Taylor Road
Stormwater Improvements

Volusia County | March 2025

TAYLOR ROAD
STORMWATER IMPROVEMENTS

Prepared for:

Volusia County

2560 W. State Road 44

DeLand, Florida 32720

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Jones Edmunds Project No.: 22015-038-01

March 2025

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Appendix A Consumptive Use Permit Technical Report

Appendix B Geotechnical Report

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ACRONYMS AND ABBREVIATIONS

ASTM	American Society of Testing and Materials
CFS	Cubic Feet per Second
DEM	Digital Elevation Model
FELSI	Florida Environmental & Land Services, Inc
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
GPM	Gallons Per Minute
H&H	Hydrologic and Hydraulic
ID	Identification
LiDAR	Light Detection and Ranging
NGVD29	National Geodetic Datum of 1929
NAVD88	North American Vertical Datum of 1988
O&M	Operations and Maintenance

1 BACKGROUND

The extension of Taylor Road from Blue Lake Avenue to the West Volusia Beltline, completed in the late 1990s, included a dry retention pond constructed to manage stormwater runoff from the new road segment. Designed to retain all runoff without discharge, the pond relied on percolation to recover its volume.

In recent years, residents in this region have reported an increased frequency of standing water and elevated water tables in their yards, conditions that had not previously been observed. Likewise, the retention pond has also faced prolonged inundation, struggling to recover the runoff volume. This issue has been particularly evident following consecutive rainfall events or major storms. In 2020, the area received a record 57 inches of rain between May and October, resulting in standing water on many properties in this region. As a point of reference, the average annual rainfall for Volusia County typically ranges from 53 to 55 inches, highlighting the severity of this single wet season.

The trend of extreme rainfall events has continued in recent years. In September 2022, Hurricane Ian brought 11 inches of rainfall, submerging portions of Taylor Road under nearly 8 inches of water. Most recently, Hurricane Milton delivered an average of 16 inches of rainfall across Volusia County, with the City of Deland recording 18.32 inches at their Utilities Department weather station. This storm was compounded by already saturated ground, causing significant flooding, inundating many residential yards, and submerging Taylor Road with as much as 2 to 3 feet of water. This persistent flooding impacts the properties in the area, the pond, and Taylor Road.

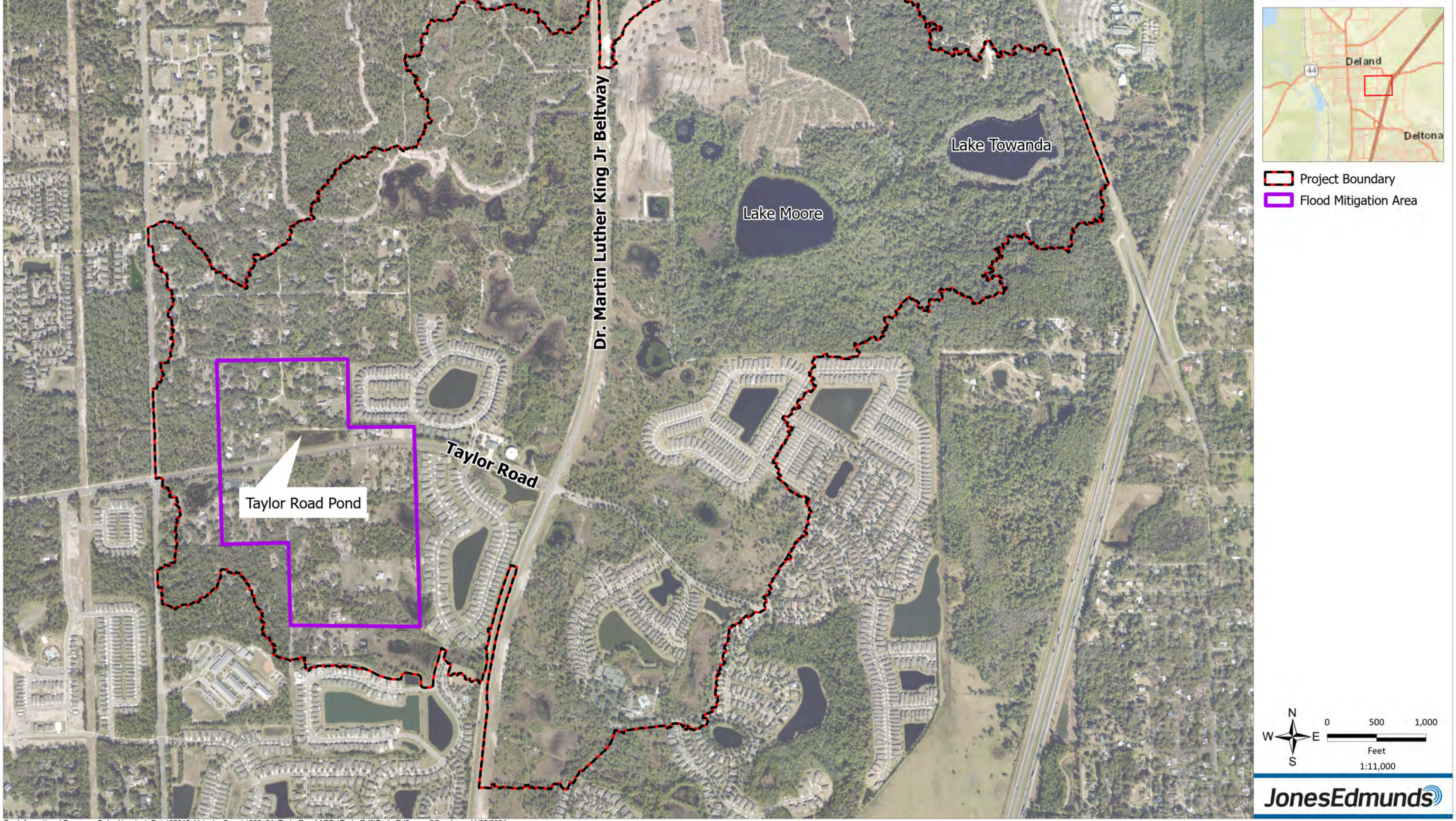
Volusia County received approximately 78 inches of rainfall in 2024 according to the Melbourne Office of National Weather Service, far surpassing the County's average annual rainfall. In response to the increasing frequency and severity of these flooding events, Volusia County initiated investigations to determine the underlying flood risks for the area and explore potential solutions.

The County engaged Jones Edmunds, under the Continuing Stormwater Engineering Services Contract No. 3535, to conduct a detailed stormwater study of Taylor Road and the surrounding areas, including the contributing area to Lake Moore, a potential outfall for the system. The primary goal of this study is to develop a hydrologic and hydraulic (H&H) model that accurately represents the stormwater dynamics of the area. The outcomes of this study will inform future stormwater engineering efforts and help guide infrastructure improvements aimed at enhancing flood resilience in the region. The second goal of this study is to evaluate potential improvements to the flooding problems in this area. Figure 1 shows the flood-mitigation target area.

Figure 1

Flood Mitigation Target Area

Taylor Road Stormwater Improvements



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2 SUMMARY OF WORK

This engineering study evaluates the potential flooding from significant storms in the areas adjacent to Taylor Road in Volusia County and identifies feasible projects to mitigate flooding impacts. Jones Edmunds completed the following tasks for this project:

- Model Development:
  - Data Collection and Analysis: Collected and analyzed construction drawings, rainfall records, Natural Resources Conservation Service (NRCS) soil data, Federal Emergency Management Agency (FEMA) floodplain data, and historical flooding reports to establish a baseline understanding of the existing and historical flood conditions in the area.
  - Stormwater Modeling: Developed a detailed stormwater model to accurately represent the existing conditions.
- Model Verification: Verified the model's results against known data.
- Alternatives Evaluation: Developed alternative stormwater improvement concepts aimed at flood reduction for Taylor Road and the surrounding areas.
- Planning-Level Construction Cost Estimates: Prepared planning-level construction cost estimates for the proposed flood-mitigation alternatives based on 2024 capital costs.

3 MODEL DEVELOPMENT

Jones Edmunds developed a comprehensive stormwater model for Taylor Road using the 2018 Volusia County Digital Elevation Model (2018 DEM), the County's stormwater inventory, and Environmental Resource Permits from the St. Johns River Water Management District (SJRWMD). The stormwater model version used for this analysis was Interconnected Pond and Channel Routing (ICPR), version 4.07.08, released in February 2021. The model incorporates all contributing areas to the pond north of Taylor Road as well as the contributing areas to Lake Moore. Figure 2 illustrates the model boundary and the ICPR basins.

3.1 TOPOGRAPHY

The digital topographic information for this project was the 2018 DEM derived from the Florida Statewide LiDAR initiative in 2018. Jones Edmunds used the DEM for delineating basin boundaries, determining storage, and mapping floodplain. Within the study area, the topography ranges from 60 to 100 feet North American Vertical Datum of 1988 (NAVD88). The DEM contained the recently constructed subdivision, Victoria Trails, located east of the flood-mitigation targeted area.

