

FINAL POND SITING REPORT

Northeast Connector Expressway - Phase I (From Cyrils Drive to Nova Road)

Osceola County, FL
Project 599-228

Prepared for:

**CENTRAL
FLORIDA
EXPRESSWAY
AUTHORITY**

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May 2021

PROFESSIONAL ENGINEER CERTIFICATION

I hereby certify that I am a registered professional engineer in the State of Florida practicing engineering with The Balmoral Group and that I have supervised the preparation of and approve the analysis, findings, opinions, conclusions and technical advice hereby reported for:

PROJECT: Northeast Connector Expressway – Phase I
(from Cyrils Drive to Nova Road)
Pond Siting Report
Project 599-228
Osceola County, Florida

The engineering work represented by this document was performed through the following duly authorized engineering business:

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This report provides the results of the preliminary analysis of the existing drainage conditions and the analysis required for the estimation of stormwater pond sizes for the proposed improvements including the potential pond locations for the Project Development and Environment Study for Northeast Connector Expressway - Phase I (from Cyrils Drive to Nova Road). The results in this report are based on assumptions from existing permits and best available desktop data; no site-specific investigations were performed for this analysis. It is recommended that additional site-specific analysis be performed to finalize the report or prior to purchasing any recommended sites. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of hydrologic analysis and hydraulic engineering as applied through professional judgment and experience.

Any engineering analysis, documents, conclusions or recommendations relied upon from other professional sources or provided with responsibility by the client are referenced accordingly in the following report.

FLORIDA REGISTERED ENGINEER:

Jennifer Ann Nunn, State of Florida, Professional Engineer, License No. 70709
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EXECUTIVE SUMMARY

The Balmoral Group has subcontracted with RS&H, Inc. to provide Project Development and Environment (PD&E) drainage design services for the Central Florida Expressway Authority (CFX) which has commissioned a study for a new expressway connection between Cyrils Drive and Nova Road, known as the Northeast Connector Expressway, in Osceola County. Two alignment Corridors, A and B, were evaluated during the planning stage and Corridor A was selected to undergo pond siting analysis. The alignment corridor under analysis begins at the terminus of the planned SR 534 near Cyrils Drive and extends southwards until connecting to Nova Road, a distance of approximately 4.3 miles. The study area is located primarily on Deseret Ranches property.

The selection of Corridor A was achieved through an extensive Alternatives Corridor Evaluation carried out in December of 2020 in which two corridors were evaluated. The selected corridor was found to have stronger stakeholder preference, less wetland impacts, and was determined to be a shorter route and lower construction costs.

The objective of this report is to discuss, analyze, and identify the stormwater management plan for the proposed roadway alignment. Stormwater management for water quality treatment and runoff attenuation will be provided using wet detention stormwater management facilities. Floodplain compensation estimates used the cup-for-cup method. The design of the stormwater facilities will comply with the standards set forth by Central Florida Expressway (CFX), South Florida Water Management District (SFWMD), Osceola County, and Florida Department of Transportation (FDOT).

One typical section is considered for the length of the project. The proposed typical section features two 12-foot travel lanes in each direction with 12-foot paved inside and outside shoulders. The proposed median width is 82 feet wide, which can accommodate future widening. The ultimate typical section, which is used to size ponds, features an eight-lane section and two potential multi-use lanes with a concrete median barrier wall, resulting in a total impervious area width of 178 feet. The proposed typical section requires 330 feet of limited access right-of-way, which includes a border width of 88 feet on both sides of the Northeast Connector Expressway.

The project is located within the Upper Kissimmee River Chain of Lakes in the SFWMD, and more specifically within the Lake Center Outlet basin, Waterbody Identification (WBID) 3174F. The project site is within Township 25 South, Range 31 East (Sections 12, 13, 24, 25), and Township 25 South, Range 32 East (Section 30).

Required pond sizes for each basin were determined by evaluating runoff volume using the Natural Resource Conservation Service (NRCS) curve number (CN) method, calculating treatment volume requirements, and including floodplain impacts (as applicable). These volumes were summed and combined with landscaping, pond geometry, side slopes, freeboard, and maintenance berm assumptions to produce an estimated total required pond size. Pond size estimates include a 20% increase in area to account for landscaping aesthetics, and tie-ins to the existing ground. Since this is a preliminary analysis for pond sizing capacity, recovery calculations for orifice sizing and permanent pool calculations are not included in the pond sizing considerations. Please note that the recommendations are based on pond sizes determined from preliminary data, reasonable engineering judgment, and assumptions. Pond size requirements may

change during final design as more detailed information on seasonal high water table (SHWT), wetland hydrologic information, and final roadway profile become available.

Design considerations for each pond site location included a desktop review of the best available data, which included hydraulic data, hydrology (land use cover, soil types, SHWTs, etc.), contamination sites, wetland limits, wildlife sitings, archaeological or historical sites, and conservation areas. No site-specific investigations have been performed or used in this analysis; this includes field survey, geotechnical testing, wetland delineation, threatened and endangered species observations, archaeological/cultural resources investigations, or contamination screenings. The results are summarized in **Table ES IA** and **Table ES IB** on the following pages.

TABLE ES IA. POND SITE MATRIX

Pond Site	Wetland Impacts (ac)	Wildlife Habitat	Contamination Risk	Floodplain Impact (ac)	Cultural or Archaeological Resources Impacts	Access Issues	Number of Property Owners	Pond Right-of-Way Area (ac)
1A	0	Moderate	Low	0	Low	None	1	2.2
1B	0	Moderate	Low	0.58	Low	None	1	2.2
2A	0	Moderate	Low	0	Low	None	1	3.9
2B	0	Moderate	Low	0	Low	None	1	3.9
3A	0	Moderate	Low	0.02	Low	None	1	3.1
3B	0	Moderate	Low	1.47	Low	None	1	3.1
4A	0	Moderate	Low	0	Low	None	1	5.9
4B	0	Moderate	Low	0.31	Low	None	1	3.7
5A	2.55	Moderate	Low	3.24	Low	None	1	4.5
5B	0.4	Moderate	Low	3.12	Low	None	1	4.5
6A	0	Moderate	Low	0	Low	None	1	4.2
6B	0	Moderate	Low	0	Low	None	1	4.2
7A	0.1	Moderate	Low	0.21	Low	None	1	3.3
7B	0	Moderate	Low	0	Low	None	1	3.4
FPC Lake Joel	0	Moderate	Low	0	Low	None	1	7.0
FPC Bullock Lake	0	Moderate	Low	0	Low	None	1	25.1

Legend:

Preferred Pond Site

TABLE ES 1B. ESTIMATED POND OPTION CONSTRUCTION COSTS

Basin	Option	Pond Site	Provided Pond Area (ac)	Estimated Pond Option Construction Cost
Basin 1	1	1A	2.2	\$ 224,200
	2	1B	2.2	\$ 223,600
Basin 2	1	2A	3.9	\$ 383,600
	2	2B	3.9	\$ 383,500
Basin 3	1	3A	3.1	\$ 306,000
	2	3B	3.1	\$ 305,400
Basin 4	2	4A	5.9	\$ 601,000
	1	4B	3.7	\$ 368,900
Basin 5	1	5A	4.5	\$ 448,800
	2	5B	4.5	\$ 472,700
Basin 6	1	6A	4.2	\$ 435,200
	2	6B	4.2	\$ 451,900
Basin 7	1	7A	3.3	\$ 332,100
	2	7B	3.4	\$ 334,400
Basin 1,2,3	1	FPC Lake Joel	7.0	\$ 388,900
Basin 4,5,6,7	1	FPC Bullock Lake	25.1	\$ 1,490,100

Legend:

 Preferred Pond Site

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I Introduction

The Balmoral Group has subcontracted with RS&H, Inc. to provide Project Development and Environment (PD&E) drainage design services for the Central Florida Expressway Authority (CFX) which has commissioned a study for a new expressway connection known as the Northeast Connector Expressway between Cyrils Drive and Nova Road in Osceola County. Two Corridors, A & B, were evaluated during the Alternatives Corridor Evaluation process and Corridor A was recommended to move forward. The alignment alternative under analysis begins at the terminus of the planned SR 534 near Cyrils Drive and extends southwards until connecting to Nova Road, a distance of approximately 4.3 miles. The study area is located primarily on Deseret Ranches property. An overview map of the location is presented in **Figure I** in **Appendix A**.

The goal of the Northeast Connector Expressway is to enhance north-south mobility and provide connections between existing and future east-west corridors in the study area. Based on an approved PD&E Study, the Northeast Connector Expressway will link the planned SR 534 with the planned Osceola/Brevard County Connectors (OBCC), currently in the planning phase. These connections will promote regional connectivity, accommodate future growth, provide for transit opportunities, and enhance mobility in Osceola County. The link between the planned SR 534 and OBCC will also provide a seamless limited access, high-speed connection from the Orlando International Airport (OIA) to I-95 in Brevard County. In the interim, before the OBCC is constructed, the Northeast Connector Expressway will extend the limited access connection from Cyrils Drive to Nova Road, a major county road. This connection will be vital to providing a limited access, north-south facility within the Northeast District, a large master-planned development in northeast Osceola County owned by Deseret Ranches.

The objective of this report is to discuss, analyze, and identify the stormwater management plan for the proposed roadway alignment. Stormwater management for water quality treatment and runoff attenuation will be provided using wet detention stormwater management facilities. Floodplain compensation estimates used the cup-for-cup method. The design of the stormwater facilities will comply with the standards set forth by CFX, South Florida Water Management District (SFWMD), Osceola County, and Florida Department of Transportation (FDOT). All exhibits for this report are included in **Appendix A**.

This report is based on the vertical datum NAVD88. Data sources based in NGVD29 are converted to NAVD88. The conversion from NGVD29 to NAVD88 is -1.01 using the U.S. Army Corps of Engineers Corpsccon Version 6 software (i.e. 10.00 feet NGVD = 8.99 feet NAVD).

2 Project Description

The project is located in Osceola County, and within the SFWMD jurisdiction. The project site is within Township 25 South, Range 31 East (Sections 12, 13, 24, 25), and Township 25 South, Range 32 East (Section 30).

The Northeast Connector Expressway has been considered in numerous previous studies. The most relevant studies to this project include:

- Northeast District Conceptual Master Plan, 2010;
- Osceola County Expressway Authority (OCX) Master Plan 2040, 2013;
- East Central Florida Corridor Task Force Final Report, 2014;
- North Ranch Sector Plan, 2015;
- CFX Visioning and 2040 Master Plan (2016); and
- CFX Northeast Connector Expressway Concept, Feasibility, and Mobility Study, 2018;

The selection of Corridor A was achieved through an extensive Alternatives Corridor Evaluation carried out in December of 2020 in which two corridors, A & B, shown on **Plate I** were evaluated. Corridor A was selected on the basis of the following considerations:

TABLE I. CORRIDOR SELECTION CRITERIA

Considerations	Criteria
Social	Stakeholders preferred the selected corridor due to its consistency with the Northeast District Master Plan and its lower right-of-way footprint covers less than 200 acres.
Cultural	Both corridors crossed a historic canal and recorded resource.
Natural Environment	Corridor A has less wetland impacts
Physical	Both corridors have identical potential contamination impacts
Engineering	Corridor A has lower organic soils, is shorter, and has lower anticipated construction costs.

The project is located within the Kissimmee River Watershed in the SFWMD, and more specifically within the Lake Center Outlet basin. The corridor lies between Lake Myrtle, Bullock Lake, and Lake Joel. The alignment has a canal/floodway crossing west of Lake Myrtle and southeast of Lake Joel. The corridor has 35.2 ac of floodway impacted.

Within the selected Corridor A, there are two alternative alignments, Nova Road Connection – Option 1 and Nova Road Connection – Option 2. For the purpose of this report, the preferred alignment is Nova Road Connection – Option 2. See **Figure I** in **Appendix A**.

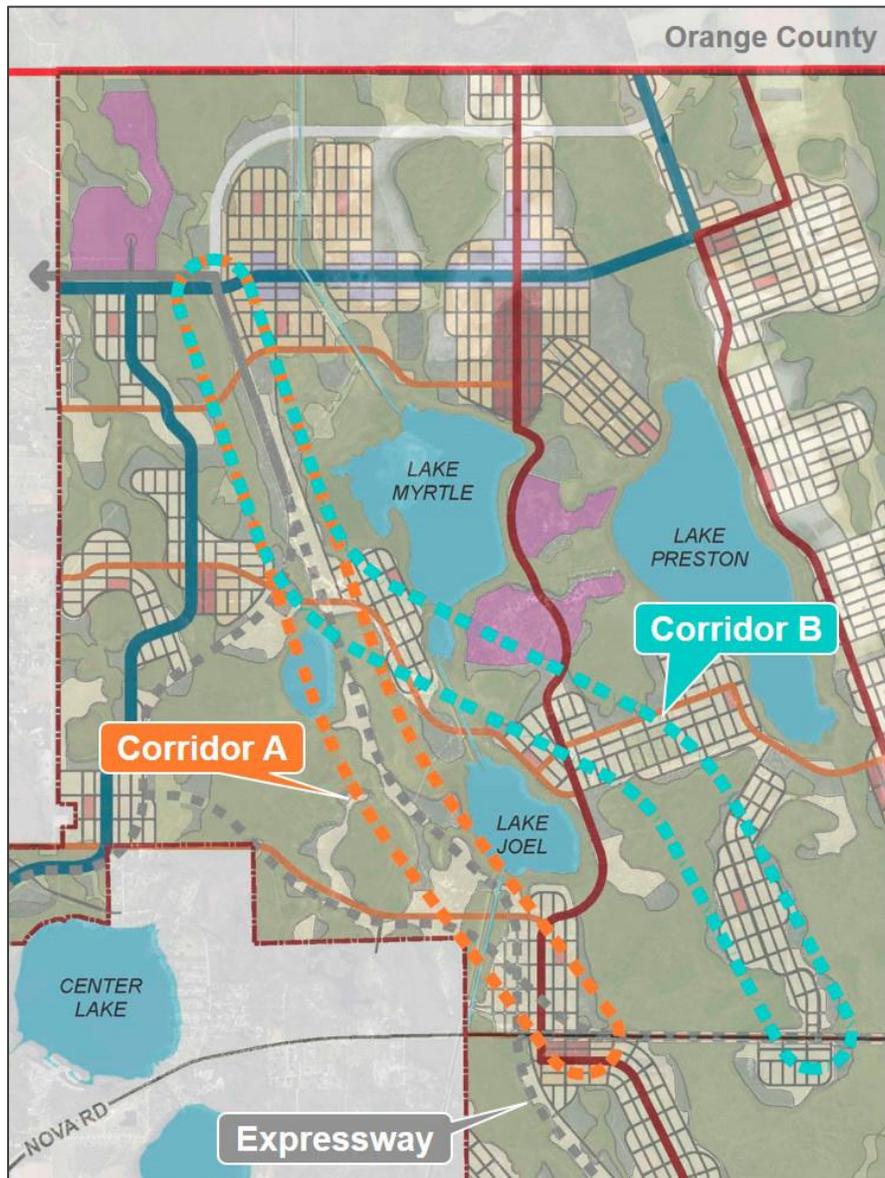


PLATE I. NORTHEAST DISTRICT ALTERNATIVE CORRIDORS A & B

One typical section is considered for the length of the project. The proposed typical section features two 12-foot travel lanes in each direction flanked by 12-foot paved inside and outside shoulders, as shown in **Plate 2**. The proposed median width is 82 feet wide, which can accommodate future widening for the ultimate typical section. The ultimate typical section features an eight-lane section and two potential multi-use lanes with a concrete median barrier wall, as shown in **Plate 3**. The limited access right-of-way for the alignment is 330 feet wide, which includes a border width of 88 feet on both sides of the Northeast Connector Expressway mainline. The ponds are sized using the ultimate typical section. It is presumed that the lowest edge of pavement will be established within the proposed condition.

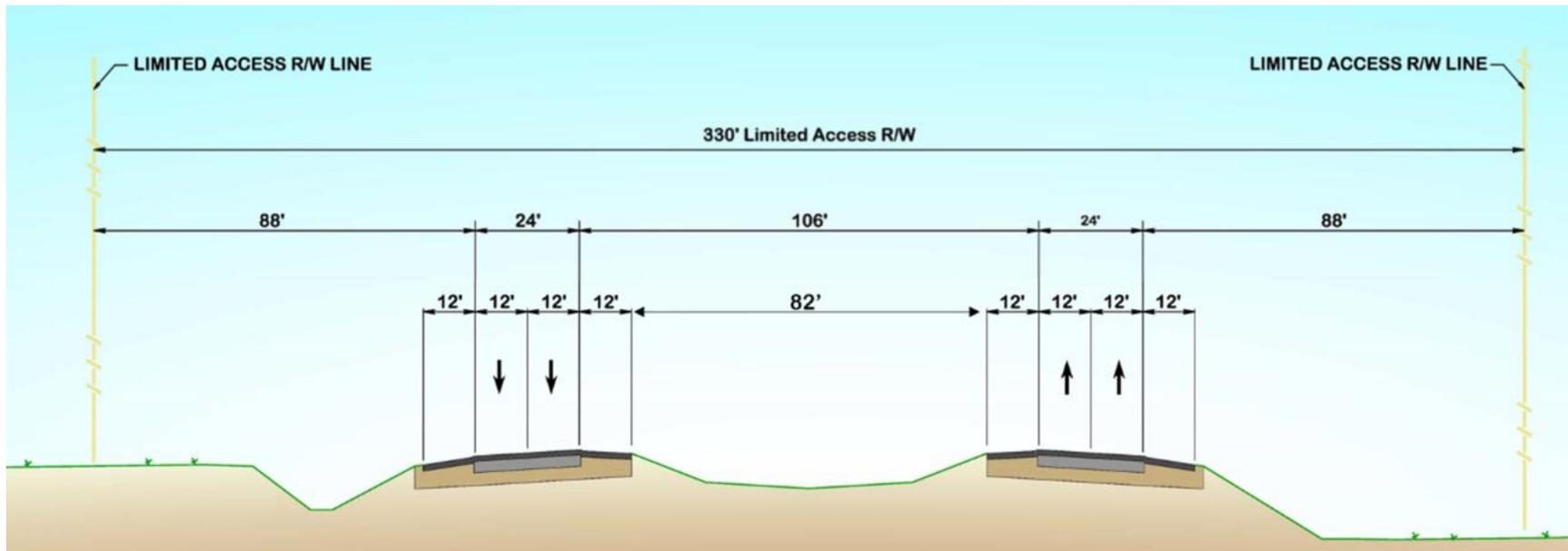
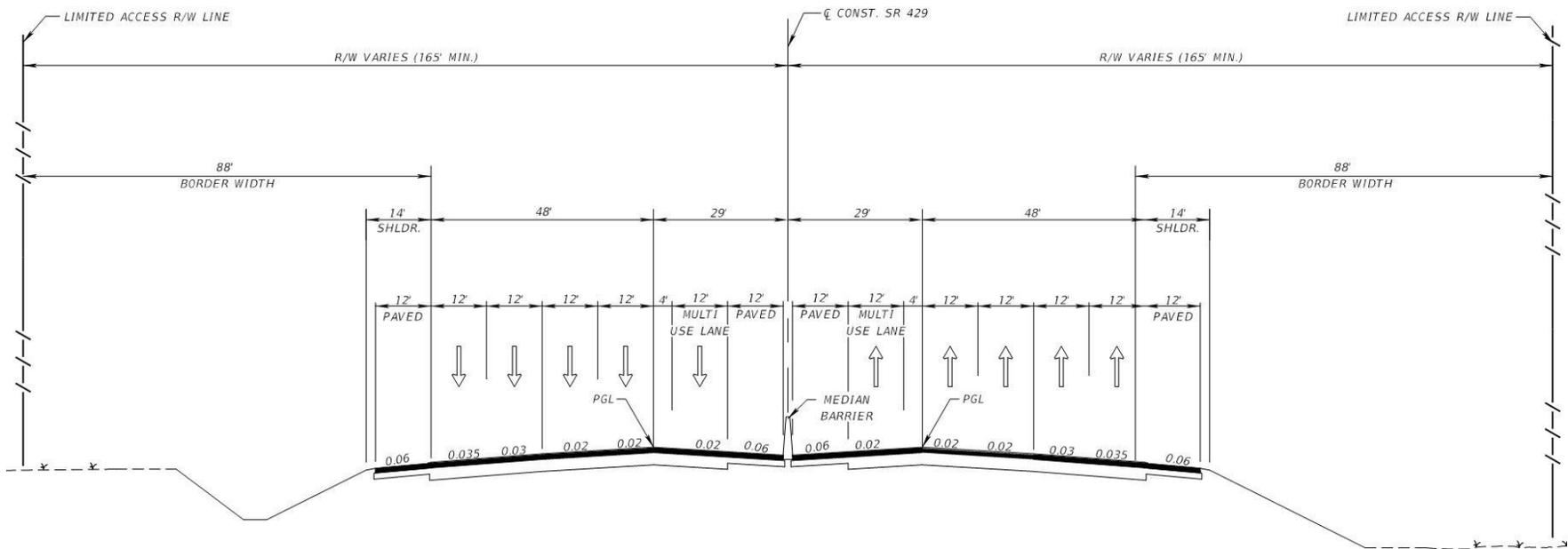


PLATE 2. PROPOSED TYPICAL SECTION



TYPICAL SECTION NO. 2
 EXPANSION PROJECTS
 8 LANE + MULTI USE LANES

PLATE 3. ULTIMATE TYPICAL SECTION

3 Data Collection

The design team collected and reviewed data from the following sources:

- Federal Emergency Management Agency (FEMA), Panel Nos. 12097C0120G and 1279C0110G (effective date 6/18/2013) with LOMR 16-04-2860P (effective date 1/20/2017) for Osceola County, Florida.
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database of Osceola County, Florida
- United States Geological Survey (USGS) 7.5-Minute Quadrangle Maps for Narcoossee (1970 and 2015)
- U.S. National Park Service's National Register of Historic Places
- U.S. Fish and Wildlife Service (USFWS) datasets for National Wetland Inventory (NWI) (2019), Wood Stork Nesting Sites (2018), Florida Panther Focus Area (2007), Environmental Conservation Online System (ECOS) (2015)
- Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute (FWC-FWRI) datasets for Gopher Tortoise Relocation Sites (2020), Panther Mortality Locations (2020), Eagle Nest Locations (2020), Woodpecker locations (2020)
- Florida Department of Environmental Protection (FDEP) and Water Management Districts (WMD) Mitigation Bank Service Areas (2019)
- FDEP datasets for Waste Clean-up Sites, Brownfields, Spring Locations (2016), Water Body Identification Number (WBID), Outstanding Florida Waters (OFW) (2018), Comprehensive Verified List of Impaired Waters (8/2020), Strategic Monitoring Plans (2021), Waters Not Attaining Standards (WNAS) (2020)
- FDEP and Florida Geological Survey (FGS) datasets for Spring Protective Areas (2005), Wells, Swallets
- FDEP and Department of Management Services (DMS) Florida State Owned Land and Record Information System (FL-SOLARIS) and Land Inventory Tracking System (LITS) (2016)
- Florida Natural Areas Inventory datasets for Florida Forever Projects (2019), Florida Conservation Lands (FLMA) (2018)
- Florida Ecological Greenways Network (2005)
- University of Florida – GeoPlan Center dataset for Florida Sand Skink and Blue-Tailed Mole Skink suitable habitat locations (2013)
- Osceola County LiDAR, 2015
- Florida Department of Revenue 2017 Parcel Data
- Kissimmee River Watershed Total Maximum Daily Load (2013)
- SFWMD and FDEP Permit Search

Elevation information was obtained from Osceola County (2015) to create a 10-foot Digital Elevation Model (DEM) using CatchmentSIM (See **Figure 2** in **Appendix B**). This DEM was used to verify the SHWT estimates and 100-year floodplain elevations. The extracted elevations within the project limits are between 59.40 feet and 69.41 feet. No topographic survey was available for the project limits and no field survey was collected for this phase. Existing permits, floodplain evaluation analysis, and previous hydraulic studies were used to assist in making assumptions to establish the SHWT, 100-year floodplain elevations, wetland normal pool elevations, existing on-site storage and treatment, and existing cross drain information.

On March 2, 2021 the Balmoral Group conducted a field study to evaluate the hydraulic structures and general hydrology of the project area. Existing structures such as cross drains and weirs were evaluated and tailwater measurements obtained.

4 Design Criteria

The design of the stormwater facilities will comply with the standards set forth by CFX, SFWMD, Osceola County, and FDOT. An Environmental Resource Permit will need to be acquired from SFWMD during the design of this project.

All basins are considered open basins. Wet detention systems were analyzed to provide water quality improvements, as well as water quantity attenuation for the project runoff. Wet detention is based on the high-water table prevalent throughout the project limits. The stormwater ponds have been preliminarily designed and sized for the proposed alignment. Required pond sizes for each basin were calculated by evaluating runoff volume using the NRCS CN method, calculating treatment volume requirements, and reviewing floodplain impacts. These volumes were added together and combined with landscaping and maintenance berm assumptions to result in the total required pond size. Please refer to the summary below for the water quality, water quantity, and detention pond facilities configuration criterion used for the project.

4.1 Water Quality Criteria

Per Section 4.2.1 of the *2016 SFWMD Environmental Resource Permit Applicant's Handbook Volume II*, wet detention volume shall be provided for the first inch of runoff from the developed project, or the total runoff of 2.5-inches times the percentage of imperviousness, whichever is greater. Proposed offsite ponds are assumed to be wet detention.

Since this is a preliminary analysis for pond sizing capacity, recovery calculations for orifice sizing, and permanent pool calculations are not included in the pond sizing considerations.

Per Appendix E of the *2016 SFWMD Environmental Resource Permit Applicant's Handbook Volume II*, as a part of the review of Environmental Resource Permit (ERP) applications, the District evaluates whether discharges from a project will be directed to an OFW or a water body that has been identified as impaired pursuant Chapter 62-303, F.A.C. If a proposed project discharges to an OFW or an impaired water body, the District will require additional protective measures. For an impaired water body, this would include a site-specific pollutant loading analysis; and for an OFW, this would include pond storage of an additional 50% water quality treatment volume above the amounts required pursuant to Section 4.2.1, Volume II.

The project study area does not direct discharge to an OFW or an impaired waterbody. Notably, East Lake Tohopekaliga (WBID 3172) and Econlockhatchee (WBID 2991) in the vicinity of the corridors are impaired for nutrients, but the study area does not directly discharge to these waterbodies. **Plate 4** shows a map of the selected corridor with respect to WBID's 3172 and 2992. The study area is also within the Lake Okeechobee Basin Management Action Plan (BMAP), adopted in 2013, which establishes a Total Phosphorus loading; however, the project area does not directly discharge to this waterbody. No additional treatment is being considered for this analysis.

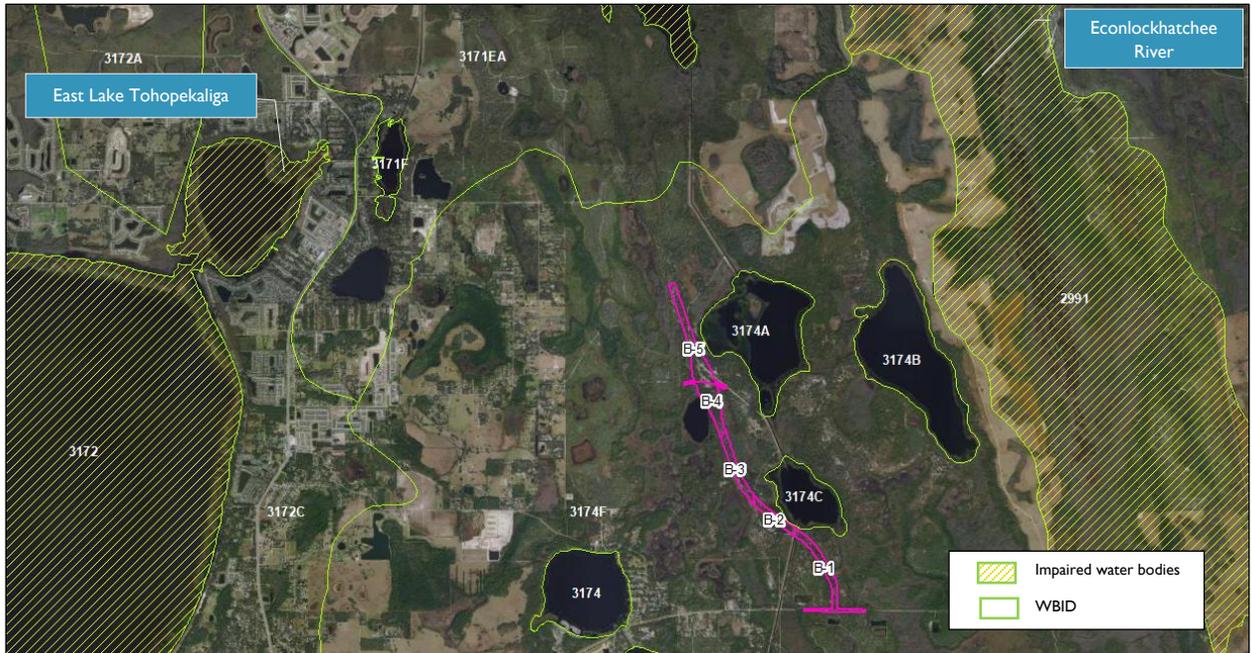


PLATE 4. IMPAIRED WATER BODIES IN THE VICINITY OF THE NORTHEAST CONNECTOR EXPRESSWAY CORRIDOR

4.2 Water Quantity Criteria

Per Section 5.2.1 of the *2021 FDOT Drainage Manual*, the design must comply with the water quality, rate, and quantity requirements of *Section 334.044(15), F.S., Chapter 14-86, F.A.C., Rules of the Department of Transportation* only in closed basins or areas subject to historical flooding.

