meadows	2299	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
Celery Ave at Pininsula Drive Outfall	1999	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
(Within City)	01E	29.1	29.1	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	Both Existing And Future
(Within City)	04D	8.2	8.2	11.4	11.4	12.0	12.0	12.3	12.3	12.5	12.5	Both Existing And Future
(Within City)	199	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
(Within City)	06B	29.2	29.2	31.5	31.5	31.9	31.9	32.1	32.1	32.2	32.2	Both Existing And Future
(Within City)	03A	11.4	11.4	12.4	12.4	12.7	12.7	13.1	13.1	13.5	13.5	Both Existing And Future
(Within City)	07M	19.5	19.5	20.1	20.1	20.2	20.2	20.4	20.4	20.6	20.6	Both Existing And Future
(Within City)	23V	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	Both Existing And Future
(Within City)	01Q	23.4	23.4	25.6	25.6	25.9	25.9	26.2	26.2	26.5	26.5	Both Existing And Future
(Within City)	01I	15.2	15.2	16.6	16.6	17.5	17.5	18.1	18.1	18.7	18.7	Both Existing And Future
(Within City)*	23F	19.9	20.1	20.9	21.1	21.0	21.2	21.0	21.4	21.1	21.5	Both Existing And Future
(Within City)	06L	11.9	11.9	14.8	14.8	15.4	15.4	15.6	15.6	15.9	15.9	Both Existing And Future
(Within City)	0788	8.7	8.7	9.6	9.6	9.8	9.8	9.9	9.9	10.0	10.0	Both Existing And Future
(Within City)	01C	21.9	21.9	22.8	22.8	22.9	22.9	22.9	22.9	23.0	23.0	Both Existing And Future
(Within City)	05A	7.9	7.9	9.3	9.3	9.5	9.5	10.0	10.0	10.5	10.5	Both Existing And Future
(Within City)	06E2	24.2	24.2	24.8	24.8	24.9	24.9	24.9	24.9	25.0	25.0	Both Existing And Future
(Within City)	06M	22.9	22.9	24.7	24.7	24.9	24.9	25.0	25.0	25.2	25.2	Both Existing And Future
(Within City)	01A	14.8	14.8	16.3	16.3	16.7	16.7	17.1	17.1	17.5	17.5	Both Existing And Future
(Within City)	07C	13.1	13.1	13.9	13.9	14.1	14.1	14.3	14.3	14.6	14.6	Both Existing And Future
(Within City)	06C	31.9	31.9	33.3	33.3	33.4	33.4	33.4	33.4	33.5	33.5	Both Existing And Future
(Within City)	07R	11.3	11.3	14.2	14.2	14.6	14.6	14.9	14.9	15.1	15.1	Both Existing And Future
(Within City)	01S	19.0	19.0	19.2	19.2	19.3	19.3	19.4	19.4	19.4	19.4	Both Existing And Future
(Within City)	01CB	19.5	19.5	21.3	21.3	21.6	21.6	21.8	21.8	22.1	22.1	Both Existing And Future
(Within City)	06E4	26.8	26.8	27.9	27.9	28.2	28.2	28.5	28.5	28.6	28.6	Both Existing And Future
(Within City)	799	3.2	3.2	5.6	5.6	6.7	6.7	7.4	7.4	8.1	8.1	Both Existing And Future
(Within City)	09O	15.2	15.2	15.3	15.3	15.3	15.3	15.4	15.4	15.4	15.4	Both Existing And Future
(Within City)	06E	24.2	24.2	24.8	24.8	24.8	24.8	24.9	24.9	24.9	24.9	Both Existing And Future
(Within City)	07U	6.9	6.9	7.5	7.5	7.7	7.7	7.8	7.8	8.1	8.1	Both Existing And Future
(Within City)	01H	23.4	23.4	25.2	25.2	25.4	25.4	25.6	25.6	25.9	25.9	Both Existing And Future
(Within City)	06H1	21.7	21.7	23.0	23.0	23.3	23.3	23.6	23.6	23.9	23.9	Both Existing And Future
(Within City)	01F	23.4	23.4	25.1	25.1	25.3	25.3	25.5	25.5	25.7	25.7	Both Existing And Future
(Within City)	06H2	20.7	20.7	21.1	21.1	21.3	21.3	21.5	21.5	21.6	21.6	Both Existing And Future
(Within City)	07H	17.1	17.1	19.6	19.6	19.7	19.7	19.7	19.7	19.8	19.8	Both Existing And Future
(Within City)	07F	13.6	13.6	14.8	14.8	15.2	15.2	15.4	15.4	15.6	15.6	Both Existing And Future
(Within City)	01G	28.3	28.3	28.8	28.8	28.9	28.9	29.0	29.0	29.1	29.1	Both Existing And Future
(Within City)	01M	39.0	39.0	40.2	40.2	40.5	40.5	40.7	40.7	41.0	41.0	Both Existing And Future
(Within City)	04A	10.5	10.5	12.3	12.3	12.8	12.8	13.1	13.1	13.5	13.5	Both Existing And Future

Appendix D Table D-1 (continued)
Predicted Peak Water Surface Elevations in NAVD88

Location Description	Model Node	Existing Conditions Mean Annual/ 24-Hour Design Storm	Future Conditions Mean Annual/ 24-Hour Design Storm	Existing Conditions 10-Year/ 24-Hour Design Storm	Future Conditions 10-Year/ 24-Hour Design Storm	Existing Conditions 25-Year/ 24-Hour Design Storm	Future Conditions 25-Year/ 24-Hour Design Storm	Existing Conditions 50-Year/ 24-Hour Design Storm	Future Conditions 50-Year/ 24-Hour Design Storm	Existing Conditions 100-Year/ 24-Hour Design Storm	Future Conditions 100-Year/ 24-Hour Design Storm	Node Scenario(s)
(Within City)	06E1	24.2	24.2	24.8	24.8	24.9	24.9	24.9	24.9	25.0	25.0	Both Existing And Future
(Within City)	04B	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.3	6.3	Both Existing And Future
(Within City)	06K	12.1	12.1	15.1	15.1	15.4	15.4	15.6	15.6	15.9	15.9	Both Existing And Future
(Within City)	01J	15.2	15.2	16.7	16.7	17.7	17.7	18.3	18.3	18.8	18.8	Both Existing And Future
(Within City)	23F3	23.3	23.3	23.6	23.6	23.7	23.7	23.9	23.9	24.1	24.1	Both Existing And Future
(Within City)	04E	7.8	7.8	9.4	9.4	9.7	9.7	10.0	10.0	10.3	10.3	Both Existing And Future
(Within City)	06J1	17.0	17.0	17.3	17.3	17.4	17.4	17.5	17.5	17.7	17.7	Both Existing And Future
(Within City)	06N	10.1	10.1	14.3	14.3	14.7	14.7	14.9	14.9	15.0	15.0	Both Existing And Future
(Within City)	06I2	12.9	12.9	15.3	15.3	15.7	15.7	15.9	15.9	16.2	16.2	Both Existing And Future
(Within City)	01B	19.1	19.1	20.4	20.4	20.6	20.6	20.8	20.8	21.0	21.0	Both Existing And Future
(Within City)*	23F6	19.4	19.6	20.2	20.6	20.3	20.8	20.4	20.9	20.5	21.1	Both Existing And Future
(Within City)	07G	16.7	16.7	19.6	19.6	19.7	19.7	19.7	19.7	19.8	19.8	Both Existing And Future
(Within City)	07I	21.3	21.3	21.7	21.7	21.8	21.8	21.9	21.9	22.0	22.0	Both Existing And Future
(Within City)	04C	9.6	9.6	12.2	12.2	12.7	12.7	13.0	13.0	13.3	13.3	Both Existing And Future
(Within City)	07S	15.1	15.1	15.7	15.7	16.0	16.0	16.3	16.3	16.6	16.6	Both Existing And Future
(Within City)	01BA	19.1	19.1	20.4	20.4	20.6	20.6	20.8	20.8	21.0	21.0	Both Existing And Future
(Within City)	01L	29.0	29.0	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	Both Existing And Future
(Within City)	06I	17.2	17.2	18.4	18.4	18.7	18.7	19.0	19.0	19.3	19.3	Both Existing And Future
(Within City)	06E3	24.2	24.2	24.8	24.8	24.9	24.9	24.9	24.9	25.0	25.0	Both Existing And Future

*Node 23F and 23F6 locations are shared with the County.

Appendix E

LOS Comparison

Appendix E Table E-1
Midway Basin LOS Comparison for Existing and Future Conditions

LOS A/B
LOS C
LOS D
Within City or Existing/Future Scenario Only

Location Description	Model Node	LOS A Elevation	LOS B Elevation	LOS C Elevation	LOS D Elevation	LOS Facility Type	Assigned LOS Event	Existing LOS Event Stage	Existing LOS Result	Future LOS Event Stage	Future LOS Result	Node Scenario(s)	LOS Change
Henri Avenue	09A4	27.7	27.9	28.3	28.5	Street - Local	10Y24H	26.6	A	26.6	A	Both Existing And Future	Same
Henri Avenue at 21st Street	09A3	27.7	28.0	28.4	28.6	Street - Local	10Y24H	26.5	A	26.5	A	Both Existing And Future	Same
Hurston Avenue	09A2	27.6	27.8	28.4	N/A	Street - Local	10Y24H	26.6	A	26.6	A	Both Existing And Future	Same
Hurston Avenue at 21st Street	09A1	28.0	28.2	28.4	N/A	Street - Local	10Y24H	26.5	A	26.5	A	Both Existing And Future	Same
21st Street at Dixie Avenue	09A	28.6	29.4	29.9	32.0	Street - Local	10Y24H	26.5	A	26.5	A	Both Existing And Future	Same
Dixie Avenue Pond	23S	27.1	27.9	28.9	29.9	Retention/Detention Basin - Positive Outfall	25Y24H	26.7	A	26.7	A	Both Existing And Future	Same
Wetland between Dixie Ave and Granby Street	23R	26.9	27.5	28.0	28.8	Retention/Detention Basin - Positive Outfall	25Y24H	26.6	A	26.6	A	Both Existing And Future	Same
Granby Street Pond	23Q	27.1	27.5	27.8	28.0	Retention/Detention Basin - Positive Outfall	25Y24H	25.9	A	25.9	A	Both Existing And Future	Same
Dixie Avenue at Lingard Avenue	23T	29.7	29.8	29.9	32.0	Street - Local	10Y24H	26.5	A	26.5	A	Both Existing And Future	Same
Childers Ditch at Crawford Drive Outfall	23M	24.9	25.9	28.0	28.6	Canals	25Y24H	28.3	D	28.3	D	Both Existing And Future	Same
Childers Ditch at Granby Street	23L	26.3	26.9	27.7	28.0	Canals	25Y24H	28.2	D	28.2	D	Both Existing And Future	Same
Childers Culvert at Church Street	23K	26.5	27.6	28.3	28.5	Canals	25Y24H	28.1	C	28.1	C	Both Existing And Future	Same
Childers Culvert at Center Street (W)	23J	27.7	27.8	28.3	28.4	Canals	25Y24H	27.8	B	27.8	B	Both Existing And Future	Same
Childers Culvert at Center Street (E)	23J3	27.9	27.9	28.3	28.4	Canals	25Y24H	27.7	A	27.7	A	Both Existing And Future	Same
Childers Culvert at Center Street (Outfall)	23I	26.1	27.7	28.0	28.1	Canals	25Y24H	27.2	B	27.2	B	Both Existing And Future	Same
Childers Ditch at Randall Street	23I1	26.7	26.9	27.7	28.0	Canals	25Y24H	27.1	C	27.1	C	Both Existing And Future	Same
Childers Culvert at Water Street	23IA	26.5	26.7	27.1	27.2	Canals	25Y24H	26.9	C	26.9	C	Both Existing And Future	Same
Childers Culvert between Water Street and Sipes Avenue	23H1	26.4	26.7	27.1	27.2	Canals	25Y24H	26.8	C	26.8	C	Both Existing And Future	Same
Childers Culvert at Sipes Avenue (W)	23H4	26.0	26.7	27.1	27.2	Canals	25Y24H	26.2	B	26.2	B	Both Existing And Future	Same
Childers Culvert at Sipes Avenue (E)	23H	26.5	26.7	26.8	26.9	Canals	25Y24H	25.7	A	25.7	A	Both Existing And Future	Same
Childers Culvert at Sipes Avenue (Outfall)	23H6	26.1	26.5	26.8	27.0	Canals	25Y24H	24.5	A	24.5	A	Both Existing And Future	Same
Childers Ditch at Broadway	23H7	25.8	26.3	26.5	26.7	Canals	25Y24H	24.3	A	24.4	A	Both Existing And Future	Same
Childers Ditch at Greenway	23H9	25.3	25.5	26.0	26.2	Canals	25Y24H	24.1	A	24.2	A	Both Existing And Future	Same
Childers Ditch at Dolarway	23HA	25.2	25.3	25.8	25.9	Canals	25Y24H	23.9	A	24.1	A	Both Existing And Future	Same
Byrd Avenue	23P	29.5	29.9	30.0	30.5	Street - Local	10Y24H	29.3	A	29.3	A	Both Existing And Future	Same
Crawford Avenue South	23O	28.4	28.6	28.9	29.1	Street - Local	10Y24H	29.3	D	29.3	D	Both Existing And Future	Same
Crawford Avenue North	23N	28.1	28.5	28.7	28.9	Street - Local	10Y24H	29.3	D	29.3	D	Both Existing And Future	Same
Granby Street at Byrd Ave	23W	29.9	30.0	30.2	30.3	Street - Local	10Y24H	30.1	C	30.1	C	Both Existing And Future	Same
Granby Street at Midway Ave	23X	28.5	28.7	28.9	29.0	Street - Local	10Y24H	29.7	D	29.7	D	Both Existing And Future	Same
Granby Street at Crawford Ave	23Y	28.5	28.7	29.2	29.4	Street - Local	10Y24H	28.6	B	28.6	B	Both Existing And Future	Same
Center Street Washington (West)	23J1	27.1	27.8	28.3	28.4	Street - Local	10Y24H	28.1	C	28.1	C	Both Existing And Future	Same
Center Street Washington (East)	23J4	27.8	27.8	28.3	28.4	Street - Local	10Y24H	27.5	A	27.5	A	Both Existing And Future	Same
Center Street North of Childers Culvert	23J2	26.3	27.1	27.5	27.6	Street - Local	10Y24H	27.2	C	27.2	C	Both Existing And Future	Same
Midway Ave at Church Street	23K1	28.9	29.0	29.3	29.7	Street - Local	10Y24H	29.2	C	29.2	C	Both Existing And Future	Same
Center Street South of Midway Ave	23J6	28.5	29.3	29.5	29.6	Street - Local	10Y24H	29.2	B	29.2	B	Both Existing And Future	Same
Midway Ave at Center Street (S)	23J5	28.4	28.7	29.0	29.8	Street - Local	10Y24H	29.2	D	29.2	D	Both Existing And Future	Same