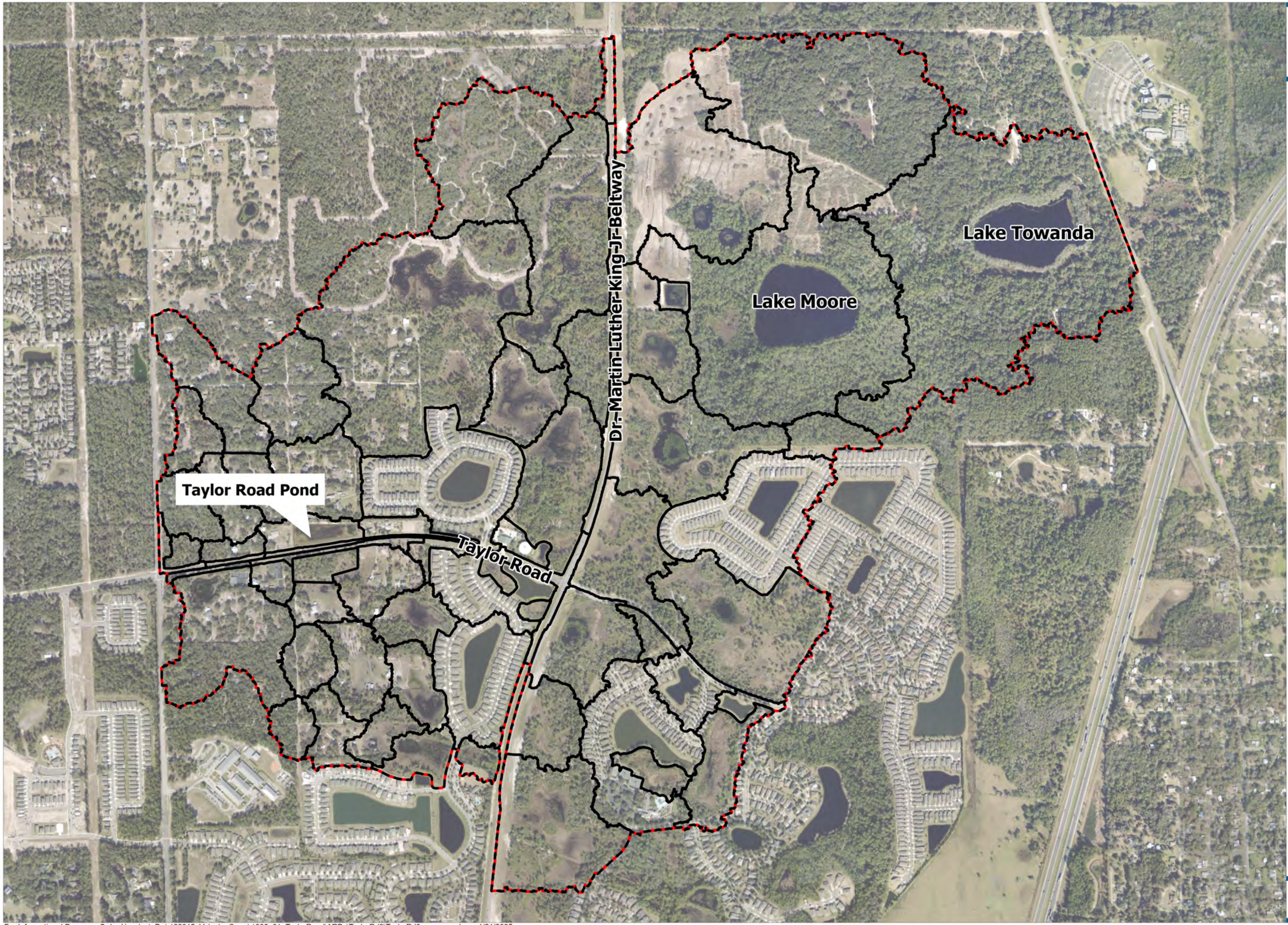

Figure 2

Overall Model Boundary

Taylor Road Stormwater Improvements

ICPR Basin
Project Boundary

N W E S

0 500 1,000 Feet

1:11,000

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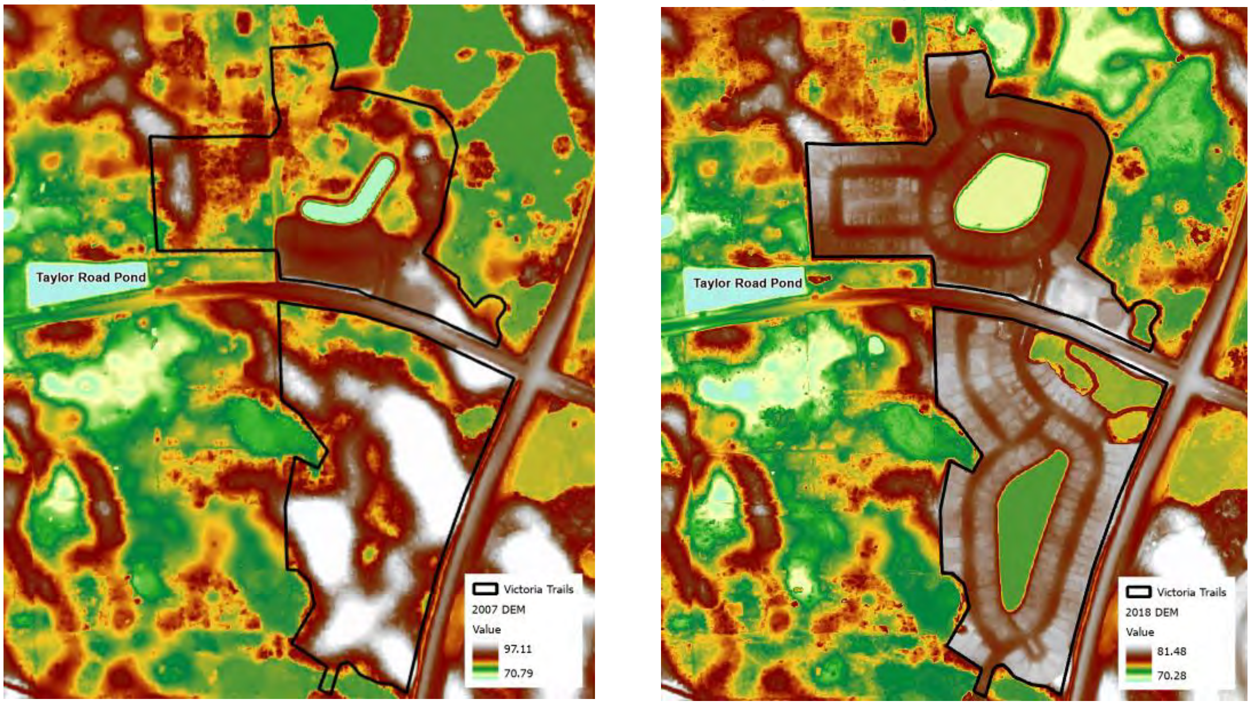
As part of the flooding-cause determination, Jones Edmunds reviewed the pre-development DEM collected in 2007 by the Volusia County Geographic Information Services department and compared it to the 2018 DEM. The comparison shows the Victoria Trails subdivision runoff being routed to the on-site pond compared to the pre-development condition, where a portion of the runoff contributes to the flood mitigation-targeted area. Since the subdivision is within a closed basin, it was designed to retain the 100-year/24-hour runoff with an emergency overflow set at 14.64 inches above the 100-year/24-hour design elevation. Figure 3 illustrates the pre-development and post-development terrain of Victoria Trails.

Figure 3 Pre-Development Versus Post-Development Topography



Pre-Development *Post-Development*

3.2 Plan Data

Jones Edmunds used various construction plans and associated survey data to develop the hydraulic model. Key plans included:

- Taylor Road Extension from Blue Lake Avenue to the West Volusia Beltline
- West Volusia Beltline
- Victoria Park Revisions 20, 28, 44, 51, 53, 66, 67, 68, 74, 76, and 85
- Summit Place

Jones Edmunds also used the County Stormwater Inventory to develop proper flow routing of stormwater runoff throughout the watershed.

3.3 Consumptive Use Permit

The Victoria Trails subdivision is part of the larger 1,873-acre Victoria Park master plan, where irrigation demand is managed SJRWMD under consumptive use permits Nos. 68916-4 and 68916-5. These permits allow stormwater ponds to be integrated with reclaimed water from the City of DeLand and groundwater from the Upper Floridan Aquifer to meet irrigation needs. Irrigation water is predominantly supplied by on-site stormwater systems and reclaimed water. To address any shortfalls, a well drawing from the Upper Floridan Aquifer was constructed, capable of supplying up to 0.133 million gallons per day (MGD) when stormwater and reclaimed water resources are insufficient.

The SJRWMD staff worked with the permittee to identify and implement water conservation measures for both the golf course and residential areas that ensure no harm to on-site or off-site water resources. These efforts included:

- Limiting outdoor residential water use to a 2.5-hour window twice per week during daylight savings time and once per week during the rest of the year.
- Installing a smart irrigation-controller system to receive feedback from on-site weather stations on climate or soil moisture measurements and adjust the irrigation application to match plant needs.
- Providing sprinkler head design and layout to reach turf grass only without overspray.
- Using on-site weather stations and rain gauges to determine irrigation scheduling.
- Constructing lined ponds throughout the community that store reclaimed water and stormwater for irrigation.
- Mulching around plants to conserve soil moisture.
- Limiting high-frequency irrigation to tees and greens.
- Minimizing fairway irrigation frequency.
- Not irrigating non-playable areas.
- Installing low-pressure and high-pressure triggers to stop pumping if a line break occurs.
- Setting a night-time irrigation schedule to reduce evaporative losses.
- Constructing dual water lines with separate irrigation systems.
- Using xeriscape materials and micro-irrigation.
- Installing rainfall shutoff devices to prevent irrigation during rain events.
- Eliminating overseeding on greens and tees, fairways, roughs, and landscape areas.

SJRWMD staff evaluated the consumptive use at the project site and found that historical water use has not altered the existing hydrology or caused an unmitigated adverse impact to the natural systems, including wetlands or other surface waters. Appendix A includes the Consumptive Use Technical Staff Report for permit No. 68916-4.

3.4 Soil

Soil information was obtained from the NRCS Soil Survey Geographic (SSURGO) dataset. These data were clipped to the Taylor Road model area. Figure 4 illustrates the soils in the project area by hydrologic soil group, and Table 1 summarizes the soil groups by percentage.

Figure 4 Soils in the Project Area

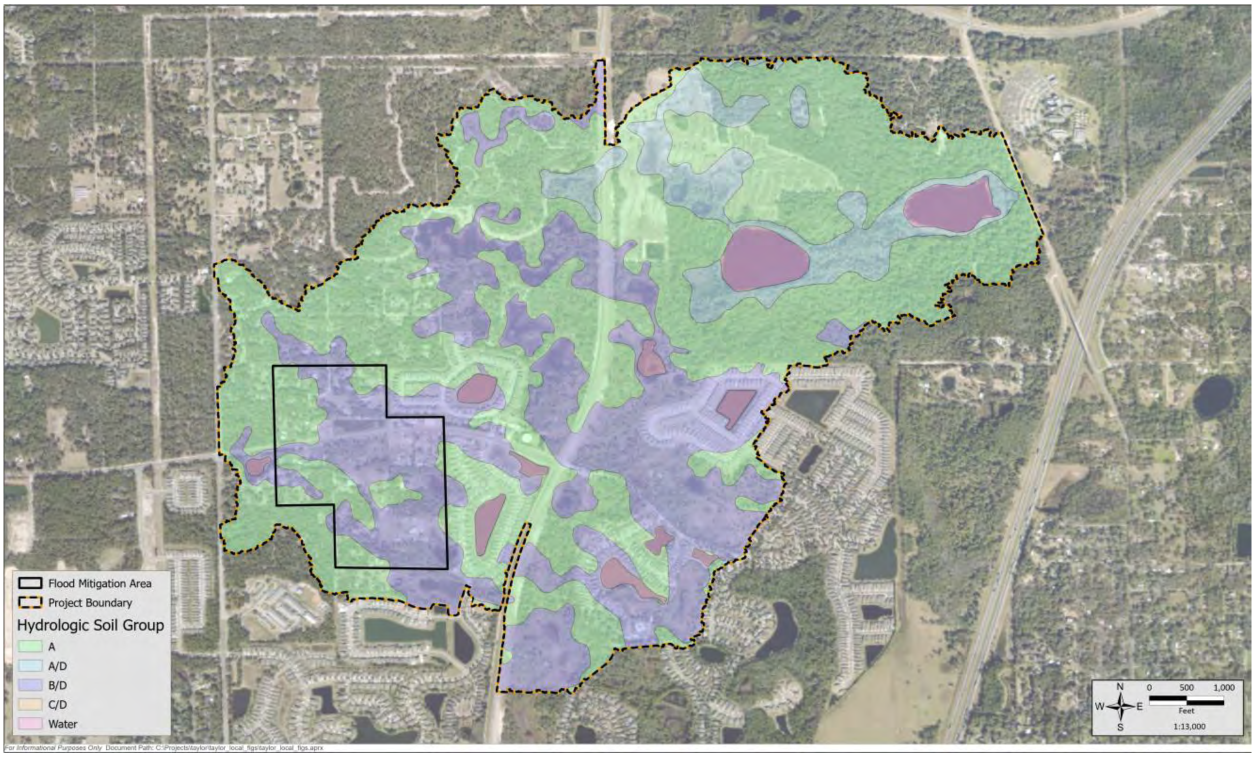


Table 1 Summary of Soils

Hydrologic Soil Group	Percent of Project Area (%)	Flood Mitigation Area (%)
A	56	36
A/D	8	Not Applicable
B/D	32	64
Water	4	Not Applicable

*Water consists of 61-percent lakes and 39-percent stormwater ponds.

The model area consists of 56-percent Type A soils, which are well-drained with a relatively deep water table. Approximately 32 percent of the model area is covered by Type B/D soils. These soils exhibit characteristics of moderately well-drained Type B soils during the dry season; however, in the wet season, they behave like poorly drained Type D soils due to a relatively shallow water table. Additionally, 8 percent of the area contains Type A/D soils, which show similar dual-seasonal behavior to Type B/D soils. Within the flood mitigation area, 64 percent is covered by Type B/D soils.

A field exploration conducted by Ardaman and Associates included a Standard Penetration Test boring, located on the western bank of the Taylor Road Pond, to a depth of 30 feet below the existing ground surface. Table 2 summarizes the general soil profile.

Table 2 Soil Profile

Depth Below Ground Surface (feet)	Description (Unified Soil Classification)
0 to 9	Very Loose Fine Sand (SP) and Fine Sand with Silt (SP-SM)
9 to 17.5	Loose Fine Sand (SP)
17.5 to 30	Loose to Medium Dense Clayey Fine Sand (SC) and Silty Fine Sand (SM)

The upper soils, consisting of fine sand (SP) and fine sand with silt (SP-SM) from 0 to 9 feet, are classified as relatively permeable, allowing for effective infiltration. In contrast, the lower strata, composed of clayey fine sand (SC) and silty fine sand (SM) from 17.5 to 30 feet, exhibit significantly lower permeability and function as aquitards, impeding water movement while still permitting limited transmission.

These findings align with observed site conditions. During dry periods, the storage capacity of the area recovers due to the relatively permeable upper soils. However, during periods of historical rainfall, when the storage capacity of the upper layer is used, the presence of less permeable soils exacerbates flooding potential by slowing water infiltration and drawdown, leading to prolonged water retention in the area. Additionally, the normal seasonal high groundwater level was estimated to be about 1.8 ft below the surface. Appendix B provides the full geotechnical report.

3.5 Land Use

Jones Edmunds obtained land use data for the project area from the 2020 SJRWMD Geographic Information System (GIS) dataset. Table 3 summarizes the land use information for each major drainage area, categorized according to the Florida Land Use, Cover and Classification System (FLUCCS). Figure 5 illustrates the land use distribution across the project area.

Table 3 Summary of Land Use

FLUCCS Code	FLUCCS Description	Percent Area (%)
1100	Residential, low-density – less than 2 dwelling units/acre	0.1
1180	Rural residential	16.2
1190	Low-density under construction	0.3
1200	Residential, medium-density – 2 to 5 dwelling units/acre	12.2
1300	Residential, high-density – 6 or more dwelling units/acre	0.4
1700	Institutional	0.5
1860	Community recreational facilities	1.1
2110	Improved pastures	0.4
3100	Herbaceous upland non-forested	0.6
3200	Shrub and brushland	4.6
3300	Mixed upland non-forested	0.7
4110	Pine flatwoods	9.2

FLUCCS Code	FLUCCS Description	Percent Area (%)
4120	Longleaf pine – xeric oak	4.0
4200	Upland hardwood forests	7.8
4210	Xeric oak	5.9
4340	Upland mixed coniferous/hardwood	4.8
4410	Pine plantation	0.5
5200	Lakes	2.8
5300	Reservoirs – pits, retention ponds, dams	1.7
6170	Mixed wetland hardwoods	0.8
6250	Hydric pine flatwoods	2.0
6300	Wetland forested mixed	3.2
6410	Freshwater marshes	3.4
6430	Wet prairies	3.1
6440	Emergent aquatic vegetation	3.1
6460	Mixed scrub-shrub wetland	0.9
7410	Rural land in transition without positive indicators of intended activity	6.2
8140	Roads and highways (divided four-lanes with medians)	3.4

The land use in this area is primarily dominated by rural residential development, covering 6.2 percent of the total land, and medium-density residential areas, which account for 12.2 percent. Other residential categories, such as high-density and low-density development, occupy much smaller portions of the land, including areas still under construction. Most of the landscape consists of natural areas, with pine flatwoods making up 9.2 percent and upland hardwood forests covering 7.8 percent. Wetlands also form a key part of the land use, including wetland forested mixed (3.2 percent) and freshwater marshes (3.4 percent). Lakes, reservoirs, and other water bodies account for about 4.5 percent of the total area. Rural land in transition (6.2 percent) and roads and highways (3.4 percent) also highlight ongoing development and infrastructure in the region.