Per Section 5.2.2 of the *2021 FDOT Drainage Manual*, the design must comply with state, Water Management District, and – when delegated by the state – local government stormwater management programs.

Per Section 3.2 of the *2016 SFWMD Environmental Resource Permit Applicant’s Handbook Volume II*, the off-site discharge rate is limited to rates not causing adverse impacts to existing offsite properties, historic discharge rates, rates determined in previous Agency permit actions, or rates specified in District criteria. The project area does not discharge to any locations with rates specified in District criteria.

Per Section 3.3 of the *2016 SFWMD Environmental Resource Permit Applicant’s Handbook Volume II*, unless otherwise specified by previous Agency permits or criteria, a storm event of a three-day duration and 25-year return frequency shall be used in computing offsite discharge rates. Applicants are advised that local drainage districts or local governments may require more stringent design storm criteria. Osceola County requires stormwater management facilities to be designed for the 10-year/ 72-hour storm (8.0 inches). For this PD&E Pond Siting Report, the SFWMD 25-year/ 72-hour criteria of 10.2 inches of rainfall was used to establish attenuation storage for all proposed ponds. Coordination of governing criteria should be established during a SFWMD Pre-Application Meeting.

4.3 Floodplain Compensation Criteria

The SFWMD requires cup-for-cup floodplain compensation between the 100-year elevation and estimated average wet season water table, and this volume can be provided within the proposed stormwater ponds. In addition, SFWMD does not allow stormwater modelling to demonstrate compensation, only cup-for-cup compensation will be allowed.

4.4 Pond Geometry Criteria

It is assumed that all proposed ponds within the Northeast Connector Expressway will be wet detention facilities. Dimensions include 0.5-acre minimum surface area at the control elevation, treatment volume will be maintained within the first 18-inches above the normal water level (NWL), and the pond bottom shall be a minimum of 12 feet below the control elevation. Side slopes shall not be steeper than 1:4, with a 20-foot wide berm. One foot of freeboard above the Design High Water (DHW) to the inside berm will be maintained. Side slopes and berms shall be sodded.

Consistent with the Highway Beautification Policy, the pond aesthetics design approach should be developed early in order to include it in the determination of pond right-of-way acquisition needs. (2021 FDOT Drainage Manual Section 5.4.4.2). To provide additional area for pond tie-in slopes to the existing ground and additional area for landscaping to meet this Highway Beautification Policy, an additional 20% pond area was added to the outside top of berm area.

5 Existing Conditions

5.1 Land Use

The project corridor consists of open land. Land use primarily consists of brush in good condition, pastures, residential land, and water. The attached **Figure 5A**, Existing Land Use Map, in **Appendix A** shows the existing land use within the project study area. The existing land use classifications shown on **Figure 5A** were defined by the SFWMD and were used to develop the curve number calculations. For the purpose of developing curve number calculations, the woods classification was conservatively used for the existing condition.

The future land use within the project area is comprised of commercial, conservation, low density residential, and mixed use. **Figure 5B** in **Appendix A** shows the future land use within the project study area in Osceola County.

For the purpose of developing proposed curve number calculations, the proposed land use within the right-of-way was categorized in the calculations as either impervious, open space, or water.

5.2 Soils

The USDA NRCS soil characteristics were used to identify the soil types within and adjacent to the project limits. These are shown in **Figure 4** in **Appendix A**. Project soils include hydrologic soil groups: A, A/D and B/D. If a soil is assigned to a dual hydrologic group (i.e. A/D, B/D), the first letter is for the drained areas and the second is for the undrained areas. The soil group descriptions are as follows:

- **Group A** is sand, loamy sand or sandy loam. It has low runoff potential and high infiltration rates even when thoroughly wetted and has a high rate of water transmission.
- **Group B** is silt loam or loam. It has a moderate infiltration rate when thoroughly wetted and consists chiefly or moderately deep to deep.
- **Group C** soils are sandy clay loam. They have low infiltration rates when thoroughly wetted.
- **Group D** soils are clay loam, silty clay loam, sandy clay, silty clay or clay with the highest runoff potential.

To identify whether the area was in a drained or undrained condition, SHWT estimates were collected from available data. Areas where the SHWT was within two-feet of the existing ground were assumed to be an undrained condition and were classified as a Type D soil group. This was the case in all instances of a dual hydrologic soil group along the corridor.

5.3 Floodplains

The project limits are within the FEMA Flood Insurance Rate Map (FIRM) Panel No.'s. I2097C0120G and I2097C0110G for Osceola County, effective 6/18/2013, with a Letter of Map Revision (LOMR) effective 1/20/2017 associated with the Sunbridge Northeast District Development (NED). The major floodplain impacts are associated with Lake Joel, Canal 32C, Lake Myrtle, and Bullock Lake and their associated wetland sloughs. Only flood zones classified as Zone X and Zone AE are present along the alignment. Zone X is an area of minimal flood hazard and was not evaluated for floodplain impacts. Zone AE has an established Base Flood Elevation (BFE) that has been approved by FEMA and ranges from 64.3 feet to 65.5 feet NAVD within the study area.

5.4 Existing Drainage Conditions

The project is located within the Kissimmee River Watershed within the jurisdiction of SFWMD and more specifically within the Lake Center Outlet basin. The existing basins are open basins which discharge to creeks, canals, wetlands, and ultimately to the adjacent receiving water bodies.

Receiving water bodies for the corridor basin are Lake Joel, Bullock Lake, and Lake Myrtle. Lake Myrtle outfalls south to Lake Joel via Canal 32B. The ultimate outfall of the project study area is the Kissimmee River, which flows to Lake Okeechobee. The project area is confined to a single WBID Lake Center Outlet (3174F). The project corridor traverses through wetlands that ultimately outfall to Lake Myrtle and Bullock Lake. Further coordination with SFWMD will be necessary for canal right-of-way permit requirements for the construction of the roadway and bridge over Canal 32C. **Plate 5** below shows existing canals and streams in the project area.



PLATE 5. EXISTING DRAINAGE PATTERNS WITHIN THE PROJECT AREA

5.4.1 Existing Ponds

There is an existing pond facility at the Tavistock Utility Site outside the right-of-way adjacent to Basin 7. This pond facility has a drop structure with an outfall to a ditch flowing west into the basin shown in the permit information from the utility in **Appendix E**. This pond will not be used for storm water treatment, attenuation, or floodplain compensation from the corridor. It does, however, provide a basis to set the SHWT for stormwater calculations.

6 Proposed Stormwater Management

6.1 Pond Sizing Methodology

Two types of ponds are included within this analysis: stormwater management facilities (SMF), which treat and attenuate the proposed roadway, and floodplain compensation (FPC) ponds, which provide equivalent floodplain storage that is displaced by the proposed roadway. Additionally, the FPC pond will provide additional attenuation for the 100-year storm event volume that is not already included within the SMF. The required pond volumes for these types of ponds for the proposed improvements is calculated by the following:

Total SMF Volume Required

$$= \text{Required Treatment Volume} + \text{Required 25y/72h Attenuation Volume}$$

Total FPC Pond Volume Required

$$= \text{Roadway Floodplain Impact Volume} \\ + \text{Difference of 100y/72h \& 25y/72h Attenuation Volume}$$

The treatment volume includes the first flush runoff volume from the proposed developed site to be detained and treated prior to discharging downstream. The attenuation volume includes the storage of the additional runoff caused by the proposed development by minimizing the peak flowrate from the site to mimic pre-development conditions so as not to adversely impact offsite properties. The floodplain impact volume includes the storage lost due to the proposed development between the seasonal high-water table and the 100-year base flood elevation. Floodplain impacts within the pond sites were not included in the pond sizing calculations.

The basin area includes the alignment right-of-way which was divided into several sub-basins along floodplain or hydraulic boundaries from the existing topography or proposed roadway bridge crossings. Assumptions were made concerning the proposed basin divides for stormwater management as the proposed mainline roadway profiles were preliminary. It is assumed that each sub-basin will have one pond, which is sized using the methodology described within the following sections. Two potential SMF sites were provided as alternatives for each basin for evaluation, and only one FPC pond was sighted for each affected floodplain watershed, at Lake Bullock and Lake Joel. All assumptions were based on the best available data from desktop and field review.

Within this PD&E effort, it is assumed that each of the pond volume parameters are “stacked” instead of taking credit for any possible volume overlapping; this provides a conservative estimate which can be further evaluated during the final design phase. The methodology used to determine these parameters for calculating pond volumes are described within the following sections.

6.1.1 Treatment Volume

For the purposes of the PD&E study, all proposed ponds are assumed to be wet. The required treatment volume for wet ponds is larger than dry ponds, and the water tables are generally shallow within the project area. It assumed that evaluation of pond types will be accomplished during the final design phase.

The SFWMD required treatment volume criterion for a wet detention pond is the greatest volume of either one inch over the basin or 2.5-inches over the new impervious area. There are no basins in the corridor designated as verified impaired waterbodies or OFW.

Treatment Volume = Greater of 1" over Basin Area or 2.5" over New Impervious Area

Existing roadway impervious areas along Nova Road (CR 532) that cross the alternative alignment was digitized via aerial imagery. The proposed roadway impervious area along the interchanges and side roads were digitized from the PD&E roadway design files. The ultimate typical section features an eight-lane section and two potential multi-use lanes with a concrete median barrier wall and onsite conveyance ditches. Pond sizing assumed a fully paved median creating a total width of 178-feet of impervious area along the mainline. The impervious area for the interchange ramps assumed shoulder widths of two feet inside as well as four feet outside for single lane ramps, and four feet inside and 10 feet outside for two-lane ramps where barrier walls were not shown.

6.1.2 Attenuation Volume

Criteria set forth by SFWMD and Osceola County were reviewed to determine the governing criteria from these agencies. It was determined that the controlling criteria for attenuation is the SFWMD requirement of the post-development peak flow rate not exceeding the pre-development peak flow rate for the 25-yr/72-hr storm event. Since no routing is being performed during this PD&E phase, the attenuation volume will be based on the pre-post difference in volume generation, not the peak discharge rate.

The NRCS CN Method was used to determine the total runoff generation for the pre-development and post-development conditions. The SFWMD land cover and land use, dated 2014/15, was modified to include existing roadway impervious area along the corridors to determine the CN for the pre-development condition. The Northeast Connector Expressway alignment was digitized to determine the difference in land use along the proposed alignment.

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

$$S = \frac{1000}{CN} - 10$$

$$Volume = Runoff * Basin Area$$

$$Attenuation Volume = Post Development Volume - Pre Development Volume$$

where

Q = runoff (in)

P = is rainfall (in)

CN = Dimensionless curve number

S = is the potential maximum soil moisture retention after runoff begins

For basins that have a lower CN in the post-development condition, (e.g. marsh land coverage is converted to impervious area and open – good land uses), the attenuation volume is assumed zero and no credit is provided for generating a lower runoff volume. See **Table 2** for the conversion between the Florida Land Use and Cover Classification System (FLUCCS) within the SFWMD land use file to the CN land use categories to determine the attenuation volume.

TABLE 2. CONVERSION OF FLUCCS LAND USE DESCRIPTIONS TO SCS RUNOFF CURVE NUMBER CATEGORY

FLUCCS	NRCS CN (TR-55)
Abandoned Grooves	Row Crops - Straight Row
Bay Swamps	Woods - Good
Channelized Waterways- Canals	Water
Citrus Groves	Row Crops - Straight Row
Commercial and Services	Commercial
Cypress	Woods - Good
Cypress – Domes/Head	Woods - Good
Cypress – Mixed Hardwoods	Woods - Good
Disturbed Lands	Open - Poor
Educational Facilities	Commercial
Emergent Aquatic Vegetation	Water
Fixed Single Family Units	Residential (size determined by FL DOR parcel data)
Freshwater Marshes	Water
Herbaceous (Dry Prairie)	Brush - Good
High Density Under Construction	Residential – 1/8 acre
Horse Farms	Farmsteads
Improved Pastures	Pasture - Good
Institutional	Commercial
Lakes	Water
Medium Density Under Construction	Residential (size determined by FL DOR parcel data)
Military	Commercial
Mixed Rangeland	Brush - Good
Mixed Shrubs	Brush - Good
Mixed Units, Fixed and Mobile Home Units	Residential (size determined by FL DOR parcel data)
Mixed Wetland Hardwoods	Woods - Good
Mobile Home Units	Residential – 1/4 acre
Multiple Dwelling Units, Low Rise	Residential – 1/8 acre
Natural River, Stream, Waterway	Water
Ornamentals	Row Crops - Straight Row
Palmetto Prairies	Brush – Good
Parks and Zoos	Open – Fair

FLUCCS	NRCS CN (TR-55)
Pine Flatwoods	Woods – Good
Race Tracks	Open – Good
Reservoirs	Water
Roads and Highways	Streets and Roads – Paved; Including Right-of-Way
Saltwater Marshes/Halophytic Herbaceous Prairies	Water
Sand Pine	Woods – Good
Shopping Centers	Commercial
Spoil Areas	Open – Good
Tree Nurseries	Row Crops – Straight Row
Unimproved Pastures	Pasture – Fair
Upland Hardwood Forests	Woods – Good
Upland Mixed Coniferous/Hardwood	Woods – Good
Upland Shrub and Brushland	Brush – Good
Wet Pinelands Hydric Pine	Woods – Good
Wetland Forested Mixed	Woods – Good
Xeric Oak	Woods - Good

6.1.3 Floodplain Evaluation

For the floodplain evaluation, potential impacts to the FEMA mapped floodplains were reviewed and quantified. The project alignment is located within FEMA FIRMs that have an associated Letter of Map Revision (LOMR) (effective January 2017) associated with the Sunbridge Northeast District (NED) development. Flood zones classified as Zone X and Zone AE are present along the alignment and only these FEMA-approved floodplain areas were reviewed and quantified for impacts. Natural historic depressions or wetlands were not evaluated for floodplain impacts as part of this PD&E study, but may require further evaluation in the design phase.

Zone X is an area of minimal flood hazard and was not evaluated for floodplain impacts. Zone AE has an established BFE that has been approved by FEMA. To assess the floodplain impacts along the alignment, an approximate SHWT for the FEMA floodplain shapes were evaluated to determine the volumetric impacts between the SHWT and the BFE. The SHWT used in this evaluation utilized the initial stages within the Sunbridge NED permitted ICPR model (ERP 49-103688-P, Application No. 200622-3738, October 2020). No site-specific information (i.e. geotechnical testing, wetland survey, topographic survey, etc.) was obtained for these estimates. No hydrologic/hydraulic modelling was performed.

Source data used for quantifying floodplain impact volumes is summarized in **Table 3**.

TABLE 3. DESCRIPTION OF DATA REVIEWED IN PRELIMINARY ANALYSIS

Data	Source	Relevance
FEMA Flood Insurance Study	FEMA Geodatabases (May 2019) & 2019 and 2013 Flood Insurance Study (FIS) for Osceola County	High
DEM or Contours developed from source	2015 LiDAR data from Osceola County	High
Wet detention ponds normal water elevations	SFWMD ERP Applications	High
Wetland seasonal high-water tables	SFWMD ERP Applications	High
Canal monitoring stations: Stage & Flow	SFWMD Arc Hydro database	Low (S57 & S58, beyond project limits)
Cross Drain Stages	PD&E Location Hydraulics Report, The Balmoral Group (2021)	Medium

Assessing Floodplain Impacts

For the roadway alignment, the floodplain impact volume was calculated with a GIS raster calculator cut-fill tool, which calculates the volumetric difference between the existing ground DEM and a specified inundation stage. The full 330-foot right-of-way footprint was used to determine the limits to the floodplain impacts.

The required floodplain compensation volume is calculated from the difference between the volume of the 100-year peak stage inundation shape over the DEM along the roadway right-of-way footprint and the volume of the SHWT inundation shape over the DEM along the roadway right-of-way footprint.

There are three bridge locations within the project area; over Canal 32C, over future Jack Brack Road (between basins 5 and 6 at the northern interchange) and over future Rummell Road (between basins 6 and 7). Proposed bridge lengths were provided by RS&H. Only the bridge over Canal 32C is within a FEMA floodplain, however, no floodplain impacts were assumed beneath the proposed bridge. Impacts were assessed for roadway fill impacts adjacent to this bridge.

6.1.4 Pond Sizing

It is assumed that all proposed ponds within the Northeast Connector Expressway will be wet detention facilities. Review of the Sunbridge Northeast District (NED) Phase I proposed stormwater management facility ponds (ERP App. 200622-3738) near the Northeast Connector Expressway determined that SMFs ranged from three to four-foot design depth above the normal water level (NWL). The assumed pond geometry, shown in **Plate 6**, is a square shape, 1:4 side slopes, one-foot of freeboard, 20-foot maintenance berm, 20% additional area for landscaping and tie-in slopes, 18-inch treatment volume depth, which resulted in the following equations to calculate the pond sizes:

Area at NWL = Greater of NWL Area for Treatment Volume Depth, or
 NWL Area for Required Volume within the Total Design Depth

$$\text{NWL Area for Treatment Volume Depth} = \frac{\left(\sqrt{\frac{\text{Treatment Volume} * 43560 \frac{ft^2}{ac}}{1.5 ft} - \left(\frac{1.5 ft}{2} * (2 * 4) \right)} \right)^2}{43560 \frac{ft^2}{ac}}$$

NWL Area for Required Volume within Total Design Depth

$$= \frac{\left(\sqrt{\frac{\text{Total Pond Volume Required} * 43560 \frac{ft^2}{ac}}{\text{Design Depth}} - \left(\frac{\text{Design Depth}}{2} * (2 * 4) \right)} \right)^2}{43560 \frac{ft^2}{ac}}$$

Required Pond Area

$$= 1.2 * \frac{\left(\sqrt{\text{Area at NWL} * 43560 \frac{ft^2}{ac}} + ((\text{Design Depth} + \text{Freeboard Height}) * (2 * 4)) + (2 * \text{Berm Width}) \right)^2}{43560 \frac{ft^2}{ac}}$$

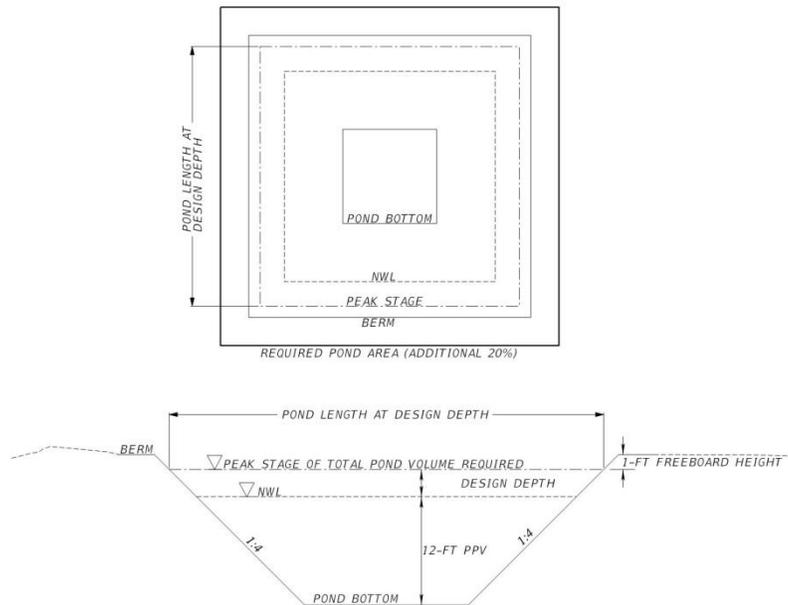


PLATE 6. POND SIZING TYPICAL SECTION (NOT TO SCALE)

The design depth is estimated to be the smallest distance between: 4-foot maximum height, 1-foot below a berm elevation that is no more than a 4-foot embankment to the pond site's existing ground elevation, or 1-foot below the proposed low edge of pavement to the NWL.

6.2 Basis of Evaluation

An alternative comparison analysis has been performed which consists of a description of each SMF location along with an analysis of the following parameters for each site. Note, analysis of these parameters is based on a desktop review of the best available data. Any data used in the review of that parameter is listed and where available a date is provided. Field analysis of these parameters for all proposed sites will be necessary as design progresses.

Wetland Impacts: Pertains to impacts to wetland areas (National Wetland Inventory, 2017)

Wildlife Habitat Impacts: Pertains to impacts to habitats for threatened, endangered, or significant wildlife species. Refer to **Table 4** for associated risk rating for the Likelihood of Occurrence of Listed Species within project corridor alternative as stated in the Natural Resources Evaluation (NRE) Report. No site specific impacts to wildlife were analyzed with this report, only results for the corridor as a whole.

TABLE 4. LISTED SPECIES LIKELIHOOD OF OCCURRENCE

Wildlife Common Name	Likelihood of Occurrence
FLORIDA PANTHER	LOW
FLORIDA BLACK BEAR	MODERATE
EASTERN INDIGO SNAKE	HIGH
AMERICAN ALLIGATOR	HIGH
GOPHER TORTISE	HIGH
FLORIDA PINE SNAKE	HIGH
FLORIDA GRASSHOPPER SPARROW	LOW
EVERGLADE SNAIL KITE	MODERATE
RED-COCKADED WOODPECKER	LOW
WOOD STORK	HIGH
AUDUBON'S CRESTED CARACARA	LOW
FLORIDA SCRUB JAY	LOW
FLORIDA SANDHILL CRANE	HIGH
FLORIDA BURROWING OWL	LOW
LITTLE BLUE HERON	HIGH
TRICOLORED HERON	HIGH
ROSEATE SPOONBILL	MODERATE
BALD EAGLE	MODERATE

For this PD&E evaluation, the following rankings were established as rating criteria for each pond site: “High” for pond sites located within a conservation area or the mitigation bank, “Medium” for pond sites that include wetlands identified by the NWI or uplands and wetlands identified within SFWMD Land Cover Land Use (LCLU) for 2014/2015, and “Low” is used if the site does not include wetlands or uplands identified within NWI or SFWMD LCLU. Acknowledging

multiple species having a high likelihood of occurrence per the results provided by the ACER no pond sites were listed as having a “low” rating for potential wildlife impacts.

Contamination Risk: Pertains to the presence of hazardous materials or petroleum contamination on or near the site location. The following references were reviewed to assist in: FDEP Clean-up Sites, Petroleum Contamination Monitoring (PCTS) Discharges, State Funded Clean-up Sites (2014), FDEP Waste Clean-up Inactive Sites (2016), and FDEP Waste Clean-up Open Sites (2016). A Level I Contamination Screening Evaluation Report (CSER) (February 2021) was prepared to establish the contamination risks in the project corridor. One site of medium risk was identified in the evaluation; however, no potential pond sites are located within that site.

Geotechnical Information: Addresses the underlying soil conditions within the pond footprint. While this factor was considered in selecting pond sites, no proposed sites are within an area of an identified brownfield, Florida Geologic Survey (FGS) swallet, and or FGS well per the following references: NRCS Soils (2019), FDEP brownfield sites (2016), FGS wells, FGS swallets, FDEP Florida Subsidence Incident Reports. Therefore, this item is not included in the evaluation matrix. Additional geotechnical investigation for the specific pond sites will need to be performed to detect the presence of muck and unsuitable materials.

Floodplain Impacts: Effective FEMA Flood Zones A and AE floodplain impacts associated with the proposed roadway were quantified and included in the FPC pond sizing. However, floodplain impacts for the individual SMF sites were not included in these calculations. SMF and FPC pond sites were selected in order to avoid further floodplain impacts. The area of impact, as defined by the FEMA dFIRM Flood Hazard Dataset, 2019, is listed in the evaluation matrix, in order to demonstrate that these impacts are in addition to the required pond size.

Cultural or Archaeological Resources Impacts: A Cultural Resource Assessment Survey (Search Project No. T2015) for the project area included an archaeological survey. Out of the 154 shovel tests that were performed, two tests were positive and there was a single surface find. The three finds were recorded within the Northeast Connector Expressway Archaeological Area of Potential Effect (APE). Archaeological occurrences are, by definition, ineligible for consideration in the National Register of Historic Places (NRHP). No further archaeological work was recommended.

The architectural survey resulted in the identification and evaluation of four newly recorded historic resources within the Northeast Connector Expressway APE. The newly recorded historic resources include two linear resources (8OS03117 and 8OS03118), one bridge (8OS03115), and one structure (8OS03116). Based on the results of the current survey, it is the opinion of SEARCH that all four resources are ineligible for the NRHP, due to a lack of significant historic associations and architectural and/or engineering distinction. No further architectural work was recommended.

Wetlands, Surface Waters, and Scrub Habitat: The corridor was determined from surveys of South Florida Water Management District (SFWMD) existing land features and photo interpretation of Florida Department of Transportation (FDOT) aerials to have wetlands, surface waters, and scrub habitat.

Permitability: Addresses impacts to permitting efforts to local, state, and federal agencies. This includes a review of the following sources: FDEP OFWs, Florida Total Maximum Daily Loads (TMDLs) (2018) and Verified Impaired WBIDs (2018). Since this is consistent for all the pond alternatives, this was not included in the evaluation matrix.

Ownership/Number of Property Owners: Addresses the impacts to property owner(s) and identifies the number of impacted entities. This includes a review of the following sources: Florida Department of Revenue Property Department (2017) & Florida Department of Revenue Property Department (2015).

Utilities: Addresses impacts to existing apparent utilities and known future utilities at each alternative pond location. This included a review of aerial imagery and the Antenna Structures (2017) shapefiles.

Access/Maintainability: Adequate area needed for regular cleaning, sediment removal, mowing, and other required maintenance. This includes evaluation if a drainage easement would be required. This was evaluated based on the proximity of the site to existing right-of-way.

Cost: Economics associated with the pond construction costs. For the purpose of this PD&E Study, the construction costs are not all inclusive to the total cost associated with the construction of a pond and only include costs associated with Excavation, Sodding, and Clearing and Grubbing. It is assumed that all other construction costs (embankment, control structure, fencing, etc.) are equivalent between options. The cost of right-of-way acquisition is not included in the pond cost for this study. Construction Costs are provided in **Appendix C**.

6.3 Proposed Stormwater Facility Alternatives

The proposed Northeast Connector Expressway will introduce a new roadway alignment through an area with no existing roadway or development. This will significantly alter drainage patterns.

The proposed drainage patterns will follow the existing/ historic drainage patterns as close as possible. Cross drains will be proposed to convey existing ditches/ streams or function as equalizer pipes for existing depressional areas. The Location Hydraulics Report (LHR) for the project is available under a separate cover.

One alignment is analyzed for this Pond Siting Report (PSR). The preferred alignment which was analyzed is the Nova Road Connection - Option 2. See **Figure I** in **Appendix A**. Two potential SMF option configurations were evaluated for each basin. Most of the basins have offsite ponds due to limited available right-of-way except basins 5 and 6 which have adequate parcels between the ramp and main lines to accommodate an infield pond. None of the basins are located in a Nutrient Impaired Water Body.

Generally, two potential SMF option configurations were evaluated for each basin, and one FPC pond was sighted for each watershed, Lake Joel and Bullock Lake. The entire corridor is undeveloped, regenerated rangelands and is owned by one entity.

All SMF sites and FPC areas for this alternative are located within Osceola County and include the potential for the species listed in Section 6.2 according to the USFWS 2016 Federally Listed Species information for Osceola County (South Florida ESO) and Alternatives Corridor Evaluation

Report. There is no specific wildlife data found in or adjacent to these sites. During a field visit conducted on March 2, 2021, Wood Storks and Sandhill Cranes were sighted at Lake Joel.

6.3.1 Basin I

This basin begins at Nova Road running east and west from the intersection of the alignment with Nova Road at station 948+93.38. The basin includes the portion of Nova Road from 1,614 feet east to 1,586 feet west of this intersection. The basin continues on the proposed alignment from the junction at station 948+93.38 to station 937+50.00.

Basin I has a total area of 18.28 acres which includes an additional 7.2 acres of impervious area. The required treatment volume is 1.5 ac-ft which is controlled by the impervious area and the required attenuation volume is 2.1 ac-ft. The total floodplain compensation volume for this basin includes 0.3 ac-ft of FEMA floodplain impacts as well as 0.1 ac-ft of 100-year attenuation volume, resulting in 0.4 ac-ft to be provided for in the floodplain compensation pond for Lake Joel.

Two potential offsite wet detention pond sites, Pond IA and IB, have been identified outside the right-of-way on Nova Road east of the proposed intersection. Pond IA is located on the north side of Nova Road and Pond IB is located on the south side. Refer to **Figure 8** in **Appendix A** for the pond locations.

Pond IA

This pond site is located along Nova Road adjacent to the right-of-way on the north side. The pond will cover 2.2 acres and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 3.60 ac-ft of storage was required for this site and 4.18 ac-ft of volume was provided. The site is not located within the 100-year FEMA floodplain and is located in Zone X where there is minimal flood hazard.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, according to the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods. Wetland mitigation is not anticipated if Pond Site IA is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential listed species in this area are listed under Section 6.3. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 66.2 feet NAVD and a minimum elevation of 65.4 feet NAVD. An average existing ground elevation of 65.8 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond IA was calculated at 68.8 feet NAVD and the estimated storm sewer tailwater elevation was 66.9 feet NAVD.

Pond IB

This is an offsite pond located along Nova Road adjacent to the right-of-way on the south side. The pond will cover 2.2 acres and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 3.60 ac-ft of storage was required for this site and 4.42 ac-ft of volume was provided. The site has a 0.58 acre of encroachment into the 100-year FEMA floodplain and is

located in Zone AE inside a special flood hazard zone. The remaining acreage of the pond is outside the floodplain in Zone X where there is minimal flood hazard.