Appendix E Table E-1 (continued)
Midway Basin LOS Comparison for Existing and Future Conditions

Location Description	Model Node	LOS A Elevation	LOS B Elevation	LOS C Elevation	LOS D Elevation	LOS Facility Type	Assigned LOS Event	Existing LOS Event Stage	Existing LOS Result	Future LOS Event Stage	Future LOS Result	Node Scenario(s)	LOS Change
Midway Ave at Center Street (N)	23J4B	28.3	28.7	29.0	29.8	Street - Local	10Y24H	29.0	C	29.0	C	Both Existing And Future	Same
Midway Ave at Randall Street	23I2	28.5	28.6	28.8	28.9	Street - Local	10Y24H	27.9	A	27.9	A	Both Existing And Future	Same
Midway Ave at Water Street	23IA1	27.7	27.8	28.6	28.8	Street - Local	10Y24H	27.7	A	27.7	A	Both Existing And Future	Same
Midway Ave Cross Drain West of Sipes (S)	23H3	27.3	27.4	28.2	28.3	Street - Local	10Y24H	26.5	A	26.5	A	Both Existing And Future	Same
Midway Ave Cross Drain West of Sipes (N)	23H2	27.3	27.4	27.6	27.8	Street - Local	10Y24H	26.5	A	26.5	A	Both Existing And Future	Same
Midway Ave at Sipes Avenue	23H5	26.4	27.5	28.0	28.1	Street - Local	10Y24H	25.9	A	25.9	A	Both Existing And Future	Same
Midway Ave at Broadway	23H8	27.4	27.5	28.2	28.7	Street - Local	10Y24H	26.4	A	26.4	A	Both Existing And Future	Same
Midway Ave at Greenway	23H10	26.8	N/A	N/A	26.9	Street - Local	10Y24H	25.0	A	25.0	A	Both Existing And Future	Same
Midway Ave at Dolarway	23HA1	26.4	26.5	26.7	26.8	Street - Local	10Y24H	24.5	A	24.5	A	Both Existing And Future	Same
Area North of Water Street at Washington Canal	23H11	24.8	25.0	25.4	25.7	Street - Local	10Y24H	26.7	D	26.7	D	Both Existing And Future	Same
Midway Ave Cross Drain at Jitway (S)	23G1	25.5	25.7	25.8	25.9	Street - Local	10Y24H	26.6	D	26.6	D	Both Existing And Future	Same
Midway Ave Cross Drain at Jitway (N)	23G2	25.5	25.7	25.8	25.9	Street - Local	10Y24H	26.6	D	26.6	D	Both Existing And Future	Same
Jitway North of Midway Ave	23G3	25.5	25.7	25.8	25.9	Street - Local	10Y24H	26.1	D	26.1	D	Both Existing And Future	Same
Jitway Pond	23PND-H	23.5	24.4	25.5	25.7	Retention/Detention Basin - Positive Outfall	25Y24H	23.8	B	23.9	B	Both Existing And Future	Same
Jitway at Washington Street	23G4	26.0	26.2	26.9	27.1	Street - Local	10Y24H	23.1	A	23.2	A	Both Existing And Future	Same
Washington Street at Canaan Ave	23G	23.3	23.6	N/A	N/A	Canals	25Y24H	22.9	A	23.1	A	Both Existing And Future	Same
Beardall Avenue at Washington Street	23F1	21.0	21.3	21.6	21.7	Canals	25Y24H	21.7	D	21.9	D	Both Existing And Future	Same
Washington Canal at Galileo Outfall	23F7	19.5	N/A	20.2	N/A	Canals	25Y24H	20.2	C	20.8	C	Both Existing And Future	Same
Washington Culvert at Cameron Avenue (W)	23FE	17.8	18.1	18.7	20.4	Canals	25Y24H	20.0	D	20.6	D	Both Existing And Future	Same
Washington Culvert at Cameron Avenue (E)	23E	17.7	18.1	19.4	20.4	Canals	25Y24H	17.8	B	18.3	C	Both Existing And Future	Degrade
Washington Culvert at Cameron Avenue (Outfall)	23C1	17.7	18.1	19.4	20.4	Canals	25Y24H	16.8	A	17.1	A	Both Existing And Future	Same
Washington Culvet between Cameron Ave and SR-415 (W)	23C2	15.5	16.1	16.2	N/A	Canals	25Y24H	16.7	C	17.1	C	Both Existing And Future	Same
Washington Culvet between Cameron Ave and SR-415 (E)	23C3	15.5	16.1	16.2	N/A	Canals	25Y24H	16.6	C	17.0	C	Both Existing And Future	Same
Washington Canal at SR-415 (W)	23C4	14.9	16.1	19.0	19.3	Canals	25Y24H	16.6	C	17.0	C	Both Existing And Future	Same
Washington Canal at SR-415 (E)	23A	14.5	15.7	17.0	18.1	Canals	25Y24H	16.1	C	16.3	C	Both Existing And Future	Same
Washington Canal at Sterling Meadows Pond 102	20B	14.9	15.9	16.9	18.0	Canals	25Y24H	15.3	B	15.4	B	Both Existing And Future	Same
Pond 101 at Sterling Meadows Outfall	22Z	10.5	14.9	15.2	16.4	Canals	25Y24H	9.8	A	9.9	A	Both Existing And Future	Same
Midway Community Center (North)	23F4	24.1	24.4	25.7	26.5	Street - Local	10Y24H	24.7	C	24.7	C	Both Existing And Future	Same
Midway Community Center (South)	23F10	24.1	24.3	24.7	25.7	Retention/Detention Basin - Adjacent to Public Right of Way	25Y24H	24.4	C	24.4	C	Both Existing And Future	Same
Property South of Washington, North of Eudell Drive	23F11	20.4	20.7	21.0	21.3	Retention/Detention Basin - Adjacent to Public Right of Way	25Y24H	22.2	D	22.2	D	Both Existing And Future	Same
Beardall Avanue at Eudell Drive	23F2	21.1	22.0	22.5	22.7	Street - Local	10Y24H	22.8	D	22.8	D	Both Existing And Future	Same
Pond at Galileo Charter School	23F9	18.9	19.9	20.9	21.7	Retention/Detention Basin - Positive Outfall	25Y24H	20.2	C	20.7	C	Both Existing And Future	Same
Galileo Charter School Outfall (Existing)	23F8	19.9	20.1	20.9	21.7	Street - Local	10Y24H	20.1	B	N/A	N/A	Existing Only	
Riverbend Pond G	Riverbend_G3	20.0	20.7	22.2	22.7	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	18.5	A	Future Only	
Riverbend Pond D	23F5	19.9	20.0	20.0	21.1	Street - Local	10Y24H	20.0	B	20.3	D	Both Existing And Future	Degrade
Cameron Office Complex Pond	23C6	16.9	17.2	17.7	17.9	Retention/Detention Basin - Positive Outfall	25Y24H	17.1	B	17.1	B	Both Existing And Future	Same
Cameron Office Complex Outfall	23C5	15.5	16.1	16.2	N/A	Street - Local	10Y24H	16.4	C	16.7	C	Both Existing And Future	Same
Cameron Heights E&F Pond C at Lake Mary Boulevard	Riverbend_PondC	17.4	21.6	21.8	22.3	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	17.0	A	Future Only	
Pond 102 at Sterling Meadows	20A	14.9	15.9	16.4	18.4	Retention/Detention Basin - Positive Outfall	25Y24H	15.3	B	15.4	B	Both Existing And Future	Same

Appendix E Table E-1 (continued)
Midway Basin LOS Comparison for Existing and Future Conditions