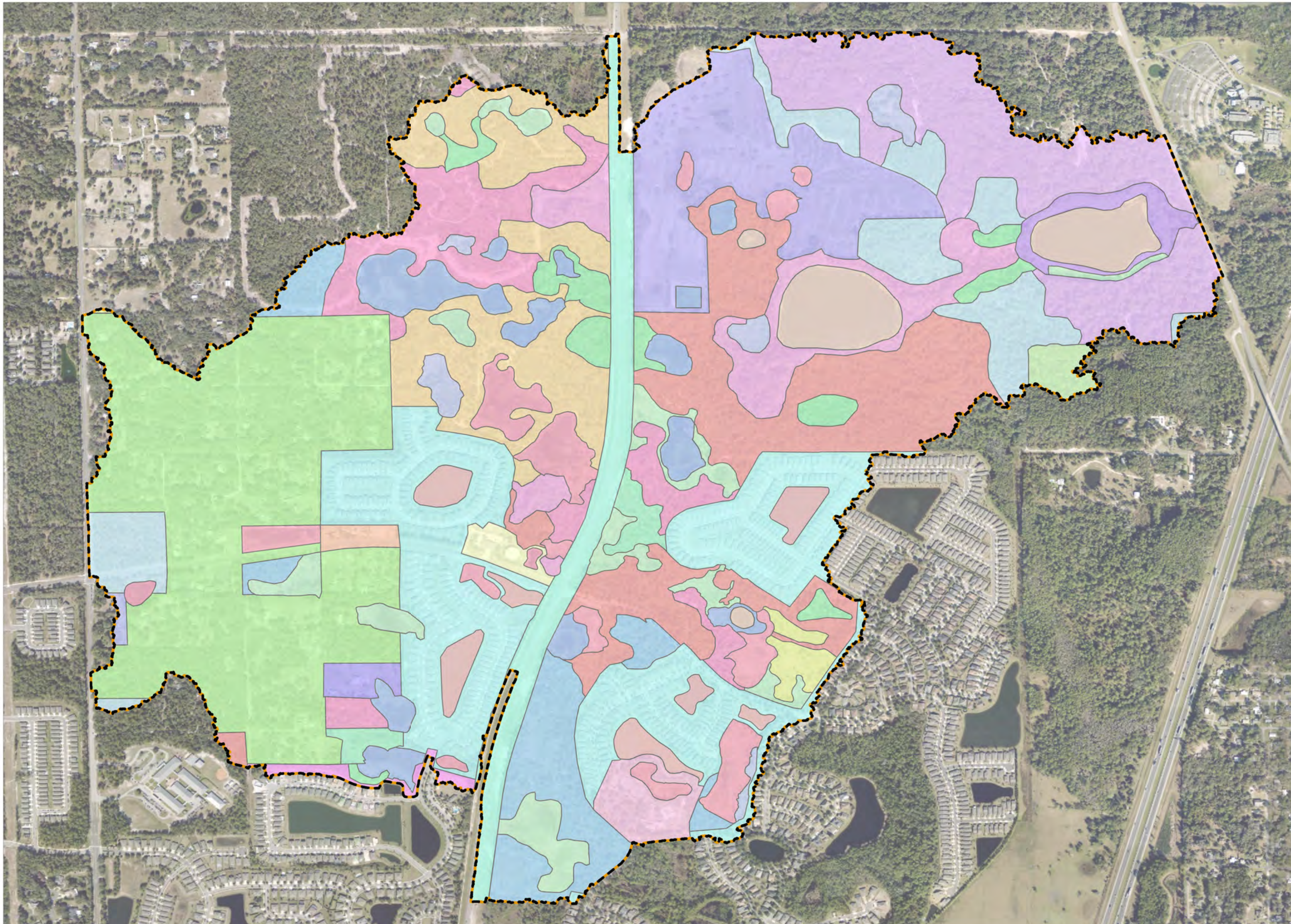
4 MODEL VERIFICATION

This section describes the process used to verify the Taylor Road model. The goal was to develop an H&H model that reflects observed conditions in the watershed and that can be used to predict system performance under design storm events as well as the benefits and impacts of proposed stormwater improvements.

Figure 5

Land Use Distribution

Taylor Road Stormwater Improvements



Land Use

- 1100: Residential, low density
- 1180: Rural residential
- 1190: Low density under construction
- 1200: Residential, medium density
- 1300: Residential, high density
- 1700: Institutional
- 1860: Community recreational facilities
- 2110: Improved pastures
- 3100: Herbaceous upland nonforested
- 3200: Shrub and brushland
- 3300: Mixed upland nonforested
- 4110: Pine flatwoods
- 4120: Longleaf pine - xeric oak
- 4200: Upland hardwood forests
- 4210: Xeric oak
- 4340: Upland mixed coniferous/hardwood
- 4410: Pine plantation
- 5200: Lakes
- 5300: Reservoirs
- 6170: Mixed wetland hardwoods
- 6250: Hydric pine flatwoods
- 6300: Wetland forested mixed
- 6410: Freshwater marshes
- 6430: Wet prairies
- 6440: Emergent aquatic vegetation
- 6460: Mixed scrub-shrub wetland
- 7410: Rural land in transition without
- 8140: Roads and highways

N W E S

0 500 1,000

Feet

1:11,000

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4.1 Storm Event Selection

Hurricane Ian was identified as the most recent significant storm event based on input from City/County staff at the kickoff meeting. The area experienced an average of 14 inches of rainfall during that storm, which is about 3 inches more rainfall than the 100-year/24-hour event. During the course of this study, Hurricane Milton passed directly over the Taylor Road Stormwater Improvements project area. The storm delivered an average of 16 inches of rainfall in the area, exceeding the 100-year/24-hour event by approximately 5 inches. These storms had significant impacts on Volusia County and the City of DeLand, which experienced extensive damage due to heavy rainfall and high winds. In many parts of Volusia County, including the project area, roads were closed for days due to standing water.

4.2 Rainfall

Rainfall data were collected from the SJRWMD Next Generation Weather Radar (NEXRAD) pixel grid. Data were available at 1-hour increments. These data served as the primary hydrological input for the model verification.

4.3 Verification Data

Data available for verifying this model were limited; however, the County provided key observations for Hurricanes Ian and Milton:

- **Hurricane Ian**: Floodwaters overtopped Taylor Road by approximately 6 to 8 inches above the roadway crown.
- **Hurricane Milton**: Before Hurricane Milton, the Taylor Road pond was already at full capacity. Approximately 2 to 3 feet of flooding was observed. The homes directly north and west of the pond experienced flooding that exceeded their finished floor elevations. Taylor Road remained impassable for 10 days while the County conducted continuous pumping operations to divert the flood water to Lake Moore.

4.4 Results

4.4.1 Hurricane Ian

The model results indicate that the peak stages were 2 inches above the observed values recorded by County staff after the event. The model simulated flooding over the road at 10 inches, while County staff observed the depth of flooding at approximately 8 inches, resulting in a difference of 0.15 feet. The slight difference could be accounted for by the observations being taken after the peak stages had slightly resided. The minimal variation demonstrates the model’s reliability for future flood risk assessments. Figure 6 illustrates the extent of the floodplain impacted by Hurricane Ian.

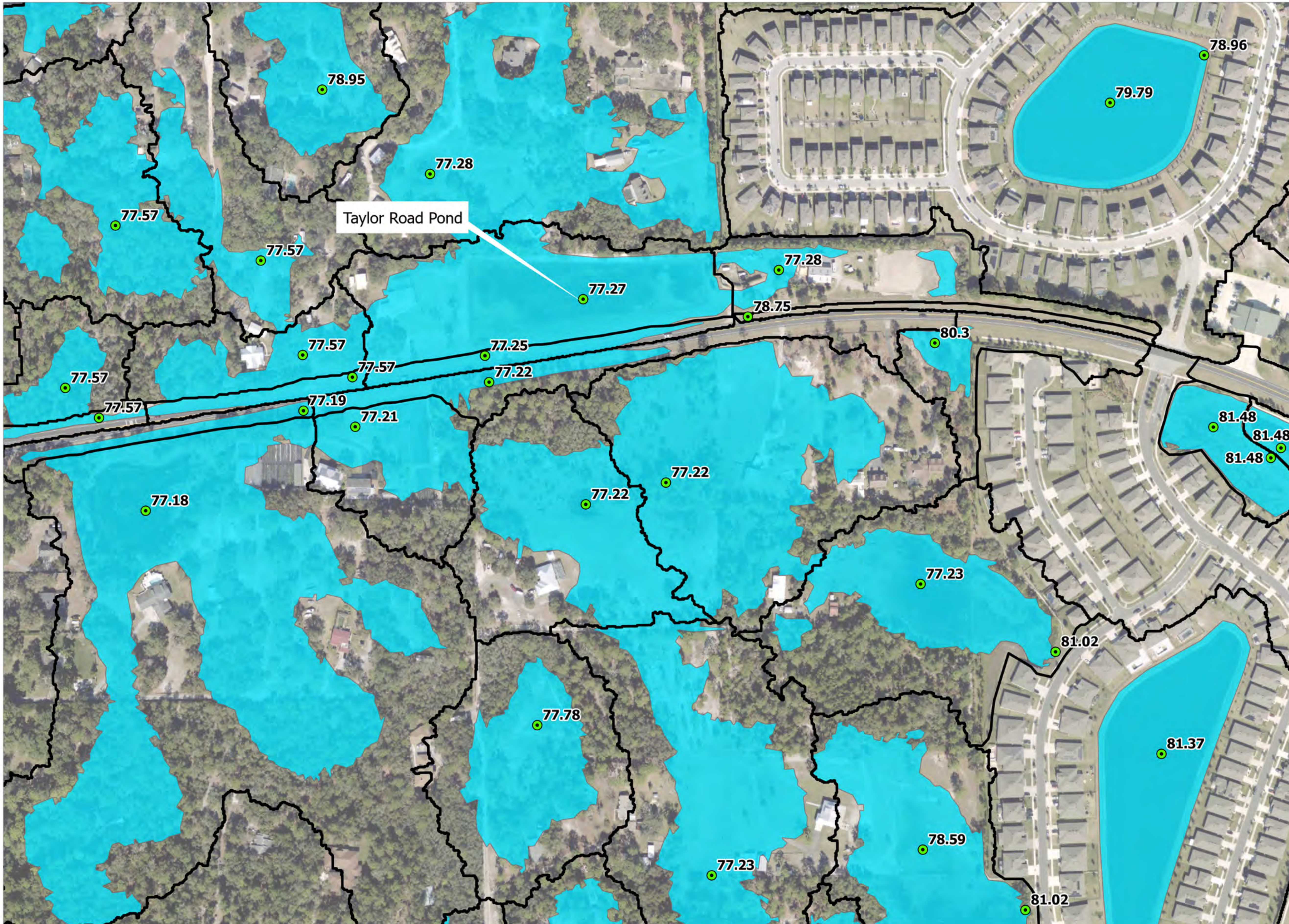

Figure 6

Hurricane Ian Floodplains

Taylor Road Stormwater Improvements

ICPR Node
ICPR Basin
Hurricane Ian Floodplain

N W E S

0 125 250
Feet
1:3,000

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4.4.2 Hurricane Milton

Before Hurricane Milton, the area was already experiencing significantly oversaturated conditions due to slow soil percolation rates and exceptionally high rainfall earlier in the year. In the 30 days leading up to the storm, the DeLand 3.9 SSE rainfall gauge recorded 12.5 inches of rain, resulting in extremely wet conditions. These pre-existing conditions were further exacerbated by the additional 16 inches of rainfall brought by Hurricane Milton, compounding the severity of flooding in the region.

The model simulated flood depths ranging from 2 feet over Taylor Road and 3 feet over the top of the bank of the Taylor Road Pond, further confirming the approximate depth observed by County field staff. The inundation extent also confirms the flooding at the home directly northwest of the pond. Figure 7 illustrates the floodplain extents associated with Hurricane Milton.

4.4.3 FEMA Floodplains

Following verification, the simulation results for the 100-year/24-hour storm were compared to the existing FEMA floodplains in the area. Figure 8 shows that although the FEMA floodplains do not encompass the entire model area, the overlapping areas align well with the model results. This consistency further supports the validity and performance of the model.