The soil encountered at this site are Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods and Unimproved Pastures. Wetland mitigation is not anticipated if Pond Site 1B is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential listed species in this area are listed under Section 6.3. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 66.8 feet NAVD and a minimum elevation of 65.5 feet NAVD. An average existing ground elevation of 66.2 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 1B was calculated at 67.4 feet NAVD and the estimated storm sewer tailwater elevation was 65.4 feet NAVD.

6.3.2 Basin 2

This basin begins from station 937+50.00 on the proposed alignment to station 901+25.00. It crosses Canal 32C between the basin boundary at stations 901+25.00 and 902+00.00. The bridge crossing at this location spans 249.7 ft. As previously noted, any floodplain storage at the intersection between the basin and bridge span is not considered for compensation.

The basin intersects two floodplains one along the superelevated curve as it turns northwest between station 912+22.99 to station 908+00.00 equaling 2.0 ac-ft of impacts. Basin 2 has a total area of 27.4 acres which includes an additional 14.7 acres of proposed impervious area. The required treatment volume is 3.1 ac-ft which is controlled by the impervious area. The total floodplain compensation volume for this basin includes 2.0 ac-ft of FEMA floodplain impacts as well as 0.2 ac-ft of 100-year attenuation volume, resulting in 2.2 ac-ft to be provided for in the floodplain compensation pond for Lake Joel.

Two potential offsite wet detention pond sites, Pond 2A and 2B, have been identified and are located adjacent to the right-of-way. Pond 2A is located on the west side of the alignment and Pond 2B is located on the east side. Refer to **Figure 9** in **Appendix A** for the pond locations.

Pond 2A

Pond 2A is an offsite pond covering 3.9 acres and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 7.30 ac-ft of storage was required for this site and 8.88 ac-ft of volume was provided. The site is not within the 100-year FEMA floodplain and is located in Zone X where there is minimal flood hazard.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods. Wetland mitigation is not anticipated if Pond Site 2A is utilized as there are no wetlands identified at this location per

the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 67.9 feet NAVD and a minimum elevation of 65.8 feet NAVD. An average existing ground elevation of 66.9 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 2A was calculated at 64.9 feet NAVD and the estimated storm sewer tailwater elevation was 62.9 feet NAVD.

Pond 2B

Pond 2B is an offsite pond covering 3.9 acres and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 7.30 ac-ft of storage was required for this site and 8.88 ac-ft of volume was provided. The site is not within the 100-year FEMA floodplain and is located in Zone X where there is minimal flood hazard.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods. Wetland mitigation is not anticipated if Pond Site 2B is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 66.0 feet NAVD and a minimum elevation of 64.7 feet NAVD. An average existing ground elevation of 65.4 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 2B was calculated at 64.9 feet NAVD and the estimated storm sewer tailwater elevation was 62.9 feet NAVD.

6.3.3 Basin 3

This basin continues from station 901+25.00 on the proposed alignment at the canal bridge crossing to station 874+50.00. The basin has 1.9 ac-ft of floodplain storage impacted between stations 901+25.00 at the bridge boundary and 894+00.00. An additional 14.5 ac-ft of floodplain storage is impacted from station 887+00.00 to station 875+00.00.

Basin 3 has a total area of 20.32 acres which includes an additional 11.0 acres of proposed impervious area. The required treatment volume is 2.3 ac-ft which is controlled by the impervious area. Refer to **Appendix B**. The total floodplain compensation volume for this basin includes 16.4 ac-ft of FEMA floodplain impacts as well as 0.3 ac-ft of 100-year attenuation volume, resulting in 16.7 ac-ft to be provided for in the floodplain compensation pond for Lake Joel.

Two potential offsite wet detention pond sites, Ponds 3A and 3B, have been identified outside the right-of-way along the boundary. Both sites are located on the northeast side of the alignment. Refer to **Figure 10** in **Appendix A** for the pond locations.

Pond 3A

Pond 3A is an offsite pond covering 3.1 acres and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 5.60 ac-ft of storage was required for this site and 6.66 ac-ft of volume was provided. The site has a 0.02 ac of encroachment into the 100-year FEMA floodplain and is located in Zone X where there is minimal flood hazard.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Upland Mixed Coniferous/Hardwood Forests. Wetland mitigation is not anticipated if Pond Site 3A is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 65.5 feet NAVD and a minimum elevation of 64.7 feet NAVD. An average existing ground elevation of 65.1 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 3A was calculated at 64.9 feet NAVD and the estimated storm sewer tailwater elevation was 62.9 feet NAVD.

Pond 3B

Pond 3B is an offsite pond covering 3.1 acres and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 5.60 ac-ft of storage was required for this site and 6.66 ac-ft of volume was provided. The site has a 1.47 ac of encroachment into the 100-year FEMA floodplain and the remaining area is located in Zone X where there is minimal flood hazard.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Upland Mixed Coniferous/Hardwood Forests. Wetland mitigation is not anticipated if Pond Site 3B is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 65.4 feet NAVD and a minimum elevation of 64.8 feet NAVD. An average existing ground elevation of 65.1 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 3B was calculated at 64.9 feet NAVD and the estimated storm sewer tailwater elevation was 62.9 feet NAVD.

6.3.4 Basin 4

This basin begins from station 874+50.00 on the proposed alignment to station 839+00.00. The basin has 0.19 ac-ft of floodplain storage from station 874+50.00 to station 866+00.00. An additional 2.01 ac-ft of floodplain storage is impacted between stations 858+00.00 and 841+00.00.

Basin 4 has a total area of 26.87 acres which includes an additional 14.5 acres of proposed impervious area. The required treatment volume is 3.0 ac-ft which is controlled by the impervious area. The total floodplain compensation volume for this basin includes 2.2 ac-ft of FEMA floodplain impacts as well as 0.3 ac-ft of 100-year attenuation volume, resulting in 2.5 ac-ft to be provided for in the floodplain compensation pond for Bullock Lake.

Two potential offsite wet detention pond sites, Ponds 4A and 4B, have been identified outside the right-of-way along the boundary. Pond 4A is located on the west side of the alignment and Pond 4B is located on the east side of the alignment. Refer to **Figure 11** in **Appendix A** for the pond locations.

Pond 4A

Pond 4A is an offsite pond covering 5.9 acres and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 7.10 ac-ft of storage was required for this site and 7.12 ac-ft of volume was provided. The site has no encroachment into the 100-year FEMA floodplain and is located in Zone X where there is minimal flood hazard.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods. Wetland mitigation is not anticipated if Pond Site 4A is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 65.7 feet NAVD and a minimum elevation of 64.6 feet NAVD. An average existing ground elevation of 65.2 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 4A was calculated at 64.8 feet NAVD and the estimated storm sewer tailwater elevation was 63.9 feet NAVD.

Pond 4B

Pond 4B is an offsite pond on 3.7 acres and is on the east side of the right-of-way and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 6.70 ac-ft of storage was required for this site and 7.18 ac-ft of volume was provided. The site has a 0.31 ac of encroachment into the 100-year FEMA floodplain in Zone AE inside a special flood hazard zone. The remaining acreage of the pond is outside the floodplain in Zone X where there is minimal flood hazard.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Upland Mixed Coniferous/Hardwood Forests. Wetland mitigation is not anticipated if Pond Site 4B is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 65.6 feet NAVD and a minimum elevation of 64.5 feet NAVD. An average existing ground elevation of 65.1 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 4B was calculated at 64.8 feet NAVD and the estimated storm sewer tailwater elevation was 63.1 feet NAVD.

6.3.5 Basin 5

This basin begins from station 839+00.00 on the proposed alignment to station 807+70.00 on the overpass at the Jack Brack Road Diamond Interchange. Basin 5 has a total area of 46.77 acres which includes an additional 16.9 acres of proposed impervious area. The required treatment volume is 3.9 ac-ft which is controlled by the basin area.

Due to the layout of the project, floodplain compensation volumes for basins 5 and 6 were analyzed together. The total floodplain compensation volume for these basins includes 14.6 ac-ft of FEMA floodplain impacts as well as 0.6 ac-ft of 100-year attenuation volume, resulting in 15.2 ac-ft to be provided for in the floodplain compensation pond for Bullock Lake.

Two potential wet detention pond sites, Ponds 5A and 5B have been identified. Pond 5A is located in the southeast corner of the Jack Brack Road Diamond Interchange between the ramp and the mainline. Pond 5B is an offsite pond located on the east side of the alignment adjacent to the gore area. Refer to **Figure 12** in **Appendix A** for the pond locations.

Pond 5A

Pond 5A is a 4.8 ac infield pond area located between the ramp and the mainline and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 6.40 ac-ft of storage was required for this site and 8.40 ac-ft of volume was provided. The site has 3.24 ac of encroachment into the 100-year FEMA floodplain and is located in Zone AE inside a special flood hazard zone. The remaining acreage of the pond is outside the floodplain in Zone X where there is minimal flood hazard. The site has a 2.55 acre of encroachment on a wetland area.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods and Freshwater Marshes/Graminoid Prairie – Marsh. Wetland mitigation is anticipated if Pond Site 5A is utilized as there is a wetland identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 66.3 feet NAVD and a minimum elevation of 63.1 feet NAVD. An average existing ground elevation of 64.7 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 5A was calculated at 64.5 feet NAVD and the estimated storm sewer tailwater elevation was 63.0 feet NAVD.

Pond 5B

Pond 5B is an offsite pond located at the southernmost end of the interchange adjacent to the right-of-way and requires 4.5 ac of pond area. It is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 7.10 ac-ft of storage was required for this site and 8.40 ac-ft of volume was provided. The site has 3.12 ac of encroachment into the 100-year FEMA floodplain and is located in Zone AE inside a special flood hazard zone. The remaining acreage of the pond is outside the floodplain in Zone X where there is minimal flood hazard. The site has a 0.4 ac of encroachment on a wetland area.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods, Mixed Wetland Hardwoods, and Freshwater Marshes/Graminoid Prairie – Marsh. Wetland mitigation is anticipated if Pond Site 5B is utilized as there is a wetland identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 65.3 feet NAVD and a minimum elevation of 62.5 feet NAVD. An average existing ground elevation of 63.9 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 5B was calculated at 64.5 feet NAVD and the estimated storm sewer tailwater elevation was 63.0 feet NAVD.

6.3.6 Basin 6

This basin begins from station 807+70.00 at the Jack Brack Road Diamond Interchange to station 783+50.00. Basin 6 has a total area of 41.69 acres which includes an additional 14.9 acres of proposed impervious area. The required treatment volume is 3.5 ac-ft which is controlled by the basin area.

Due to the layout of the project, floodplain compensation volumes for basins 5 and 6 were analyzed together. The total floodplain compensation volume for these basins includes 14.6 ac-ft of FEMA floodplain impacts as well as 0.6 ac-ft of 100-year attenuation volume, resulting in 15.2 ac-ft to be provided for in the floodplain compensation pond for Bullock Lake.

Two potential wet detention pond sites, Ponds 6A and 6B, have been identified within the basin. Pond site 6A is located within the interchange between the ramp and the mainline of the Jack Brack Road Diamond Interchange. Pond Site 6B utilizes the property adjacent to the right-of-way within the intersection between the mainline and Jack Brack Road that runs east. Refer to **Figure 13** in **Appendix A** for the pond locations.

Pond 6A

Pond 6A is an infield pond located in the northeast corner of the interchange and requires 4.2 ac of pond area. The infield area provides 4.7 ac of pond area, thus showing the infield can provide sufficient capacity. It is within the Deseret Ranches property therefore; a drainage easement is not necessary. 7.70 ac-ft of storage was required for this site and 7.73 ac-ft of volume was

provided. The site is not located within the 100-year FEMA floodplain and is located in Zone X where there is minimal flood hazard.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods. Wetland mitigation is not anticipated pond site 6A is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 67.4 feet NAVD and a minimum elevation of 66.8 feet NAVD. An average existing ground elevation of 67.1 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 6A was calculated at 64.5 feet NAVD and the estimated storm sewer tailwater elevation was 63.0 feet NAVD.

Pond 6B

Pond 6B is an offsite pond at the intersection of the mainline and Jack Brack Road adjacent to the right-of-way and requires 4.2 ac of pond area. It is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 8.30 ac-ft of storage was required for this site and 8.88 ac-ft of volume was provided. The site is not located within the 100-year FEMA floodplain and is located in Zone X where there is minimal flood hazard.

The soils encountered at this site are Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classifications are Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods. Wetland mitigation is not anticipated pond site 6B is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 66.7 feet NAVD and a minimum elevation of 66.0 feet NAVD. An average existing ground elevation of 66.4 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 6B was calculated at 64.5 feet NAVD and the estimated storm sewer tailwater elevation was 62.7 feet NAVD.

6.3.7 Basin 7

This basin continues from station 783+50.00 on the proposed alignment to the end of the project extent at station 753+00.00. Basin 7 has a total area of 22.85 acres which includes an additional 12.7 acres of new impervious area. The required treatment volume is 2.6 ac-ft which is controlled by the impervious area. The total floodplain compensation volume for this basin includes 0.0 ac-ft of FEMA floodplain impacts as well as 0.2 ac-ft of 100-year attenuation volume, resulting in 0.2 ac-ft to be provided for in the floodplain compensation pond for Bullock Lake.

Two potential offsite wet detention pond sites, Ponds 7A and 7B, have been identified outside the right-of-way along the boundary of the right-of-way. Both Ponds 7A and 7B are located on the east side of the alignment at stations 769+0.00 and 764+0.00 respectively. Refer to **Figure 14** in **Appendix A** for the pond locations.

This basin is adjacent to the Tavistock Utility site for the Phase I development of the Sunbridge Community. The site is located due west of this basin. The utility site includes a water treatment plant (WTP) to supply drinking water to the new community and a water reclamation facility (WRF) to treat domestic wastewater generated by the Sunbridge Northeast District community. Refer to the preliminary design report for the utility site in **Appendix E**. The WTP will be required to meet public access reuse and quality standards. Additionally, Lake Okeechobee BMAP effluent standards will need to be met.

The current stormwater management system at the utility site was designed to meet Osceola County and SFWMD criteria. This includes a combination of inlets and swales with conveyance to a wet detention pond at the north side of the site and outfalls to the wetland to the west.

Pond 7A

Pond 7A is an offsite pond covering 3.3 acres and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 6.30 ac-ft of storage was required for this site and 6.56 ac-ft of volume was provided. The site has a 0.21 ac of encroachment into the 100-year FEMA floodplain and the remaining area is located in Zone X where there is minimal flood hazard.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods. Wetland mitigation is anticipated if Pond Site 7A is utilized as there are 0.1 ac of wetlands identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 67.0 feet NAVD and a minimum elevation of 65.1 feet NAVD. An average existing ground elevation of 66.1 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 7A was calculated at 66.1 feet NAVD and the estimated storm sewer tailwater elevation was 64.3 feet NAVD.

Pond 7B

Pond 7B is an offsite pond covering 3.4 acres and is within the Deseret Ranches property; therefore, a drainage easement is not necessary. 6.20 ac-ft of storage was required for this site and 7.48 ac-ft of volume was provided. The site is not within the 100-year FEMA floodplain and is located in Zone X where there is minimal flood hazard.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods. Wetland mitigation is not anticipated if Pond Site 7B is utilized as there are no wetlands identified at this location per

the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

The existing ground elevation at the site had a maximum elevation of 67.4 feet NAVD and a minimum elevation of 65.7 feet NAVD. An average existing ground elevation of 66.6 feet NAVD was used for pond site specific calculations. The design high water elevation of Pond 7B was calculated at 66.5 feet NAVD and the estimated storm sewer tailwater elevation was 64.5 feet NAVD.

6.3.8 Floodplain Compensation Ponds

Separate floodplain compensation ponds are sized to accommodate the floodplain volume displaced by the Northeast Connector Expressway as well as provide additional attenuation volume storage for the 100yr-72hr storm event. This results in 32.1 acres of floodplain compensation area to offset a total floodplain impacted volume of 37.1 ac-ft. One FPC pond was sited for each affected watershed, Lake Joel and Bullock Lake. A discussion on how floodplain impacts were determined can be found in **Section 6.1.3** of this report. See **Figure 7** in **Appendix A** for a depiction of the floodplain impacts for each basin.

Lake Joel

This FPC pond is offsite and located within Basin 3 and between pond sites 3A and 3B. It does not encroach on the adjoining wetlands. It is not adjacent to the right-of-way; therefore, a drainage easement is necessary. The site is located within the 100-year FEMA floodplain and is located in Flood Zone AE. See **Figure 10** in **Appendix A** for the FPC pond location.

FPC Lake Joel stores the floodplain impacts for basins 1, 2 and 3. The Base flood elevation was 64.3 feet NAVD which allowed for a compensation depth of 3.4 feet for the FPC pond when compared to the seasonal high water table elevation of 60.9 feet NAVD. A floodplain compensation area of 7.0 ac was provided for the site.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Upland Mixed Coniferous/Hardwood Forests, Improved Pastures, Unimproved Pastures, and Wet Prairie. Wetland mitigation is not anticipated if the site is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

Bullock Lake

This FPC pond is offsite and located between Jack Brack Road and Bullock Lake and is tucked into the intersection to avoid any floodplain or wetlands. It is within the Deseret Ranches property; therefore, a drainage easement is not necessary. The site is not located within the 100-year FEMA floodplain and is located in Zone X where there is minimal flood hazard. See **Figure 12** and **13** in **Appendix A** for the FPC pond location.

FPC Bullock Lake stores the floodplain impacts for basins 4, 5, 6 and 7. The Base flood elevation was 64.3 feet NAVD which allowed for a compensation depth of 0.8 feet for the FPC pond when compared to the seasonal high water table elevation of 63.5 feet NAVD. A floodplain compensation area of 25.1 ac was provided for the site.

The soil encountered at this site is Myakka Fine Sand with a 0-2% slope. The hydrologic soil group classification is Type D, per the USDA NRCS.

According to the SFWMD, the existing land use at the site is Pine Flatwoods and Unimproved Pastures. Wetland mitigation is not anticipated if the site is utilized as there are no wetlands identified at this location per the National Wetland Inventory. Potential species in this area are listed under **Section 6.2**. There are also no cultural/historic resources within a 500-foot buffer of the potential parcel take.

7 Conclusion

The following table, **Table 5** summarizes the recommended pond sites for the preferred alignment. The preferred pond sites are selected to minimize flood plain and ROW impacts, intrusion into wildlife habitat, reduce contamination risk and reduce impacts on cultural and archaeological resources. Based on this analysis, the preferred pond alternatives are 1A, 2A, 3A, 4B, 5A, 6A, 7B, FPC Lake Joel and FPC Bullock Lake. Pond Sites 5A and 6A were ultimately selected for their respective basins as they are part of an unusable remained from the roadway interchange. Sites 3B, 4B and 7B were ultimately chosen due to developer preference.

TABLE 5. POND SITE MATRIX

Pond Site	Wetland Impacts (ac)	Wildlife Habitat	Contamination Risk	Floodplain Impact (ac)	Cultural or Archaeological Resources Impacts	Access Issues	Number of Property Owners	Pond Right-of-Way Area (ac)	Estimated Pond Option Construction Cost
1A	0	Moderate	Low	0	Low	None	1	2.2	\$ 224,200
1B	0	Moderate	Low	0.58	Low	None	1	2.2	\$ 223,600
2A	0	Moderate	Low	0	Low	None	1	3.9	\$ 383,600
2B	0	Moderate	Low	0	Low	None	1	3.9	\$ 383,500
3A	0	Moderate	Low	0.02	Low	None	1	3.1	\$ 306,000
3B	0	Moderate	Low	1.47	Low	None	1	3.1	\$ 305,400
4A	0	Moderate	Low	0	Low	None	1	5.9	\$ 601,000
4B	0	Moderate	Low	0.31	Low	None	1	3.7	\$ 368,900
5A	2.55	Moderate	Low	3.24	Low	None	1	4.5	\$ 448,800
5B	0.4	Moderate	Low	3.12	Low	None	1	4.5	\$ 472,700
6A	0	Moderate	Low	0	Low	None	1	4.2	\$ 435,200
6B	0	Moderate	Low	0	Low	None	1	4.2	\$ 451,900
7A	0.1	Moderate	Low	0.21	Low	None	1	3.3	\$ 332,100
7B	0	Moderate	Low	0	Low	None	1	3.4	\$ 334,400
FPC Lake Joel	0	Moderate	Low	0	Low	None	1	7.0	\$ 388,900
FPC Bullock Lake	0	Moderate	Low	0	Low	None	1	25.1	\$ 1,490,100

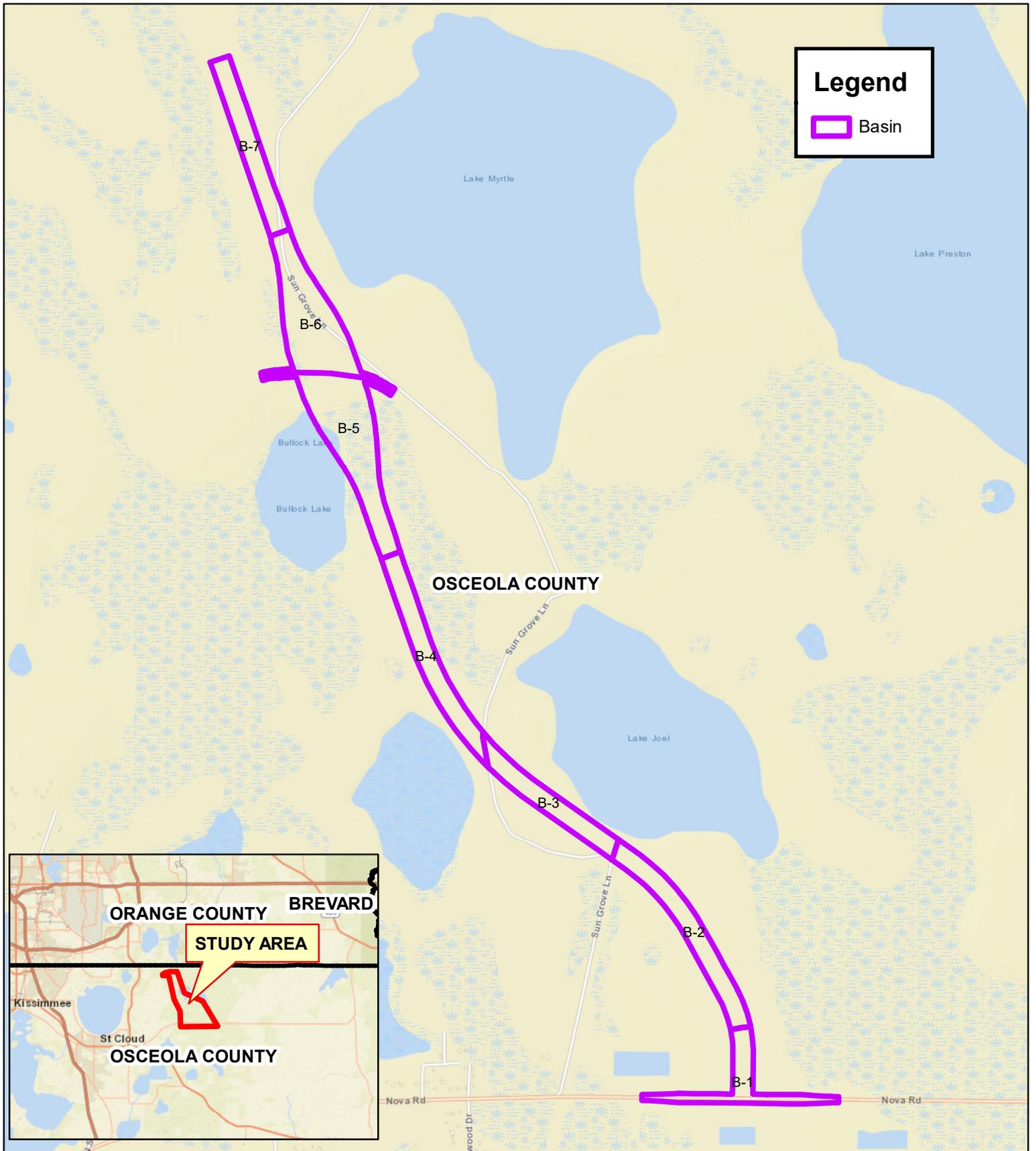
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Preferred Pond Site

8 References

- Level I Contamination Screening Evaluation Report for Northeast Connector Expressway Phase I Project Development and Environmental (PD&E) Study, Geotechnical and Environmental Consultants, Inc. (GEC) (February 2021)
- Cultural Resource Assessment Survey for the Osceola Parkway Extension, Cyril's Drive to Nova Road (County Road 532) (February 2021)
- Natural Resource Evaluation (NRE) Listed Species for Northeast Connector Expressway – Phase I, RS&H (May 2021)
- Location Hydraulics Report for the Northeast Connector Expressway- Phase I, The Balmoral Group (May 2021)
- Alternatives Corridor Evaluation (ACE) Report for the Northeast Connector Expressway – Phase I from Cyrils Drive to Nova Road (CR 532) PD&E Study, CFX (December 2020)
- FDOT Drainage Manual, January 2021
- FDOT Drainage Design Guide, January 2021
- CFX Design Guidelines, 2020
- FDOT PD&E Manual, July 2020
- FDOT Design Manual, January 2021
- Lake Okeechobee Basin Management Action Plan (BMAP) (2014)
- Pond Sizing and Siting Technical Memorandum for Northeast Connector Expressway Concept, Feasibility, and Mobility Study, prepared by CH2M Hill, Inc. (February 2018)

Appendix A
Figures



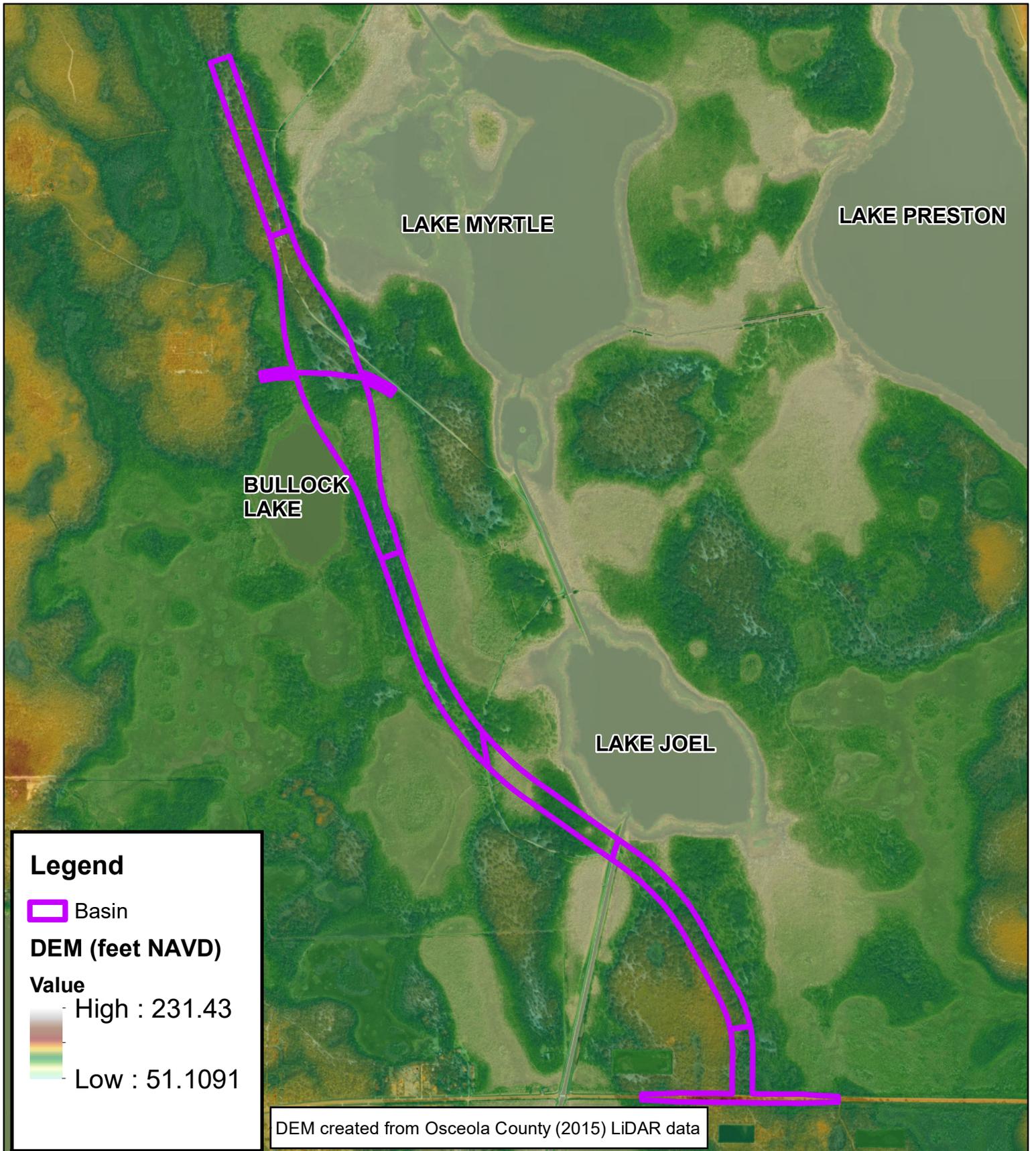
NORTHEAST CONNECTOR
 FROM CYRILS DRIVE TO NOVA ROAD (CR 532)