Location Description	Model Node	LOS A Elevation	LOS B Elevation	LOS C Elevation	LOS D Elevation	LOS Facility Type	Assigned LOS Event	Existing LOS Event Stage	Existing LOS Result	Future LOS Event Stage	Future LOS Result	Node Scenario(s)	LOS Change
Pond 101 at Sterling Meadows	20C	13.9	14.9	15.2	16.4	Retention/Detention Basin - Positive Outfall	25Y24H	12.9	A	12.9	A	Both Existing And Future	Same
20th Street at Sipes Ave (1)	22L	21.8	23.8	24.7	24.9	Canals	25Y24H	24.9	D	24.9	D	Both Existing And Future	Same
20th Street at Sipes Ave (2)	22L2	23.9	24.1	24.7	24.9	Canals	25Y24H	24.6	C	24.6	C	Both Existing And Future	Same
Hughey at Sipes Ave	22K1	23.3	23.9	24.2	24.4	Canals	25Y24H	24.6	D	24.6	D	Both Existing And Future	Same
Hughey at Sipes Ave Outfall	22K2	22.3	24.3	24.7	24.8	Canals	25Y24H	24.4	C	24.4	C	Both Existing And Future	Same
Hughey Street Driveway A (W)	22K3	22.6	23.0	24.5	24.6	Canals	25Y24H	24.4	C	24.4	C	Both Existing And Future	Same
Hughey Street Driveway A (E)	22K4	22.4	23.0	24.5	24.6	Canals	25Y24H	24.2	C	24.2	C	Both Existing And Future	Same
Hughey Street Driveway B (W)	22K5	22.6	23.8	24.5	24.6	Canals	25Y24H	24.2	C	24.2	C	Both Existing And Future	Same
Hughey Street Driveway B (E)	22K6	22.2	23.6	24.0	24.1	Canals	25Y24H	24.0	C	24.0	C	Both Existing And Future	Same
Hughey Street Driveway C (W)	22K7	22.9	23.2	24.0	24.1	Canals	25Y24H	24.0	C	24.0	C	Both Existing And Future	Same
Hughey Street Driveway C (E)	22K8	22.9	23.1	24.0	24.1	Canals	25Y24H	23.7	C	23.7	C	Both Existing And Future	Same
Hughey Street Driveway D (W)	22K9	21.9	23.1	23.6	23.7	Canals	25Y24H	23.7	D	23.7	D	Both Existing And Future	Same
Hughey Street Driveway D (E)	22K10	22.0	23.1	23.6	23.7	Canals	25Y24H	23.7	D	23.7	D	Both Existing And Future	Same
Hughey Street Driveway E (W)	22K11	22.3	23.1	23.6	23.7	Canals	25Y24H	23.7	D	23.7	D	Both Existing And Future	Same
Hughey Street Driveway E (Mid 1)	22K12	23.3	23.4	23.7	23.8	Canals	25Y24H	23.4	B	23.4	B	Both Existing And Future	Same
Hughey Street Driveway E (Mid 2)	22K12B	23.3	23.4	23.7	23.8	Canals	25Y24H	23.0	A	23.0	A	Both Existing And Future	Same
Hughey Street Driveway E (E)	22K13	22.6	23.2	23.6	23.7	Canals	25Y24H	22.9	B	22.9	B	Both Existing And Future	Same
Hughey Street Driveway F (W)	22K14	22.5	23.2	23.6	23.7	Canals	25Y24H	22.9	B	22.9	B	Both Existing And Future	Same
Hughey Street Driveway F (E)	22K15	21.4	23.2	23.6	23.7	Canals	25Y24H	22.0	B	22.0	B	Both Existing And Future	Same
Hughey Street Driveway G (W)	22K16	22.8	23.2	23.6	23.7	Canals	25Y24H	22.0	A	22.0	A	Both Existing And Future	Same
Hughey Street Driveway G (Mid)	22K17	22.3	23.2	23.6	23.7	Canals	25Y24H	21.9	A	21.9	A	Both Existing And Future	Same
Hughey Street Driveway G (E)	22K18	20.4	23.2	23.6	23.7	Canals	25Y24H	21.6	B	21.6	B	Both Existing And Future	Same
Hughey Street at Deepwater Avenue (W)	22K19	22.0	23.1	23.6	23.7	Canals	25Y24H	21.6	A	21.6	A	Both Existing And Future	Same
Hughey Street at Deepwater Avenue (E)	22J	21.7	22.6	23.4	23.5	Canals	25Y24H	19.7	A	19.8	A	Both Existing And Future	Same
Hughey Street at Beardall Avenue (W)	22I	18.7	19.0	19.1	19.9	Canals	25Y24H	19.4	D	19.6	D	Both Existing And Future	Same
Hughey Street at Beardall Avenue (E)	22G1	18.6	19.0	19.7	19.9	Canals	25Y24H	18.9	B	19.1	C	Both Existing And Future	Degrade
Channel at Riverbend (1)	22G2	17.9	N/A	18.4	N/A	Canals	25Y24H	18.7	C	18.9	C	Both Existing And Future	Same
Channel at Riverbend (2)	22G3	17.9	N/A	18.2	N/A	Canals	25Y24H	18.4	C	18.4	C	Both Existing And Future	Same
Channel at Riverbend (3)	22E1	17.9	N/A	18.2	N/A	Canals	25Y24H	18.4	C	18.4	C	Both Existing And Future	Same
Riverbend Channel at Cameron Avenue (1)	22E2	17.9	18.5	18.9	19.3	Canals	25Y24H	16.8	A	16.8	A	Both Existing And Future	Same
Riverbend Channel at Cameron Avenue (2)	22E3	18.2	18.9	19.8	19.9	Canals	25Y24H	16.6	A	16.5	A	Both Existing And Future	Same
Riverbend Channel at Cameron Avenue (3)	22D1	17.9	18.9	19.8	19.9	Canals	25Y24H	15.7	A	15.5	A	Both Existing And Future	Same
Channel at Cameron Heights A (1)	22D2	16.0	N/A	16.5	N/A	Canals	25Y24H	15.2	A	14.9	A	Both Existing And Future	Same
Channel at Cameron Heights A (2)	22B1	16.0	N/A	16.5	N/A	Canals	25Y24H	14.3	A	14.0	A	Both Existing And Future	Same
Channel at SR-415 (W)	22B2	13.5	15.5	16.0	16.5	Canals	25Y24H	13.3	A	12.7	A	Both Existing And Future	Same
Channel at SR-415 (E)	22A	13.5	15.5	16.0	16.5	Canals	25Y24H	12.8	A	12.3	A	Both Existing And Future	Same
Lincoln Street at Diesel Lane	22Y1	25.0	25.2	25.6	26.2	Street - Local	10Y24H	26.0	D	26.0	D	Both Existing And Future	Same
Lincoln Street at Deepwater Avenue	22Y	23.0	23.3	24.0	24.3	Roadside Swale	10Y24H	24.0	C	24.0	C	Both Existing And Future	Same
Lincoln Street (1)	22X	23.0	23.3	23.7	24.1	Roadside Swale	10Y24H	24.0	D	24.0	D	Both Existing And Future	Same

Appendix E Table E-1 (continued)
Midway Basin LOS Comparison for Existing and Future Conditions

Location Description	Model Node	LOS A Elevation	LOS B Elevation	LOS C Elevation	LOS D Elevation	LOS Facility Type	Assigned LOS Event	Existing LOS Event Stage	Existing LOS Result	Future LOS Event Stage	Future LOS Result	Node Scenario(s)	LOS Change
Lincoln Street (2)	22W	22.0	23.0	23.2	23.3	Roadside Swale	10Y24H	22.5	B	22.5	B	Both Existing And Future	Same
Lincoln Street (3)	22V	22.0	22.3	22.6	22.7	Roadside Swale	10Y24H	22.5	C	22.5	C	Both Existing And Future	Same
Lincoln Street (4)	22U	22.0	22.3	22.6	22.9	Roadside Swale	10Y24H	22.4	C	22.4	C	Both Existing And Future	Same
Lincoln Street (5)	22T	21.0	22.0	22.6	22.9	Roadside Swale	10Y24H	22.4	C	22.4	C	Both Existing And Future	Same
Lincoln Street (6)	22S	21.0	22.0	22.6	22.9	Roadside Swale	10Y24H	22.1	C	22.1	C	Both Existing And Future	Same
Lincoln Street (7)	22R	21.0	21.2	21.5	22.1	Roadside Swale	10Y24H	22.0	D	22.1	D	Both Existing And Future	Same
Lincoln Street (8)	22Q	20.0	21.0	21.5	21.7	Roadside Swale	10Y24H	21.5	C	21.6	D	Both Existing And Future	Degrade
Lincoln Street (9)	22P	20.0	21.0	21.3	21.5	Roadside Swale	10Y24H	21.5	D	21.6	D	Both Existing And Future	Same
Lincoln Street (10)	22O	20.0	21.0	21.3	21.5	Roadside Swale	10Y24H	21.5	D	21.6	D	Both Existing And Future	Same
Lincoln Street at Beardall Avenue (1)	22N	20.0	21.0	21.3	21.5	Roadside Swale	10Y24H	21.5	D	21.6	D	Both Existing And Future	Same
Lincoln Street at Beardall Avenue (2)	22M	20.0	20.0	21.0	21.5	Roadside Swale	10Y24H	19.9	A	19.8	A	Both Existing And Future	Same
Cameron Heights J Pond B	CamJ_PondB	18.1	18.5	19.8	20.3	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	19.0	C	Future Only	
Cameron Avenue at Hughey Street	22F	17.0	18.5	18.9	19.3	Roadside Swale	10Y24H	17.8	B	17.8	B	Both Existing And Future	Same
Cameron Heights E&F Pond E	22D3	18.9	19.9	20.7	22.3	Retention/Detention Basin - Positive Outfall	25Y24H	15.1	A	16.5	A	Both Existing And Future	Same
Cameron Heights E&F Pond F	Cam_Pond_F	18.9	19.9	21.3	22.6	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	15.8	A	Future Only	
Brisson Avenue at Palm Point (1)	07Q	23.9	24.6	24.9	26.8	Roadside Swale	10Y24H	23.6	A	23.6	A	Both Existing And Future	Same
Brisson Avenue at Palm Point (2)	07P	23.9	24.6	24.9	26.8	Roadside Swale	10Y24H	23.0	A	23.0	A	Both Existing And Future	Same
Brisson Avenue at Palm Point (3)	07O	23.9	24.6	24.9	26.8	Roadside Swale	10Y24H	22.8	A	22.8	A	Both Existing And Future	Same
Brisson Avenue at Palm Point (4)	07N	23.9	24.6	24.9	26.8	Roadside Swale	10Y24H	22.0	A	22.0	A	Both Existing And Future	Same
Brisson Avenue at Palm Point (5)	07K	21.3	22.7	23.0	26.5	Roadside Swale	10Y24H	20.0	A	20.0	A	Both Existing And Future	Same
Brisson Avenue at Palm Point (6)	07J	21.3	22.7	23.0	26.5	Roadside Swale	10Y24H	19.6	A	19.6	A	Both Existing And Future	Same
Brisson Avenue at Celery Estates South (1)	07E	16.1	17.2	17.3	19.0	Street - Local	10Y24H	14.7	A	14.7	A	Both Existing And Future	Same
Brisson Avenue at Celery Estates South (2)	07D	16.1	17.2	17.3	19.0	Street - Local	10Y24H	12.8	A	12.8	A	Both Existing And Future	Same
Brisson Avenue at Celery Avenue	07B	10.8	12.9	13.5	19.4	Street - Local	10Y24H	12.5	B	12.5	B	Both Existing And Future	Same
Celery Avenue at Pisa Avenue	07T	12.7	13.3	13.9	19.4	Street - Arterial and Collector	10Y24H	14.2	D	14.2	D	Both Existing And Future	Same
Celery Avenue at Brisson Avenue	07A	12.8	13.1	14.0	15.0	Street - Arterial and Collector	10Y24H	10.5	A	10.5	A	Both Existing And Future	Same
Celery Avenue Outfall at Brisson Avenue (W)	0777	10.7	11.9	12.4	14.0	Canals	25Y24H	10.2	A	10.2	A	Both Existing And Future	Same
Water Street at Hughey Street	09P	23.9	24.7	N/A	N/A	Retention/Detention Basin - Positive Outfall	25Y24H	23.2	A	23.2	A	Both Existing And Future	Same
Midway Regional SWF Pond 1	09L	21.9	23.0	26.0	28.4	Retention/Detention Basin - Positive Outfall	25Y24H	19.2	A	19.2	A	Both Existing And Future	Same
Midway Regional SWF Pond 2	09M	16.9	N/A	N/A	N/A	Retention/Detention Basin - Positive Outfall	25Y24H	15.3	A	15.3	A	Both Existing And Future	Same
Celery Avenue at Midway Regional SWF Pond 2	09N	13.9	15.7	16.5	N/A	Retention/Detention Basin - Positive Outfall	25Y24H	9.6	A	9.7	A	Both Existing And Future	Same
Midway Regional SWF Pond 4	10A4	10.9	N/A	N/A	N/A	Retention/Detention Basin - Positive Outfall	25Y24H	8.9	A	9.0	A	Both Existing And Future	Same
Pond at Jack Court	09B	24.2	24.5	25.0	25.6	Street - Local	10Y24H	25.3	D	25.3	D	Both Existing And Future	Same
20th Street Cross Drain (S)	09C	25.5	26.0	26.3	26.5	Street - Local	10Y24H	24.4	A	24.4	A	Both Existing And Future	Same
20th Street Cross Drain (N)	09D	25.5	26.0	26.3	26.5	Street - Local	10Y24H	24.1	A	24.1	A	Both Existing And Future	Same
20th Street Outfall	09E	24.5	25.0	26.3	26.5	Street - Local	10Y24H	23.5	A	23.5	A	Both Existing And Future	Same
20th Street Outfall (2)	09F	24.0	N/A	N/A	N/A	Canals	25Y24H	22.7	A	22.7	A	Both Existing And Future	Same
20th Street Outfall at MRSWF	09G	22.9	25.0	26.0	27.5	Street - Local	10Y24H	21.3	A	21.3	A	Both Existing And Future	Same
Palm Point Pond	09I	24.9	25.5	26.0	26.5	Retention/Detention Basin - Positive Outfall	25Y24H	23.0	A	23.0	A	Both Existing And Future	Same