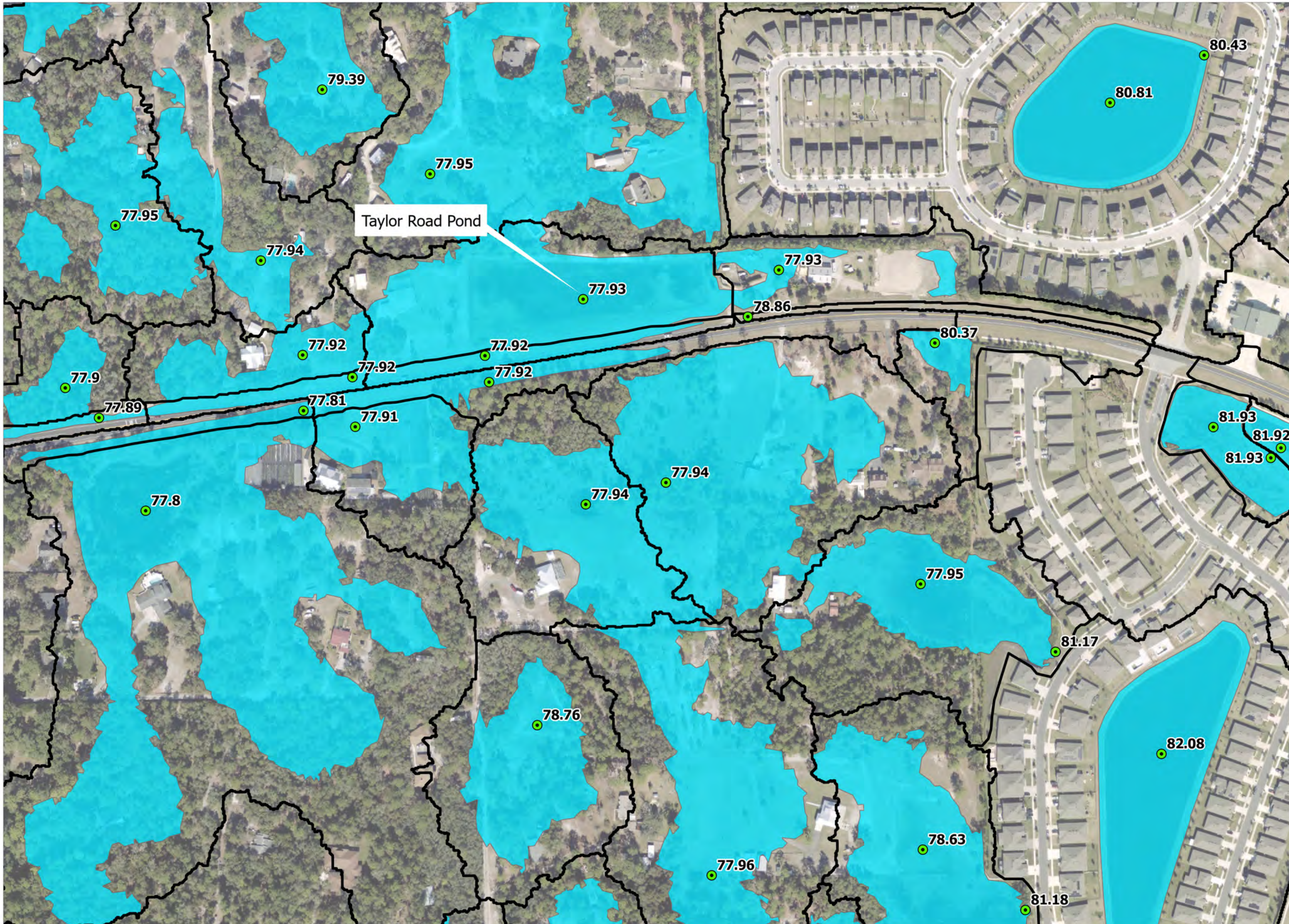

Figure 7

Hurricane Milton Floodplains

Taylor Road Stormwater Improvements

- ICPR Node
- ICPR Basin
- Hurricane Milton Floodplain

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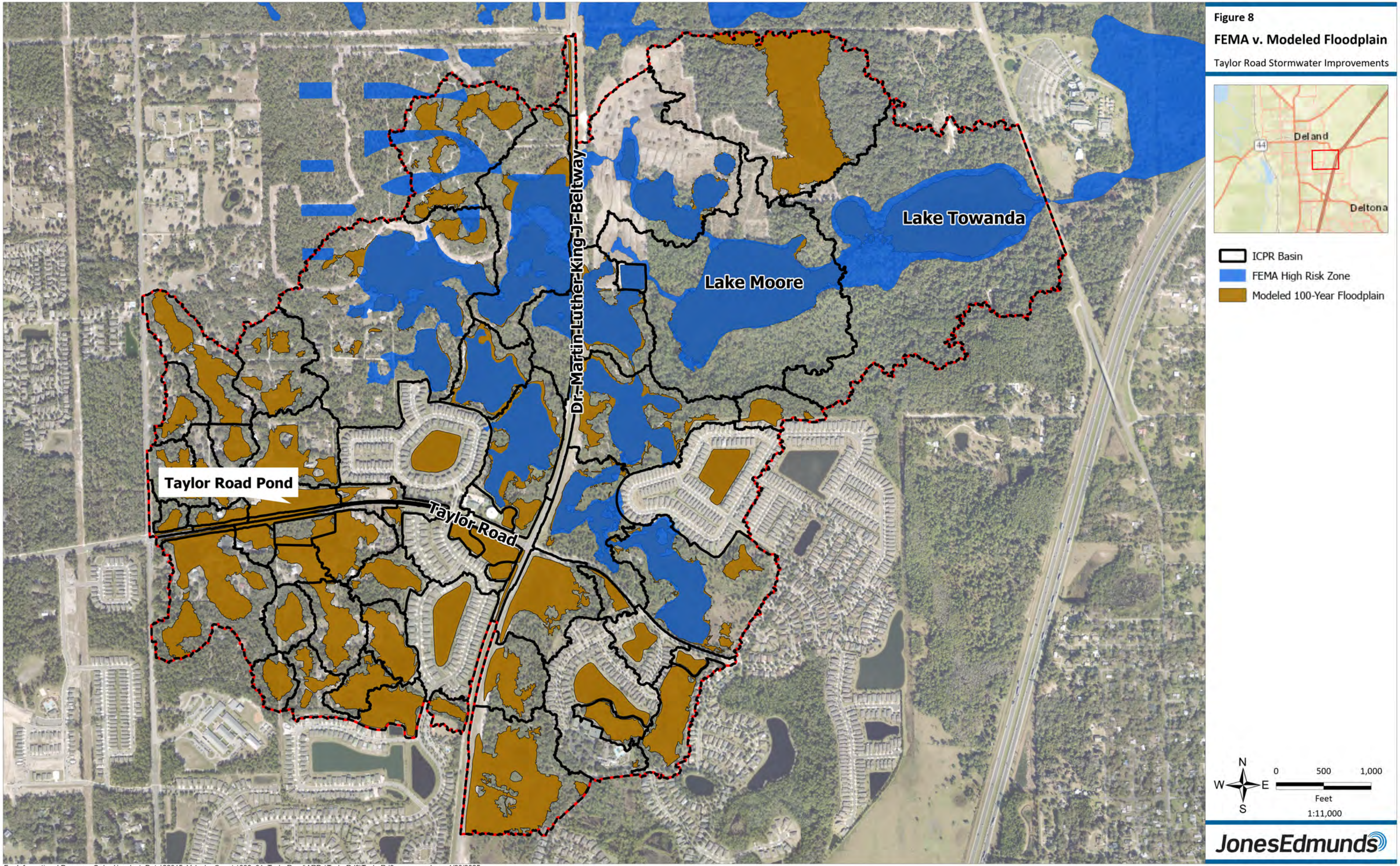

Figure 8

FEMA v. Modeled Floodplain

Taylor Road Stormwater Improvements

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5 ALTERNATIVE EVALUATION

5.1 DESCRIPTION

In consultation with the County, Jones Edmunds evaluated various options to address flooding within the Taylor Road right-of-way from S. Blue Lake Avenue to Dr. Martin Luther King Jr. Beltway. These options included increasing storage capacity, providing a positive outfall via gravity or a pressurized system, and assessing the feasibility of improving the percolation of Taylor Road Pond by removing a clay layer. A geotechnical evaluation revealed that the clay layer is over 18 feet below the ground surface, rendering excavation to improve percolation unfeasible. Based on this analysis, three alternative concepts were developed to reduce flooding along Taylor Road:

- Alternative 1: Install a 6.5-cfs (3,000-gpm) pump station at the Taylor Road Pond to discharge water to Lake Moore. Figure 9 illustrates the approximate location of the pump station and the proposed route of the force main.
- Alternative 2: Acquire the property directly south of Taylor Road Pond to construct an additional 3.6-acre pond for increased storage capacity. This option also includes installing a 3-cfs (1,500-gpm) pump station at Taylor Road Pond to pump water to Lake Moore. Figure 10 illustrates the proposed pond location and its extent, the approximate location of the pump station, and the planned route of the force main.
- Alternative 3: Acquire the parcel directly south of Taylor Road Pond to construct an additional 3.6-acre pond for increased storage capacity. The Taylor Road Pond will be treated like a wet retention pond by adding a control structure and a gravity outfall leading to Lake Moore. Figure 11 illustrates the approximate location of the control structure, the proposed pond extent, and the planned route for the gravity pipe.

Figure 9

Alternative 1: Pump Only

Taylor Road Stormwater Improvements

- Pump Station
- Proposed Force Main

N / W / E / S

0 250 500

Feet

1:7,000

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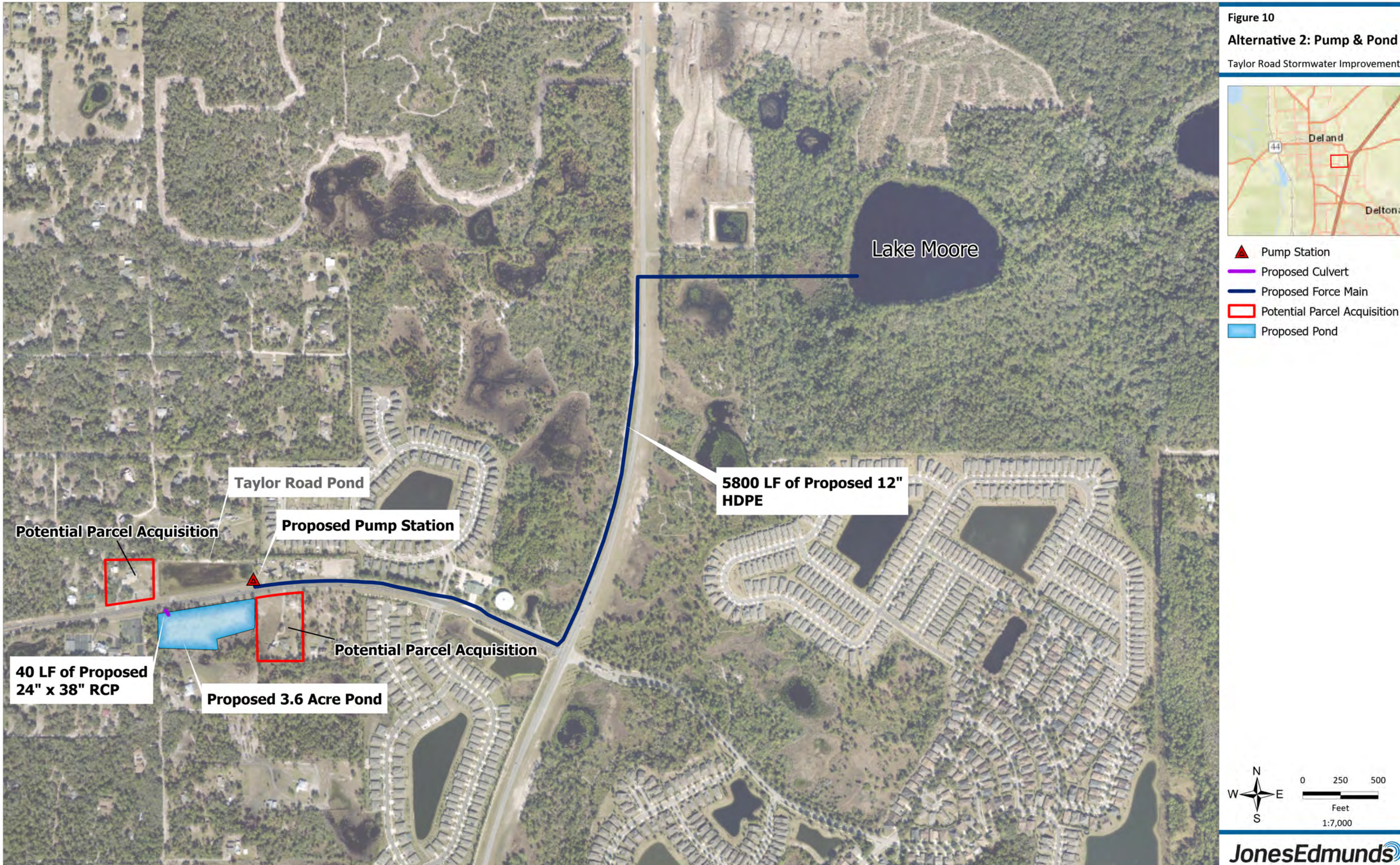

Figure 10

Alternative 2: Pump & Pond

Taylor Road Stormwater Improvements

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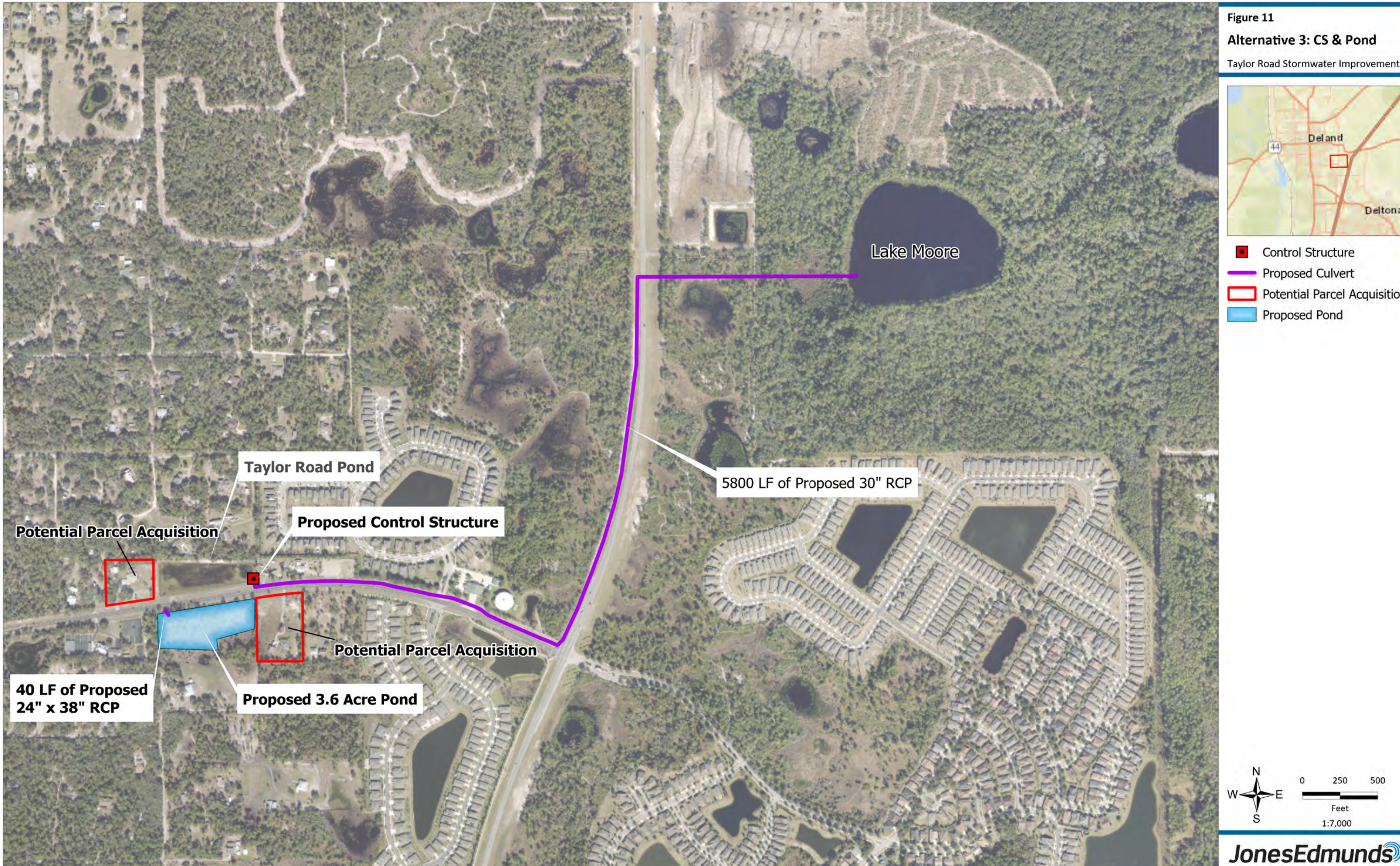
Figure 11