OSCEOLA COUNTY, FLORIDA

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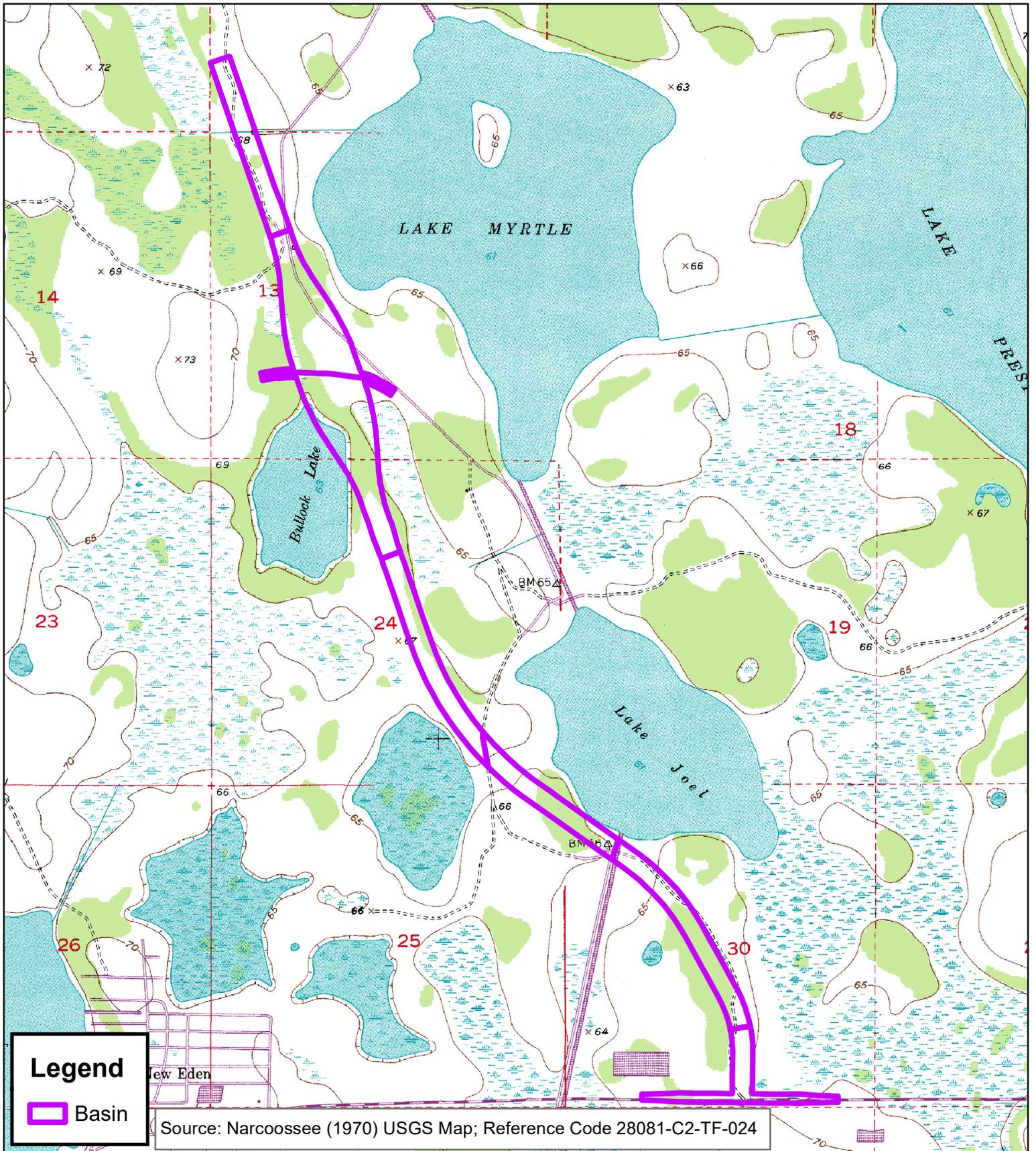
FIGURE 1
LOCATION MAP





DEM created from Osceola County (2015) LIDAR data

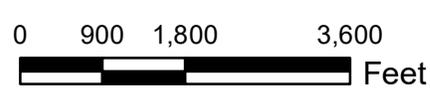
<p>NORTHEAST CONNECTOR</p> <p>FROM CYRILS DRIVE TO NOVA ROAD (CR 532)</p> <p>OSCEOLA COUNTY, FLORIDA</p>	<p>PREPARED BY: The Balmoral Group 165 Lincoln Avenue Winter Park, Florida 32789</p>	<p>FIGURE 2 DEM MAP</p>
<p>0 900 1,800 3,600 Feet</p>		

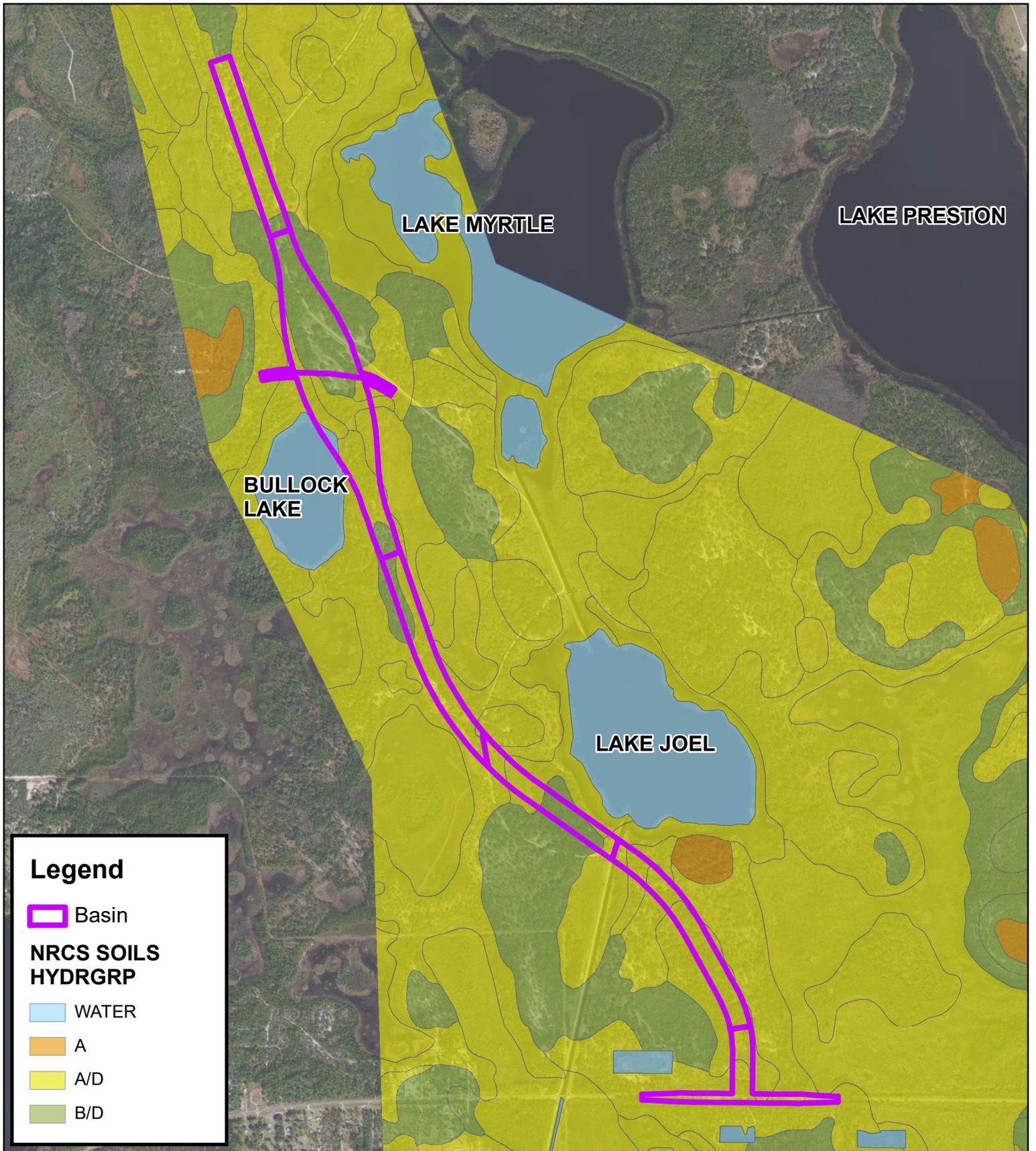


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FIGURE 3
USGS MAP





Legend

-  Basin
- NRCS SOILS HYDRGRP**
-  WATER
-  A
-  A/D
-  B/D

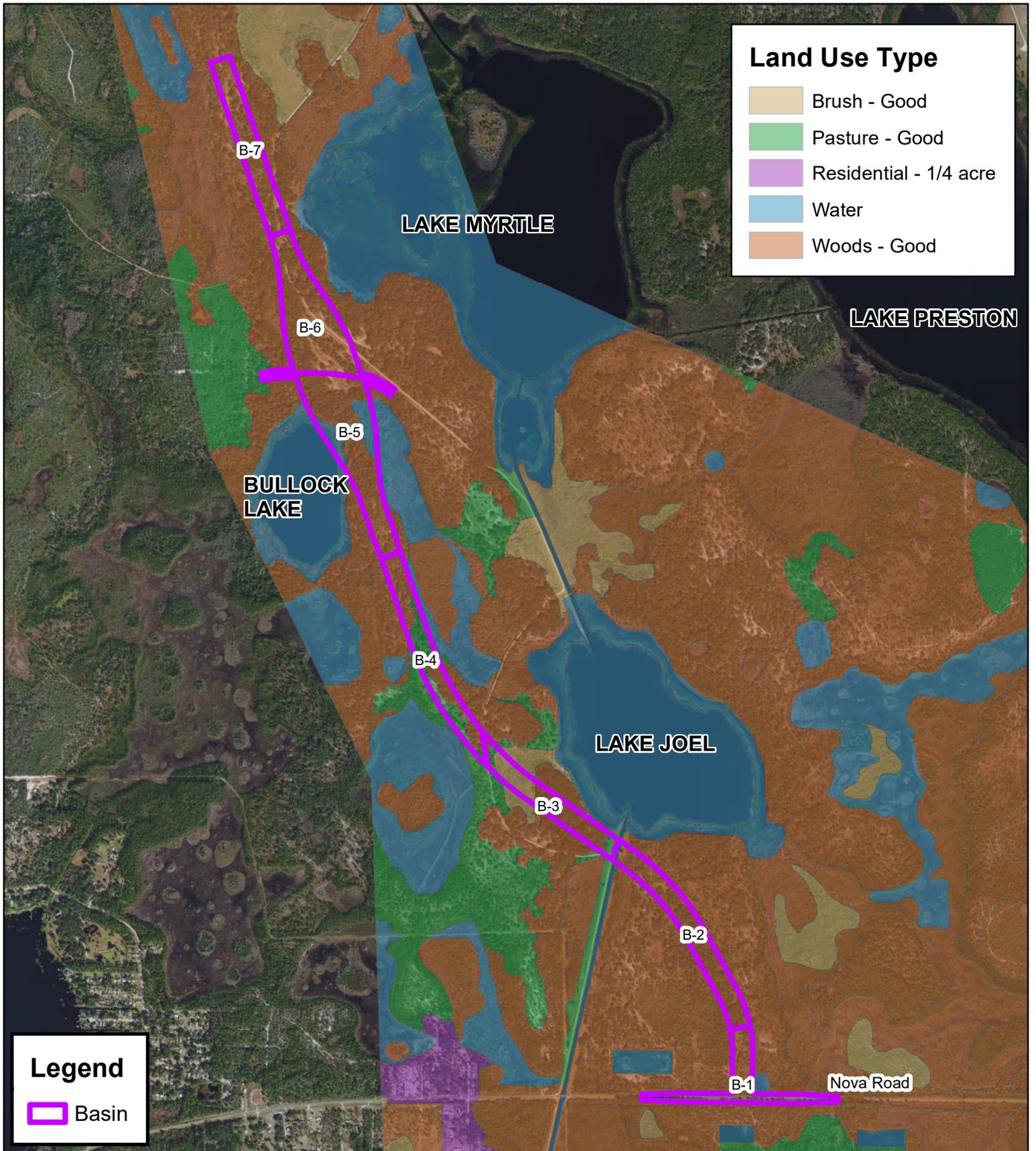
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FIGURE 4
NRCS SOILS MAP

0 900 1,800 3,600
 Feet


 N



Land Use Type

- Brush - Good
- Pasture - Good
- Residential - 1/4 acre
- Water
- Woods - Good

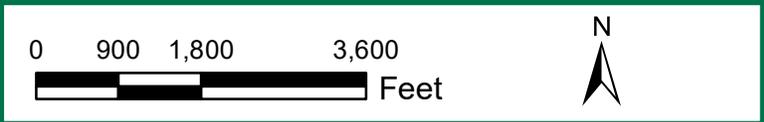
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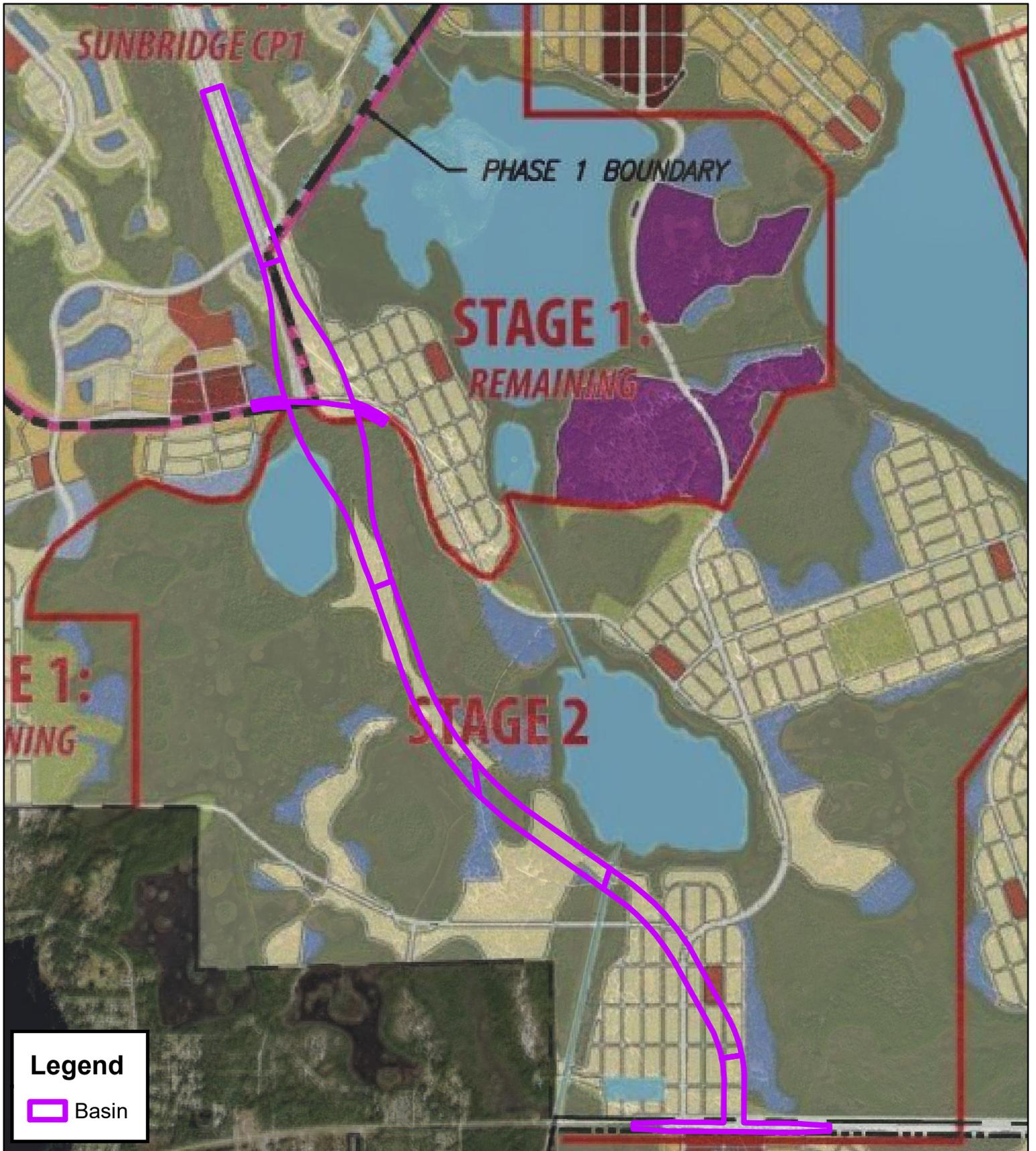
- Basin

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FIGURE 5A
EXISTING LAND
USE MAP





NORTHEAST CONNECTOR

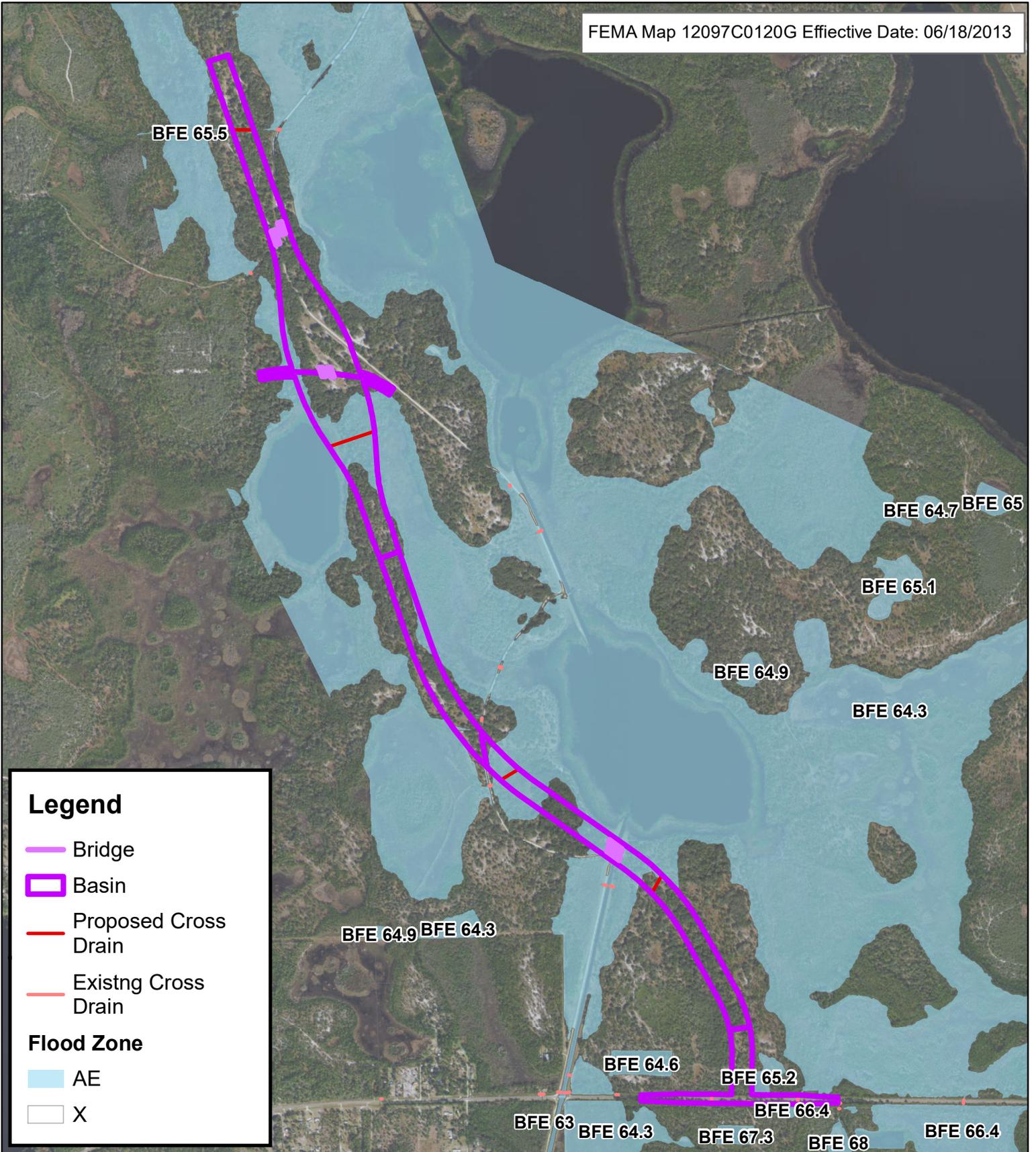
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**FIGURE 5B
FUTURE LAND
USE MAP**





Legend

- Bridge
- Basin
- Proposed Cross Drain
- Existing Cross Drain

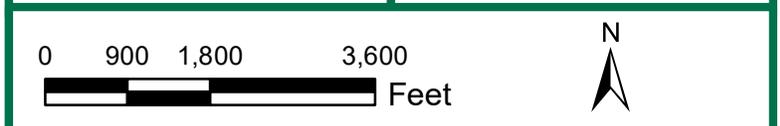
Flood Zone

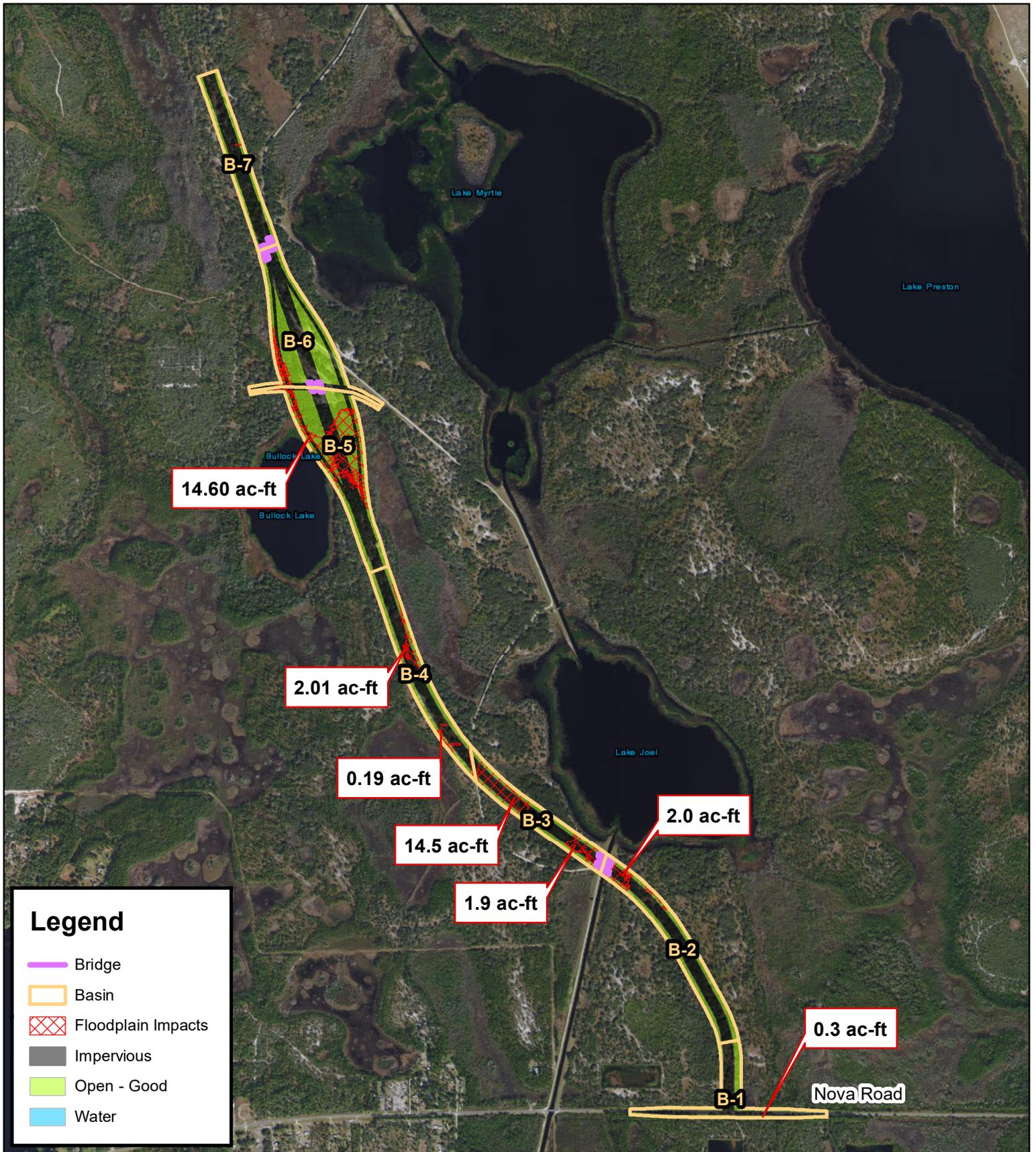
- AE
- X

NORTHEAST CONNECTOR
FROM CYRILS DRIVE TO NOVA ROAD (CR 532)
OSCEOLA COUNTY, FLORIDA

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**FIGURE 6
FEMA MAP**





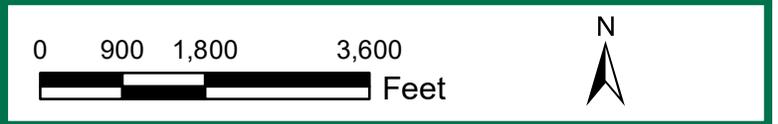
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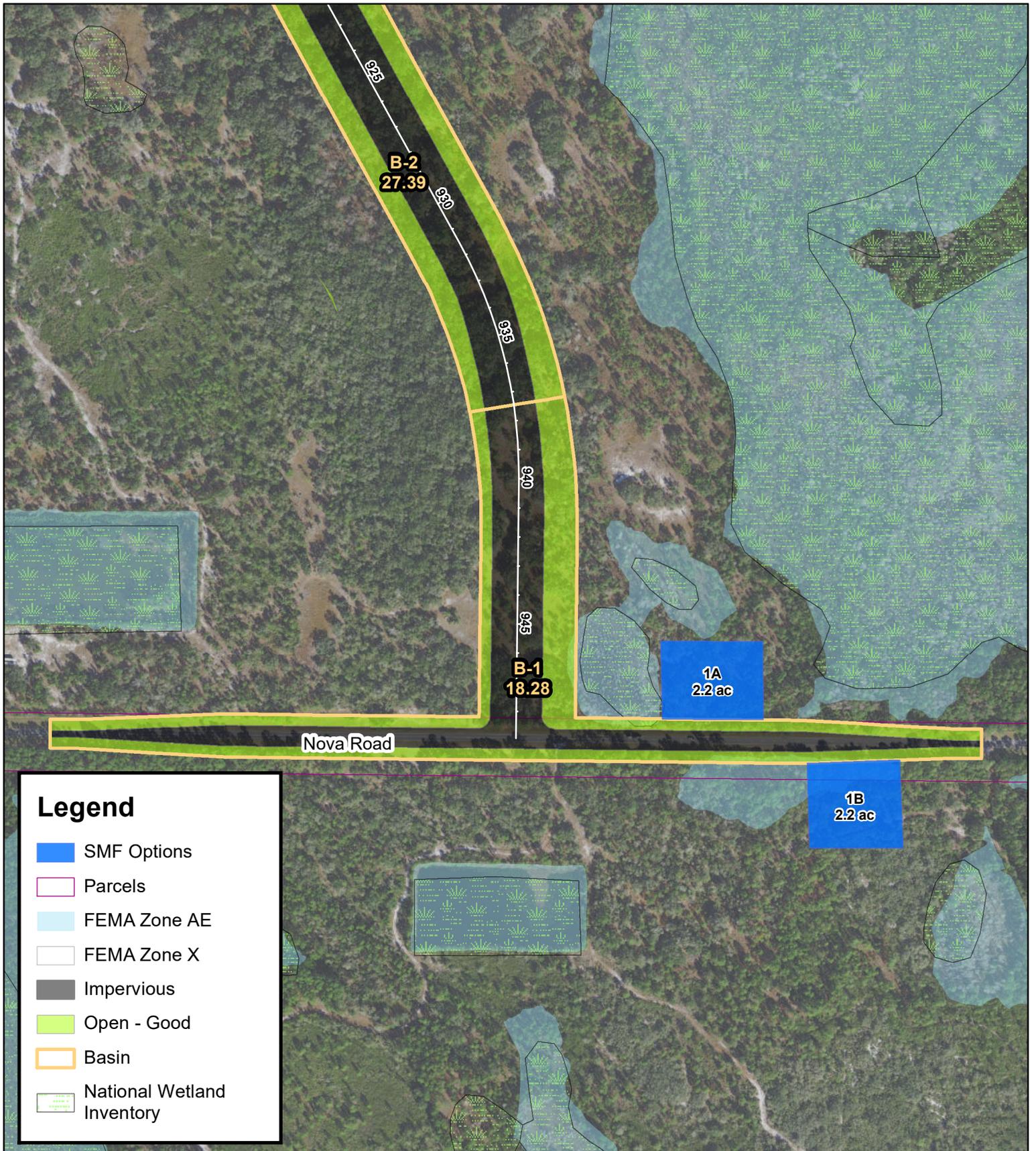
-  Bridge
-  Basin
-  Floodplain Impacts
-  Impervious
-  Open - Good
-  Water

NORTHEAST CONNECTOR
 FROM CYRILS DRIVE TO NOVA ROAD (CR 532)
 OSCEOLA COUNTY, FLORIDA

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**FIGURE 7
 FLOODPLAIN
 IMPACTS
 MAP**