Appendix E Table E-1 (continued)
Midway Basin LOS Comparison for Existing and Future Conditions

Location Description	Model Node	LOS A Elevation	LOS B Elevation	LOS C Elevation	LOS D Elevation	LOS Facility Type	Assigned LOS Event	Existing LOS Event Stage	Existing LOS Result	Future LOS Event Stage	Future LOS Result	Node Scenario(s)	LOS Change
Palm Point Outfall Ditch (1)	09J	23.0	24.0	26.0	27.8	Street - Local	10Y24H	21.4	A	21.4	A	Both Existing And Future	Same
Palm Point Outfall Ditch (2)	09K	21.9	23.0	26.0	28.4	Street - Local	10Y24H	21.1	A	21.1	A	Both Existing And Future	Same
Palm Point Outfall to MRSWF (Tie In Node)	09H	22.9	25.0	26.0	27.5	Street - Local	10Y24H	20.1	A	20.1	A	Both Existing And Future	Same
Celery Avenue at Thoroughbred Trail (S)	10B	17.0	17.7	17.7	18.0	Street - Arterial and Collector	10Y24H	17.4	B	17.4	B	Both Existing And Future	Same
Celery Avenue at Thoroughbred Trail (N)	10A	16.4	16.9	17.0	17.5	Street - Arterial and Collector	10Y24H	16.4	A	16.5	B	Both Existing And Future	Degrade
Sanford Trails Outfall (1)	10B1	16.5	16.9	17.0	17.5	Canals	25Y24H	13.9	A	13.9	A	Both Existing And Future	Same
Sanford Trails Outfall (2)	10A1	14.0	N/A	14.7	N/A	Canals	25Y24H	12.5	A	12.5	A	Both Existing And Future	Same
Sanford Trails Outfall (3)	10A2	11.9	N/A	12.9	N/A	Canals	25Y24H	11.4	A	11.5	A	Both Existing And Future	Same
Sanford Trails Outfall at MRSWF	10A3	9.9	N/A	10.9	N/A	Canals	25Y24H	11.1	C	11.2	C	Both Existing And Future	Same
Sipes Ave North of CSX	10C1	20.9	21.7	21.9	22.0	Roadside Swale	10Y24H	18.2	A	18.8	A	Both Existing And Future	Same
Sipes Ave at Celery Avenue	10C	18.0	18.1	19.0	19.3	Street - Arterial and Collector	10Y24H	18.3	C	18.8	C	Both Existing And Future	Same
Cameron Heights A Pond A1	CamA_PondA1	21.2	21.6	22.3	22.8	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	21.2	A	Future Only	
Cameron Heights A Pond A2	CamA_PondA2	20.0	20.4	21.7	22.2	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	19.7	A	Future Only	
Cameron Heights A Pond A3	CamA_PondA3	20.0	20.4	21.7	22.2	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	19.7	A	Future Only	
Thoroughbred Trail Outfall	08A	8.9	N/A	N/A	N/A	Retention/Detention Basin - Positive Outfall	25Y24H	8.6	A	8.6	A	Both Existing And Future	Same
Sipes Ave at CSX (W)	12E	22.5	22.6	22.7	23.3	Canals	25Y24H	22.0	A	22.0	A	Both Existing And Future	Same
Sipes Ave at CSX (E)	12F1	21.0	22.4	22.7	23.3	Canals	25Y24H	20.9	A	20.9	A	Both Existing And Future	Same
CSX Culvert (W)	12F2	17.0	17.7	18.0	18.1	Canals	25Y24H	18.6	D	18.5	D	Both Existing And Future	Same
CSX Culvert (E)	12G1	17.0	17.7	18.0	18.1	Canals	25Y24H	18.5	D	18.5	D	Both Existing And Future	Same
Sipes Avenue North of Hughey	12F5	23.0	N/A	N/A	N/A	Roadside Swale	10Y24H	22.6	A	22.6	A	Both Existing And Future	Same
Sipes Ave at Oneal (S)	12F4	23.0	N/A	N/A	N/A	Roadside Swale	10Y24H	22.6	A	22.6	A	Both Existing And Future	Same
Sipes Ave at Oneal (N)	12F3	23.0	N/A	N/A	N/A	Roadside Swale	10Y24H	20.9	A	20.9	A	Both Existing And Future	Same
Cameron Heights B Pond 1	CamB_Pond1	20.3	20.4	22.4	22.9	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	20.1	A	Future Only	
Beardall Office/Warehouse (Future)	BeardallHQ	19.0	999.0	999.0	20.0	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	18.6	A	Future Only	
Cameron Heights at Beardall Avenue	CamC_PostPond	19.0	20.1	20.5	21.0	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	20.2	C	Future Only	
Beardall Avenue at Hughey Street (S)	22H	17.7	19.0	19.1	19.9	Roadside Swale	10Y24H	19.9	D	19.7	D	Both Existing And Future	Same
Beardall Avenue at Hughey Street (N)	12G6	18.6	19.0	19.5	19.8	Roadside Swale	10Y24H	18.5	A	18.2	A	Both Existing And Future	Same
Cameron Heights C1 Pond	CamC1_Pond1	19.7	20.2	22.2	22.7	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	19.5	A	Future Only	
Cameron Heights C1 at Beardall Avenue (S)	12G5	18.0	18.4	18.9	19.0	Roadside Swale	10Y24H	18.4	B	17.9	A	Both Existing And Future	Improve
Cameron Heights C1 at Beardall Avenue (N)	12G4	17.0	18.0	18.9	19.0	Roadside Swale	10Y24H	18.3	C	17.9	B	Both Existing And Future	Improve
Beardall Avenue at Future Warehouse (S)	12G3	17.0	17.5	17.7	18.0	Roadside Swale	10Y24H	18.2	D	17.9	D	Both Existing And Future	Same
CSX Ditch at Beardall	12G2	17.0	17.5	17.6	18.0	Canals	25Y24H	18.0	D	17.9	D	Both Existing And Future	Same
Cameron Heights J at Beardall Avenue (1)	12H4	17.0	18.1	18.5	18.9	Roadside Swale	10Y24H	18.0	B	18.3	C	Both Existing And Future	Degrade
Cameron Heights J at Beardall Avenue (2)	12H3	17.0	18.0	18.9	19.0	Roadside Swale	10Y24H	18.0	B	18.3	C	Both Existing And Future	Degrade
Cameron Heights J at Beardall Avenue (3)	12H2	17.0	17.9	18.9	19.0	Roadside Swale	10Y24H	18.0	C	18.3	C	Both Existing And Future	Same
Beardall Avenue at Cameron Heights D (S)	12H1	17.0	17.6	18.0	18.2	Street - Local	10Y24H	18.0	C	18.2	D	Both Existing And Future	Degrade
Beardall Avenue at Cameron Heights D (N)	12H	17.4	17.7	18.0	18.2	Street - Local	10Y24H	17.9	C	17.9	C	Both Existing And Future	Same
Beardall Avenue at Suntera Park (1)	12D	16.6	16.8	16.8	17.2	Roadside Swale	10Y24H	15.6	A	15.5	A	Both Existing And Future	Same
Beardall Avenue at Suntera Park (2)	12D1	15.0	16.0	16.5	17.9	Roadside Swale	10Y24H	15.6	B	15.4	B	Both Existing And Future	Same

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Appendix E Table E-1 (continued)
Midway Basin LOS Comparison for Existing and Future Conditions

Location Description	Model Node	LOS A Elevation	LOS B Elevation	LOS C Elevation	LOS D Elevation	LOS Facility Type	Assigned LOS Event	Existing LOS Event Stage	Existing LOS Result	Future LOS Event Stage	Future LOS Result	Node Scenario(s)	LOS Change
Beardall Avenue at Suntera Park (3)	12D2	15.0	16.2	16.5	17.0	Roadside Swale	10Y24H	15.6	B	15.4	B	Both Existing And Future	Same
Beardall Avenue at Suntera Park (4)	12D3	15.3	15.6	15.9	16.0	Street - Local	10Y24H	15.6	B	15.3	A	Both Existing And Future	Improve
Beardall Avenue at Celery Avenue	12C	14.4	15.7	15.8	16.0	Street - Arterial and Collector	10Y24H	15.5	B	15.2	B	Both Existing And Future	Same
Undeveloped Pond East of Cameron Avenue	19C	17.9	18.1	18.7	18.8	Retention/Detention Basin - Land Locked	100Y24H	18.6	C	18.7	C	Both Existing And Future	Same
Undeveloped Pond West of Cameron Avenue (1)	16E	16.5	17.5	17.8	N/A	Retention/Detention Basin - Land Locked	100Y24H	18.0	C	18.1	C	Both Existing And Future	Same
Undeveloped Pond West of Cameron Avenue (2)	16D	16.2	16.5	16.9	N/A	Retention/Detention Basin - Land Locked	100Y24H	17.1	C	17.2	C	Both Existing And Future	Same
Undeveloped Pond West of Cameron Avenue (3)	12I	16.5	17.0	17.3	N/A	Retention/Detention Basin - Land Locked	100Y24H	18.3	C	N/A	N/A	Existing Only	
Cameron Heights D Pond D	CamD_PondD	17.8	18.3	19.6	20.1	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	18.2	B	Future Only	
Celery Ave West of Beardall	12B	15.0	15.6	15.8	16.0	Street - Arterial and Collector	10Y24H	16.1	D	15.8	C	Both Existing And Future	Improve
Suntera Park Pond	Suntera_Pond	16.0	16.5	999.0	999.0	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	17.3	C	Future Only	
Celery Cross Drain East of Beardall (S)	12C1	13.6	14.8	15.1	16.0	Street - Arterial and Collector	10Y24H	15.3	D	15.0	C	Both Existing And Future	Improve
Celery Cross Drain East of Beardall (N)	12A1	13.6	14.9	15.1	15.2	Street - Arterial and Collector	10Y24H	15.2	D	15.0	C	Both Existing And Future	Improve
Celery Outfall East of Beardall (1)	12A2	13.4	14.5	15.0	15.2	Canals	25Y24H	14.3	B	13.2	A	Both Existing And Future	Improve
Celery Outfall East of Beardall (2)	12A3	12.8	N/A	13.0	N/A	Canals	25Y24H	12.2	A	11.8	A	Both Existing And Future	Same
Celery Outfall East of Beardall (3)	12A4	11.2	N/A	11.5	N/A	Canals	25Y24H	10.5	A	9.7	A	Both Existing And Future	Same
Meriwether Farms at Celery Avenue (S)	10E-1	14.2	16.1	16.4	16.5	Street - Arterial and Collector	10Y24H	16.1	B	15.5	B	Both Existing And Future	Same
Meriwether Farms at Celery Avenue (N)	10F	15.0	N/A	15.8	16.4	Street - Arterial and Collector	10Y24H	14.3	A	14.1	A	Both Existing And Future	Same
Meriwether Farms/Riverside Oaks Ditch (1)	10F1	14.0	N/A	14.9	N/A	Canals	25Y24H	11.9	A	11.8	A	Both Existing And Future	Same
Meriwether Farms/Riverside Oaks Ditch (2)	10F2	11.0	N/A	12.2	N/A	Canals	25Y24H	8.9	A	8.7	A	Both Existing And Future	Same
Meriwether Farms/Riverside Oaks Ditch (3)	10F3	8.0	N/A	9.8	N/A	Canals	25Y24H	7.9	A	7.1	A	Both Existing And Future	Same
Meriwether Farms/Riverside Oaks Ditch (4)	10F4	6.0	N/A	6.2	N/A	Canals	25Y24H	6.7	C	6.7	C	Both Existing And Future	Same
Riverside Oaks Pond 1	Riverside_Pond1	14.8	15.3	17.8	18.3	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	14.2	A	Future Only	
Riverside Oaks Pond 2	Riverside_Pond2	9.1	9.6	12.3	12.8	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	6.8	A	Future Only	
Riverside Oaks Pond 3	Riverside_Pond3	7.9	8.4	11.2	11.7	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	6.7	A	Future Only	
Riverside Oaks Pond 4	Riverside_Pond4	7.5	8.1	10.7	11.2	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	6.6	A	Future Only	
Celery Pointe Pond	CeleryPt_Propond	7.7	8.0	9.5	10.0	Retention/Detention Basin - Positive Outfall	25Y24H	N/A	N/A	9.3	C	Future Only	
Celery Ave Crossing at Indian Mound Channel (S)	16C	15.7	16.3	16.6	16.7	Street - Arterial and Collector	10Y24H	16.5	C	16.6	C	Both Existing And Future	Same
Celery Ave Crossing at Indian Mound Channel (N)	16B	16.0	16.6	16.6	16.7	Canals	25Y24H	16.4	B	16.6	B	Both Existing And Future	Same
Indian Mound Channel at Cameron Ave	16A2	14.6	N/A	N/A	N/A	Canals	25Y24H	12.0	A	12.3	A	Both Existing And Future	Same
Cameron Ave south of Chickasaw Drive	16A	13.0	N/A	N/A	N/A	Street - Local	10Y24H	10.6	A	10.6	A	Both Existing And Future	Same
Chickasaw Drive	19E	7.3	7.5	7.8	7.9	Street - Local	10Y24H	7.5	B	7.5	B	Both Existing And Future	Same
Cameron Avenue at Celery Avenue (W)	19A	16.7	16.9	17.5	17.6	Street - Arterial and Collector	10Y24H	15.2	A	15.2	A	Both Existing And Future	Same
Cameron Avenue at Celery Avenue (E)	19B1	17.0	17.4	17.8	17.9	Roadside Swale	10Y24H	14.6	A	14.6	A	Both Existing And Future	Same
Celery Avenue at Chickasaw Drive	19B2	10.5	11.0	11.5	11.9	Roadside Swale	10Y24H	8.8	A	8.8	A	Both Existing And Future	Same
Celery Avenue at Peninsula Drive (1)	19B3	8.0	8.5	10.0	10.2	Roadside Swale	10Y24H	6.0	A	6.0	A	Both Existing And Future	Same
Celery Avenue at Peninsula Drive (2)	19B4	7.3	7.5	8.0	8.5	Roadside Swale	10Y24H	5.8	A	5.8	A	Both Existing And Future	Same
FL-46 at Midway Transporation Complex	06D	34.0	N/A	36.0	37.0	Canals	25Y24H	31.0	A	31.0	A	Both Existing And Future	Same
Pond at Midway Transportation Facility	06D1	31.0	31.5	33.0	34.5	Retention/Detention Basin - Positive Outfall	25Y24H	29.8	A	29.8	A	Both Existing And Future	Same
Dry Pond A at Midway Elementary School	07V	31.0	32.0	33.0	34.2	Retention/Detention Basin - Positive Outfall	25Y24H	31.0	A	31.0	A	Both Existing And Future	Same