Alternative 3: CS & Pond

Taylor Road Stormwater Improvements



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For Alternatives 2 and 3, opportunities for land acquisition have been identified in parcels directly east of the proposed pond and west of the Taylor Road Pond that could increase the capacity of the proposed and existing ponds in the surrounding areas. The identified parcels are highlighted in the corresponding figures for each alternative.

Jones Edmunds evaluated peak water-surface elevations, flood extents, and flooding duration in the neighborhoods surrounding Taylor Road under existing conditions and for each of the alternatives. The analysis included simulations for the 25-year/24-hour and the 100-year/24-hour design storm, with rainfall depths of 8.4 and 11.3 inches, respectively.

5.2 RESULTS

For Alternative 1, Jones Edmunds analyzed the performance of various pump sizes to mitigate flooding impacts along Taylor Road, where the lowest edge of pavement is 75.8 feet. Table 4 shows that all pumps, except for the 3-cfs pumps, effectively eliminated flooding from Taylor Road during the 25-year/24-hour storm event. However, to fully contain the runoff within the pond banks, which are at an elevation 75 feet, a pump with a capacity of 6.5-cfs is required. For the 100-year/24-hour storm event, the 6.5-cfs pump reduces the duration of flooding, offering substantial improvements over existing conditions. Figures 12 and 13 illustrate these results, highlighting the reduction in flood stage and duration.

Table 4 Alternative 1: Time to Eliminate Road Flooding by Pump Size

Pump Size	25-Year/24-Hour Time	100-Year/24-Hour Time
Existing	60	150+
3 cfs	15	106
4 cfs	0	83
5 cfs	0	66
6 cfs	0	54
6.5 cfs	0	48

In Alternative 2, which incorporates a pump and a pond designed to work in tandem, the analysis determined that a 3-cfs pump was necessary to keep water off Taylor Road during the 25-year/24-hour event. This configuration reduces the peak stage in the Taylor Road Pond by nearly 1 foot, effectively mitigating flood impacts. For the 100-year/24-hour event, this alternative significantly reduces the flooding duration to 73 hours or about 3 days. This improvement is notable compared to the existing conditions, where the lack of a positive outfall results in prolonged stagnant water. Figures 14 and 15 illustrate these results, highlighting the reduction in flood stage and duration.

Figure 12 Alternative 1: Discharge Time by Pump Size (25-Year / 24-Hour Event)

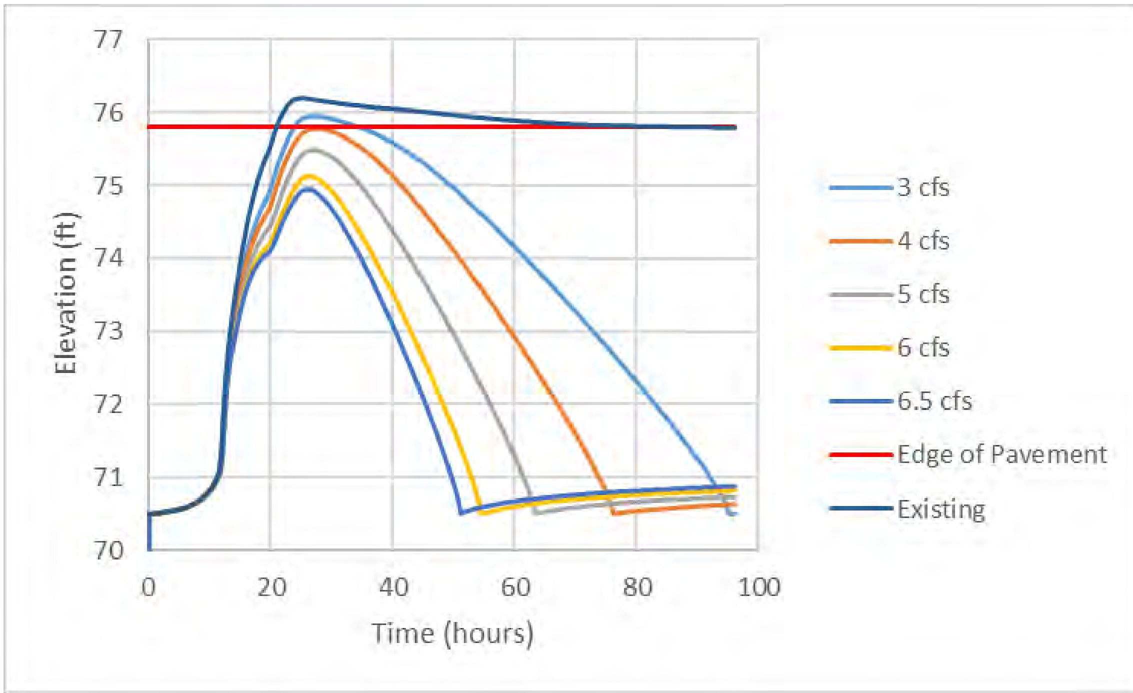


Figure 13 Alternative 1: Discharge Time by Pump Size (100-Year / 24-Hour Event)

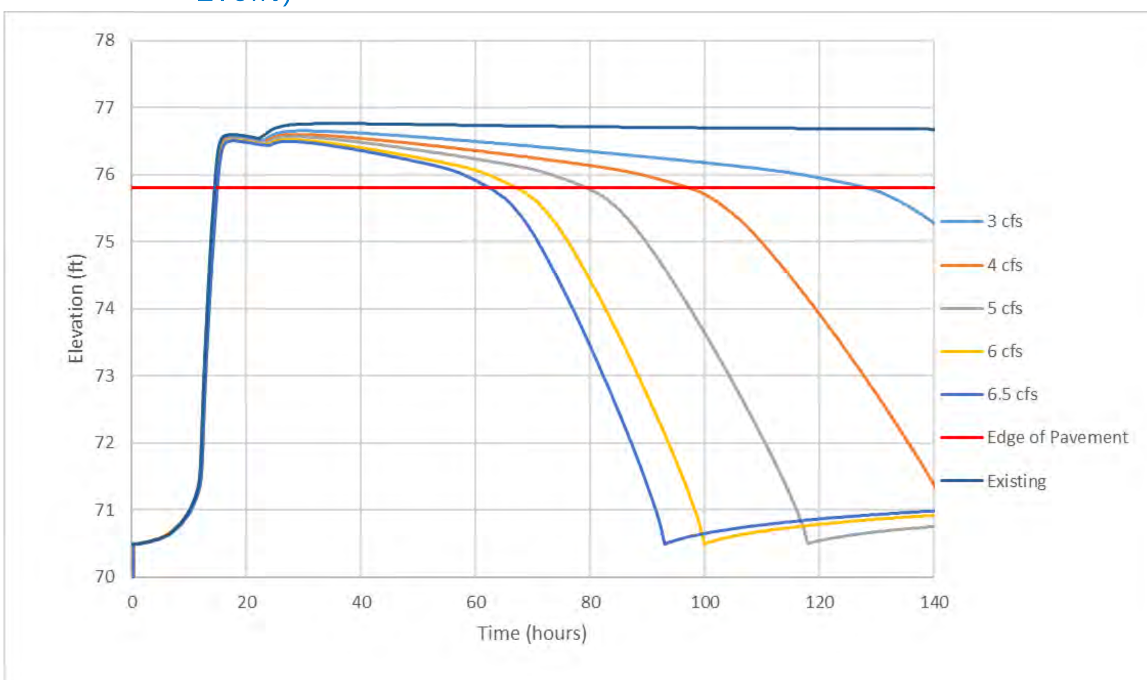


Figure 14 Alternative 2: Discharge Time by Pump Size (25-Year / 24-Hour Event)

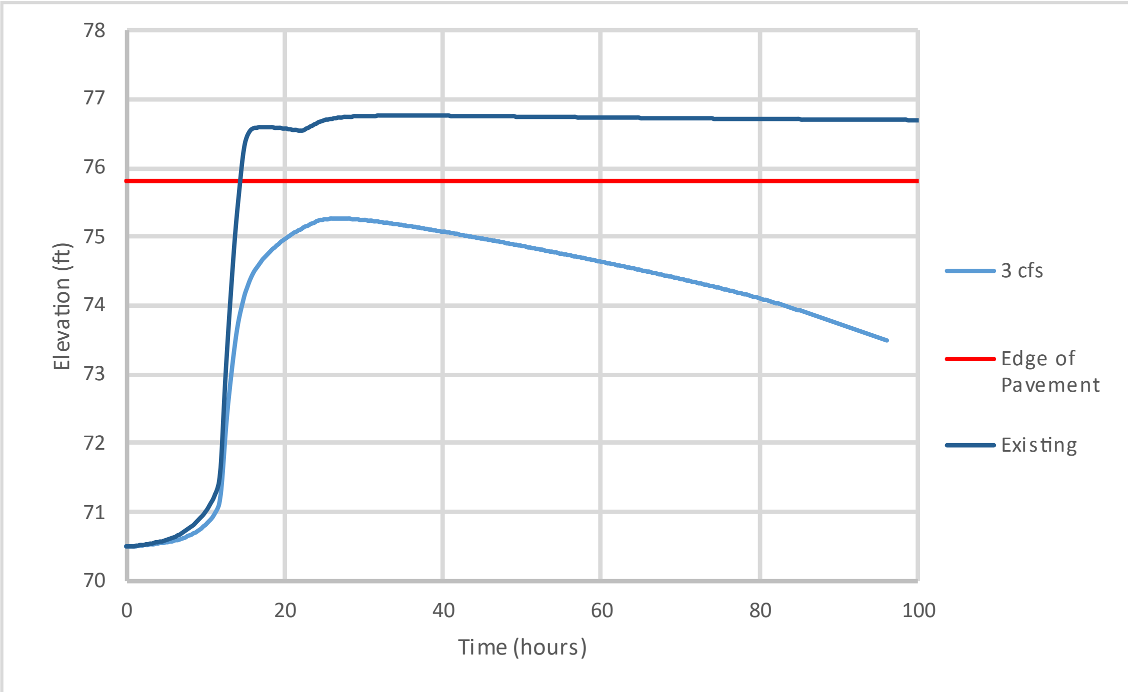
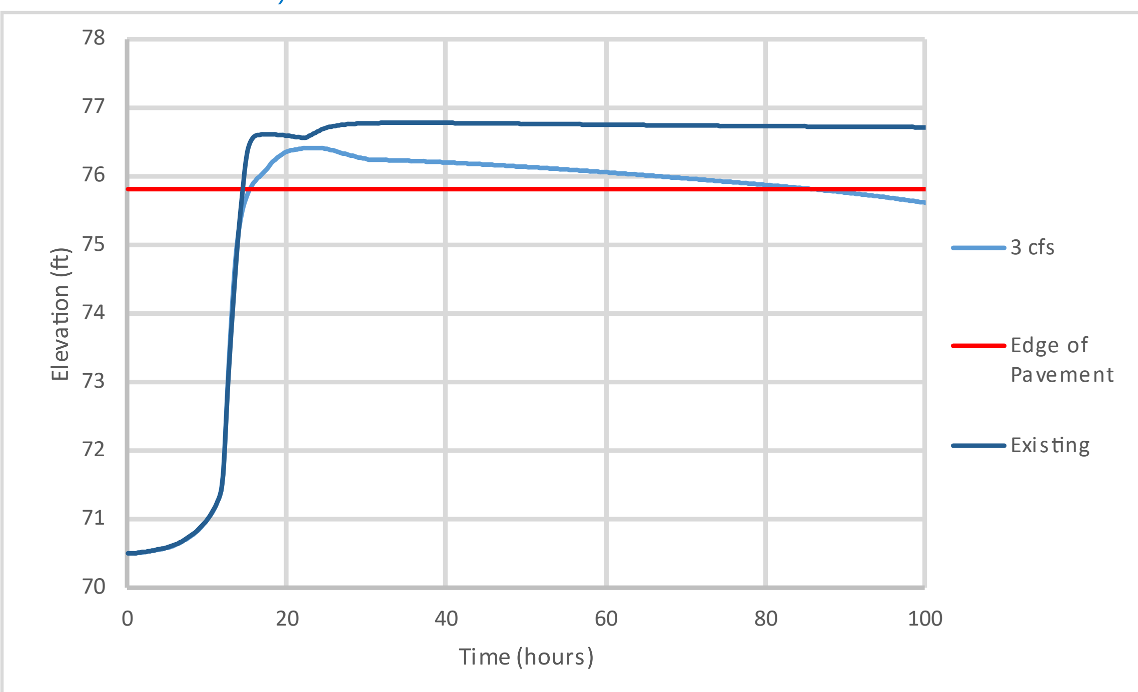


Figure 15 Alternative 2: Discharge Time by Pump Size (100-Year / 24-Hour Event)



In Alternative 3, a stormwater pond and control structure were proposed. This design eliminates flooding on Taylor Road and ensures that all runoff remains within the pond banks for the 25-year/24-hour event, meaning that Taylor Road will be free from flooding. For the 100-year/24-hour event, this alternative does not contain all the runoff within the pond banks but keeps the duration of flooding on Taylor Road to under 1 day. This improvement is notable compared to the existing conditions, where the lack of a positive outfall results in prolonged stagnant water. Figures 16 and 17 illustrate these results, highlighting the reduction in flood stage and duration.