NORTHEAST CONNECTOR

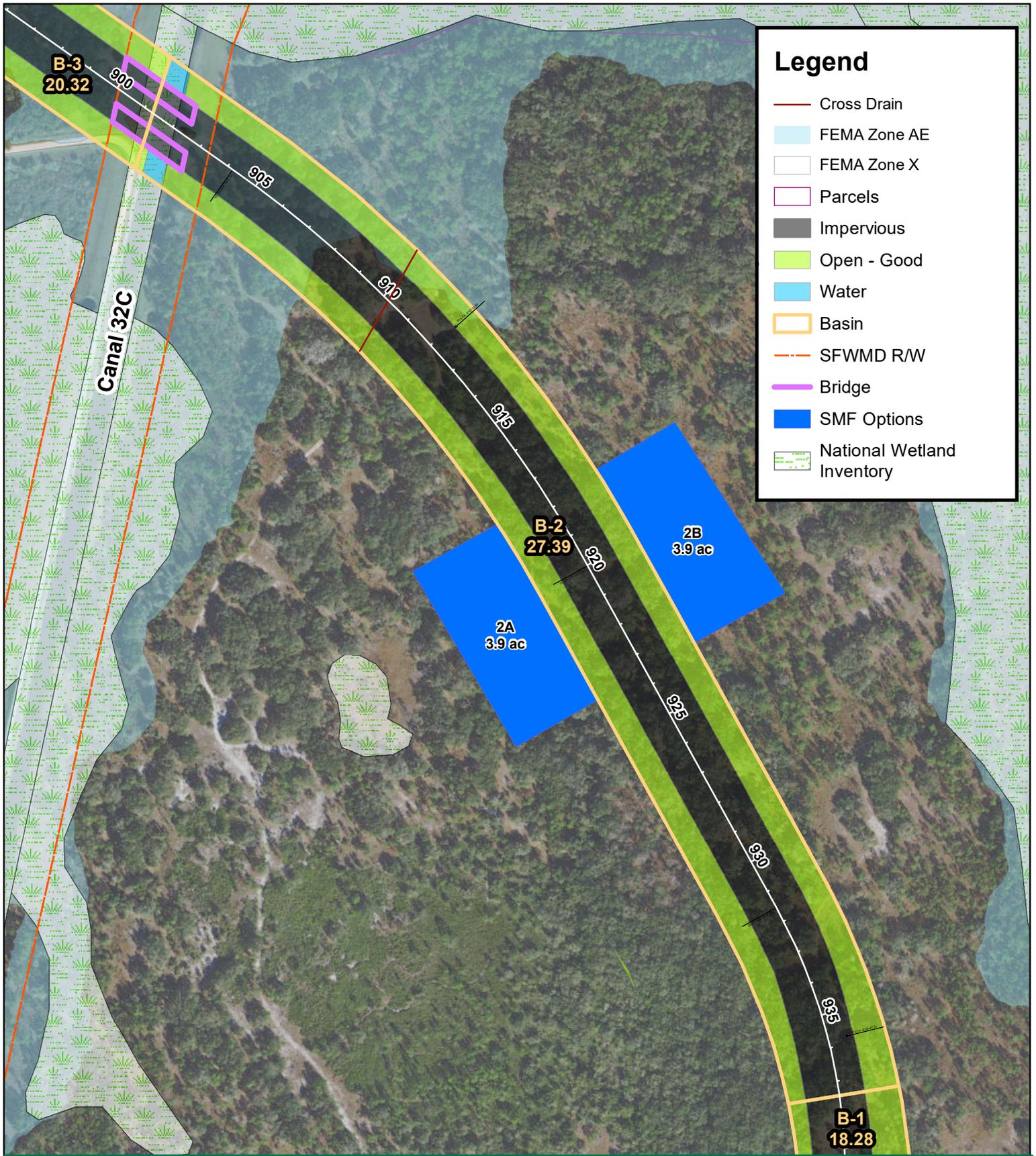
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FIGURE 8 POND SITING MAP BASIN 1





Legend

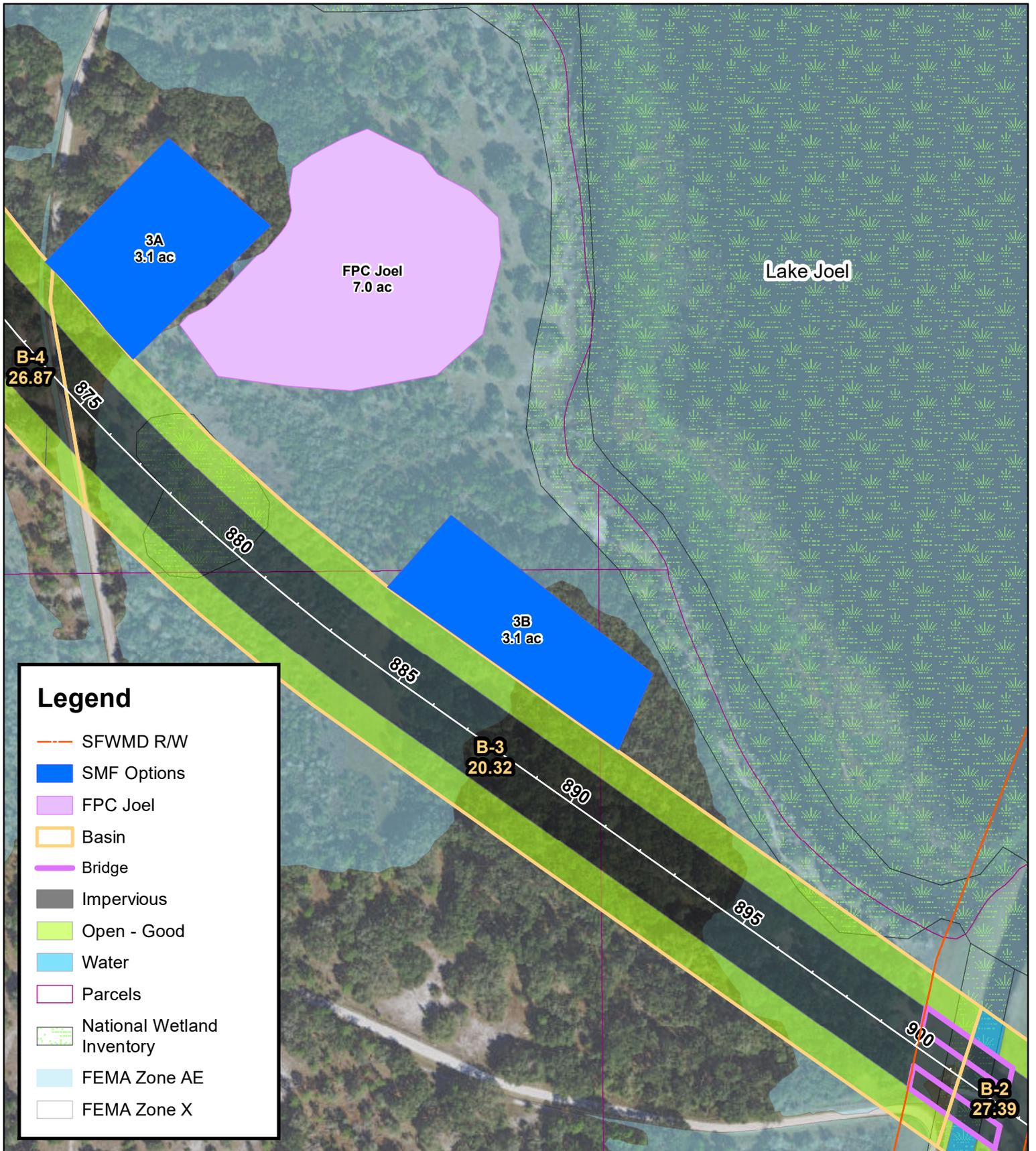
- Cross Drain
- FEMA Zone AE
- FEMA Zone X
- Parcels
- Impervious
- Open - Good
- Water
- Basin
- SFWMD R/W
- Bridge
- SMF Options
- National Wetland Inventory

NORTHEAST CONNECTOR
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FIGURE 9
POND SITING MAP
B-2





Legend

- SFWMD R/W
- SMF Options
- FPC Joel
- Basin
- Bridge
- Impervious
- Open - Good
- Water
- Parcels
- National Wetland Inventory
- FEMA Zone AE
- FEMA Zone X

NORTHEAST CONNECTOR

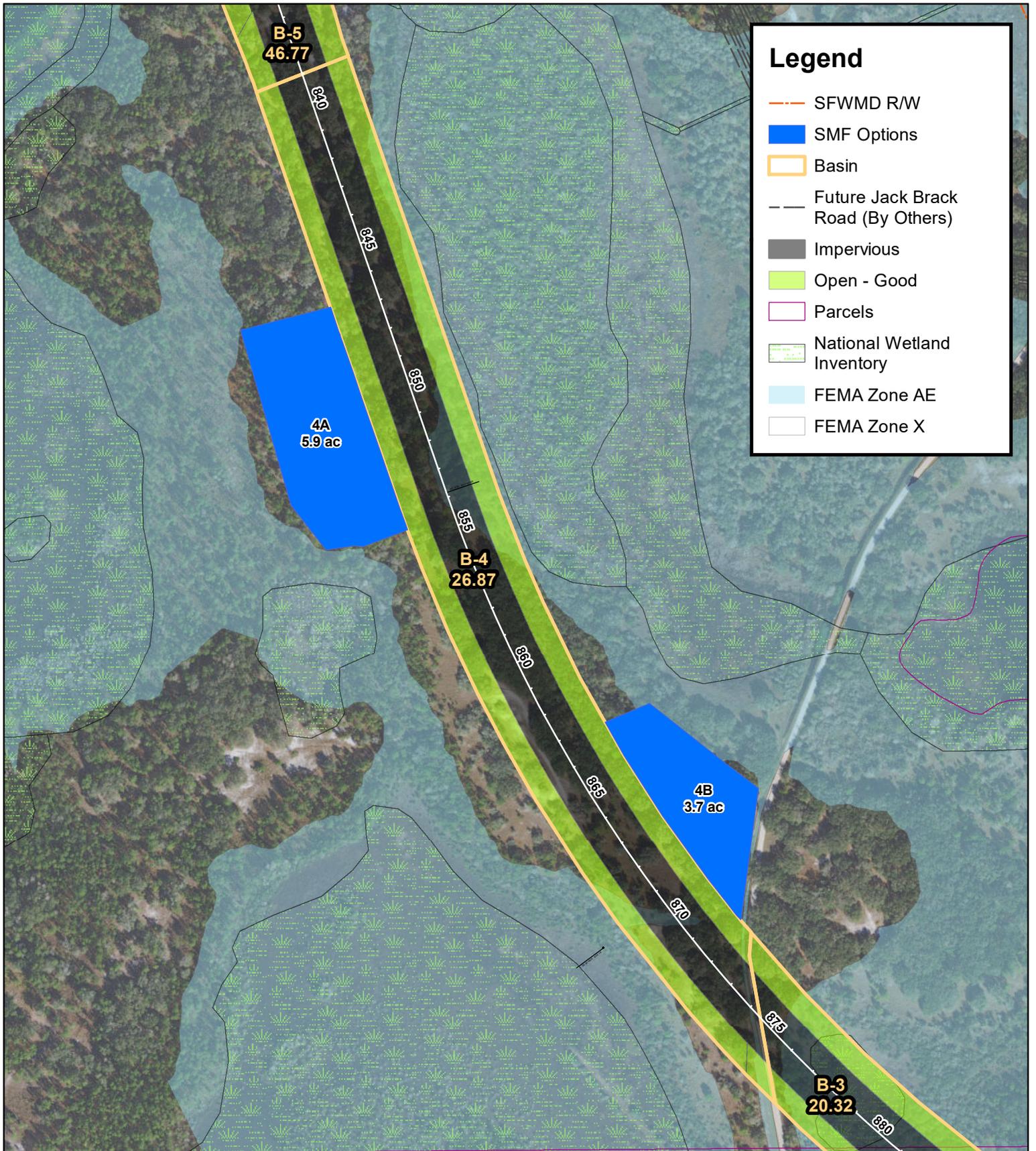
FROM CYRILS DRIVE TO NOVA ROAD (CR 532)

OSCEOLA COUNTY, FLORIDA

PREPARED BY:
The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

**FIGURE 10
POND SITING MAP
B-3**





NORTHEAST CONNECTOR

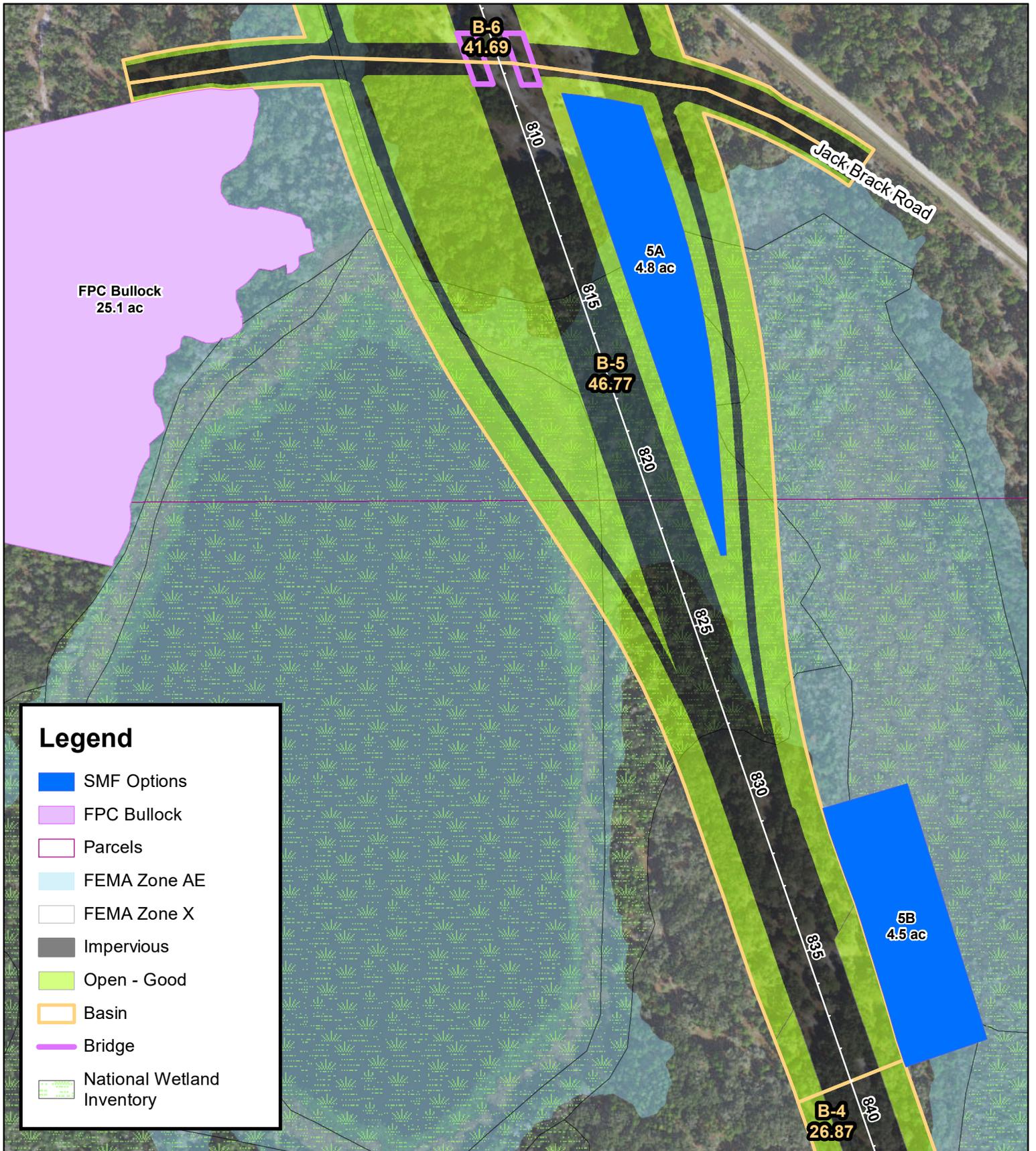
FROM CYRILS DRIVE TO NOVA ROAD (CR 532)

OSCEOLA COUNTY, FLORIDA

PREPARED BY:
The Balmoral Group
165 Lincoln Avenue
Winter Park, Florida 32789

FIGURE 11 POND SITING MAP B-4





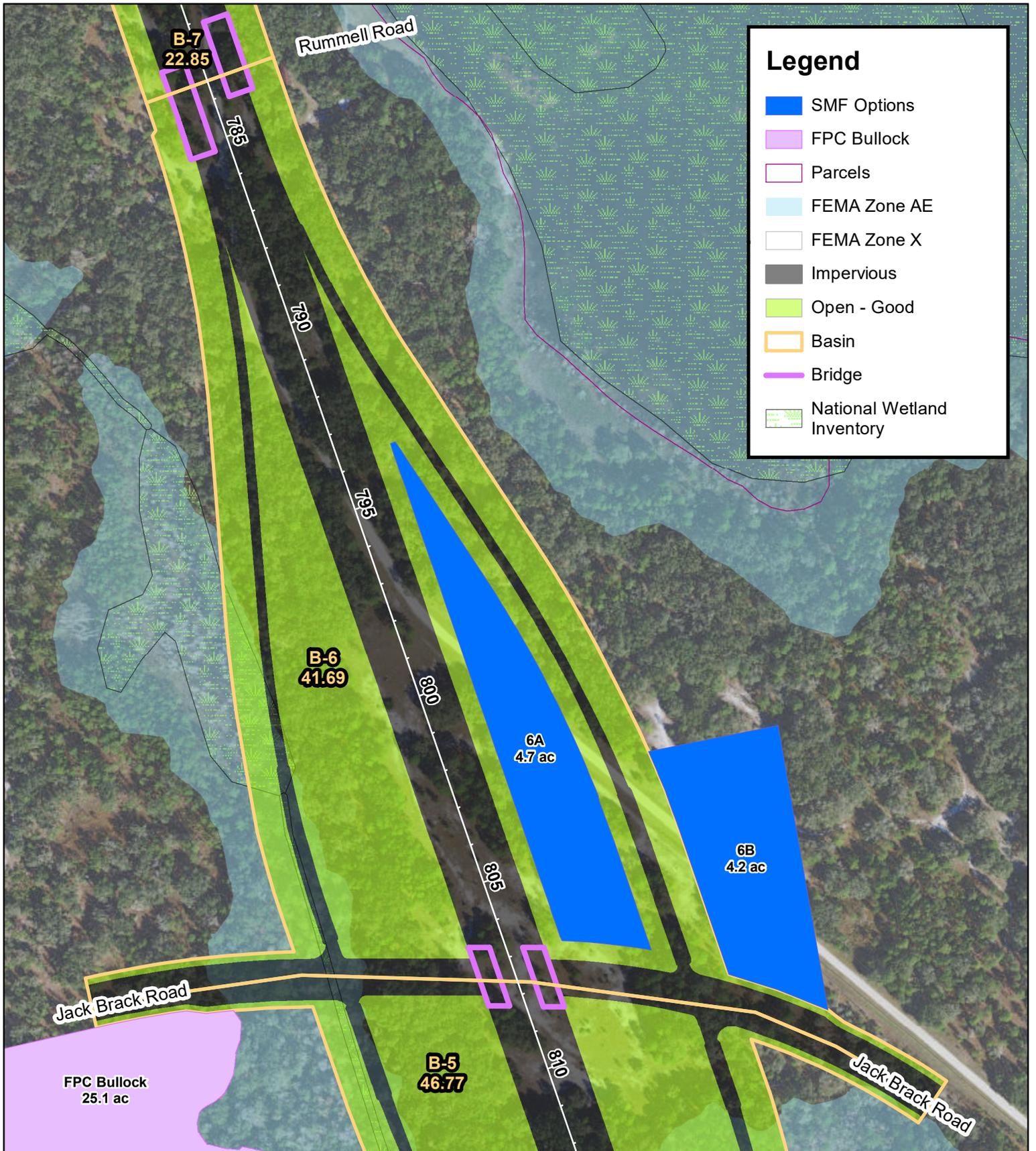
NORTHEAST CONNECTOR
 FROM CYRILS DRIVE TO NOVA ROAD (CR 532)

OSCEOLA COUNTY, FLORIDA

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 165 Lincoln Avenue
 Winter Park, Florida 32789

FIGURE 12
POND SITING MAP
B-5





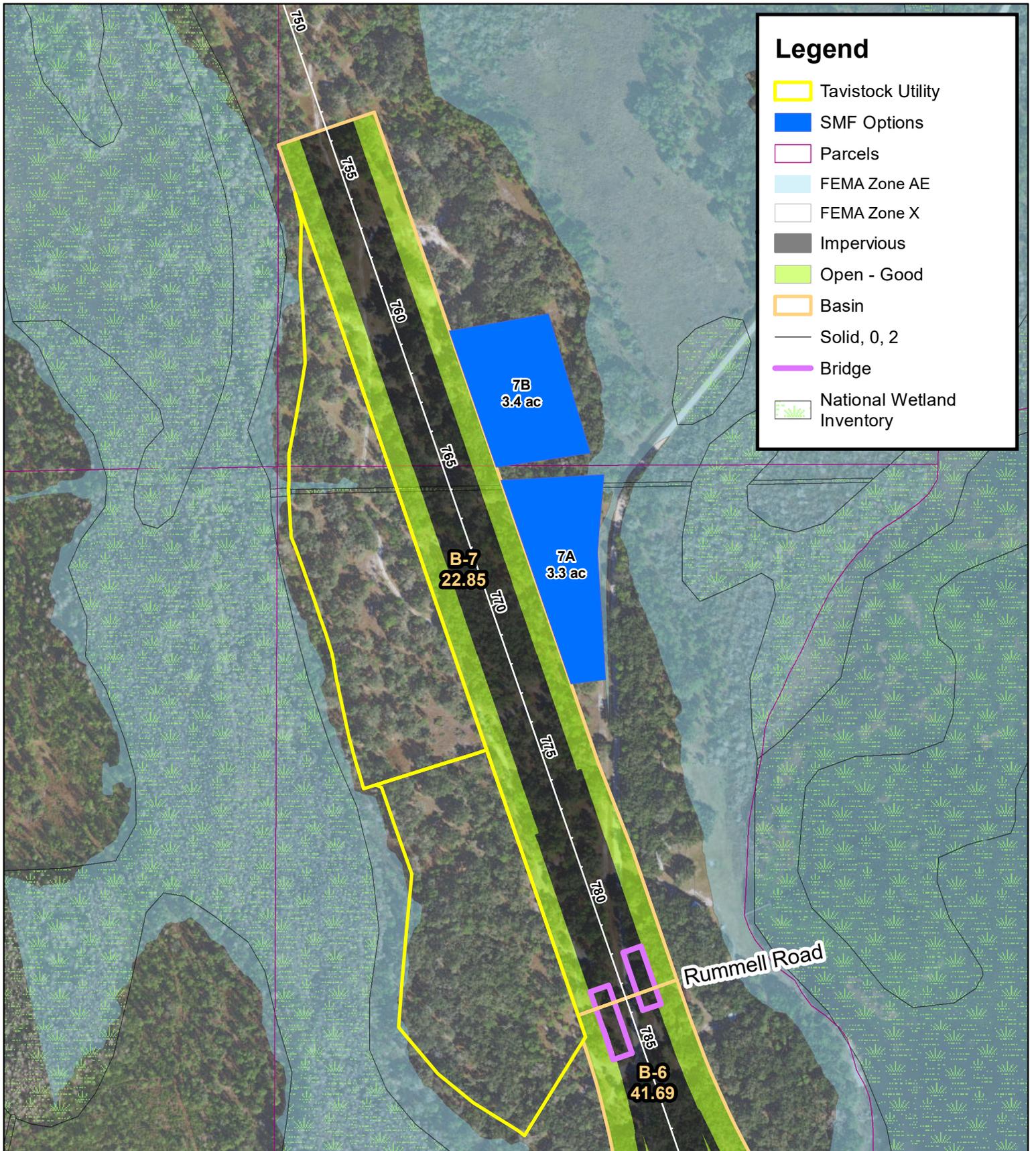
NORTHEAST CONNECTOR
 FROM CYRILS DRIVE TO NOVA ROAD (CR 532)

OSCEOLA COUNTY, FLORIDA

PREPARED BY:
 The Balmoral Group
 165 Lincoln Avenue
 Winter Park, Florida 32789

FIGURE 13
POND SITING MAP
B-6





Legend

- Tavistock Utility
- SMF Options
- Parcels
- FEMA Zone AE
- FEMA Zone X
- Impervious
- Open - Good
- Basin
- Solid, 0, 2
- Bridge
- National Wetland Inventory

NORTHEAST CONNECTOR
 FROM CYRILS DRIVE TO NOVA ROAD (CR 532)
 OSCEOLA COUNTY, FLORIDA

PREPARED BY:
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FIGURE 14
POND SITING MAP
B-7



Appendix B
Pond Analysis Calculations

Project: Northeast Connector Expressway from Cyrils Drive to Nova Road (CR 532)
Project #: 599-228 **Designer:** MM **Date:** 5/16/2021
County: Osceola County **Reviewer:** AE **Checked:** 5/16/2021

Notes:

- (1) Interchange CN does not account for wet infield ponds. Open Space CN is used for infield areas; this will need to be further refined in design.
- (2) Rainfall Source: NOAA Atlas 14 Point Percipitation Frequency Estimates, Hart Lake Station (Site ID 08-3840)

Attenuation Volume Summary

Rainfall (in) **10.2** (25-yr/72-hr SFWMD)

<i>Roadway Basins</i>		Existing				Proposed				Results
Basin	Area (ac)	Weighted CN	S	Runoff (in)	Runoff (ac-ft)	Weighted CN	S	Runoff (in)	Runoff (ac-ft)	Attenuation Volume (ac-ft)
B1	18.28	79.3	2.61	7.62	11.6	88.8	1.26	8.83	13.4	1.8
B2	27.39	77.4	2.92	7.38	16.8	89.9	1.12	8.97	20.5	3.7
B3	20.32	76.1	3.14	7.21	12.2	89.7	1.15	8.94	15.1	2.9
B4	26.87	78.3	2.77	7.49	16.8	89.7	1.15	8.94	20.0	3.2
B5	46.77	81.4	2.29	7.89	30.8	86.5	1.56	8.54	33.3	2.5
B6	41.69	77.0	2.99	7.32	25.4	86.4	1.57	8.53	29.6	4.2
B7	22.85	77.0	2.99	7.32	13.9	90.0	1.11	8.97	17.1	3.2

<i>Off-site Pond Areas</i>		Existing				Proposed				Results	Comments
Pond Option	Area (ac)	Weighted CN	S	Runoff (in)	Runoff (ac-ft)	Weighted CN	S	Runoff (in)	Runoff (ac-ft)	Attenuation Volume (ac-ft)	
1A	2.2	77.0	2.99	7.32	1.3	88.6	1.29	8.80	1.6	0.3	
1B	2.2	77.0	2.99	7.32	1.3	88.6	1.29	8.80	1.6	0.3	
2A	3.9	77.0	2.99	7.32	2.4	90.2	1.09	9.00	2.9	0.5	
2B	3.9	77.0	2.99	7.32	2.4	90.2	1.09	9.00	2.9	0.5	
3A	3.1	77.0	2.99	7.32	1.9	89.4	1.18	8.91	2.3	0.4	
3B	3.1	77.0	2.99	7.32	1.9	89.4	1.18	8.91	2.3	0.4	
4A	5.9	77.0	2.99	7.32	3.6	92.2	0.85	9.25	4.5	0.9	
4B	3.7	77.0	2.99	7.32	2.3	90.4	1.06	9.02	2.8	0.5	
5A	4.5	77.0	2.99	7.32	2.7	91.1	0.97	9.12	3.4	0.0	N/A, Infield Option
5B	4.5	77.0	2.99	7.32	2.7	91.1	0.97	9.12	3.4	0.7	
6A	4.2	77.0	2.99	7.32	2.6	91.0	0.99	9.10	3.2	0.0	N/A, Infield Option
6B	4.2	77.0	2.99	7.32	2.6	90.7	1.03	9.06	3.2	0.6	
7A	3.3	77.0	2.99	7.32	2.0	90.1	1.10	8.98	2.5	0.5	
7B	3.4	77.0	2.99	7.32	2.1	89.8	1.14	8.95	2.5	0.4	

Project: Northeast Connector Expressway from Cyrils Drive to Nova Road (CR 532)
Project #: 599-228 **Designer:** MM **Date:** 5/16/2021
County: Osceola County **Reviewer:** AE **Checked:** 5/16/2021

Notes:

- (1) Interchange CN does not account for wet infield ponds. Open Space CN is used for infield areas; this will need to be further refined in design.
- (2) Rainfall Source: NOAA Atlas 14 Point Percipitation Frequency Estimates, Hart Lake Station (Site ID 08-3840)

Attenuation Volume within Floodplain Compensation Ponds

Rainfall (in) **13.9** (100-yr/72-hr SFWMD)

Basin	Area (ac)	Existing				Proposed				Results	
		Weighted CN	S	Runoff (in)	Runoff (ac-ft)	Weighted CN	S	Runoff (in)	Runoff (ac-ft)	Attenuation Volume (ac-ft)	Floodplain Impacts Attenuation Volume (ac-ft)*
B1	18.28	79.3	2.61	11.19	17.1	88.8	1.26	12.49	19.0	1.9	0.1
B2	27.39	77.4	2.92	10.92	24.9	89.9	1.12	12.64	28.8	3.9	0.2
B3	20.32	76.1	3.14	10.73	18.2	89.7	1.15	12.61	21.4	3.2	0.3
B4	26.87	78.3	2.77	11.05	24.7	89.7	1.15	12.61	28.2	3.5	0.3
B5	46.77	81.4	2.29	11.49	44.8	86.5	1.56	12.19	47.5	2.7	0.2
B6	41.69	77.0	2.99	10.86	37.7	86.4	1.57	12.17	42.3	4.6	0.4
B7	22.85	77.0	2.99	10.86	20.7	90.0	1.11	12.65	24.1	3.4	0.2

*Attenuation Volume for FPC Ponds calculated as the difference between the 100yr and 25yr storm attenuation volumes

Project: Northeast Connector Expressway from Cyrils Drive to Nova Road (CR 532)