Appendix E Table E-1 (continued)
Midway Basin LOS Comparison for Existing and Future Conditions

Location Description	Model Node	LOS A Elevation	LOS B Elevation	LOS C Elevation	LOS D Elevation	LOS Facility Type	Assigned LOS Event	Existing LOS Event Stage	Existing LOS Result	Future LOS Event Stage	Future LOS Result	Node Scenario(s)	LOS Change
Club II Pond South Cell	06G	25.9	28.0	29.9	31.0	Retention/Detention Basin - Positive Outfall	25Y24H	25.1	A	25.1	A	Both Existing And Future	Same
Club II Pond North Cell	06H	22.9	N/A	N/A	23.9	Retention/Detention Basin - Positive Outfall	25Y24H	22.2	A	22.2	A	Both Existing And Future	Same
Burrows Lane at 1st Drive	06F	22.9	23.9	24.5	25.0	Canals	25Y24H	24.9	D	24.9	D	Both Existing And Future	Same
FL-46 at Brisson Avenue	23U	34.2	N/A	N/A	N/A	Street - Arterial and Collector	10Y24H	30.1	A	30.1	A	Both Existing And Future	Same
SR-415 Pond B at Celery Avenue	19D	13.5	14.5	15.0	16.5	Retention/Detention Basin - Positive Outfall	25Y24H	13.0	A	13.0	A	Both Existing And Future	Same
Celery Manor	699	999.0	N/A	N/A	N/A	Street - Local	10Y24H	5.6	A	5.6	A	Both Existing And Future	Same
Chickasaw Drive Outfall	19F	999.0	N/A	N/A	N/A	Street - Local	10Y24H	5.6	A	5.6	A	Both Existing And Future	Same
Meriwether Farms/Riverside Oaks Ditch Outfall	1099	999.0	N/A	N/A	N/A	Canals	25Y24H	6.7	A	6.7	A	Both Existing And Future	Same
Channel at Sterling Meadows Pond 101	2399	999.0	N/A	N/A	N/A	Canals	25Y24H	6.7	A	6.7	A	Both Existing And Future	Same
Canal Outfall at Chickasaw Drive	99	999.0	N/A	N/A	N/A	Street - Local	10Y24H	5.6	A	5.6	A	Both Existing And Future	Same
Lake Mary Boulevard	21A	999.0	N/A	N/A	N/A	Street - Local	10Y24H	5.6	A	5.6	A	Both Existing And Future	Same
Celery Outfall East of Beardall Outfall	1299	999.0	N/A	N/A	N/A	Canals	25Y24H	6.7	A	6.7	A	Both Existing And Future	Same
Sterling Meadows	2299	999.0	N/A	N/A	N/A	Street - Local	10Y24H	5.6	A	5.6	A	Both Existing And Future	Same
Celery Ave at Pininsula Drive Outfall	1999	999.0	N/A	N/A	N/A	Roadside Swale	10Y24H	5.6	A	5.6	A	Both Existing And Future	Same
(Within City)	01E	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	04D	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	199	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06B	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	03A	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	07M	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	23V	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01Q	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01I	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	23F	19.0	21.3	21.6	21.7	Canals	25Y24H	21.0		21.2		Both Existing And Future	Same
(Within City)	06L	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	0788	12.9	14.1	N/A	N/A	Canals	25Y24H	9.8		9.8		Both Existing And Future	Same
(Within City)	01C	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	05A	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06E2	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06M	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01A	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	07C	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06C	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	07R	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01S	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01CB	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06E4	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	799	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	09O	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same

Appendix E Table E-1 (continued)
Midway Basin LOS Comparison for Existing and Future Conditions

Location Description	Model Node	LOS A Elevation	LOS B Elevation	LOS C Elevation	LOS D Elevation	LOS Facility Type	Assigned LOS Event	Existing LOS Event Stage	Existing LOS Result	Future LOS Event Stage	Future LOS Result	Node Scenario(s)	LOS Change
(Within City)	06E	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	07U	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01H	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06H1	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01F	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06H2	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	07H	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	07F	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01G	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01M	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	04A	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06E1	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	04B	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06K	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01J	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	23F3	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	04E	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06J1	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06N	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06I2	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01B	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	23F6	19.9	N/A	2.4	N/A	Canals	25Y24H	20.3		20.8		Both Existing And Future	Same
(Within City)	07G	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	07I	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	04C	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	07S	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01BA	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01L	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06I	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06E3	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01D	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06J2	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	01K	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same
(Within City)	06I3	N/A	N/A	N/A	N/A	<Null>	<Null>					Both Existing And Future	Same

Appendix F

Conceptual Cost Estimates

Table F-1: Opinion of Conceptual Capital Cost
Alternative 1 - Midway Community Drainage Improvements (Phase 1 - Pond Expansion)

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 26,800	$ 26,800
2	Traffic Control (approx. 2 percent)	LS	1	$ 10,700	$ 10,700
3	Excavation	CY	41,000	$ 10	$ 410,000
4	Control Structure Modification	EA	1	$ 10,000	$ 10,000
5	Sodding	SY	2,500	$ 3	$ 7,500
6	Property Acquisition	LS	1	$ 70,000	$ 70,000
				Subtotal	**$ 535,000**
				Contingency: 30%	$160,500
				Overhead and Profit/Bonding/General Conditions: 22%	$117,700
				Survey, Engineering, and Permitting: 30%	$160,500
	Opinion of Conceptual Capital Cost				**$ 974,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2019 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 150% factor applied.

Table F-2: Opinion of Conceptual Capital Cost
Alternative 1 - Midway Community Drainage Improvements (Childers Ditch Improvements)

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 23,800	$ 23,800
2	Traffic Control (approx. 2 percent)	LS	1	$ 9,500	$ 9,500
5	43-in x 68-in ERCP, Class III	LF	655	$ 330	$ 216,150
6	Channel Excavation	CY	780	$ 60	$ 46,800
7	ACB Revetment Channel Lining	SY	2,200	$ 75	$ 165,000
14	Sodding	SY	5,000	$ 3	$ 15,000
				Subtotal	**$ 477,000**
				Contingency: 30%	$143,100
				Overhead and Profit/Bonding/General Conditions: 22%	$104,900
				Survey, Engineering, and Permitting: 30%	$143,100
	Opinion of Conceptual Capital Cost				**$ 869,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2019 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 150% factor applied.

Table F-3: Opinion of Conceptual Capital Cost
Alternative 1 - Midway Community Drainage Improvements (Local Drainage Improvements - East)

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 67,800	$ 67,800
2	Traffic Control (approx. 2 percent)	LS	1	$ 27,100	$ 27,100
3	18-in RCP, Class III	LF	5,700	$ 85	$ 484,500
4	24-in RCP, Class III	LF	2,200	$ 105	$ 231,000
5	43-in x 68-in ERCP, Class III	LF	0	$ 330	$ -
6	Channel Excavation	CY	0	$ 60	$ -
7	ACB Revetment Channel Lining	SY	0	$ 75	$ -
8	Excavation	CY	0	$ 10	$ -
9	Control Structure Modification	EA	0	$ 10,000	$ -
10	Inlets, Curb, Type P-5, <10' (with yard drain hookups)	EA	36	$ 5,000	$ 180,000
11	Milling Existing Asphalt Pavement, 2" Average Depth	SY	8,759	$ 7	$ 61,314
12	Optional Base Group 04 (Limerock)	SY	8,759	$ 18	$ 157,662
13	Asphaltic Concrete FC-12.5	TN	983	$ 130	$ 127,847
14	Sodding	SY	6,000	$ 3	$ 18,000
15	Property Acquisition	LS	0	$ 70,000	$ -
				Subtotal	**$ 1,356,000**
				Contingency: 30%	$406,800
				Overhead and Profit/Bonding/General Conditions: 22%	$298,300
				Survey, Engineering, and Permitting: 30%	$406,800
	Opinion of Conceptual Capital Cost				**$ 2,468,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2019 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 150% factor applied.

Table F-4: Opinion of Conceptual Capital Cost
Alternative 1 - Midway Community Drainage Improvements (Local Drainage Improvements - West)

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 85,800	$ 85,800
2	Traffic Control (approx. 2 percent)	LS	1	$ 34,300	$ 34,300
3	18-in RCP, Class III	LF	4,200	$ 85	$ 357,000
4	24-in RCP, Class III	LF	5,400	$ 105	$ 567,000
5	43-in x 68-in ERCP, Class III	LF	0	$ 330	$ -
6	Channel Excavation	CY	0	$ 60	$ -
7	ACB Revetment Channel Lining	SY	0	$ 75	$ -
8	Excavation	CY	0	$ 10	$ -
9	Control Structure Modification	EA	0	$ 10,000	$ -
10	Inlets, Curb, Type P-5, <10' (with yard drain hookups)	EA	44	$ 5,000	$ 220,000
11	Milling Existing Asphalt Pavement, 2" Average Depth	SY	10,872	$ 7	$ 76,102
12	Optional Base Group 04 (Limerock)	SY	10,872	$ 18	$ 195,696
13	Asphaltic Concrete FC-12.5	TN	1,221	$ 130	$ 158,681
14	Sodding	SY	6,500	$ 3	$ 19,500
15	Property Acquisition	LS	0	$ 70,000	$ -
				Subtotal	**$ 1,715,000**
				Contingency: 30%	$514,500
				Overhead and Profit/Bonding/General Conditions: 22%	$377,300
				Survey, Engineering, and Permitting: 30%	$514,500
	Opinion of Conceptual Capital Cost				**$ 3,122,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2019 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 150% factor applied.