Figure 16 Alternative 3: Time to Eliminate Road Flooding (25-Yr/24-Hour Event)

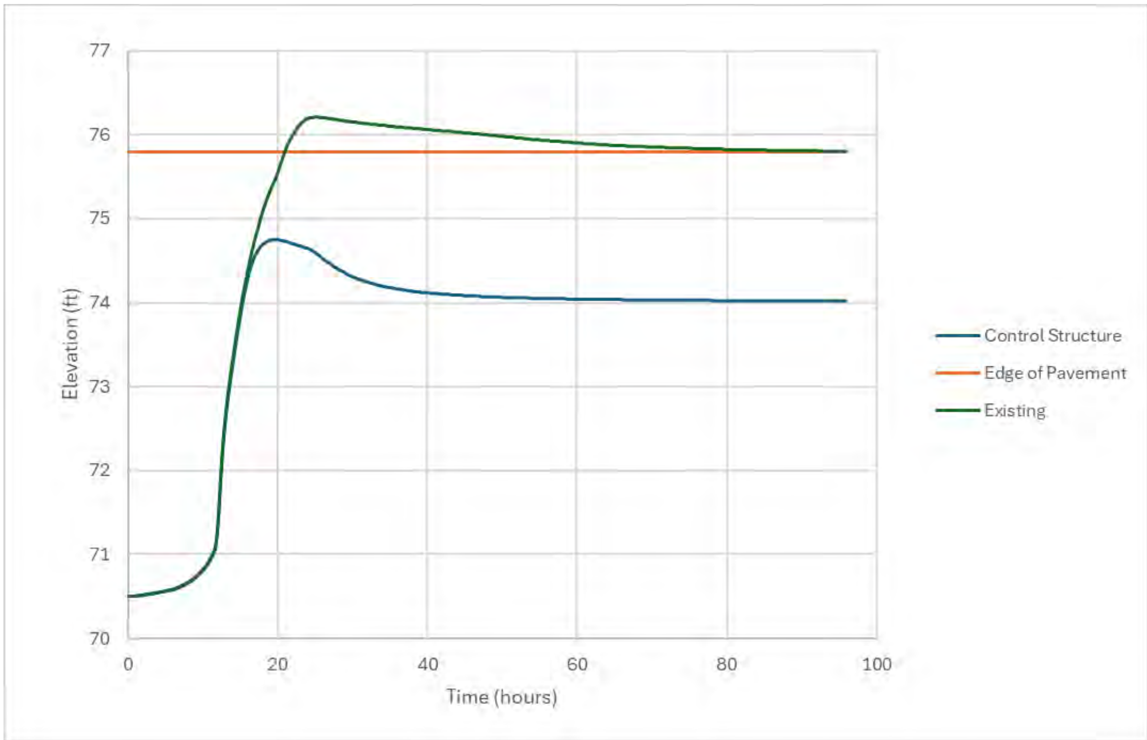


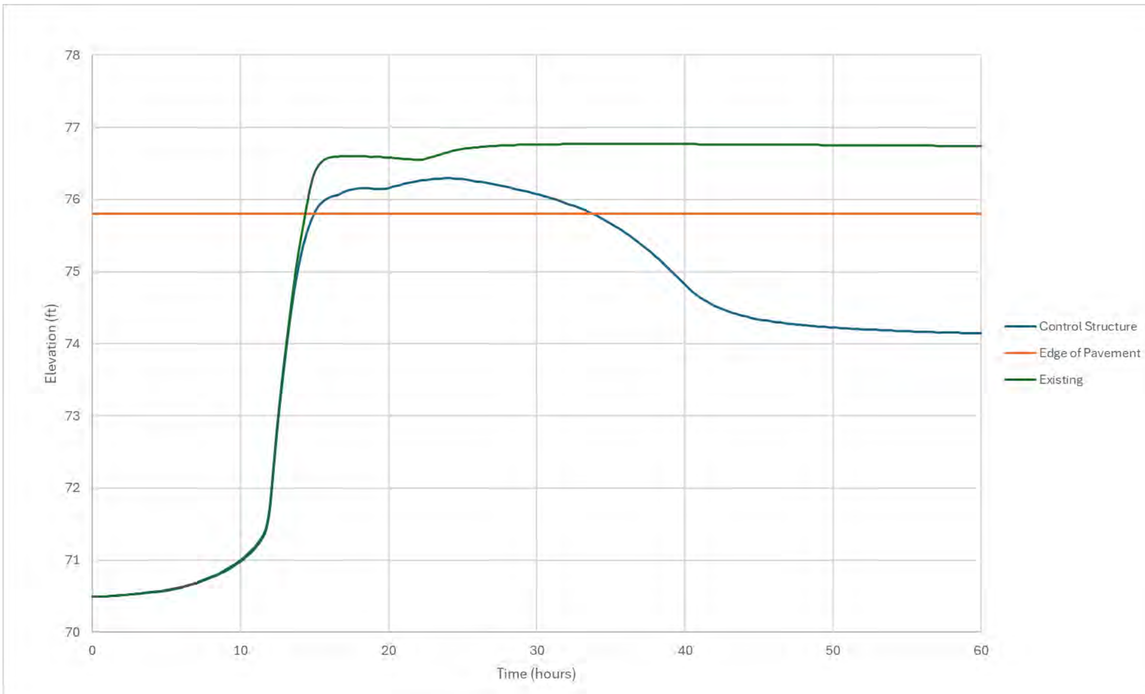
Table 5 summarizes the effects of the proposed improvements on peak water-surface elevations at various locations. All alternatives eliminated the flooding on Taylor Road for the 25-year/24-hour storm event. However, these reductions had a limited impact on the overall inundation extents for the areas adjacent to the pond. Alternative 1 increases the peak stages in both Lake Moore and Lake Towanda by 0.01 feet, which may require coordination with the City of DeLand.

Table 5 Comparison of Peak Water-Surface Elevations

Model	25-Year/24-Hour			100-Year/24-Hour		
	Taylor Road Pond	Lake Moore	Lake Towanda	Taylor Road Pond	Lake Moore	Lake Towanda
Existing Condition	76.21	67.26	63.70	76.77	67.45	64.75
Alternative 1	75.08	67.27	63.71	76.51	67.46	64.80
Alternative 2	75.26	67.27	63.70	76.42	67.45	64.77
Alternative 3	74.75	67.26	63.69	76.30	67.45	64.79

Red font means an increase in this alternative.

Figure 17 Alternative 2: Time to eliminate road flooding (100-Year/24-Hour Event)

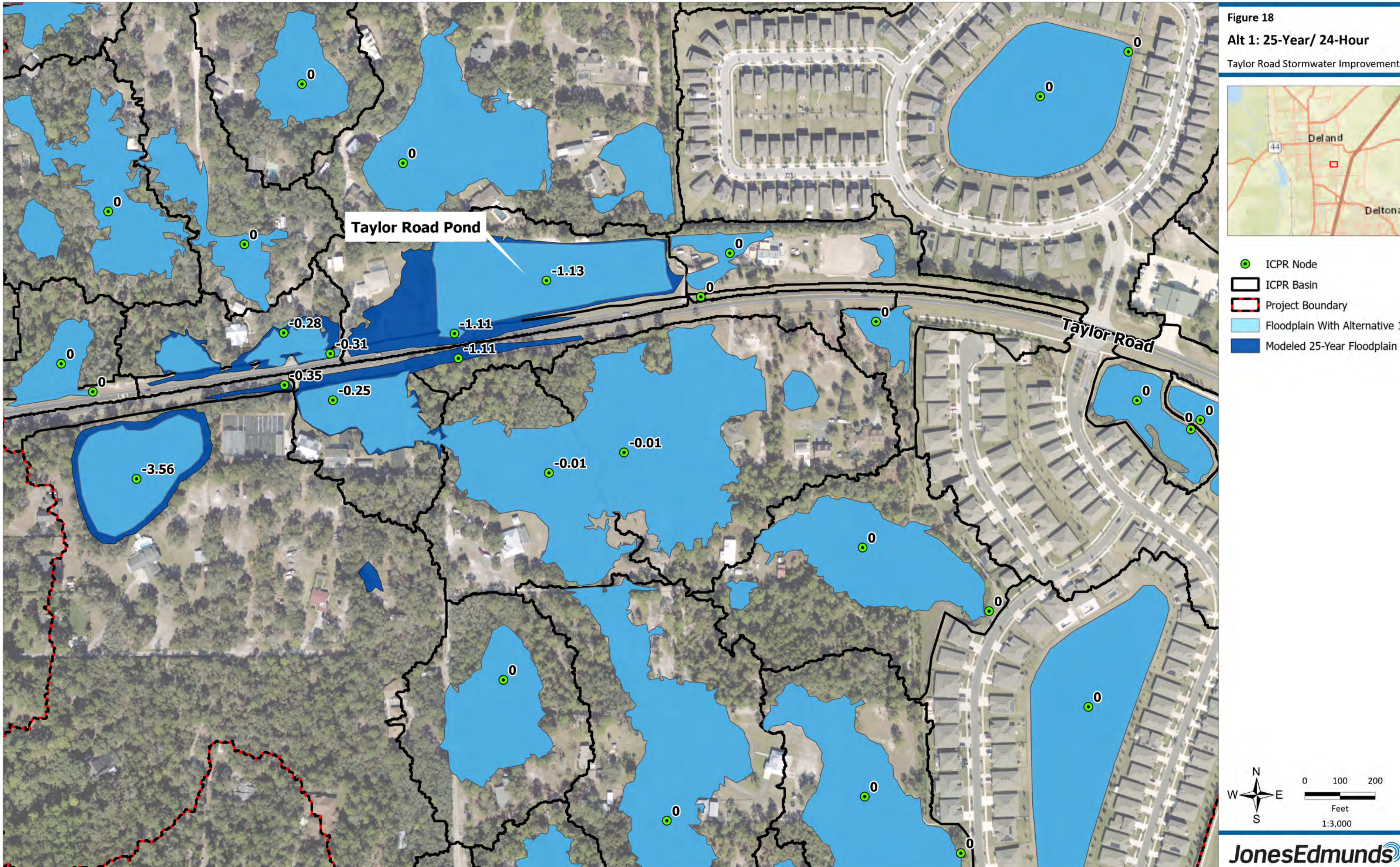


For the 100-year/24-hour storm, none of the alternatives completely alleviate the flooding on Taylor Road. All alternatives reduce flood stages but still result in localized inundation along portions of Taylor Road, although they all reduce the duration of flooding. Alternatives 1, 2, and 3 increase the peak stage in Lake Towanda by 0.05, 0.02, and 0.06 feet, respectively, which may require coordination with the City of DeLand.

Figures 18, 19, 20, 21, 22, and 23 depict the changes in flood extents for each alternative and storm event, providing a clear visual comparison of how each option affects the surrounding areas. These analyses collectively demonstrate that although the proposed alternatives offer varying degrees of improvement, the most effective solutions involve providing storage and a positive outfall.

6 PLANNING-LEVEL CONSTRUCTION COST ESTIMATES

Jones Edmunds developed planning-level opinions of 2024 capital costs for all the Alternatives. All feasibility opinions of costs can be considered Class 4 cost estimates as defined by the American Society for Testing and Materials (ASTM) *Standard Classification of Cost Estimating* (ASTM E2516-11[2019]). Class 4 estimates are for conceptual projects or feasibility studies based on a 0- to 2-percent complete level of project definition. In the general construction industry, this level of estimate typically has an expected cost accuracy range of -20 percent on the low side and +30 percent on the high side. All opinions of costs are presented as ranges (-20 to +30 percent) to give an estimate of the variability that could be associated with the final project costs. Table 6 summarizes the expected cost ranges for each alternative. Appendix C includes a breakdown of the expected costs.