Project #: 599-228

Designer: MM

Date: 5/16/2021

County: Osceola County

Reviewer: AE

Checked: 5/16/2021

Treatment Volume Summary

Basin	Area (ac)	Existing Impervious Area (ac)	Proposed Impervious Area (ac)	Treatment Volume Basin (ac-ft)	Treatment Volume Impervious Area (ac-ft)	Treatment Volume Required (ac-ft)	Located in a Nutrient Impaired Waterbody
B1	18.28	1.7	8.9	1.5	1.5	1.5	No
B2	27.39	0.0	14.7	2.3	3.1	3.1	No
B3	20.32	0.0	11.0	1.7	2.3	2.3	No
B4	26.87	0.0	14.5	2.2	3.0	3.0	No
B5	46.77	0.0	16.9	3.9	3.5	3.9	No
B6	41.69	0.0	14.9	3.5	3.1	3.5	No
B7	22.85	0.0	12.7	1.9	2.6	2.6	No
Total	204.2	1.7	93.6	17.0	19.1	19.9	

Project: Northeast Connector Expressway from Cyrils Drive to Nova Road (CR 532)
Project #: 599-228
County: Osceola County

Designer: MM
Reviewer: AE

Date: 5/16/2021
Checked: 5/16/2021

Required SMF Pond Volume Calculations

Basin	SMF Pond Option	Roadway Attenuation Volume	Pond Site Attenuation Volume	Treatment Volume	Total Required SMF Pond Volume
		ac-ft	ac-ft	ac-ft	ac-ft
B1	1A	1.8	0.3	1.5	3.6
B1	1B	1.8	0.3	1.5	3.6
B2	2A	3.7	0.5	3.1	7.3
B2	2B	3.7	0.5	3.1	7.3
B3	3A	2.9	0.4	2.3	5.6
B3	3B	2.9	0.4	2.3	5.6
B4	4A	3.2	0.9	3.0	7.1
B4	4B	3.2	0.5	3.0	6.7
B5	5A	2.5	0.0	3.9	6.4
B5	5B	2.5	0.7	3.9	7.1
B6	6A	4.2	0.0	3.5	7.7
B6	6B	4.2	0.6	3.5	8.3
B7	7A	3.2	0.5	2.6	6.3
B7	7B	3.2	0.4	2.6	6.2

Project: Northeast Connector Expressway from Cyrils Drive to Nova Road (CR 532)
Project #: 599-228 **Designer:** MM **Date:** 5/20/2021
County: Osceola County **Reviewer:** AE **Checked:** 5/20/2021

Pond Design Depth Calculations: Nova Interchange on Tavistock Alignment

Minimum Pavement Elevation

Basin	Lowest PGL Elev. (ft-NAVD)	Lowest EOP* (ft-NAVD)	Lowest Edge of Shoulder** (ft-NAVD)
B1	75.02	74.5	73.7
B2	67.86	67.3	66.5
B3	70.74	70.2	69.4
B4	66.35	65.8	65
B5	66.00	65.5	64.7
B6	66.00	65.5	64.7
B7	70.14	69.6	68.8

Assume future cross road follows existing terrain
 Assume future cross road follows existing terrain

*Proposed condition is constructing the outside two travel lanes from the ultimate typical section. Assumes proposed LEOP (2-12' travel lanes at 2% from PGL) will control the ultimate LEOP.
 **Assumes a 12-foot shoulder at 6% from Lowest EOP

Estimated SHWT at Pond

Pond	SHWT*	Pond Outfall Location*
1A	65.0	NED65
1B	63.4	NED75
2A	60.9	Lake Joel
2B	60.9	Lake Joel
3A	60.9	Lake Joel
3B	60.9	Lake Joel
4A	62.9	NED45
4B	61.4	NED43
5A	61.4	NED43
5B	61.4	NED43
6A	61.4	NED43
6B	60.9	Lake Myrtle
7A	62.5	NED16
7B	62.5	NED16

*Initial Stage in Sunbridge NED Conceptual Modification (ERP 49-103688-P, App. 200622-3738, 10/2020)

Pond Sizing Design Depth

Basin	Pond	Lowest EOP (ft-NAVD)	Avg. Existing Ground Elev. (ft-NAVD)	SHWT (ft-NAVD)	Berm Elevation* (ft-NAVD)	Treatment Volume Elev. (ft-NAVD)	DHW Elev. (ft-NAVD)	TW Elev. (ft-NAVD)****	Maximum Depth (ft)**	Design Depth (ft) ***	
B1	1A	74.5	65.8	65	69.8	66.5	68.8	66.9	3.8	3.8	Wet Pond
B1	1B	74.5	66.2	63.4	68.4	64.9	67.4	65.4	5.8	4.0	Wet Pond
B2	2A	67.3	66.9	60.9	65.9	62.4	64.9	62.9	5.4	4.0	Wet Pond
B2	2B	67.3	65.4	60.9	65.9	62.4	64.9	62.9	4.5	4.0	Wet Pond
B3	3A	70.2	65.1	60.9	65.9	62.4	64.9	62.9	4.2	4.0	Wet Pond
B3	3B	70.2	65.1	60.9	65.9	62.4	64.9	62.9	4.2	4.0	Wet Pond
B4	4A	65.8	65.2	62.9	65.8	64.4	64.8	63.9	1.9	1.9	Wet Pond
B4	4B	65.8	65.1	61.4	65.8	62.9	64.8	63.1	3.4	3.4	Wet Pond
B5	5A	65.5	64.7	61.4	65.5	62.9	64.5	63.0	3.1	3.1	Wet Pond
B5	5B	65.5	63.9	61.4	65.5	62.9	64.5	63.0	3.1	3.1	Wet Pond
B6	6A	65.5	67.1	61.4	65.5	62.9	64.5	63.0	3.1	3.1	Wet Pond
B6	6B	65.5	66.4	60.9	65.5	62.4	64.5	62.7	3.6	3.6	Wet Pond
B7	7A	69.6	66.1	62.5	67.1	64.0	66.1	64.3	3.6	3.6	Wet Pond
B7	7B	69.6	66.6	62.5	67.5	64.0	66.5	64.5	4.1	4.0	Wet Pond

*The berm elevation is calculated as the SHW elev. + design depth + 1' of freeboard

**Maximum depth was calculated as the minimum of the Exist. Ground Elev. - SHWT + 4' (max impoundment height per SFWMD Criteria)-1' of freeboard or the Lowest EOP - SHWT - 1' of freeboard

***Design depth is the chosen depth utilized in the sizing calculations based on reasonable depths for wet ponds and minimizing the required pond area. A maximum depth of 4ft was used for sizing.

**** Estimated TW Elev. is based of the average of the SHWT and the DHW

Profile may need to be adjusted to meet base clearance after site specific data is obtained. Should be coordinated with Design Team.

Project: Northeast Connector Expressway from Cyrils Drive to Nova Road (CR 532)
Project #: 599-228
County: Osceola County

Designer: MM
Reviewer: AE

Date: 5/16/2021
Checked: 5/16/2021

Wet Detention Pond Sizing Calculations:

Basin	Pond	Required Volume	Design Depth for Sizing	Area at NWL Based on Required	Required Treatment Volume	Max Treatment Volume Depth	Area at NWL Based on Treatment Volume	Area at NWL	L & W at Outside Top of Berm	L & W at Design Depth	Provided Volume	Additional Percent for Landscaping / Tie-In Area	Required Pond Area
		ac-ft	ft	ac	ac-ft	ft	ac	ac	ft	ft	ac-ft	pct	ac
B1	1A	3.60	3.8	0.8	1.5	1.5	0.9	0.9	282	234	4.18	20%	2.2
	1B	3.60	4.0	0.8	1.5	1.5	0.9	0.9	283	235	4.42	20%	2.2
B2	2A	7.30	4.0	1.6	3.1	1.5	2.0	2.0	375	327	8.88	20%	3.9
	2B	7.30	4.0	1.6	3.1	1.5	2.0	2.0	375	327	8.88	20%	3.9
B3	3A	5.60	4.0	1.2	2.3	1.5	1.5	1.5	333	285	6.66	20%	3.1
	3B	5.60	4.0	1.2	2.3	1.5	1.5	1.5	333	285	6.66	20%	3.1
B4	4A	7.10	1.9	3.6	3.0	1.5	1.9	3.6	460	412	7.12	20%	5.9
	4B	6.70	3.4	1.8	3.0	1.5	1.9	1.9	365	317	7.18	20%	3.7
B5	5A	6.40	3.1	1.9	3.9	1.5	2.5	2.5	404	356	8.40	20%	4.5
	5B	7.10	3.1	2.1	3.9	1.5	2.5	2.5	404	356	8.40	20%	4.5
B6	6A	7.70	3.1	2.3	3.5	1.5	2.2	2.3	390	342	7.73	20%	4.2
	6B	8.30	3.6	2.1	3.5	1.5	2.2	2.2	390	342	8.88	20%	4.2
B7	7A	6.30	3.6	1.6	2.6	1.5	1.7	1.7	346	298	6.56	20%	3.3
	7B	6.20	4.0	1.4	2.6	1.5	1.7	1.7	349	301	7.48	20%	3.4

Pond Geometry Assumptions

Freeboard: 1 ft
 Slope: 4 :1
 Berm: 20 ft

Project: Northeast Connector Expressway from Cyrils Drive to Nova Road (CR 532)
Project #: 599-228
County: Osceola County

Designer: MM
Reviewer: AE

Date: 5/16/2021
Checked: 5/16/2021

Floodplain Impacts

	Basin	Floodplain Impacts (ac-ft)	Additional Attenuation Volume (ac-ft)	Total Volume (ac-ft)	Min. SHWT Elev. (ft NAVD)	BFE (ft NAVD)	Floodplain Compensation Depth (ft)	Floodplain Compensation Area (ac)
Lake Joel	B1	0.3	0.1	0.4	60.9	64.3	3.4	7.0
	B2	2.0	0.2	2.2				
	B3	16.4	0.3	16.7				
Bullock Lake	B4	2.2	0.3	2.5	63.5	64.3	0.8	25.1
	B5	14.6	0.6	15.2				
	B6							
	B7	0.0	0.2	0.2				

Total FP Impacted Volume (ac-ft)	37.1 ac-ft
Required Floodplain Compensation Area (ac)	32.1 ac

Pond Geometry Assumptions

Freeboard: 0 ft
 Slope: 4 :1
 Berm: 15 ft
 Perc. Factor of Safety for Grading: 5%

Appendix C

Pond Option Construction Cost Estimates

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 1A					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	2.20	\$ 17,000.00	\$ 37,400.00
0120 1	REGULAR EXCAVATION	CY	17,553.07	\$ 5.30	\$ 93,031.25
0120 6	EMBANKMENT	CY	262.7	\$ 8.30	\$ 2,180.63
--	CONTROL STRUCTURE	EA	2	\$ 6,000.00	\$ 12,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	200	\$ 165.00	\$ 33,000.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	2	\$ 8,400.00	\$ 16,800.00
0570 1 2	PERFORMANCE TURF, SOD	SY	6,728	\$ 2.50	\$ 16,819.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	757	\$ 15.75	\$ 11,922.75
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 224,153.63
0101	Mobilization (L.S.) - 15%	LS	0	\$ 33,623.05	\$ -
				Grand Total:	\$ 224,153.63

\$ 224,200

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 1B					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	2.20	\$ 17,000.00	\$ 37,400.00
0120 1	REGULAR EXCAVATION	CY	17,553.07	\$ 5.30	\$ 93,031.25
0120 6	EMBANKMENT	CY	262.7	\$ 8.30	\$ 2,180.63
--	CONTROL STRUCTURE	EA	2	\$ 6,000.00	\$ 12,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	200	\$ 165.00	\$ 33,000.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	2	\$ 8,400.00	\$ 16,800.00
0570 1 2	PERFORMANCE TURF, SOD	SY	6,728	\$ 2.50	\$ 16,819.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	716	\$ 15.75	\$ 11,277.00
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 223,507.88
0101	Mobilization (L.S.) - 15%	LS	0	\$ 33,526.18	\$ -
				Grand Total:	\$ 223,507.88

\$ 223,600

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 2A					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	3.90	\$ 17,000.00	\$ 66,300.00
0120 1	REGULAR EXCAVATION	CY	39,800.93	\$ 5.30	\$ 210,944.95
0120 6	EMBANKMENT	CY	353.9	\$ 8.30	\$ 2,937.61
--	CONTROL STRUCTURE	EA	2	\$ 6,000.00	\$ 12,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	200	\$ 165.00	\$ 33,000.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	2	\$ 8,400.00	\$ 16,800.00
0570 1 2	PERFORMANCE TURF, SOD	SY	10,261	\$ 2.50	\$ 25,652.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	946	\$ 15.75	\$ 14,899.50
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 383,534.06
0101	Mobilization (L.S.) - 15%	LS	0	\$ 57,530.11	\$ -
				Grand Total:	\$ 383,534.06

\$ 383,600

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 2B					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	3.90	\$ 17,000.00	\$ 66,300.00
0120 1	REGULAR EXCAVATION	CY	39,800.93	\$ 5.30	\$ 210,944.95
0120 6	EMBANKMENT	CY	353.9	\$ 8.30	\$ 2,937.61
--	CONTROL STRUCTURE	EA	2	\$ 6,000.00	\$ 12,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	200	\$ 165.00	\$ 33,000.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	2	\$ 8,400.00	\$ 16,800.00
0570 1 2	PERFORMANCE TURF, SOD	SY	10,261	\$ 2.50	\$ 25,652.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	943	\$ 15.75	\$ 14,852.25
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 383,486.81
0101	Mobilization (L.S.) - 15%	LS	0	\$ 57,523.02	\$ -
				Grand Total:	\$ 383,486.81

\$ 383,500

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 3A					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	3.10	\$ 17,000.00	\$ 52,700.00
0120 1	REGULAR EXCAVATION	CY	28,717.33	\$ 5.30	\$ 152,201.87
0120 6	EMBANKMENT	CY	314.2	\$ 8.30	\$ 2,607.84
--	CONTROL STRUCTURE	EA	2	\$ 6,000.00	\$ 12,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	200	\$ 165.00	\$ 33,000.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	2	\$ 8,400.00	\$ 16,800.00
0570 1 2	PERFORMANCE TURF, SOD	SY	8,760	\$ 2.50	\$ 21,901.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	872	\$ 15.75	\$ 13,734.00
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 305,944.71
0101	Mobilization (L.S.) - 15%	LS	0	\$ 45,891.71	\$ -
				Grand Total:	\$ 305,944.71

\$ 306,000

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 1B					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	3.10	\$ 17,000.00	\$ 52,700.00
0120 1	REGULAR EXCAVATION	CY	28,717.33	\$ 5.30	\$ 152,201.87
0120 6	EMBANKMENT	CY	314.2	\$ 8.30	\$ 2,607.84
--	CONTROL STRUCTURE	EA	2	\$ 6,000.00	\$ 12,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	200	\$ 165.00	\$ 33,000.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	2	\$ 8,400.00	\$ 16,800.00
0570 1 2	PERFORMANCE TURF, SOD	SY	8,760	\$ 2.50	\$ 21,901.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	835	\$ 15.75	\$ 13,151.25
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 305,361.96
0101	Mobilization (L.S.) - 15%	LS	0	\$ 45,804.29	\$ -
				Grand Total:	\$ 305,361.96

\$ 305,400

Note:

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Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 4A					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	5.90	\$ 17,000.00	\$ 100,300.00
0120 1	REGULAR EXCAVATION	CY	66,308.00	\$ 5.30	\$ 351,432.40
0120 6	EMBANKMENT	CY	438.2	\$ 8.30	\$ 3,636.92
--	CONTROL STRUCTURE	EA	3	\$ 6,000.00	\$ 18,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	300	\$ 165.00	\$ 49,500.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	3	\$ 8,400.00	\$ 25,200.00
0570 1 2	PERFORMANCE TURF, SOD	SY	12,487	\$ 2.50	\$ 31,218.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	1,315	\$ 15.75	\$ 20,711.25
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 600,998.57
0101	Mobilization (L.S.) - 15%	LS	0	\$ 90,149.79	\$ -
				Grand Total:	\$ 600,998.57

\$ 601,000

Note:

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Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 4B					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	3.70	\$ 17,000.00	\$ 62,900.00
0120 1	REGULAR EXCAVATION	CY	37,719.73	\$ 5.30	\$ 199,914.59
0120 6	EMBANKMENT	CY	344.4	\$ 8.30	\$ 2,858.61
--	CONTROL STRUCTURE	EA	2	\$ 6,000.00	\$ 12,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	200	\$ 165.00	\$ 33,000.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	2	\$ 8,400.00	\$ 16,800.00
0570 1 2	PERFORMANCE TURF, SOD	SY	9,583	\$ 2.50	\$ 23,958.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	1,041	\$ 15.75	\$ 16,395.75
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 368,826.95
0101	Mobilization (L.S.) - 15%	LS	0	\$ 55,324.04	\$ -
				Grand Total:	\$ 368,826.95

\$ 368,900

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 5A					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	4.50	\$ 17,000.00	\$ 76,500.00
0120 1	REGULAR EXCAVATION	CY	46,899.60	\$ 5.30	\$ 248,567.88
0120 6	EMBANKMENT	CY	381.1	\$ 8.30	\$ 3,163.16
--	CONTROL STRUCTURE	EA	3	\$ 6,000.00	\$ 18,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	300	\$ 165.00	\$ 49,500.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	3	\$ 8,400.00	\$ 25,200.00
0570 1 2	PERFORMANCE TURF, SOD	SY	10,745	\$ 2.50	\$ 26,862.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	0	\$ 15.75	\$ -
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 448,793.04
0101	Mobilization (L.S.) - 15%	LS	0	\$ 67,318.96	\$ -
				Grand Total:	\$ 448,793.04

\$ 448,800

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 5B					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	4.50	\$ 17,000.00	\$ 76,500.00
0120 1	REGULAR EXCAVATION	CY	48,028.93	\$ 5.30	\$ 254,553.35
0120 6	EMBANKMENT	CY	381.1	\$ 8.30	\$ 3,163.16
--	CONTROL STRUCTURE	EA	3	\$ 6,000.00	\$ 18,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	300	\$ 165.00	\$ 49,500.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	3	\$ 8,400.00	\$ 25,200.00
0570 1 2	PERFORMANCE TURF, SOD	SY	10,745	\$ 2.50	\$ 26,862.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	1,136	\$ 15.75	\$ 17,892.00
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 472,670.51
0101	Mobilization (L.S.) - 15%	LS	0	\$ 70,900.58	\$ -
				Grand Total:	\$ 472,670.51

\$ 472,700

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 6A					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	4.20	\$ 17,000.00	\$ 71,400.00
0120 1	REGULAR EXCAVATION	CY	45,528.27	\$ 5.30	\$ 241,299.81
0120 6	EMBANKMENT	CY	367.8	\$ 8.30	\$ 3,052.40
--	CONTROL STRUCTURE	EA	3	\$ 6,000.00	\$ 18,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	300	\$ 165.00	\$ 49,500.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	3	\$ 8,400.00	\$ 25,200.00
0570 1 2	PERFORMANCE TURF, SOD	SY	10,261	\$ 2.50	\$ 25,652.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	0	\$ 15.75	\$ -
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 435,104.21
0101	Mobilization (L.S.) - 15%	LS	0	\$ 65,265.63	\$ -
				Grand Total:	\$ 435,104.21

\$ 435,200

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 6B					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	4.20	\$ 17,000.00	\$ 71,400.00
0120 1	REGULAR EXCAVATION	CY	45,592.80	\$ 5.30	\$ 241,641.84
0120 6	EMBANKMENT	CY	367.8	\$ 8.30	\$ 3,052.40
--	CONTROL STRUCTURE	EA	3	\$ 6,000.00	\$ 18,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	300	\$ 165.00	\$ 49,500.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	3	\$ 8,400.00	\$ 25,200.00
0570 1 2	PERFORMANCE TURF, SOD	SY	10,503	\$ 2.50	\$ 26,257.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	1,004	\$ 15.75	\$ 15,813.00
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 451,864.24
0101	Mobilization (L.S.) - 15%	LS	0	\$ 67,779.64	\$ -
				Grand Total:	\$ 451,864.24

\$ 451,900

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 7A					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	3.30	\$ 17,000.00	\$ 56,100.00
0120 1	REGULAR EXCAVATION	CY	32,895.87	\$ 5.30	\$ 174,348.09
0120 6	EMBANKMENT	CY	324.6	\$ 8.30	\$ 2,693.93
--	CONTROL STRUCTURE	EA	2	\$ 6,000.00	\$ 12,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	200	\$ 165.00	\$ 33,000.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	2	\$ 8,400.00	\$ 16,800.00
0570 1 2	PERFORMANCE TURF, SOD	SY	8,857	\$ 2.50	\$ 22,143.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	886	\$ 15.75	\$ 13,954.50
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 332,039.52
0101	Mobilization (L.S.) - 15%	LS	0	\$ 49,805.93	\$ -
				Grand Total:	\$ 332,039.52

\$ 332,100

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

POND 7B					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	3.40	\$ 17,000.00	\$ 57,800.00
0120 1	REGULAR EXCAVATION	CY	32,734.53	\$ 5.30	\$ 173,493.03
0120 6	EMBANKMENT	CY	329.6	\$ 8.30	\$ 2,736.00
--	CONTROL STRUCTURE	EA	2	\$ 6,000.00	\$ 12,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	200	\$ 165.00	\$ 33,000.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	2	\$ 8,400.00	\$ 16,800.00
0570 1 2	PERFORMANCE TURF, SOD	SY	9,341	\$ 2.50	\$ 23,353.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	897	\$ 15.75	\$ 14,127.75
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 334,309.77
0101	Mobilization (L.S.) - 15%	LS	0	\$ 50,146.47	\$ -
				Grand Total:	\$ 334,309.77

\$ 334,400

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

FPC Joel Pond					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	7.00	\$ 17,000.00	\$ 119,000.00
0120 1	REGULAR EXCAVATION	CY	3,630.00	\$ 5.30	\$ 19,239.00
0120 6	EMBANKMENT	CY	478.6	\$ 8.30	\$ 3,972.53
--	CONTROL STRUCTURE	EA	4	\$ 6,000.00	\$ 24,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	400	\$ 165.00	\$ 66,000.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	4	\$ 8,400.00	\$ 33,600.00
0570 1 2	PERFORMANCE TURF, SOD	SY	33,880	\$ 2.50	\$ 84,700.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	2,370	\$ 15.75	\$ 37,327.50
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 388,839.03
0101	Mobilization (L.S.) - 15%	LS	0	\$ 58,325.85	\$ -
				Grand Total:	\$ 388,839.03

\$ 388,900

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

ENGINEERS OPINION OF PROBABLE COSTS

Estimated Cost for Construction Services

Northeast Connector Expressway (From Cyrils Drive to Nova Road) (CFX #599-228)

FPC Bullock Pond					
Item	Description	Unit	Quantity	Unit Price	Amount
General Conditions					
0110 1 1	CLEARING & GRUBBING	AC	25.10	\$ 17,000.00	\$ 426,700.00
0120 1	REGULAR EXCAVATION	CY	53,531.17	\$ 5.30	\$ 283,715.21
0120 6	EMBANKMENT	CY	917.2	\$ 8.30	\$ 7,613.03
--	CONTROL STRUCTURE	EA	13	\$ 6,000.00	\$ 78,000.00
0430175142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	LF	1,300	\$ 165.00	\$ 214,500.00
0400 1 2	CONC CLASS I, ENDWALLS	EA	13	\$ 8,400.00	\$ 109,200.00
0570 1 2	PERFORMANCE TURF, SOD	SY	121,484	\$ 2.50	\$ 303,710.00
0550 10212	FENCING, TYPE B, 0.0-5.0', W/ VINYL COAT	LF	4,169	\$ 15.75	\$ 65,661.75
--	12' GATE	EA	1	\$ 1,000.00	\$ 1,000.00
				Sub-Total:	\$ 1,490,099.99
0101	Mobilization (L.S.) - 15%	LS	0	\$ 223,515.00	\$ -
				Grand Total:	\$ 1,490,099.99

\$ 1,490,100

Note:

This opinion of costs is based on the best available information and on the opinion of the engineer. The items in the opinion of costs require proposals from other contractors and consultants. Some of the work stated in this opinion of costs requires investigative work that has not been completed. Although every effort has been made to provide a reasonable budget number it should be noted that the actual costs could be significantly more or less than stated in the opinion of costs. This opinion should be used to determine an order of magnitude for the costs. It is recommended that the owner obtain firm quotes from the various contractors in order to obtain a more accurate number. The costs stated in the opinion can also be influenced by market conditions, legal and regulatory conditions which are unforeseen.

Quantity Estimate Notes:

Unit Prices from CFX dated 2/2019.

Clearing & Grubbing is the entire parcel and easement area(s).

Excavation based off of the total required volume plus the permanent pool volume.

Embankment includes fill for tie-in slopes and pond berm. Assumes berm is 1-ft above existing ground.

Sodding is based off of the easement+ remnant parcel + berm area + pond slope to two feet below NWL or pond bottom.

Assumes a control structure system for every 2-acres of pond.

Fencing is the net additional fencing required outside the proposed LA R/W and is measured along the parcel perimeter.

Assumed additional mobilization costs not required for ponds adjacent to the proposed limited access right-of-way.

Cost estimates do not include any on-site conveyance systems quantities (median, shoulder gutter, etc.). On-site conveyance systems are subject to change during design for hydraulic and spread capacity needs, and are not considered a significant cost comparison indicator between pond options

Appendix D
Pond Site Aerial Photos

POND 1A AND 1B:



POND 2A AND 2B:



POND 3A, 3B, FPC JOEL AND 4B:



POND 4A AND 5B:



POND 5A, 6A, 6B, AND FPC BULLOCK:



POND 7A AND 7B:



Appendix E
Existing Permit Information

Sunbridge Northeast District (NED)
Master Drainage Report Conceptual
Permit Application Phase 1 West of
C-30 Canal Post-Development
Conditions
Osceola County, Florida

Prepared For:

Tavistock Development Company

6900 Tavistock Lakes Blvd, Suite 200
Orlando, FL 32827

Date:

October 25, 2017



2602 E. Livingston Street | Orlando, Florida 32803 | Tel: 407.487.2594 | www.poulosandbennett.com
FBPE Certificate of Authorization No. 28567

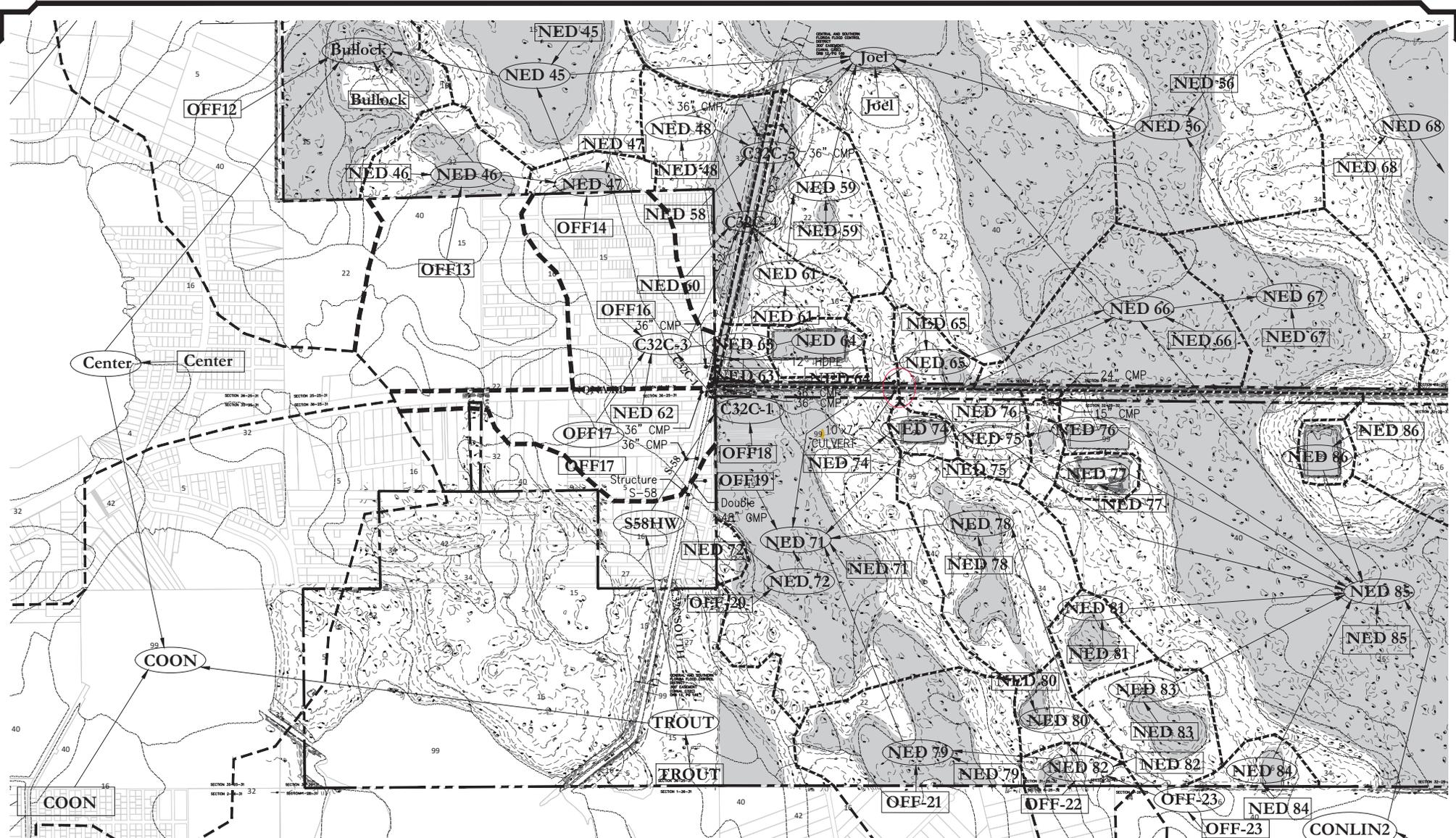
Please refer to the geotechnical reports submitted under separate cover for soil boring locations and information. A letter from Universal Engineering is included under separate cover establishing general design considerations for the Estimated Seasonal High WT provided by Devo Engineering.