Table F-5: Opinion of Conceptual Capital Cost
Alternative 2 - Lincoln Street Drainage Improvements

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 53,900	$ 53,900
2	Traffic Control (approx. 2 percent)	LS	1	$ 21,500	$ 21,500
3	Channel Excavation	CY	470	$ 60	$ 28,200
4	24-in RCP, Class III	LF	750	$ 105	$ 78,750
5	30-in RCP, Class III	LF	1,300	$ 135	$ 175,500
6	3-ft x 6-ft RCBC	LF	50	$ 700	$ 35,000
7	Inlets, Curb, Type P-5, <10'	EA	20	$ 5,000	$ 100,000
8	Milling Existing Asphalt Pavement, 2" Average Depth	SY	2,597	$ 7	$ 18,178
9	Optional Base Group 04 (Limerock)	SY	2,597	$ 18	$ 46,746
10	Asphaltic Concrete FC-12.5	TN	292	$ 130	$ 37,903
11	Sodding	SY	2,000	$ 3	$ 6,000
	Excavation	EA	25000	$ 9	$ 225,000
12	Property Acquisition	LS	1	$ 100,000	$ 100,000
12	Nutrient Separating Baffle Box	LS	1	$ 150,000	$ 150,000
				Subtotal	**$ 1,077,000**
				Contingency: 30%	$323,100
				Overhead and Profit/Bonding/General Conditions: 22%	$236,900
				Survey, Engineering, and Permitting: 30%	$323,100
	Opinion of Conceptual Capital Cost				**$ 1,961,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2019 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.

Table F-6: Opinion of Conceptual Capital Cost
Alternative 3 - Beardall Avenue Drainage Improvements

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 37,400	$ 37,400
2	Traffic Control (approx. 2 percent)	LS	1	$ 15,000	$ 15,000
3	43-in x 68-in ERCP, Class III	LF	250	$ 285	$ 71,250
4	3-ft x 7-ft RCBC	LF	60	$ 750	$ 45,000
5	4-ft x 6-ft RCBC	LF	45	$ 850	$ 38,250
6	Channel Excavation	CY	3,900	$ 60	$ 234,000
7	Inlets, Curb, Type P-5, <10'	EA	2	$ 5,000	$ 10,000
8	Junction Boxes for Box Culverts	EA	2	$ 50,000	$ 100,000
9	Milling Existing Asphalt Pavement, 2" Average Depth	SY	648	$ 7	$ 4,539
10	Optional Base Group 04 (Limerock)	SY	648	$ 18	$ 11,664
11	Asphaltic Concrete FC-12.5	TN	73	$ 130	$ 9,464
12	Sodding	SY	7,000	$ 3	$ 21,000
13	Nutrient Separating Baffle Box	LS	1	$ 150,000	$ 150,000
				Subtotal	**$ 748,000**
				Contingency: 30%	$224,400
				Overhead and Profit/Bonding/General Conditions: 22%	$164,600
				Survey, Engineering, and Permitting: 30%	$224,400
	Opinion of Conceptual Capital Cost				**$ 1,362,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2019 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.

Table F-7: Opinion of Conceptual Capital Cost
Alternative 4 - 21st Street Treatment Facility

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 58,000	$ 58,000
2	Traffic Control (approx. 2 percent)	LS	1	$ 23,200	$ 23,200
3	24-in RCP, Class III	LF	2,200	$ 105	$ 231,000
5	36-in RCP, Class III	LF	400	$ 160	$ 64,000
5	Excavation	CY	45,000	$ 10	$ 450,000
7	Inlets, Curb, Type P-5, <10'	EA	16	$ 5,000	$ 80,000
8	Milling Existing Asphalt Pavement, 2" Average Depth	SY	3,106	$ 7	$ 21,743
9	Optional Base Group 04 (Limerock)	SY	2,639	$ 18	$ 47,502
10	Asphaltic Concrete FC-12.5	TN	349	$ 130	$ 45,338
11	Sodding	SY	14,000	$ 3	$ 42,000
12	Property Acquisition	LS	1	$ 96,000	$ 96,000
				Subtotal	**$ 1,159,000**
				Contingency: 30%	$347,700
				Overhead and Profit/Bonding/General Conditions: 22%	$255,000
				Survey, Engineering, and Permitting: 30%	$347,700
	Opinion of Conceptual Capital Cost				**$ 2,110,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2019 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 150% factor applied.

Table F-8: Opinion of Conceptual Capital Cost
Alternative 5 - Washington Street Outfall Improvements

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 44,800	$ 44,800
2	Traffic Control (approx. 2 percent)	LS	1	$ 17,900	$ 17,900
3	30-in RCP, Class III	LF	120	$ 135	$ 16,200
4	5-ft x 7-ft RCBC	LF	40	$ 1,000	$ 40,000
5	5-ft x 5-ft RCBC	LF	80	$ 850	$ 68,000
6	Inlets, Curb, Type P-5, <10'	EA	4	$ 5,000	$ 20,000
7	ACB Revetment Channel Lining	SY	6,700	$ 75	$ 502,500
8	Excavation	CY	6,000	$ 10	$ 60,000
9	Milling Existing Asphalt Pavement, 2" Average Depth	SY	404	$ 7	$ 2,829
10	Optional Base Group 04 (Limerock)	SY	404	$ 18	$ 7,272
11	Asphaltic Concrete FC-12.5	TN	45	$ 130	$ 5,899
12	Sodding	SY	1,000	$ 3	$ 3,000
13	Property Acquisition	LS	1	$ 90,000	$ 90,000
14	Removal of Existing Culverts	LS	1	$ 17,500	$ 17,500
				Subtotal	**$ 896,000**
				Contingency: 30%	$268,800
				Overhead and Profit/Bonding/General Conditions: 22%	$197,100
				Survey, Engineering, and Permitting: 30%	$268,800
	Opinion of Conceptual Capital Cost				**$ 1,631,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2019 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 150% factor applied.

Table F-9: Opinion of Conceptual Capital Cost
Revised Alternative 1 - Midway Community Drainage Improvements (Phase 1)

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 79,800	$ 79,800
2	Traffic Control (approx. 2 percent)	LS	1	$ 31,900	$ 31,900
3	24-in RCP, Class III	LF	1,210	$ 110	$ 133,100
4	18-in RCP, Class III	LF	310	$ 85	$ 26,350
5	36-in RCP, Class III	LF	1,700	$ 140	$ 238,000
6	Pond Excavation	CY	40,200	$ 9	$ 361,800
7	Inlets, DBI, Type D, <10'	EA	29	$ 4,500	$ 130,500
8	Inlets, DBI, Type H, <10'	EA	1	$ 6,000	$ 6,000
9	Mitered End Section, 36"	EA	1	$ 3,500	$ 3,500
10	Milling Existing Asphalt Pavement, 2" Average Depth	SY	4,022	$ 3	$ 12,067
11	Optional Base Group 04 (Limerock)	SY	4,022	$ 20	$ 80,440
12	Asphaltic Concrete FC-12.5	TN	452	$ 120	$ 54,191
13	Sodding	SY	13,100	$ 3	$ 39,300
14	Clearing and Grubbing	AC	3.4	$ 27,000	$ 91,800

Subtotal		**$ 1,289,000**
Property Acquisition:		$306,000
Contingency:	30%	$386,700
Overhead and Profit/Bonding/General Conditions:	22%	$283,600
Survey, Engineering, and Permitting:	30%	$386,700

Opinion of Conceptual Capital Cost **$ 2,652,000**
(Rounded to the nearest $1,000)

These Opinions of Conceptual Capital Cost:

1. Are in 2021 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 200% factor applied.

Table F-10: Opinion of Conceptual Capital Cost
Revised Alternative 1 - Midway Community Drainage Improvements (Phase 2)

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 18,500	$ 18,500
2	Traffic Control (approx. 2 percent)	LS	1	$ 7,400	$ 7,400
3	24-in RCP, Class III	LF	450	$ 110	$ 49,500
4	18-in RCP, Class III	LF	100	$ 85	$ 8,500
5	30-in RCP, Class III	LF	1,100	$ 130	$ 143,000
7	Inlets, DBI, Type D, <10'	EA	13	$ 4,500	$ 58,500
10	Milling Existing Asphalt Pavement, 2" Average Depth	SY	2,104	$ 3	$ 6,313
11	Optional Base Group 04 (Limerock)	SY	2,104	$ 20	$ 42,080
12	Asphaltic Concrete FC-12.5	TN	236	$ 120	$ 28,350
13	Sodding	SY	2,000	$ 3	$ 6,000
				Subtotal	**$ 369,000**
				Contingency: 30%	$110,700
				Overhead and Profit/Bonding/General Conditions: 22%	$81,200
				Survey, Engineering, and Permitting: 30%	$110,700
	Opinion of Conceptual Capital Cost				**$ 672,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2021 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 200% factor applied.

Table F-11: Opinion of Conceptual Capital Cost
Revised Alternative 1 - Midway Community Drainage Improvements (Phase 3)

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 54,800	$ 54,800
2	Traffic Control (approx. 2 percent)	LS	1	$ 21,900	$ 21,900
3	43-in x 68-in ERCP, Class III	LF	1,100	$ 480	$ 528,000
4	Pond Excavation	CY	26,800	$ 9	$ 241,200
5	Inlets, DBI, Type H, <10'	EA	6	$ 6,000	$ 36,000
6	Mitered End Section, 43-in x 68-in	EA	4	$ 15,600	$ 62,400
7	Milling Existing Asphalt Pavement, 2" Average Depth	SY	1,960	$ 3	$ 5,880
8	Optional Base Group 04 (Limerock)	SY	1,960	$ 20	$ 39,200
9	Asphaltic Concrete FC-12.5	TN	220	$ 120	$ 26,408
10	Sodding	SY	8,700	$ 3	$ 26,100
11	Clearing and Grubbing	AC	2	$ 27,000	$ 54,000
				Subtotal	**$ 1,096,000**
				Contingency: 30%	$328,800
				Overhead and Profit/Bonding/General Conditions: 22%	$241,100
				Survey, Engineering, and Permitting: 30%	$328,800
	Opinion of Conceptual Capital Cost				**$ 1,995,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2021 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 200% factor applied.

Table F-12: Opinion of Conceptual Capital Cost
Revised Alternative 1 - Midway Community Drainage Improvements (Phase 4)

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 19,800	$ 19,800
2	Traffic Control (approx. 2 percent)	LS	1	$ 7,900	$ 7,900
3	19-in x 30-in ERCP, Class III	LF	350	$ 110	$ 38,500
4	24-in x 38-in RCP, Class III	LF	525	$ 140	$ 73,500
5	48-in RCP, Class III	LF	225	$ 190	$ 42,750
6	Pond Excavation	CY	8,500	$ 9	$ 76,500
7	Inlets, DBI, Type D, <10'	EA	5	$ 4,500	$ 22,500
8	Inlets, DBI, Type H, <10'	EA	3	$ 6,000	$ 18,000
9	Mitered End Section, 48"	EA	1	$ 3,700	$ 3,700
10	Milling Existing Asphalt Pavement, 2" Average Depth	SY	1,493	$ 3	$ 4,479
11	Optional Base Group 04 (Limerock)	SY	1,493	$ 20	$ 29,860
12	Asphaltic Concrete FC-12.5	TN	168	$ 120	$ 20,113
13	Sodding	SY	3,500	$ 3	$ 10,500
14	Clearing and Grubbing	AC	1	$ 27,000	$ 27,000
				Subtotal	**$ 396,000**
				Contingency: 30%	$118,800
				Overhead and Profit/Bonding/General Conditions: 22%	$87,100
				Survey, Engineering, and Permitting: 30%	$118,800
	Opinion of Conceptual Capital Cost				**$ 721,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2021 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 200% factor applied.