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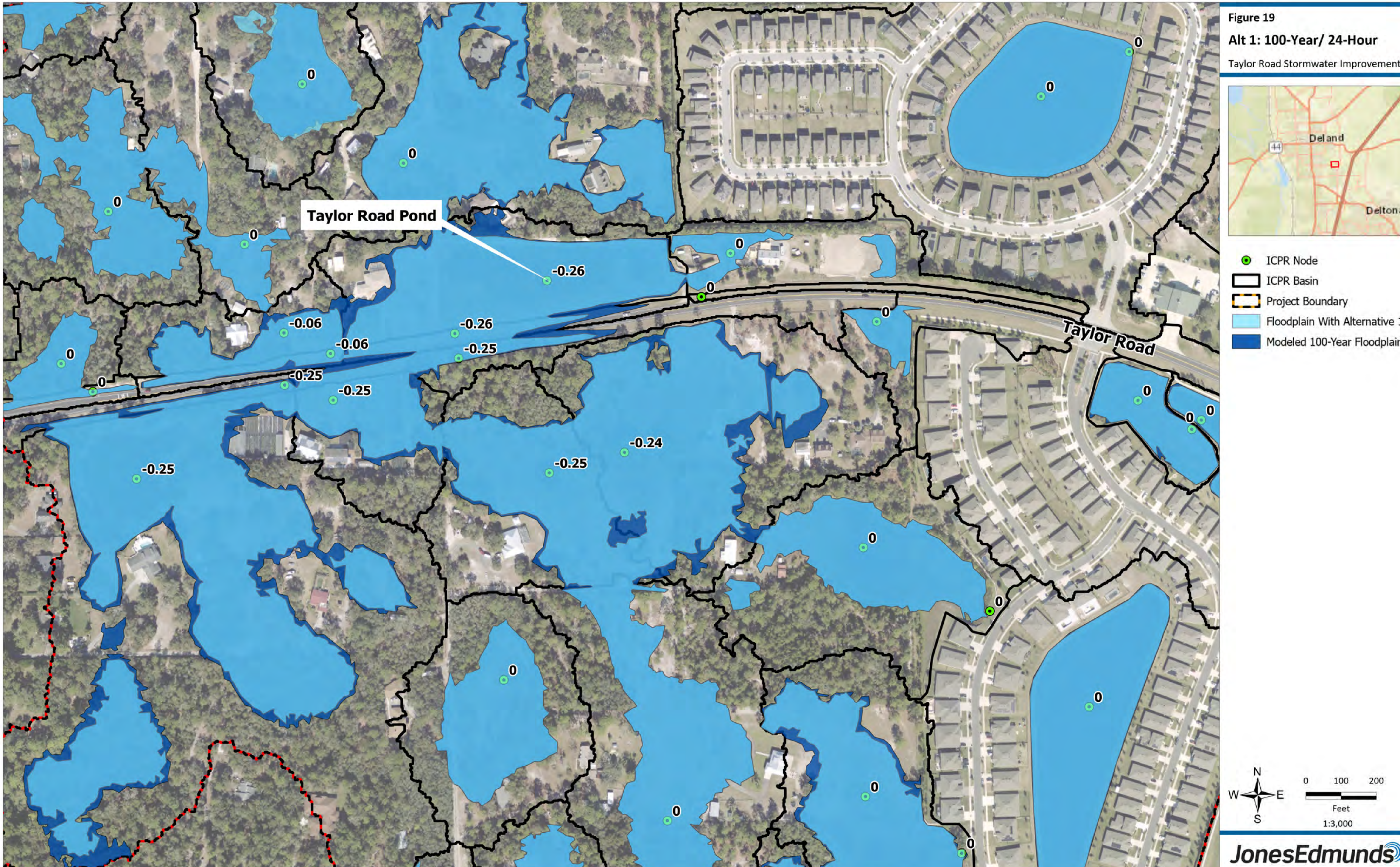

Figure 19

Alt 1: 100-Year/ 24-Hour

Taylor Road Stormwater Improvements

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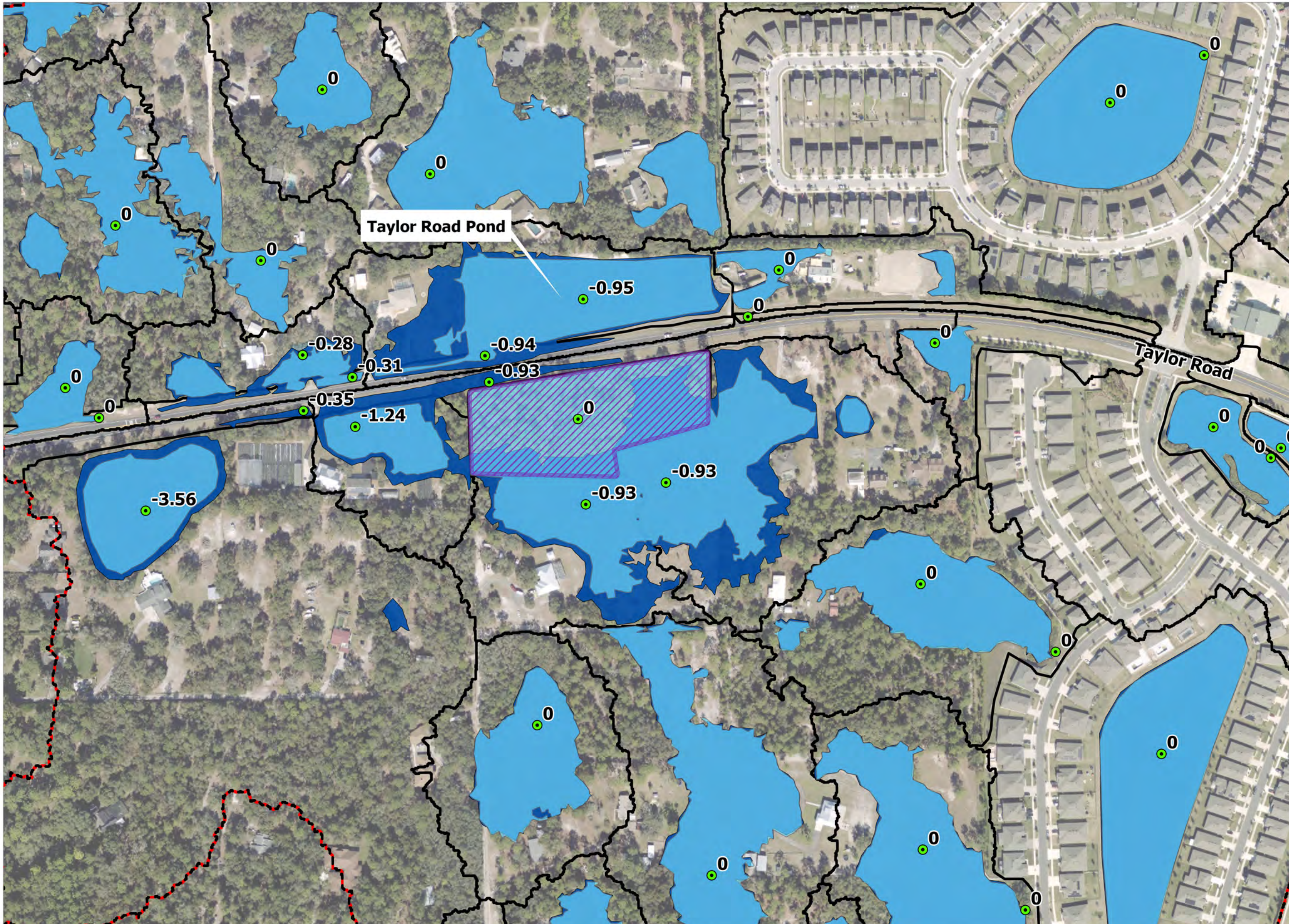

Figure 20

Alt 2: 25-Year/ 24-Hour

Taylor Road Stormwater Improvements

- ICPR Node
- ICPR Basin
- Project Boundary
- Proposed Pond
- Floodplain With Alternative 2
- Modeled 25-Year Floodplain

N W E S

0 100 200 Feet 1:3,000

JonesEdmunds

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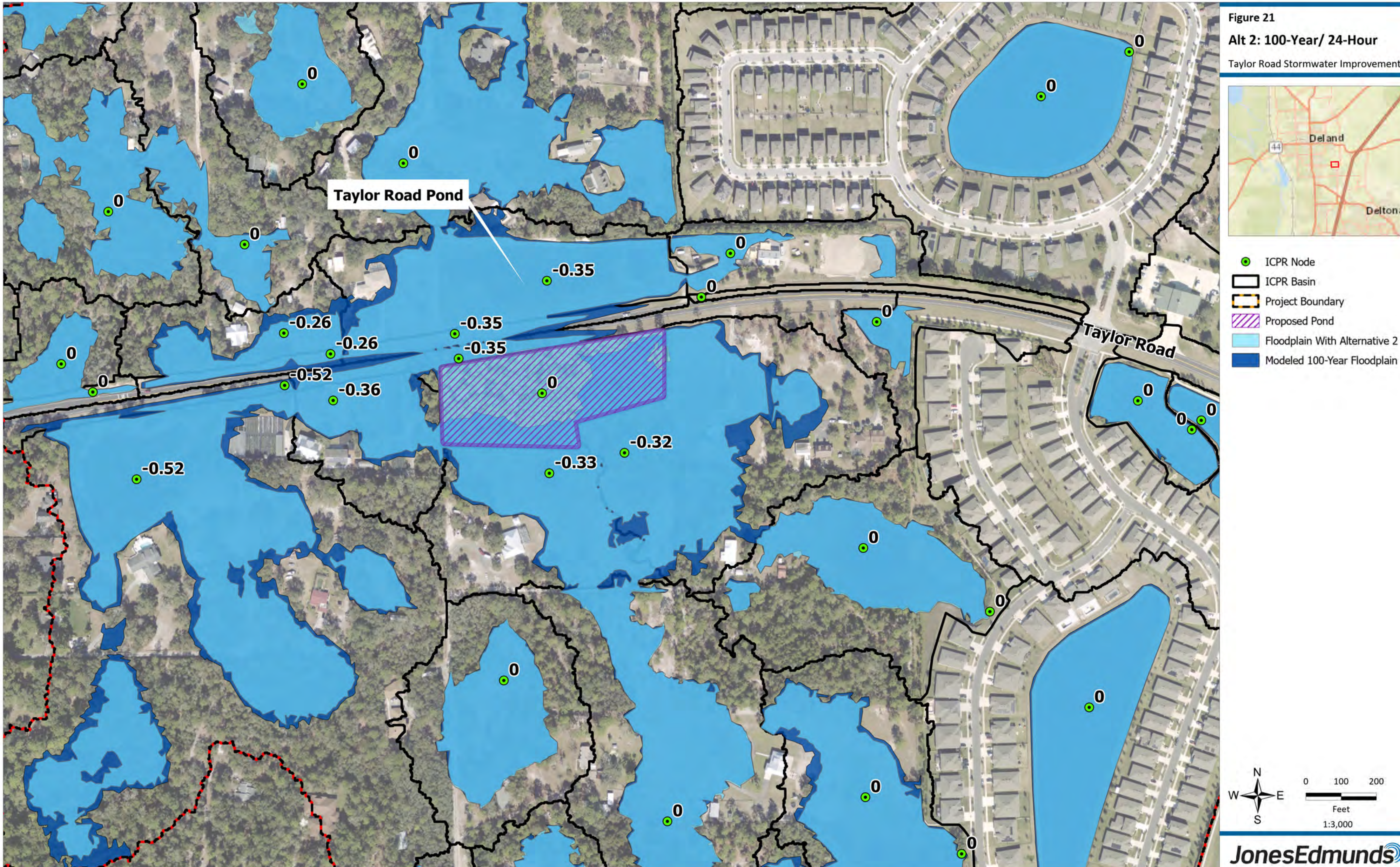
Figure 21

Alt 2: 100-Year/ 24-Hour

Taylor Road Stormwater Improvements



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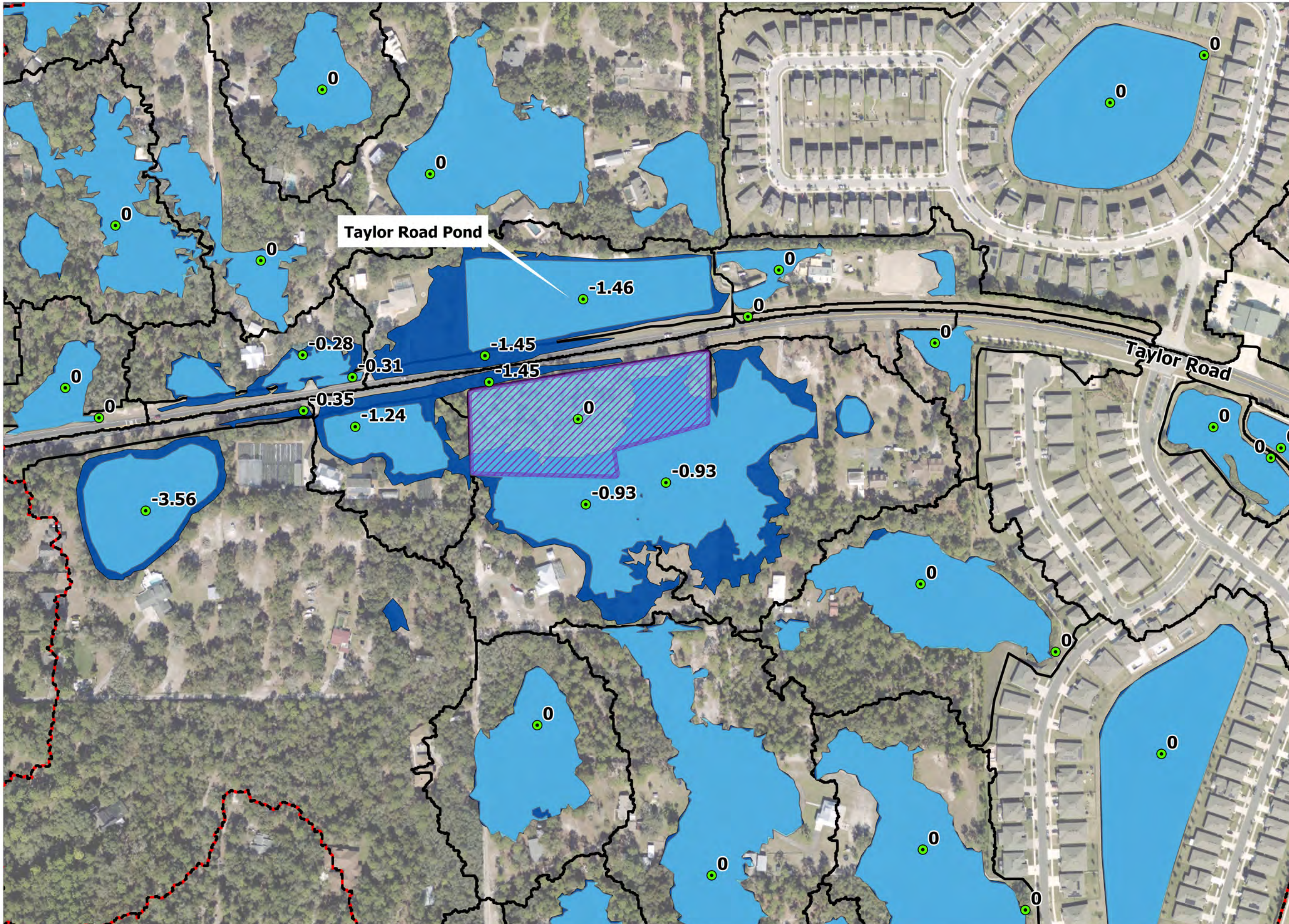