6. Culvert Information

Node Link	Upstream Node	Existing	Proposed	Existing	Proposed
		100yr/24hr Stage (ft.)	100yr/24hr Stage (ft.)	50yr/24hr Stage (ft.)	50yr/24hr Stage (ft.)
NED10 C	NED10	69.80	69.60	69.77	69.49
NED01 C	NED01	67.22	67.78	67.14	67.67
NEDO2-1	NED15	65.52	65.92	65.49	65.76
NED15-2 P					
NED15-2 PBU					
NED15 DBI-1					
BULLOCK-2 DBI	NED14	68.46	68.45	68.40	68.39
BULLOCK-2 DBI	NED30	69.26	69.26	69.23	69.23
NED16-1 C	NED16	64.13	64.38	63.88	64.21

The proposed stages in Nodes NED01 and NED15 are slightly increased by 0.56 feet, 0.43 feet for the 100 yr-24 hr storm event, respectively. However, they are still at or within the culvert cross-sections and are completely contained within the on-site property boundary. Node NED16 also has a slight increase of 0.25 feet in the 100 yr-24 hr storm event designed to provide additional retention of water within the wholly contained on-site wetland.

Node Link	Proposed 50yr/24hr Disch. (cfs)	Culvert Size (units as noted)	Culvert Cross-Sectional Area (ft ²)	Proposed 50yr/24hr Outlet Velocity (ft./sec)
NED10 C	12.41	Two – 36” RCPs	14.14	0.9
NED01 C	258.3	Three – 6’ X 3’ Box Culverts	54	4.8
NEDO2-1C	412.5	Eight– 6’ X 3’ Box Culverts	144	2.9
NED15-2 C	404.7	Eight– 6’ X 3’ Box Culverts	144	2.8
NED15-2 PBU	15.2	One – 36” RCP	7.07	2.1
NED16-1 C	24.6	One – 36” RCP	7.07	3.5

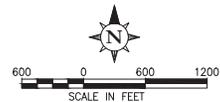


Pre-Development Basin Map
Sunbridge NED

POULOS & BENNETT

2612 E. Livingston St.
 Orlando, Florida 32803-407,487,2594

www.poulosandbennett.com
 Certificate of Authorization No. 28567



October 11, 2017
 P & B Job No.: 17-042

21/017-042 TWS/STOCK - SUNBRIDGE MASTER STORMWATER CAD/EAR & P&S/17042 PRE-DEVELOPMENT BASIN MAP NED SITE

Exhibit 9.5

Appendix E, Page 2 of 21

**TABLE PRE-2
SUNBRIDGE PHASE 1**

PRE-DEVELOPMENT TIME OF CONCENTRATION

B A S I N O	OVERLAND FLOW (100' MAX) KINEMATIC WAVE FORMULA					SHALLOW CONCENTRATED FLOW					CHANNELIZED FLOW					TOTAL TIME CONC. (MIN)
	L E N G T H (FT)	S L O P E (%)	M A N N I N G ¹ (N)	I N T E N S I T Y ² (IN/HR)	INC. TIME CONC. (MIN)	L E N G T H (FT)	S L O P E (%)	U N P A V E D / P A V E D (UNPAVED)	V E L O C I T Y ³ (FT/S)	INC. TIME CONC. (MIN)	L E N G T H (FT)	S L O P E (%)	H Y D R A U L I C (FT)	V E L O C I T Y ⁴ (FT/S)	INC. TIME CONC. (MIN)	
	MYRTLE	300	0.100%	0.400	4.8	140.0	1800	0.300%	UNPAVED	0.9	33.95					
PRESTON	300	0.666%	0.400	4.8	65.6	2000	0.220%	UNPAVED	0.8	44.05						109.60
JOEL	300	0.167%	0.400	4.8	114.1	1000	0.400%	UNPAVED	1.0	16.33						130.44
BULLOCK	300	0.177%	0.400	4.8	111.4	1300	0.380%	UNPAVED	1.0	21.78						133.16
NED01	300	0.260%	0.400	4.8	95.5	1200	0.260%	UNPAVED	0.8	24.31						119.81
NED02	300	0.140%	0.400	4.8	122.3	1200	0.140%	UNPAVED	0.6	33.13						155.46
NED04	300	0.730%	0.400	4.8	63.2	1123	0.730%	UNPAVED	1.4	13.58						76.77
NED05	300	0.310%	0.400	4.8	89.0	1829	0.310%	UNPAVED	0.9	33.93						122.94
NED07	300	0.340%	0.400	4.8	85.8	1957	0.340%	UNPAVED	0.9	34.67						120.45
NED08	300	0.180%	0.400	4.8	110.6	1200	0.180%	UNPAVED	0.7	29.22						139.85
NED09	300	0.870%	0.400	4.8	58.9	42	0.870%	UNPAVED	1.5	0.47						59.37
NED10	300	0.670%	0.400	4.8	65.4	193	0.670%	UNPAVED	1.3	2.44						67.83
NED11	300	0.700%	0.400	4.8	64.3	256	0.700%	UNPAVED	1.3	3.16						67.42
NED12	60	1.000%	0.400	4.8	15.4											15.37
NED13	300	0.780%	0.400	4.8	61.5	413	0.780%	UNPAVED	1.4	4.83						66.37
NED14	300	0.290%	0.400	4.8	91.4	2603	0.290%	UNPAVED	0.9	49.93						141.35
NED15	300	0.400%	0.400	4.8	80.4	1200	0.400%	UNPAVED	1.0	19.60						99.98
NED16	300	0.300%	0.400	4.8	90.2	1200	0.300%	UNPAVED	0.9	22.63						112.81
NED17	300	0.590%	0.400	4.8	68.8	900	0.590%	UNPAVED	1.2	12.10						80.91
NED18	300	0.560%	0.400	4.8	70.3	900	0.560%	UNPAVED	1.2	12.42						82.68
NED19	30	1.100%	0.400	4.8	8.5											10.00
NED20	300	0.520%	0.400	4.8	72.4	1500	0.520%	UNPAVED	1.2	21.49						93.86
NED21	300	0.660%	0.400	4.8	65.8	650	0.660%	UNPAVED	1.3	8.26						74.05
NED22	300	0.320%	0.400	4.8	87.9	959	0.320%	UNPAVED	0.9	17.51						105.40
NED23	204	0.980%	0.400	4.8	41.3		0.980%	UNPAVED	1.6	0.00						41.26
NED24	300	0.910%	0.400	4.8	57.9	40	0.910%	UNPAVED	1.5	0.43						58.29
NED25	300	0.410%	0.400	4.8	79.6	1800	0.410%	UNPAVED	1.0	29.04						108.63
NED26	300	0.260%	0.400	4.8	95.5	1500	0.260%	UNPAVED	0.8	30.39						125.88
NED28	300	0.840%	0.400	4.8	59.7	192	0.840%	UNPAVED	1.5	2.16						61.90
NED29	300	0.170%	0.400	4.8	113.2	1900	0.170%	UNPAVED	0.7	47.60						160.79
NED30	300	0.550%	0.400	4.8	70.8	425	0.550%	UNPAVED	1.2	5.92						76.69
NED31	300	0.520%	0.400	4.8	72.4	229	0.520%	UNPAVED	1.2	3.28						75.65
NED33	300	0.660%	0.400	4.8	65.8	200	0.660%	UNPAVED	1.3	2.54						68.33
NED34	300	0.440%	0.400	4.8	77.4	368	0.440%	UNPAVED	1.1	5.73						83.10
NED35	300	0.620%	0.400	4.8	67.5	426	0.620%	UNPAVED	1.3	5.59						73.04
NED36	300	0.680%	0.400	4.8	65.0	636	0.680%	UNPAVED	1.3	7.97						72.98

B A S I N N O	OVERLAND FLOW (100' MAX) KINEMATIC WAVE FORMULA					SHALLOW CONCENTRATED FLOW					CHANNELIZED FLOW					TOTAL TIME CONC. (MIN)
	L E N G T H (FT)	S L O P E (%)	M A N N I N G ¹ (N)	I N T E N S I T Y ² (IN/HR)	I N C. T I M E C O N C. (MIN)	L E N G T H (FT)	S L O P E (%)	U N P A V E D / P A V E D D / D	V E L O C I T Y ³ (FT/S)	I N C. T I M E C O N C. (MIN)	L E N G T H (FT)	S L O P E (%)	H Y D R A U L I C (FT)	V E L O C I T Y ⁴ (FT/S)	I N C. T I M E C O N C. (MIN)	
NED37	300	0.390%	0.400	4.8	81.2	1100	0.390%	UNPAVED	1.0	18.20						99.39
NED43	300	0.420%	0.400	4.8	78.8	400	0.420%	UNPAVED	1.0	6.38						85.20
NED44	300	0.490%	0.400	4.8	74.1	510	0.490%	UNPAVED	1.1	7.53						81.64
NED45	300	0.480%	0.400	4.8	74.7	520	0.480%	UNPAVED	1.1	7.75						82.48
NED46	300	0.130%	0.400	4.8	126.0	480	0.130%	UNPAVED	0.6	13.75						139.76
NED47	300	0.530%	0.400	4.8	71.8	460	0.530%	UNPAVED	1.2	6.53						78.35
NED48	300	0.390%	0.400	4.8	81.2	864	0.390%	UNPAVED	1.0	14.29						95.49
NED49	300	0.333%	0.400	4.8	86.5	970	0.600%	UNPAVED	1.2	12.94						99.43
NED50	300	0.270%	0.400	4.8	94.1	400	0.870%	UNPAVED	1.5	4.43						98.49
NED51	272	1.100%	0.400	4.8	49.6											49.59
NED52	300	0.350%	0.400	4.8	84.8	862	0.380%	UNPAVED	1.0	14.44						99.24
NED53	300	0.660%	0.400	4.8	65.8	1672	0.350%	UNPAVED	1.0	29.19						94.98
NED54	300	0.500%	0.400	4.8	73.5	194	0.500%	UNPAVED	1.1	2.83						76.35
NED55	300	1.500%	0.400	4.8	47.4	21	1.500%	UNPAVED	2.0	0.18						47.55
NED56	300	0.403%	0.400	4.8	80.1	940	0.403%	UNPAVED	1.0	15.30						95.44
NED57	300	0.240%	0.400	4.8	98.6	520	0.240%	UNPAVED	0.8	10.96						109.57
NED58	30	5.000%	0.150	4.8	2.1											10.00
NED59	300	0.470%	0.400	4.8	75.4	1200	0.470%	UNPAVED	1.1	18.08						93.44
NED60	40	5.000%	0.150	4.8	2.7											10.00
NED61	300	0.660%	0.400	4.8	65.8	1200	0.660%	UNPAVED	1.3	15.26						81.05
NED62	40	5.000%	0.150	4.8	2.7											10.00
NED63	300	0.280%	0.400	4.8	92.7	987	0.280%	UNPAVED	0.9	19.27	2170		2.5	14.47		126.44
NED64	300	0.100%	0.400	4.8	140.0											139.95
NED65	300	0.440%	0.400	4.8	77.4	600	0.440%	UNPAVED	1.1	9.34						86.72
NED66	300	0.330%	0.400	4.8	86.8											86.81
NED67	300	0.680%	0.400	4.8	65.0	728	0.680%	UNPAVED	1.3	9.12						74.13
NED68	300	0.440%	0.400	4.8	77.4	1200	0.440%	UNPAVED	1.1	18.69						96.06
NED69	300	0.460%	0.400	4.8	76.0	993	0.460%	UNPAVED	1.1	15.12						91.13
NED70	200	0.500%	0.400	4.8	53.2											53.15
NED71	300	0.240%	0.400	4.8	98.6	1000	0.240%	UNPAVED	0.8	21.09						119.69
NED72	300	0.750%	0.400	4.8	62.5											62.51
NED74	246	1.250%	0.400	4.8	43.5											43.48
NED75	300	0.730%	0.400	4.8	63.2	388	0.730%	UNPAVED	1.4	4.69						67.88
NED76	300	0.670%	0.400	4.8	65.4	297	0.670%	UNPAVED	1.3	3.75						69.14
NED77	300	1.600%	0.400	4.8	46.2											46.17
NED78	300	0.580%	0.400	4.8	69.3	732	0.580%	UNPAVED	1.2	9.93						79.21
NED79	300	0.770%	0.400	4.8	61.9	346	0.770%	UNPAVED	1.4	4.07						65.93
NED80	300	1.300%	0.400	4.8	50.2	80	1.300%	UNPAVED	1.8	0.72						50.89
NED81	300	0.450%	0.400	4.8	76.7	140	0.450%	UNPAVED	1.1	2.16						78.84
NED82	300	0.500%	0.400	4.8	73.5	500	0.500%	UNPAVED	1.1	7.30						80.82
NED83	300	0.100%	0.400	4.8	140.0	635	0.300%	UNPAVED	0.9	11.98						151.93
NED84	300	0.460%	0.400	4.8	76.0	349	0.460%	UNPAVED	1.1	5.32						81.33
NED85	300	0.470%	0.400	4.8	75.4	977	0.470%	UNPAVED	1.1	14.72						90.08

BASIN NO	OVERLAND FLOW (100' MAX) KINEMATIC WAVE FORMULA					SHALLOW CONCENTRATED FLOW					CHANNELIZED FLOW					TOTAL TIME CONC. (MIN)
	L	S	M	I		L		U	V		L	S	H	V		
	LENGTH (FT)	SLOPE (%)	MAN (N)	IN (IN/HR)	INC. TIME CONC. (MIN)	LENGTH (FT)	SLOPE (%)	UN PAVED / PAVED (FT/S)	VELOCITY (FT/S)	INC. TIME CONC. (MIN)	LENGTH (FT)	SLOPE (%)	HY DR AD JUST MENT (FT)	VELOCITY (FT/S)	INC. TIME CONC. (MIN)	
NED86	198	0.700%	0.400	4.8	46.1											46.09
NED87	140	0.880%	0.400	4.8	31.9											31.87
NED88	300	0.360%	0.400	4.8	83.8	251	0.360%	UNPAVED	1.0	4.32						88.16
NED89	300	0.520%	0.400	4.8	72.4	849	0.520%	UNPAVED	1.2	12.16						84.53
NED20A	300	0.370%	0.400	4.8	82.9	1500	0.370%	UNPAVED	1.0	25.47						108.40

1) Per Table 3-1 of the TR-55. n=0.40 for dense grasses

2) Per Figure B-3 of the TR-55.

3) Per Appendix F of the TR-55. Unpaved $V = 16.1345(s)^{0.5}$. Paved $V = 20.3282(s)^{0.5}$.

4) Per equation 3-4 of the TR-55. $V = [1.49r^{(2/3)}s^{(1/2)}]/n$

5) A minimum time of concentration of 10 minutes was used.

**TABLE PRE 1A
SUNBRIDGE PHASE 1**

PRE-DEVELOPMENT HYDROLOGIC DATA OVERALL NED MODEL

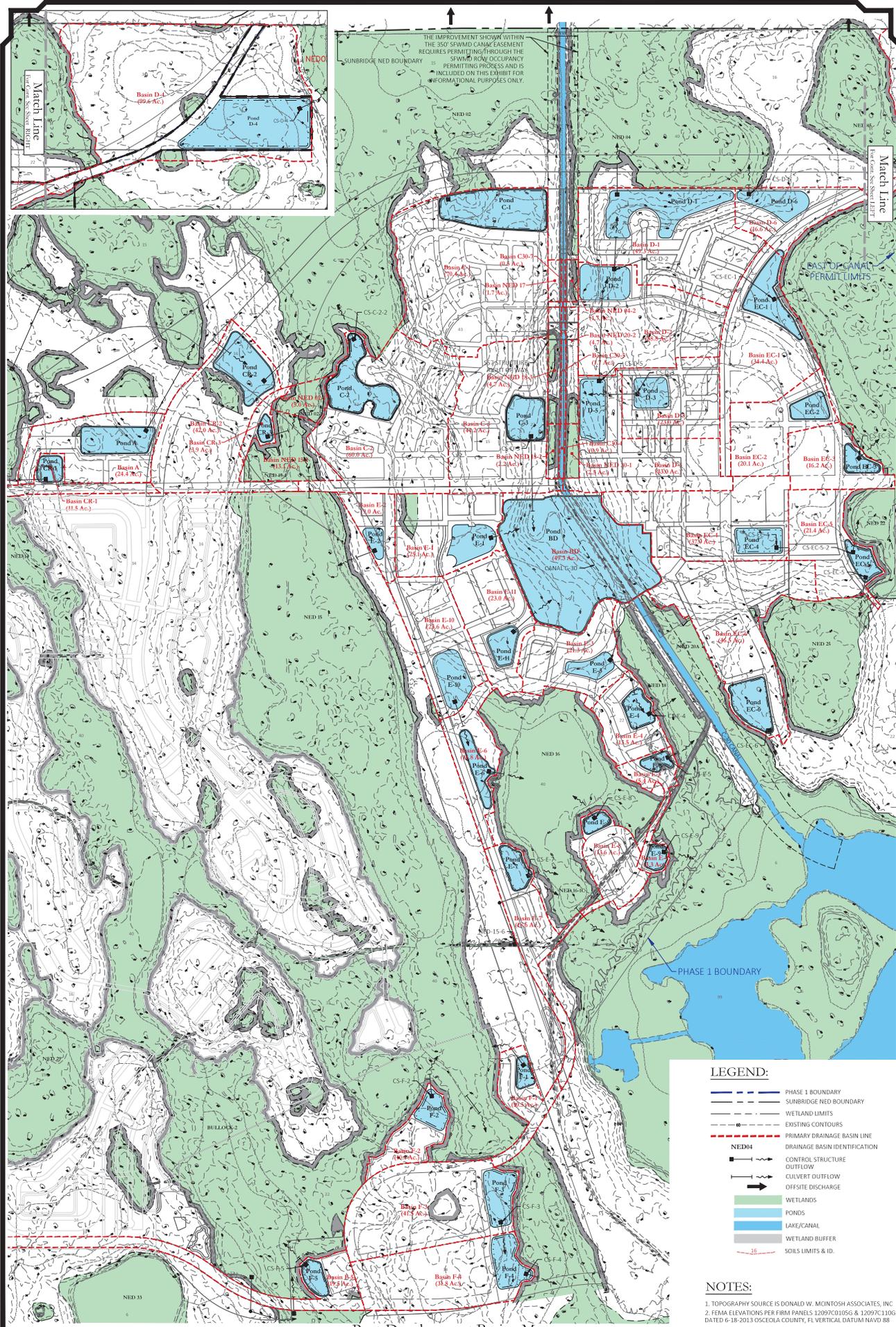
BASIN ID	NODE ID	TOTAL DRAINAGE AREA(ac)	SOIL-> CN->	EXISTING LAND USE												WATER	WEIGHTED RUNOFF CN		
				Woods				Pasture			Wood-Grass		Brush					Residential 1/2 acre	
				Good	Good	Fair	Poor	Good	Fair	Good	Good	Good	Fair	Good	Good			A	D
				A	D	D	D	D	D	A	A	D	A	D	D			A	D
				30	77	79	83	80	84	39	32	79	30	77	73	39	80	98	
A-1	POND A-1	19.00																	94
A-2	POND A-2	25.30																	93
A-3	POND A-3	29.70																	93
CR-1	POND CR-1	11.70																	90
CR-2A	POND CR-2A & 2B	16.80																	92
CR-2B	POND CR-2A & 2B	3.90																	88
CR-2C	POND CR-2A & 2B	23.90																	93
CR-3	POND CR-3	7.90																	88
C-1	POND C-1	76.50																	93
C-2	POND C-2	50.60																	92
C-3	POND C-3	26.10																	90
E-1	POND E-1	40.10																	95
E-2	POND E-2	22.70																	92
E-3	POND E-3	24.90																	92
E-4	POND E-4	13.20																	93
E-5	POND E-5	5.00																	92
E-6	POND E-6	15.80																	93
E-7	POND E-7	17.30																	93
E-8	POND E-8	13.60																	92
E-9	POND E-9	3.30																	93
F-1	POND F-1	9.30																	93
F-2	POND F-2	42.20																	82
F-3	POND F-3	29.30																	90
F-4	POND F-4	16.20																	92
F-5	POND F-5	43.40																	93
F-6	POND F-6	41.60																	90
BD	POND BD	29.70																	94
MYRTLE	MYRTLE	1049.10			47.90							284.15		49.00				668.05	91
PRESTON	PRESTON	2628.22						449.00		89.00		694.21			141.44			1254.57	87
JOEL	JOEL	652.58										250.63			8.95			393.00	90
BULLOCK	BULLOCK	938.01									8.70	279.01						650.05	92
BULLOCK-2	BULLOCK-2	72.68										23.13						49.55	92
NED01	NED01	134.68						52.16			0.37	8.15						74.00	90
NED02	NED02	330.62						123.93		0.00								206.69	91
NED02-1	NED02-1	5.30						2.08										3.22	91
NED04	NED04	179.26						97.46		10.80								71.00	85
NED05	NED05	79.26						48.53		5.73								25.00	83
NED07	OFF32-2	125.08						46.11		12.90								66.57	86
NED08	NED08	336.13						217.89		7.10								111.14	85
NED09	NED09	18.57						11.57		0.00								7.00	87
NED10	NED10	11.53						4.41			0.00							7.12	91
NED14	NED14	259.07						128.71		34.99								95.37	81
NED15	NED15	511.49						90.47		45.70	9.78	130.45						235.09	83
NED15-1	NED15-1	17.70						8.67										9.03	89
NED15-2	NED15-2	9.20										2.73						6.47	92
NED16	NED16	73.10										14.18						58.92	94
NED17	NED17	2.78						2.78											80
NED18-1	NED18-1	23.63									0.00	11.23						12.40	89
NED18-2	NED18-2	17.80										6.99						10.81	91
NED19	C30-4	10.77										2.77						8.00	93
NED20	NED20	83.05						42.02		22.91		12.08						6.04	70
NED21	NED21	28.53						12.40		8.48								7.65	73
NED22	NED22	356.69						131.35		78.35								146.99	78

BASIN ID	NODE ID	TOTAL DRAINAGE AREA(ac)	SOIL-> CN->	EXISTING LAND USE														WATER	WEIGHTED RUNOFF CN
				Woods				Pasture			Wood-Grass		Brush			Residential 1/2 acre			
				Good	Good	Fair	Poor	Good	Fair	Good	Good	Good	Fair	Good	A	D			
				A	D	D	D	D	D	A	A	D	A	D	A	D			
NED23	NED23	7.46						5.07		0.41								1.98	83
NED24	NED24	14.77						3.21		9.28								2.28	57
NED25	NED25	105.98						40.14		24.18		10.24						31.42	76
NED26	NED26	339.66						111.06		43.30								185.30	85
NED28	NED28	21.24						17.12		0.58								3.54	82
NED29	NED29	89.38						44.94		11.40								33.04	81
NED30	NED30	28.93						16.93		7.28								4.72	73
NED31	NED31	20.64						8.52		7.37								4.75	70
NED33	NED33	82.74						36.94		8.40								42.40	90
NED34	NED34	58.06						25.66										27.40	82
NED35	NED35	44.11						31.35		1.50								14.26	90
NED36	NED36	90.64						49.36		5.64								35.64	85
NED37	NED37	64.15						27.89		19.90	9.63							6.73	62
NED43	NED43	215.94						30.00				72.11						113.83	89
NED44	C32B-3	52.02						20.04										31.98	91
NED45	NED45	188.23						76.13										112.10	91
NED46	NED46	43.53						25.97										17.56	87
NED47	NED47	17.97						13.13										4.84	85
NED48	NED48	63.33						12.30				16.90						34.13	89
NED49	NED49	119.08										75.46						43.62	86
NED50	NED50	19.37										18.04						1.33	80
NED51	NED51	15.38										12.49						2.89	83
NED52	NED52	48.08										38.67						9.41	83
NED53	NED53	69.85						60.45		7.12								2.28	76
NED54	NED54	22.34						14.57			5.80							1.97	69
NED55	NED55	15.02						3.43			6.09							5.50	67
NED56	NED56	427.67						76.35		14.90	0.90	99.19						236.33	88
NED57	NED57	112.55						22.88				46.43						43.24	87
NED58	C32C-5	4.97						2.27										2.70	90
NED59	NED59	69.93										58.63						11.30	82
NED60	C32C-4	3.31						1.71										1.60	89
NED61	NED61	28.83										25.93						2.90	81
NED62	C32C-3	2.28						1.00										1.28	90
NED63	NED63	29.21										25.54						3.67	81
NED64	NED64	21.32						5.00				8.24						8.08	86
NED65	NED65	19.88						4.34				11.68						3.86	83
NED66	NED66	116.62										1.54						115.08	98
NED67	NED67	130.90									4.80	45.62						80.48	89
NED68	NED68	633.54						11.79	96.95		13.49	97.91						413.40	91
NED69	NED69	81.98						74.21		7.77									76
NED70	NED70	7.48						1.19				2.38						3.91	89
NED71	NED71	246.73						105.07		2.93								138.73	90
NED72	NED72	6.11										4.90						1.21	83
NED74	NED74	11.00										7.08						3.92	86
NED75	NED75	31.20										1.87	29.33						76
NED76	NED76	14.43										3.19	9.66					1.58	71
NED77	NED77	14.44										0.33	10.21					3.90	83
NED78	NED78	105.09						63.50		17.57								24.02	77
NED79	NED79	90.47						15.00				29.59						45.88	89
NED80	NED80	23.19						16.64		2.72								3.83	78
NED81	NED81	24.92						16.83		0.72								7.37	84
NED82	NED82	15.89										6.40	7.08					2.41	63
NED83	NED83	52.36						31.47		7.03								13.86	79
NED84	NED84	16.33										1.76	11.57					3.00	77
NED85	NED85	574.37						189.76		6.12		17.56						360.93	89
NED86	NED86	13.52										5.20	1.15					7.17	71
NED87	NED87	5.32										1.41						3.91	93
NED88	NED88	43.48									10.30		14.53					18.65	78
NED89	NED89	446.69						112.54				22.54	86.02					225.59	86
NED20A	C30-2	83.80						29.75		14.28		20.00						19.77	77

Sunbridge NED Phase West C-30 Canal
Post-Development Conditions

Link Min/Max Conditions [Icpr3]

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Max Avg Velocity [fps]
36 CAT-TROUT	5024	7.08	0.00	-0.03	2.59	4.39	3.49
BAY-LIZZIE	5024	0.00	0.00	0.00	0.00	0.00	0.00
BAY-TROUT	5024	0.00	0.00	0.00	0.00	0.00	0.00
BULL-CENTER P - Pipe	5024	38.82	-61.55	2.12	0.00	0.00	0.00
BULL-CENTER P - Weir: 1	5024	38.82	-61.55	4.25	-0.85	-0.85	-0.85
BULLOCK-2 DBI - Pipe	5024	24.51	0.00	0.01	0.00	0.00	0.00
BULLOCK-2 DBI - Weir: 1	5024	24.51	0.00	0.02	2.42	2.42	2.42
BULLOCK-2 P	5024	24.50	-60.12	-0.92	-8.50	-9.31	-8.74
C-13 - Pipe	5024	19.38	-0.11	0.06	0.00	0.00	0.00
C-13 - Weir: 1	5024	19.38	-0.13	0.09	1.58	1.58	1.58
C-13 - Weir: 2	5024	0.00	0.00	0.00	0.00	0.00	0.00
C-13A - Pipe	5024	36.09	-0.88	0.04	0.00	0.00	0.00
C-13A - Weir: 1	5024	36.09	-0.88	0.07	3.54	3.54	3.54
C-13A - Weir: 2	5024	0.00	0.00	0.00	0.00	0.00	0.00
C-14 - Pipe	5024	31.41	-0.02	-0.20	0.00	0.00	0.00
C-14 - Weir: 1	5024	31.41	-0.02	-0.24	1.67	1.67	1.67
C-14 - Weir: 2	5024	0.00	0.00	0.00	0.00	0.00	0.00
C-14A - Pipe	5024	13.61	-0.02	2.01	0.00	0.00	0.00
C-14A - Weir: 1	5024	13.61	-0.02	4.11	2.14	2.14	2.14
C-14A - Weir: 2	5024	0.40	0.00	-0.08	0.83	0.83	0.83
C-16	5024	0.00	0.00	0.00	0.00	0.00	0.00
C-19-1	5024	10.60	0.00	0.02	3.14	5.24	4.19
C-19-2	5024	11.82	0.00	-0.03	3.32	5.48	4.40
C-20	5024	0.00	0.00	0.00	0.00	0.00	0.00
C-21 - Pipe	5024	130.22	0.00	0.18	0.00	0.00	0.00
C-21 - Weir: 1	5024	130.23	0.00	0.24	0.86	0.86	0.86
C-25 - Pipe	5024	22.10	0.00	0.19	0.00	0.00	0.00
C-25 - Weir: 1	5024	22.10	0.00	0.13	0.33	0.33	0.33



THE IMPROVEMENT SHOWN WITHIN THE 50' SWAMP CANAL EASEMENT REQUIRES PERMITTING THROUGH THE SWAMP ROW OCCUPANCY PERMITTING PROCESS AND IS INCLUDED ON THIS EXHIBIT FOR INFORMATIONAL PURPOSES ONLY.

- LEGEND:**
- PHASE 1 BOUNDARY
 - - - - SUNBRIDGE NED BOUNDARY
 - - - - WETLAND LIMITS
 - - - - EXISTING CONTOURS
 - - - - PRIMARY DRAINAGE BASIN LINE
 - - - - DRAINAGE BASIN IDENTIFICATION
 - | CONTROL STRUCTURE
 - | OUTFLOW
 - | CULVERT OUTFLOW
 - | OFFSITE DISCHARGE
 - WETLANDS
 - PONDS
 - LAKE/CANAL
 - WETLAND BUFFER
 - - - - SOILS LIMITS & ID.