Table F-13: Opinion of Conceptual Capital Cost
Revised Alternative 2 - Lincoln Street and Hughey Street Outfall Drainage Improvements

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 138,800	$ 138,800
2	Traffic Control (approx. 2 percent)	LS	1	$ 55,500	$ 55,500
3	24-in RCP, Class III	LF	1,275	$ 110	$ 140,250
4	18-in RCP, Class III	LF	1,075	$ 85	$ 91,375
5	34-in x 53-in RCP, Class III	LF	705	$ 300	$ 211,500
6	24-in x 38-in RCP, Class III	LF	400	$ 140	$ 56,000
6	Pond Excavation	CY	48,800	$ 9	$ 439,200
7	Channel Excavation	CY	5,500	$ 30	$ 165,000
8	Inlets, DBI, Type D, <10'	EA	11	$ 4,500	$ 49,500
9	Inlets, DBI, Type H, <10'	EA	3	$ 6,000	$ 18,000
10	Mitered End Section, 39-in x 53-in	EA	1	$ 7,400	$ 7,400
11	Milling Existing Asphalt Pavement, 2" Average Depth	SY	3,766	$ 3	$ 11,299
12	Optional Base Group 04 (Limerock)	SY	3,766	$ 20	$ 75,320
13	Asphaltic Concrete FC-12.5	TN	423	$ 120	$ 50,746
14	Sodding	SY	39,000	$ 3	$ 117,000
15	Clearing and Grubbing	AC	10.48	$ 27,000	$ 282,960

Subtotal		**$ 1,910,000**
Property Acquisition:		$864,600
Contingency:	30%	$573,000
Overhead and Profit/Bonding/General Conditions:	22%	$420,200
Survey, Engineering, and Permitting:	30%	$573,000
Opinion of Conceptual Capital Cost		**$ 4,341,000**
(Rounded to the nearest $1,000)		

These Opinions of Conceptual Capital Cost:

1. Are in 2021 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 150% factor applied.

Table F-14: Opinion of Conceptual Capital Cost
Revised Alternative 3 - Beardall Avenue/CSX Ditch Drainage Improvements

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 101,900	$ 101,900
2	Traffic Control (approx. 2 percent)	LS	1	$ 40,800	$ 40,800
3	24-in RCP, Class III	LF	1,400	$ 110	$ 154,000
4	30-in RCP, Class III	LF	50	$ 130	$ 6,500
5	48-in RCP, Class III	LF	1,110	$ 190	$ 210,900
6	Pond Excavation	CY	60,700	$ 9	$ 546,300
7	Channel Excavation	CY	235	$ 30	$ 7,050
8	Inlets, DBI, Type H, <10'	EA	9	$ 6,000	$ 54,000
9	Concrete Ditch Lining	SY	420	$ 65	$ 27,300
10	Milling Existing Asphalt Pavement, 2" Average Depth	SY	3,359	$ 3	$ 10,078
11	Optional Base Group 04 (Limerock)	SY	3,359	$ 20	$ 67,180
12	Asphaltic Concrete FC-12.5	TN	377	$ 120	$ 45,259
13	Sodding	SY	19,500	$ 3	$ 58,500
14	Clearing and Grubbing	AC	4	$ 27,000	$ 108,000

Subtotal		**$ 1,438,000**
Property Acquisition:		$600,000
Contingency:	30%	$431,400
Overhead and Profit/Bonding/General Conditions:	22%	$316,400
Survey, Engineering, and Permitting:	30%	$431,400

Opinion of Conceptual Capital Cost **$ 3,218,000**
(Rounded to the nearest $1,000)

These Opinions of Conceptual Capital Cost:

1. Are in 2021 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 150% factor applied.

Table F-15: Opinion of Conceptual Capital Cost
Revised Alternative 4 - 20th Street/Sipes Avenue Drainage Improvements

Item No.	Item Description	Unit	Qty	Unit Cost	Capital Cost
1	Mobilization (approx. 5 percent)	LS	1	$ 77,700	$ 77,700
2	Traffic Control (approx. 2 percent)	LS	1	$ 31,100	$ 31,100
3	24-in RCP, Class III	LF	280	$ 110	$ 30,800
4	18-in RCP, Class III	LF	660	$ 85	$ 56,100
5	36-in RCP, Class III	LF	2,730	$ 140	$ 382,200
6	Pond Excavation	CY	56,600	$ 9	$ 509,400
7	Inlets, DBI, Type D, <10'	EA	17	$ 4,500	$ 76,500
9	Mitered End Section, 36"	EA	3	$ 3,500	$ 10,500
10	Milling Existing Asphalt Pavement, 2" Average Depth	SY	4,691	$ 3	$ 14,073
11	Optional Base Group 04 (Limerock)	SY	4,691	$ 20	$ 93,820
12	Asphaltic Concrete FC-12.5	TN	527	$ 120	$ 63,203
13	Sodding	SY	24,200	$ 3	$ 72,600
14	Clearing and Grubbing	AC	5	$ 27,000	$ 135,000
				Subtotal	**$ 1,553,000**
				Contingency: 30%	$465,900
				Overhead and Profit/Bonding/General Conditions: 22%	$341,700
				Survey, Engineering, and Permitting: 30%	$465,900
	Opinion of Conceptual Capital Cost				**$ 2,827,000**
	(Rounded to the nearest $1,000)				

These Opinions of Conceptual Capital Cost:

1. Are in 2021 dollars.
2. Include contractor's overhead, profit, mobilization, and bonding.
3. Do not include potential replacement or rehabilitation of non-stormwater infrastructure (e.g., water, sewer, reuse, cable, telephone, gas, fiber optic, etc.)
4. Do not include potential land acquisition (unless noted).
5. Do not include any potential hazardous material or groundwater remediation.
6. Do not include any potential wetlands mitigation.
7. Have a 30% contingency.
8. Are rounded to the next highest $1,000.
9. Property acquisition based on SCPAO property values with 200% factor applied.

Appendix G

BMPTRAINS

CATCHMENTS AND TREATMENT SURFACE DISCHARGE SUMMARY V 8.6

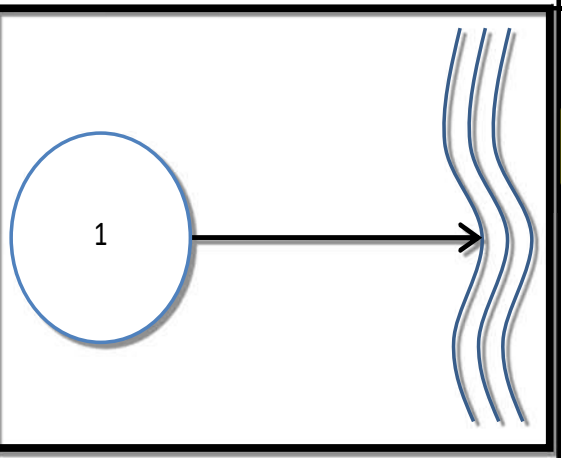
CALCULATION METHODS:

1. The effectiveness of each BMP in a single catchment is converted to an equivalent capture volume.
2. Certain BMP treatment train combinations have not been evaluated and in practice they are at this time not used, an example is a greenroof following a tree well.
3. Wet detention is last when used in a single catchment with other BMPs, except when followed by filtration

PROJECT TITLE	Midway ALT 1	Optional Identification		
	ALT1_PRE	Catchment 2	Catchment 3	Catchment 4
BMP Name	Wet Detention/ MAPs			
BMP Name				
BMP Name				

Surface Water Discharge Summary Performance of Entire Watershed

Catchment Configuration	A - Single Catchment	Treatment Objectives or Target for	12/19/2019
Nitrogen Pre Load (kg/yr)	319.23		BMPTRAINS MODEL
Phosphorus Pre Load (kg/yr)	48.37		
Nitrogen Post Load (kg/yr)	314.24		
Phosphorus Post Load (kg/yr)	47.61		
Target Load Reduction (N) %			
Target Load Reduction (P) %			
Target Discharge Load, N (kg/yr)			
Target Discharge Load, P (kg/yr)			
Provided Overall Efficiency, N (%):	21		
Provided Overall Efficiency, P (%):	50		
Discharged Load, N (kg/yr & lb/yr):	247.77	545.73	
Discharged Load, P (kg/yr & lb/yr):	24.02	52.91	
Load Removed, N (kg/yr & lb/yr):	66.47	146.41	
Load Removed, P (kg/yr & lb/yr):	23.59	51.96	



CATCHMENTS AND TREATMENT SURFACE DISCHARGE SUMMARY V 8.6

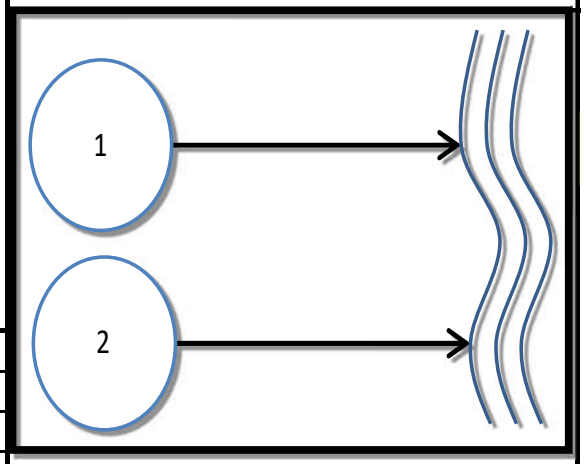
CALCULATION METHODS:

1. The effectiveness of each BMP in a single catchment is converted to an equivalent capture volume.
2. Certain BMP treatment train combinations have not been evaluated and in practice they are at this time not used, an example is a greenroof following a tree well.
3. Wet detention is last when used in a single catchment with other BMPs, except when followed by filtration

PROJECT TITLE	Midway ALT 1	Optional Identification		
	ALT1_POST	Catchment 2	Catchment 3	Catchment 4
BMP Name	Wet Detention/ MAPs			
BMP Name				
BMP Name				

Surface Water Discharge Summary Performance of Entire Watershed

Catchment Configuration	C - 2 Catchment-Parallel	Treatment Objectives or Target for	12/19/2019
Nitrogen Pre Load (kg/yr)	319.23		BMPTRAINS MODEL
Phosphorus Pre Load (kg/yr)	48.37		
Nitrogen Post Load (kg/yr)	309.24		
Phosphorus Post Load (kg/yr)	46.86		
Target Load Reduction (N) %			
Target Load Reduction (P) %			
Target Discharge Load, N (kg/yr)			
Target Discharge Load, P (kg/yr)			
Provided Overall Efficiency, N (%):	29		
Provided Overall Efficiency, P (%):	55		
Discharged Load, N (kg/yr & lb/yr):	220.68	486.08	
Discharged Load, P (kg/yr & lb/yr):	21.29	46.89	
Load Removed, N (kg/yr & lb/yr):	88.56	195.06	
Load Removed, P (kg/yr & lb/yr):	25.57	56.32	



CATCHMENTS AND TREATMENT SURFACE DISCHARGE SUMMARY V 8.6

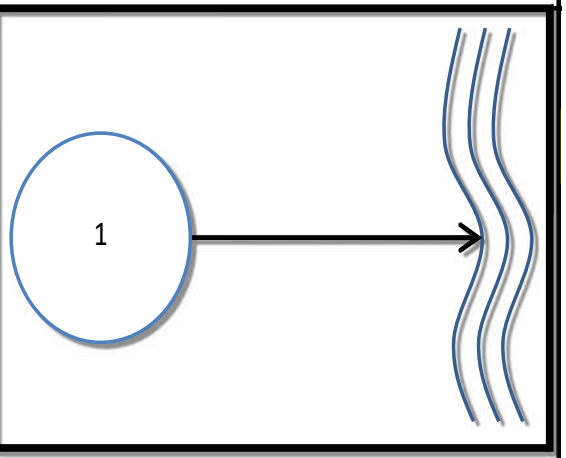
CALCULATION METHODS:

1. The effectiveness of each BMP in a single catchment is converted to an equivalent capture volume.
2. Certain BMP treatment train combinations have not been evaluated and in practice they are at this time not used, an example is a greenroof following a tree well.
3. Wet detention is last when used in a single catchment with other BMPs, except when followed by filtration

PROJECT TITLE	ALT 2	Optional Identification		
	ALT 2	Catchment 2	Catchment 3	Catchment 4
BMP Name	Filtration			
BMP Name				
BMP Name				

Surface Water Discharge Summary Performance of Entire Watershed

Catchment Configuration	A - Single Catchment	Treatment Objectives or Target for	12/19/2019
Nitrogen Pre Load (kg/yr)	262.86		BMPTRAINS MODEL
Phosphorus Pre Load (kg/yr)	41.58		
Nitrogen Post Load (kg/yr)	262.86		
Phosphorus Post Load (kg/yr)	41.58		
Target Load Reduction (N) %			
Target Load Reduction (P) %			
Target Discharge Load, N (kg/yr)			
Target Discharge Load, P (kg/yr)			
Provided Overall Efficiency, N (%):	36		
Provided Overall Efficiency, P (%):	43		
Discharged Load, N (kg/yr & lb/yr):	168.29	370.67	
Discharged Load, P (kg/yr & lb/yr):	23.90	52.64	
Load Removed, N (kg/yr & lb/yr):	94.58	208.31	
Load Removed, P (kg/yr & lb/yr):	17.68	38.94	



CATCHMENTS AND TREATMENT SURFACE DISCHARGE SUMMARY V 8.6

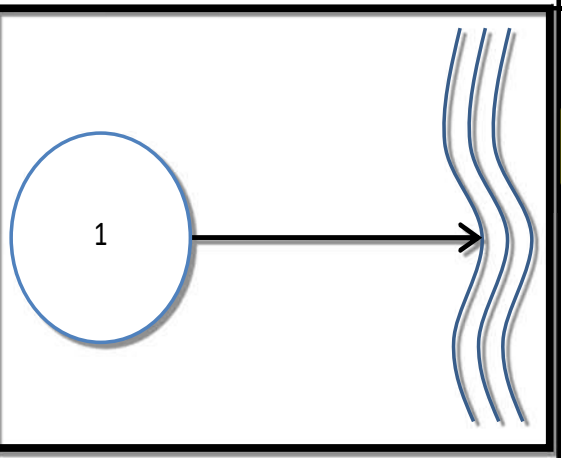
CALCULATION METHODS:

1. The effectiveness of each BMP in a single catchment is converted to an equivalent capture volume.
2. Certain BMP treatment train combinations have not been evaluated and in practice they are at this time not used, an example is a greenroof following a tree well.
3. Wet detention is last when used in a single catchment with other BMPs, except when followed by filtration

PROJECT TITLE	ALT 3	Optional Identification		
	ALT 3	Catchment 2	Catchment 3	Catchment 4
BMP Name	Filtration			
BMP Name				
BMP Name				

Surface Water Discharge Summary Performance of Entire Watershed

Catchment Configuration	A - Single Catchment		12/19/2019
Nitrogen Pre Load (kg/yr)	566.73	Treatment Objectives or Target for	BMPTRAINS MODEL
Phosphorus Pre Load (kg/yr)	95.52		
Nitrogen Post Load (kg/yr)	566.73		
Phosphorus Post Load (kg/yr)	95.52		
Target Load Reduction (N) %			
Target Load Reduction (P) %			
Target Discharge Load, N (kg/yr)			
Target Discharge Load, P (kg/yr)			
Provided Overall Efficiency, N (%):	34		
Provided Overall Efficiency, P (%):	40		
Discharged Load, N (kg/yr & lb/yr):	372.79	821.11	
Discharged Load, P (kg/yr & lb/yr):	56.89	125.30	
Load Removed, N (kg/yr & lb/yr):	193.94	427.16	
Load Removed, P (kg/yr & lb/yr):	38.63	85.08	



CATCHMENTS AND TREATMENT SURFACE DISCHARGE SUMMARY V 8.6

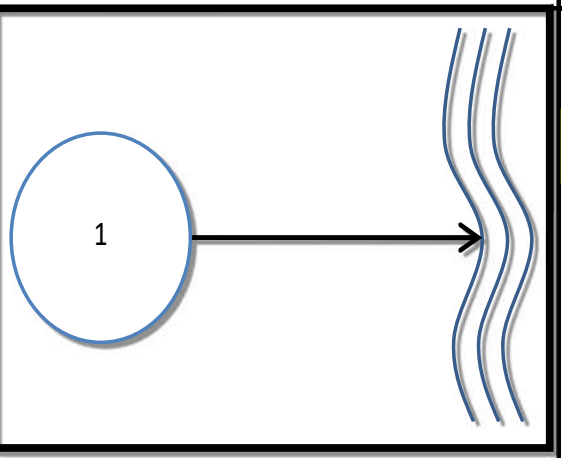
CALCULATION METHODS:

1. The effectiveness of each BMP in a single catchment is converted to an equivalent capture volume.
2. Certain BMP treatment train combinations have not been evaluated and in practice they are at this time not used, an example is a greenroof following a tree well.
3. Wet detention is last when used in a single catchment with other BMPs, except when followed by filtration

PROJECT TITLE	Midway ALT 4	Optional Identification		
	ALT4_PRE	Catchment 2	Catchment 3	Catchment 4
BMP Name	Wet Detention/ MAPs			
BMP Name				
BMP Name				

Surface Water Discharge Summary Performance of Entire Watershed

Catchment Configuration	A - Single Catchment	Treatment Objectives or Target for	12/19/2019
Nitrogen Pre Load (kg/yr)	85.23		BMPTRAINS MODEL
Phosphorus Pre Load (kg/yr)	12.03		
Nitrogen Post Load (kg/yr)	80.94		
Phosphorus Post Load (kg/yr)	11.43		
Target Load Reduction (N) %			
Target Load Reduction (P) %			
Target Discharge Load, N (kg/yr)			
Target Discharge Load, P (kg/yr)			
Provided Overall Efficiency, N (%):	33		
Provided Overall Efficiency, P (%):	58		
Discharged Load, N (kg/yr & lb/yr):	54.45	119.93	
Discharged Load, P (kg/yr & lb/yr):	4.81	10.60	
Load Removed, N (kg/yr & lb/yr):	26.49	58.34	
Load Removed, P (kg/yr & lb/yr):	6.61	14.57	



CATCHMENTS AND TREATMENT SURFACE DISCHARGE SUMMARY V 8.6

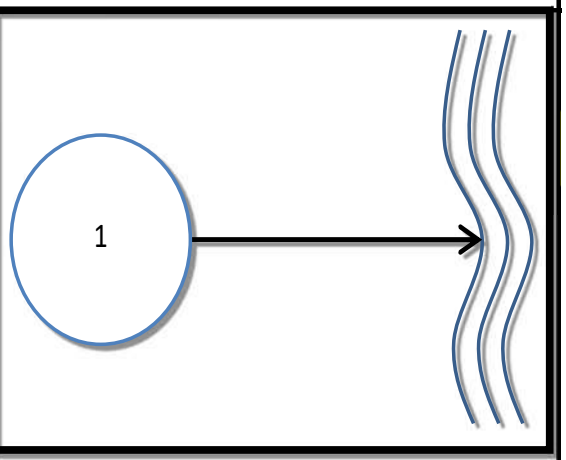
CALCULATION METHODS:

1. The effectiveness of each BMP in a single catchment is converted to an equivalent capture volume.
2. Certain BMP treatment train combinations have not been evaluated and in practice they are at this time not used, an example is a greenroof following a tree well.
3. Wet detention is last when used in a single catchment with other BMPs, except when followed by filtration

PROJECT TITLE	Midway ALT 4	Optional Identification		
	ALT4_POST	Catchment 2	Catchment 3	Catchment 4
BMP Name	Wet Detention/ MAPs			
BMP Name				
BMP Name				

Surface Water Discharge Summary Performance of Entire Watershed

Catchment Configuration	A - Single Catchment	Treatment Objectives or Target for	12/19/2019
Nitrogen Pre Load (kg/yr)	85.23		BMPTRAINS MODEL
Phosphorus Pre Load (kg/yr)	12.03		
Nitrogen Post Load (kg/yr)	74.33		
Phosphorus Post Load (kg/yr)	10.49		
Target Load Reduction (N) %			
Target Load Reduction (P) %			
Target Discharge Load, N (kg/yr)			
Target Discharge Load, P (kg/yr)			
Provided Overall Efficiency, N (%):	39		
Provided Overall Efficiency, P (%):	65		
Discharged Load, N (kg/yr & lb/yr):	45.62	100.48	
Discharged Load, P (kg/yr & lb/yr):	3.67	8.09	
Load Removed, N (kg/yr & lb/yr):	28.71	63.23	
Load Removed, P (kg/yr & lb/yr):	6.82	15.03	



Meeting Minutes

To: *Cammie Dewey, P.E., SJRWMD*

From: *Ben Pernezny, P.E., PMP, CDM Smith*

Date: *June 1, 2021*

Subject: *Midway Basin Engineering Study – Conceptual Alternatives Environmental Resource Permitting Considerations*

A conference call was held on June 1, 2021, between Ben Pernezny of CDM Smith and Cammie Dewey of SJRWMD to review the five recommended conceptual capital improvement projects/programs that CDM Smith has proposed in the Midway Basin Engineering Study. The five recommended alternatives include:

- Alternative 1 (Revised) – Midway Community Drainage Improvement Program
- Alternative 2 (Revised) – Lincoln Street and Hughey Street Outfall Drainage Improvements
- Alternative 3 (Revised) – Beardall Avenue and CSX Ditch Drainage Improvements
- Alternative 4 (Revised) – 20th Street and Sipes Avenue Drainage Improvements
- Alternative 5 – Washington Street Outfall Improvements

Based on a cursory review, it appears that all five proposed alternatives should be subject to routine Environmental Resource Permitting (ERP) requirements through SJRWMD. All alternatives are not increasing impervious area and are generally maintaining existing drainage patterns; the ultimate outfalls for the Midway Basin will remain the St. Johns River and Lake Monroe under the proposed basin plan.

Alternatives 1, 2, 3, and 5 appear to qualify for the General Permit to Counties, Municipalities, and other Agencies to Conduct Stormwater Retrofit Activities (Chapter 62-330.451, F.A.C.). These projects generally would be considered under subsection (6) as water quantity retrofits and would be subject to the following requirements:

- The project must not result in a net reduction in water quality treatment provided by the existing stormwater management system;

- The project must not increase discharges of untreated stormwater entering receiving waters.

The storage elements included in all four of these projects appear to provide the necessary water quantity attenuation and water quality benefits to meet these requirements. Furthermore, under the general permit, work in wetlands and non-artificial surface waters are limited to no more than 0.5-acres. It will be necessary during the design phase to delineate wetlands and surface waters (including existing ditches) on the areas to be altered, and to work with the District to determine if any impacts exceed the limits for the general permit (therefore requiring an Individual permit instead) and/or if mitigation will be required. The District's review procedure is the same for both permit types; the fee for the general permit is less than an individual permit.

Revised Alternative 4 may require additional reviews due to the permitting history in the area. The improvements as proposed include alterations to two existing, permitted stormwater systems in the Jack Court Pond (ERP 29179-1) and the IFAS-Midway Treatment Facility (ERP 88965-1); the District's initial impression is that this project will likely require an Individual ERP as a modification of the IFAS-Midway Treatment Facility permit line, though the District is willing to explore if the project can also be permitted under the 62-330.451 general permit. The District recommended reaching out to Seminole County's Watershed Management Division to identify if BMAP credits are being claimed for the existing IFAS-Midway Treatment Facility and if the proposed expansion and re-routing of flows impacts the County's plans for the facility.

For all projects, the District emphasized the importance of having ownership and property issues resolved, including any necessary temporary construction easements (TCEs) in place before permits can be issued.

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