NOTES:

1. TOPOGRAPHY SOURCE IS DONALD W. MCINTOSH ASSOCIATES, INC.
2. FEMA ELEVATIONS PER FIRM PANELS 12097C0105S & 12097C110G DATED 6-18-2013 OSCEOLA COUNTY, FL VERTICAL DATUM NAVD 88

Post-Development Basins Map
Sunbridge NED

POULOS & BENNETT

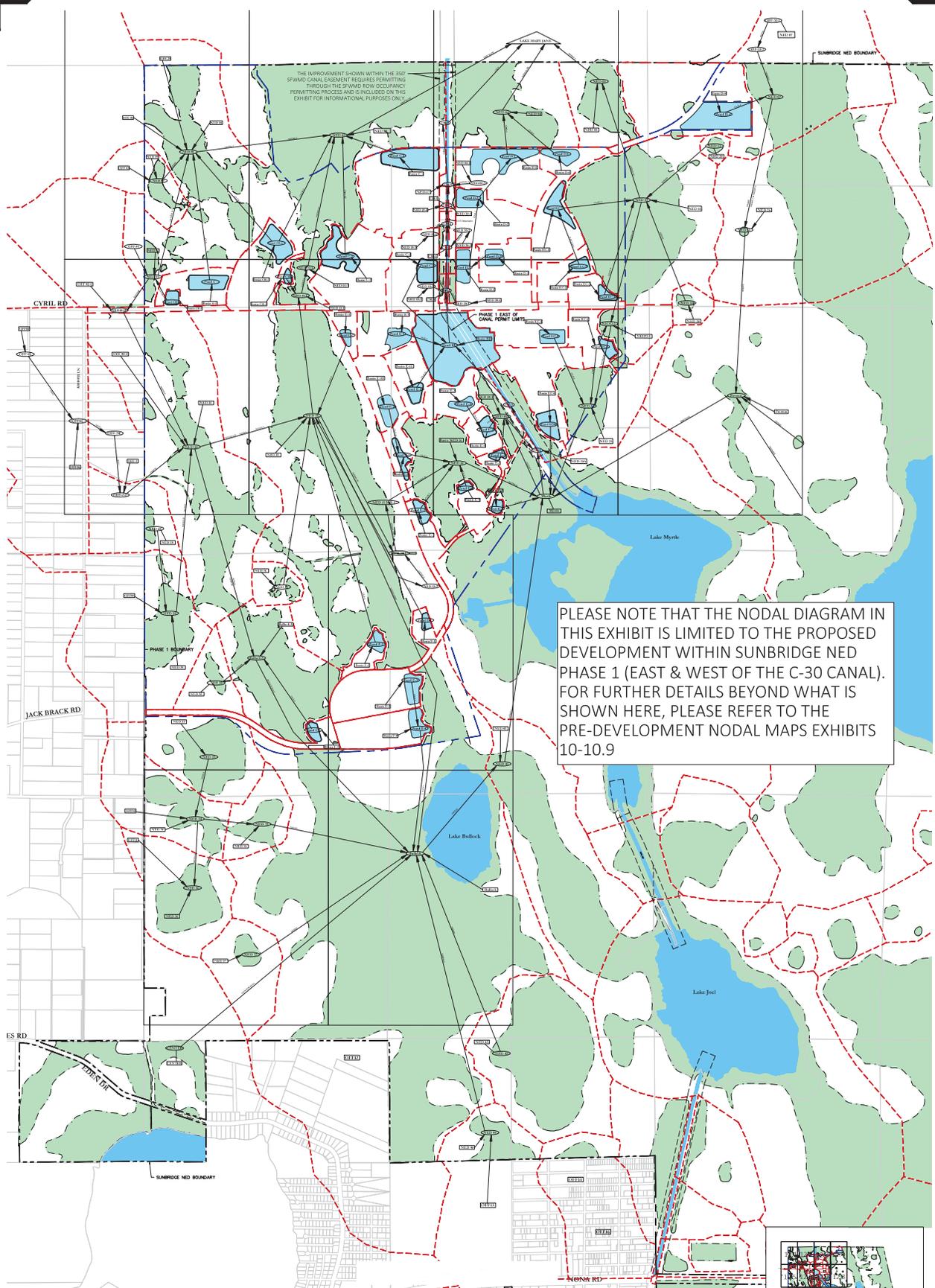
May 18, 2020
 P & B Job No: 17-042

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 Orlando, Florida 32803-407-487-2594

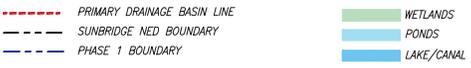
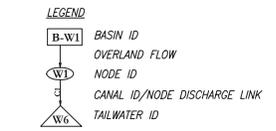
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SCALE IN FEET
 Appendix Page 11 of 21



PLEASE NOTE THAT THE NODAL DIAGRAM IN THIS EXHIBIT IS LIMITED TO THE PROPOSED DEVELOPMENT WITHIN SUNBRIDGE NED PHASE 1 (EAST & WEST OF THE C-30 CANAL). FOR FURTHER DETAILS BEYOND WHAT IS SHOWN HERE, PLEASE REFER TO THE PRE-DEVELOPMENT NODAL MAPS EXHIBITS 10-10.9



Post-Development Nodal Diagram Phase 1

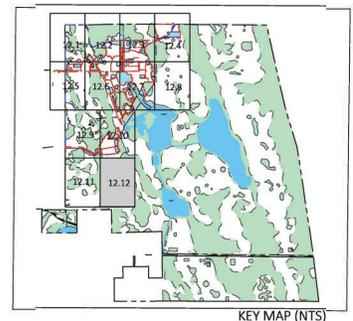
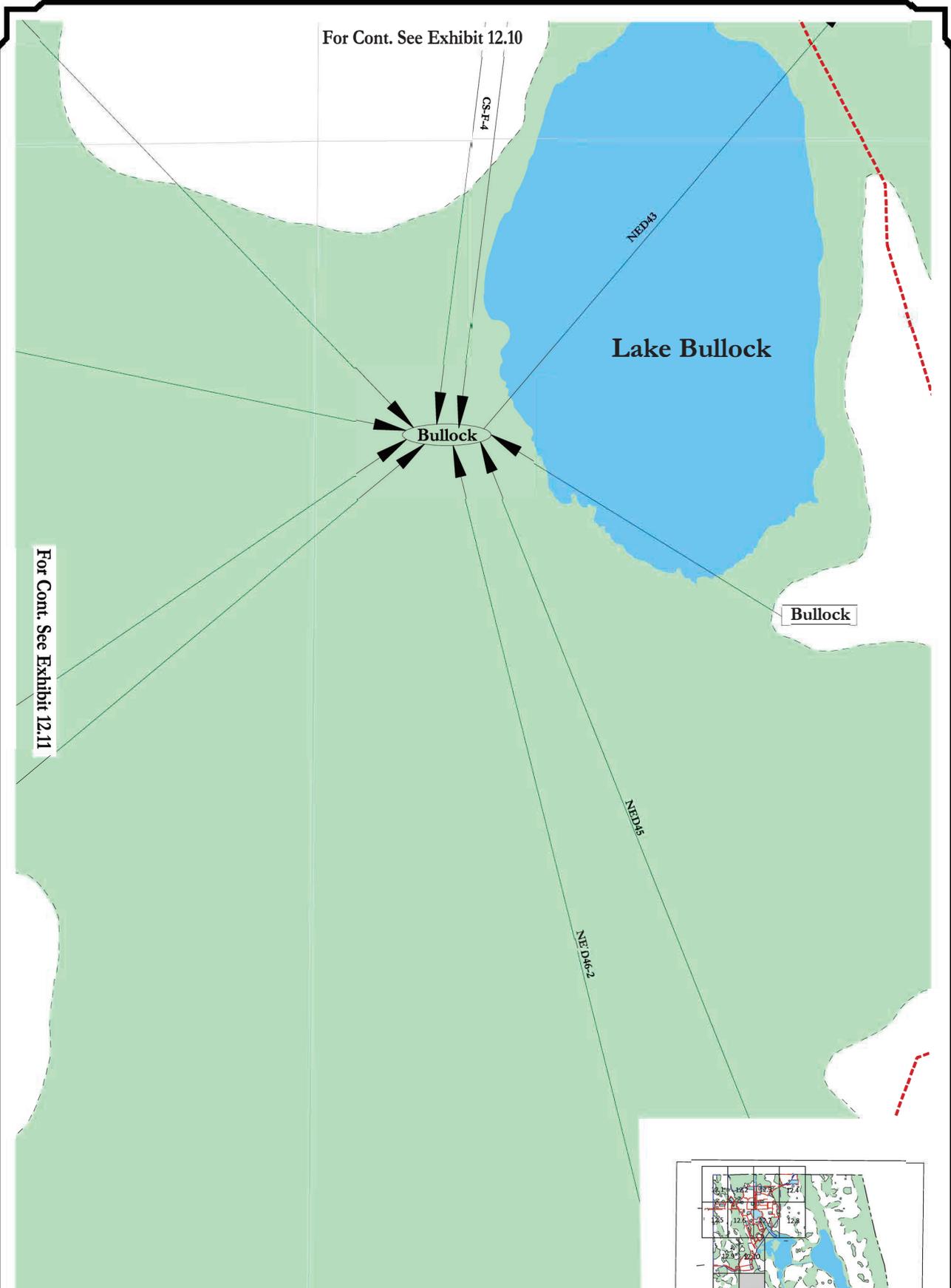
Sunbridge NED

POULOS & BENNETT



For Cont. See Exhibit 12.10

For Cont. See Exhibit 12.11



LEGEND

- B-W1** BASIN ID
- OVERLAND FLOW
- W1** NODE ID
- CANAL ID/NODE DISCHARGE LINK
- W6** TAILWATER ID

- PRIMARY DRAINAGE BASIN LINE
- SUNBRIDGE NED BOUNDARY
- PHASE 1 BOUNDARY

- WETLANDS
- PONDS
- LAKE/CANAL

Post-Development Nodal Diagram Phase 1

Sunbridge NED

POULOS & BENNETT



Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Max Avg Velocity [fps]
NED15-1 P - Pipe	5024	39.97	0.00	-0.07	0.00	0.00	0.00
NED15-1 P - Weir: 1	5024	39.97	0.00	-0.09	0.73	0.73	0.73
NED15-16	5024	46.81	-136.05	8.56	-6.93	-9.31	-7.74
NED15-2	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED15-2 C	5024	295.76	-0.71	-0.91	3.89	4.55	4.22
NED15-2 PBU	5024	50.79	0.00	0.34	2.64	4.12	3.38
NED15-3	5024	0.00	-111.83	2.28	-1.25	-1.25	-1.25
NED16-1 C - Pipe	5024	51.06	-0.38	7.45	0.00	0.00	0.00
NED16-1 C - Weir: 1	5024	51.06	-0.38	-0.08	4.27	4.27	4.27
NED18-1	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED18-2	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED20 - Pipe	5024	43.89	-0.42	43.89	0.00	0.00	0.00
NED20 - Weir: 1	5024	43.89	-0.62	-44.99	2.66	2.66	2.66
NED20 - Weir: 2	5024	0.00	-0.02	0.01	-0.01	-0.01	-0.01
NED20-1	5024	11.40	-63.39	14.59	-1.07	-1.07	-1.07
NED20-2	5024	3.31	-4.53	-3.67	0.33	0.33	0.33
NED22-1W	5024	30.46	-7.21	-0.04	0.61	0.61	0.61
NED22-2 C	5024	0.03	0.00	0.00	0.00	0.00	0.00
NED22-3 C	5024	23.82	0.00	0.01	3.20	4.78	3.99
NED23	5024	4.95	0.00	0.01	0.00	0.00	0.00
NED24	5024	11.97	0.00	0.02	0.67	0.67	0.67
NED25-2	5024	86.57	0.00	0.07	1.07	1.07	1.07
NED26	5024	395.83	0.00	-0.12	0.26	1.92	1.09
NED28	5024	38.19	0.00	0.03	1.08	1.08	1.08
NED29	5024	68.12	0.00	0.02	1.55	1.55	1.55
NED29 P - Pipe	5024	4.62	0.00	2.97	0.00	0.00	0.00
NED29 P - Weir: 1	5024	7.58	0.00	6.02	0.05	0.05	0.05
NED30	5024	23.74	0.00	0.02	1.39	1.39	1.39
NED31-1	5024	12.33	0.00	0.00	1.21	1.21	1.21
NED33	5024	21.27	-1.74	0.00	1.72	1.72	1.72
NED34-1	5024	43.77	0.00	0.01	2.81	2.81	2.81
NED34-2	5024	4.24	-4.49	0.00	-1.64	-1.64	-1.64
NED35	5024	60.24	0.00	0.01	2.97	2.97	2.97
NED37	5024	24.79	0.00	0.04	0.67	0.67	0.67
NED43	5024	496.10	0.00	-0.12	2.19	2.19	2.19
NED43-1	5024	314.30	0.00	0.06	2.27	2.27	2.27
NED43-2	5024	75.45	0.00	0.01	0.87	0.87	0.87
NED43-3	5024	95.99	0.00	0.02	0.97	0.97	0.97
NED43-4	5024	0.00	0.00	0.00	0.00	0.00	0.00

Link Name	Sim Name	Max Flow [cfs]	Min Flow [cfs]	Min/Max Delta Flow [cfs]	Max Us Velocity [fps]	Max Ds Velocity [fps]	Max Avg Velocity [fps]
NED45	5024	27.55	-45.08	0.04	-1.15	-1.15	-1.15
NED45-1	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED46-2	5024	36.33	0.00	1.84	0.04	0.04	0.04
NED46-3	5024	103.63	0.00	7.14	0.04	0.04	0.04
NED47	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED48-1	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED48-2	5024	1.52	-25.45	-0.44	-0.91	-0.91	-0.91
NED48-3	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED48-4	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED49	5024	59.84	-43.49	-3.90	0.65	0.65	0.65
NED49-1	5024	0.46	-0.01	0.00	0.06	0.06	0.06
NED49-2	5024	0.21	-8.04	0.00	-0.04	-0.04	-0.04
NED49-3	5024	0.00	-0.12	0.00	-0.05	-0.05	-0.05
NED50	5024	12.33	0.00	0.02	0.80	0.80	0.80
NED51	5024	12.42	0.00	0.01	0.97	0.97	0.97
NED52-1	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED52-2	5024	33.03	0.00	0.02	0.83	0.83	0.83
NED53	5024	46.15	0.00	0.05	0.81	0.81	0.81
NED54	5024	16.76	0.00	0.01	1.13	1.13	1.13
NED55	5024	8.10	0.00	0.01	0.00	0.00	0.00
NED56	5024	483.26	-37.40	0.50	1.39	1.39	1.39
NED56-1	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED57	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED57-1	5024	224.54	0.00	0.06	1.30	1.30	1.30
NED57-2	5024	154.37	0.00	0.04	1.49	1.49	1.49
NED59-1	5024	36.38	-1.00	-0.38	1.07	1.07	1.07
NED59-2	5024	1.50	-1.27	0.00	0.37	0.37	0.37
NED61-1	5024	6.94	0.00	0.01	0.81	0.81	0.81
NED61-3	5024	14.84	0.00	0.04	0.62	0.62	0.62
NED63	5024	0.01	-0.04	0.00	-0.05	-0.50	-0.27
NED63-1	5024	0.00	0.00	0.00	0.00	0.00	0.00
NED64	5024	8.51	0.00	0.00	1.24	1.24	1.24
NED65	5024	15.17	0.00	0.01	0.84	0.84	0.84
NED66	5024	243.39	0.00	1.41	0.36	0.36	0.36
NED67-1	5024	120.85	0.00	0.38	0.48	0.48	0.48
NED67-2	5024	6.19	-8.27	0.01	-0.40	-0.40	-0.40
NED68	5024	44.10	0.00	-23.62	0.20	0.20	0.20
NED68 C	5024	472.51	0.00	-277.18	3.08	2.97	3.03
NED68 D1	5024	445.15	0.00	4.08	1.54	1.54	1.54
NED68 P	5024	0.27	0.00	-0.17	0.27	0.30	0.29
NED69	5024	55.33	0.00	0.03	0.96	0.96	0.96
NED69 P - Pipe	5024	3.46	0.00	2.21	0.00	0.00	0.00
NED69 P - Weir: 1	5024	5.67	0.00	4.52	0.02	0.02	0.02
NED70	5024	9.17	0.00	0.19	0.08	0.08	0.08
NED71	5024	350.10	-8.53	1.06	2.73	2.73	2.73

aka PC-22

Pipe Link: C-16	Upstream	Downstream
Scenario: Icp3	Invert: 69.02 ft	Invert: 68.96 ft
From Node: NED71	Manning's N: 0.0120	Manning's N: 0.0120
To Node: NED65	Geometry: Rectangular	Geometry: Rectangular
Link Count: 1	Max Depth: 7.00 ft	Max Depth: 7.00 ft
Flow Direction: Both	Max Width: 10.00 ft	Max Width: 10.00 ft
Damping: 0.0000 ft	Fillet: 0.00 ft	Fillet: 0.00 ft
Length: 54.00 ft	Bottom Clip	
FHWA Code: 14	Default: 0.00 ft	Default: 0.00 ft
Entr Loss Coef: 0.50	Op Table:	Op Table:
Exit Loss Coef: 0.50	Ref Node:	Ref Node:
Bend Loss Coef: 0.00	Manning's N: 0.0120	Manning's N: 0.0120
Bend Location: 0.00 ft	Top Clip	
Energy Switch: Energy	Default: 0.00 ft	Default: 0.00 ft
	Op Table:	Op Table:
	Ref Node:	Ref Node:
	Manning's N: 0.0120	Manning's N: 0.0120

Comment: DWMA Survey-Cattle/Wildlife crossing under Nova Rd

Pipe Link: C-19-1	Upstream	Downstream
Scenario: Icp3	Invert: 64.36 ft	Invert: 64.27 ft
From Node: NED75	Manning's N: 0.0120	Manning's N: 0.0120
To Node: NED66	Geometry: Circular	Geometry: Circular
Link Count: 1	Max Depth: 2.33 ft	Max Depth: 2.33 ft
Flow Direction: Both	Bottom Clip	
Damping: 0.0000 ft	Default: 0.00 ft	Default: 0.00 ft
Length: 80.00 ft	Op Table:	Op Table:
FHWA Code: 1	Ref Node:	Ref Node:
Entr Loss Coef: 0.50	Manning's N: 0.0120	Manning's N: 0.0120
Exit Loss Coef: 0.50	Top Clip	
Bend Loss Coef: 0.00	Default: 0.00 ft	Default: 0.00 ft
Bend Location: 0.00 ft	Op Table:	Op Table:
Energy Switch: Energy	Ref Node:	Ref Node:
	Manning's N: 0.0120	Manning's N: 0.0120

Comment: DWMA Survey-Box culvert under Nova Rd

Pipe Link: C-19-2	Upstream	Downstream
Scenario: Icp3	Invert: 64.27 ft	Invert: 64.15 ft
From Node: NED75	Manning's N: 0.0120	Manning's N: 0.0120
To Node: NED66	Geometry: Circular	Geometry: Circular

Sunbridge NED Overall

Pre-Development Conditions

Link Count:	1	Max Depth:	2.33 ft	Max Depth:	2.33 ft
Flow Direction:	Both	Bottom Clip			
Damping:	0.0000 ft	Default:	0.00 ft	Default:	0.00 ft
Length:	80.00 ft	Op Table:		Op Table:	
FHWA Code:	1	Ref Node:		Ref Node:	
Entr Loss Coef:	0.50	Manning's N:	0.0120	Manning's N:	0.0120
Exit Loss Coef:	0.50	Top Clip			
Bend Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:		Op Table:	
Energy Switch:	Energy	Ref Node:		Ref Node:	
		Manning's N:	0.0120	Manning's N:	0.0120

Comment: DWMA Survey-Box culvert under Nova Rd

Pipe Link: C-20	Upstream	Downstream	
Scenario:	Icpr3	Invert: 66.14 ft	Invert: 66.22 ft
From Node:	NED75	Manning's N: 0.0240	Manning's N: 0.0240
To Node:	NED85	Geometry: Circular	Geometry: Circular
Link Count:	1	Max Depth: 2.00 ft	Max Depth: 2.00 ft
Flow Direction:	Both	Bottom Clip	
Damping:	0.0000 ft	Default:	0.00 ft
Length:	41.00 ft	Op Table:	
FHWA Code:	6	Ref Node:	
Entr Loss Coef:	0.90	Manning's N: 0.0240	Manning's N: 0.0240
Exit Loss Coef:	0.50	Top Clip	
Bend Loss Coef:	0.00	Default:	0.00 ft
Bend Location:	0.00 ft	Op Table:	
Energy Switch:	Energy	Ref Node:	
		Manning's N: 0.0240	Manning's N: 0.0240

Comment: DWMA Survey

Drop Structure Link: C-21	Upstream Pipe	Downstream Pipe	
Scenario:	Icpr3	Invert: 63.47 ft	Invert: 63.28 ft
From Node:	NED85	Manning's N: 0.0120	Manning's N: 0.0120
To Node:	NED66	Geometry: Rectangular	Geometry: Rectangular
Link Count:	1	Max Depth: 4.00 ft	Max Depth: 4.00 ft
Flow Direction:	Both	Max Width: 8.00 ft	Max Width: 8.00 ft
Solution:	Combine	Fillet: 0.00 ft	Fillet: 0.00 ft
Increments:	10	Bottom Clip	
Pipe Count:	1	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:	
Length:	63.00 ft	Ref Node:	
FHWA Code:	14	Manning's N: 0.0120	Manning's N: 0.0120
Entr Loss Coef:	0.50	Top Clip	
Exit Loss Coef:	0.50	Default:	0.00 ft
Bend Loss Coef:	0.00	Op Table:	

Sunbridge NED Overall
Pre-Development Conditions

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
NED26	10024	75.00	65.59	0.0002	468.25	437.24	5526650
NED28	10024	77.00	71.26	0.0005	67.29	48.23	687340
NED29	10024	76.00	70.10	0.0003	121.08	235.98	2141153
NED30	10024	73.00	69.30	0.0006	26.83	22.92	243083
NED31	10024	75.00	69.33	0.0002	15.64	14.51	229257
NED33	10024	74.00	68.77	0.0003	98.35	26.08	1685503
NED34	10024	76.00	68.68	0.0004	84.80	60.01	1177514
NED35	10024	72.00	67.84	0.0005	74.06	71.43	482220
NED36	10024	74.00	68.74	0.0003	101.01	8.60	1688686
NED37	10024	74.00	68.08	0.0004	32.02	30.39	374898
NED43	10024	69.00	64.19	0.0005	670.90	667.30	6315416
NED45	10024	70.00	64.29	0.0002	189.40	46.99	5062369
NED46	10024	71.00	64.90	0.0000	157.46	157.45	4781925
NED47	10024	70.00	64.17	0.0005	249.28	142.96	2698130
NED48	10024	68.00	64.17	0.0004	72.34	11.91	1632083
NED49	10024	68.00	64.16	0.0002	123.25	52.03	3157024
NED50	10024	67.00	64.16	0.0005	14.52	14.28	139997
NED51	10024	67.00	64.94	0.0004	20.59	15.23	231506
NED52	10024	67.00	64.17	0.0001	37.63	37.43	527726
NED53	10024	71.00	65.13	0.0004	53.89	53.08	648350
NED54	10024	71.00	64.62	0.0003	20.44	19.38	236328
NED55	10024	71.00	65.05	0.0004	20.75	11.22	301472
NED56	10024	72.00	64.17	0.0001	545.74	538.96	9459954
NED57	10024	69.00	64.31	0.0001	253.33	252.24	1674887
NED59	10024	69.00	64.17	0.0006	64.10	60.29	637364
NED61	10024	70.00	64.17	0.0005	25.25	25.03	224742
NED63	10024	78.00	64.17	0.0005	24.20	16.32	307942
NED64	10024	70.00	64.51	0.0001	13.29	10.04	395171
NED65	10024	78.00	65.13	0.0001	17.29	17.19	208956
NED66	10024	73.00	64.17	0.0000	265.32	265.28	3306559
NED67	10024	73.00	64.17	0.0000	141.38	141.10	1886536
NED68	10024	80.00	64.48	0.0002	702.36	708.32	9057588
NED68 D1	10024	80.00	64.47	0.0010	555.98	491.00	55151

PRELIMINARY DESIGN REPORT

SUNBRIDGE

WATER RECLAMATION FACILITY

PHASE I

PREPARED FOR:

TAVISTOCK EAST II, LLC
Project #SLR-31

TAVISTOCK[®]
— G R O U P —

PREPARED BY:

Reiss Engineering, Inc.
1016 Spring Villas Pt.
Winter Springs, Florida 32708
(407) 679-5358

REI Project No. 164003



REISS ENGINEERING

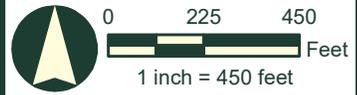
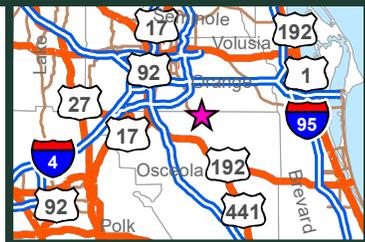
January 2021



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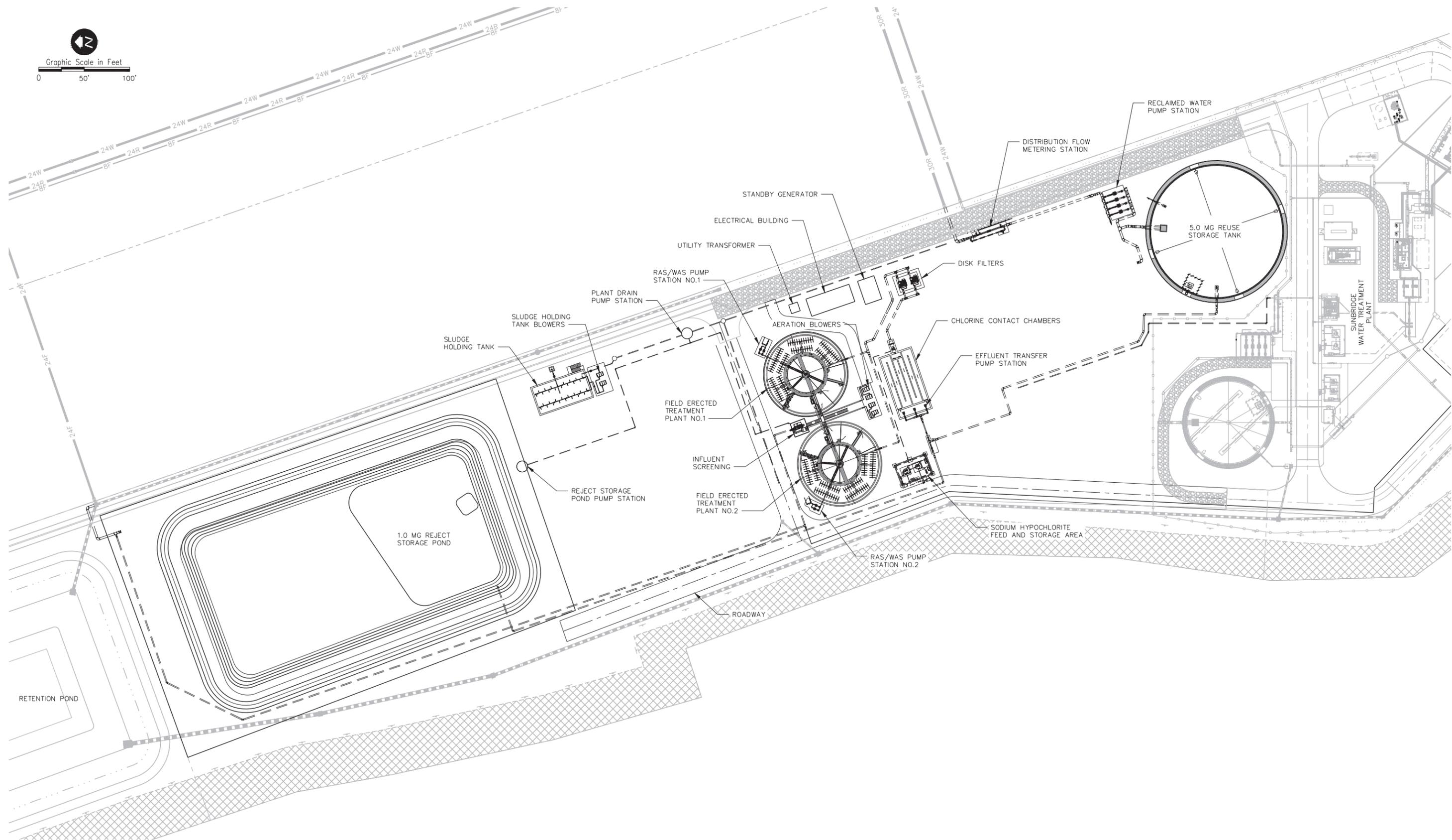
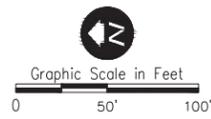
Legend

-  Project Boundary
-  Proposed Water Treatment Facility
-  Surface Water Impact
-  Upland Buffer (3.71 ac)
-  Wetland (In Buffer)



**EXHIBIT 7 (REVISED).
PROPOSED DEVELOPMENT PLAN FOR THE WATER AND WASTEWATER
FACILITY PROJECT SITE, OSCEOLA COUNTY, FLORIDA.**

BDA BREEDLOVE, DENNIS & ASSOCIATES, INC.
Environmental Consultants
330 W. Canton Ave., Winter Park, FL 32789 • 407-677-1882



SUNBRIDGE WATER RECLAMATION FACILITY