Figure 22

Alt 3: 25-Year/ 24-Hour

Taylor Road Stormwater Improvements

JonesEdmunds

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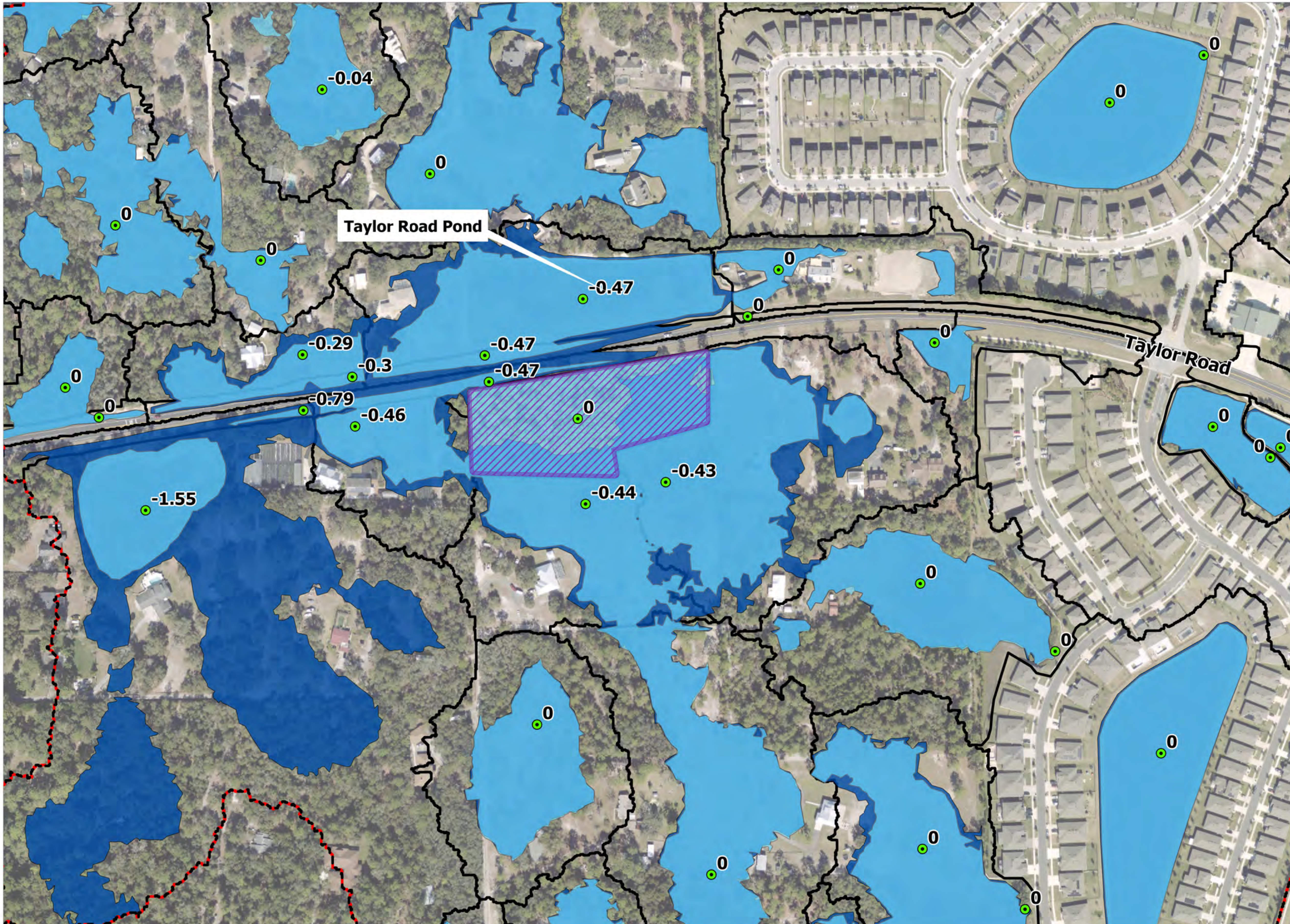


Figure 23

Alt 3: 100-Year/ 24-Hour

Taylor Road Stormwater Improvements

- ICPR Node
- ICPR Basin
- Project Boundary
- Proposed Pond
- Floodplain With Alternative 3
- Modeled 100-Year Floodplain

JonesEdmunds

Table 6 Expected Cost Ranges Summary

Alternative	Planning-Level Capital Cost Range*	
	Low	High
Alternative 1	$6,161,000	$10,011,000
Alternative 2	$7,631,000	$12,400,000
Alternative 3	$5,284,000	$8,587,000

* 2024 Dollars.

7 SUMMARY AND CONCLUSIONS

The Taylor Road Pond was originally designed as a dry retention area to collect runoff from the roadway segment. The pond has no outfall and was intended to collect the runoff and have it infiltrate into the ground below it. In areas around the Taylor Road Pond and adjacent properties with significant flooding concerns, Type B/D soils predominate. These soils' moderate-to-low infiltration rates suggest a higher runoff potential, increasing the risk of flooding. Furthermore, these areas are considered closed basins, where water can only dissipate through evaporation and infiltration. As a result, not only is the flooding risk elevated, but floodwaters are likely to persist for extended periods due to the slow infiltration process.

A review of the topography and construction plans revealed that the Victoria Trails development retains its runoff for the 100-year/24-hour design event versus pre-development where portions of the subdivision contribute runoff to the flood-mitigation area.

Flooding in the Taylor Road Pond area is the result of excess cumulative rainfall and an increase in record-breaking rainfall associated with the broader climatic patterns. Since 2022, two significant rainfall events have occurred with rainfall depths exceeding the 100-year/24-hour rainfall event.

Evaluation of the three proposed alternatives highlights that, in conditions where the pond has full capacity, all options effectively eliminate flooding on Taylor Road within the right-of-way for the 25-year/24-hour storm event and reduce the flooding duration for the 100-year/24-hour storm event. However, the impact on overall inundation extents for areas adjacent to the Taylor Road Pond vary. Alternatives that include additional storage capacity (Alternatives 2 and 3) provide greater reductions in flood extents compared to pumping alone (Alternative 1).

Alternative 3, which combines additional storage with a control structure outfall, offers the most comprehensive solution by minimizing flooding extents. Although Alternative 2 achieves significant improvements, its reliance on a 3-cfs pump highlights the importance of pump-pond interaction for effective flood reduction. Alternative 1, though the simplest to implement, increases the peak stage in Lake Towanda slightly, requiring further consideration and potential coordination with the City of DeLand. Ultimately, a balanced approach incorporating storage and a positive outfall ensure long-term flood mitigation for the Taylor Road Pond area, aligning with the County's stormwater management goals. Further coordination with stakeholders is recommended to finalize the preferred solution.

Appendix A

Consumptive Use Permit

Technical Report

CONSUMPTIVE USE TECHNICAL STAFF REPORT
15-Oct-2021
APPLICATION #: 68916-4

Owner:	James Harvey Victoria Park Community Council Inc 2100 S Hiawassee Rd Orlando, FL 32835-6307 (386) 738-2112
Applicant:	Lyle Kimpling Victoria Park Community Council Inc 525 E VICTORIA TRAILS BLVD Deland, FL 32724-7993 (386) 738-2112
Agent:	Peter J Pellerito, PE Miller Legg & Assoc 5747 N Andrews Way Ft Lauderdale, FL 33309-2364 (954) 628-3616
Compliance Contact:	Lyle Kimpling Victoria Park Community Council Inc 525 E VICTORIA TRAILS BLVD Deland, FL 32724-7993 (386) 738-2112
Project Name:	Victoria Park
County:	Volusia

Objectors: No

Authorization Statement:
The District authorizes, as limited by the attached permit conditions, the use of 263.0 million gallons per year (mgy)(0.721 million gallons per day (mgd), annual average) of surface water from onsite stormwater ponds for supplemental irrigation of a 195 acre golf course and 389.2 acres of landscaping, and 48.45 mgy (0.133 mgd, annual average) of groundwater from the Upper Floridan aquifer for emergency backup irrigation of 195 acres of golf course and 73.08 acres of landscaping through 2041.

Recommendation: Approval

Reviewers: Kristian Holmberg; Isaac Crenshaw; Alexandra Smith

Abstract:
This is a renewal of an existing landscape irrigation use type permit with a request for a 42% increase from 0.507 mgd to 0.721 mgd of surface water allocation due to an increase in irrigated acreage. Staff is recommending a 20-year permit duration with a 10-year compliance report.

PROJECT DESCRIPTION:

Project Location:
Victoria Park is a golf course development located in Volusia County between the City of Deland and Lake Helen along Camp Road. The development currently consists of an 18-hole golf course, a 9-hole practice area, and residential units comprising 1873 acres. Irrigated areas at full build out will include 195 acres of golf course and 464 acres of landscaping. Current landscaping acreage is 389 acres.

Background:
Irrigation for Victoria Park is primarily supplied by reclaimed water from the City of Deland in conjunction with the development's stormwater system to meet irrigation demands. Groundwater is used as a backup source when reclaimed water and stormwater are not sufficient to meet irrigation demands. The City has supplied reclaimed water since 2001 and will continue to supply reclaimed water for Victoria Park's irrigation.

Water Use Description:
Irrigation water is supplied predominantly from the onsite stormwater system and from reclaimed water provided by the City of Deland. Reclaimed water use is 1.026 mgd. Stormwater ponds store reclaimed water and surface water runoff which is used for irrigation. Ponds are sized to retain storm events without offsite discharge by pumping for irrigation or transferring water to other ponds for storage. Eight pump stations are located at the irrigation storage ponds to withdraw or transfer water. Separate reclaimed water connections and meters are installed at the ponds. The eight pump stations are designed to irrigate the residential and common area landscape. One Upper Floridan aquifer well was constructed to supply groundwater as an emergency backup source when stormwater and reclaimed water supplies are insufficient to meet the demand. The emergency backup groundwater allocation is being reduced to 0.133 mgd (20% reduction).

PERMIT APPLICATION REVIEW:

Section 373.223, *Florida Statutes* (F.S.), and Section 40C-2.301, Florida Administrative Code (F.A.C.), require an applicant to establish that the proposed use of water:

(a) is a reasonable-beneficial use;
(b) will not interfere with any presently existing legal use of water; and,
(c) is consistent with the public interest.

In addition, the above requirements are detailed further in the District's Applicant's Handbook: Consumptive Uses of Water, August 29, 2018 ("A.H.") District staff has reviewed the consumptive use permit application pursuant to the above-described requirements and has determined that the application meets the conditions for issuance of this permit. A summary of the staff review is provided below.

REASONABLE BENEFICIAL USE CRITERIA:

Economic and Efficient Utilization:
Staff has worked with the permittee to identify ways to conserve water. The permittee has chosen protocols include limiting outdoor residential water use to once per week and only allowing a 2.5 hour window for landscape irrigation, and increasing water conservation education for homeowners. The site uses reclaimed and surface water for irrigation and relies on groundwater only as an emergency backup source. The GWRAPPS allocation is 39.44 inches/acrea for 195 acres of golf course and 34.03 inches/acre for 389.2 acres of landscaping. The recommended allocation is in accordance with the GWRAPPS allocation. A groundwater allocation has been provided as a one-month emergency backup supply for instances when reclaimed water or stormwater are insufficient. A smart irrigation controller system is used to receive feedback from onsite weather stations on climate or soil moisture measurements and adjusts the irrigation application to match plant needs. Because of Victoria Park’s proactive present and future water conservation program proposals, staff has concluded that reasonable assurances have been provided that the proposed use of water is in such quantity as is necessary for economic and efficient utilization.

Water Conservation:

Victoria Park has proposed to implement the following water conservation measures:

- Irrigation schedules for each home have been restricted to a 2.5-hour window, one day per week, controlled by weather stations, computer and valving, to reduce over-watering at individual homes
- Completion of continuing education units by Rainbird for employees who operate the irrigation to learn best landscape irrigation practices
- Use of paycheck stuffers to provide water conservation tips and information to employees
- Regular inspections to verify efficient operation and optimal performance of the system
- Installation of signs in clubhouse and restrooms encouraging water conservation
- Float control devices and automatic sensors will be installed on Pond 1 by the end of 2022 to regulate storage pond stages and further reduce the amount of groundwater potentially needed
  Installation of additional weather stations to determine irrigation scheduling

Conservation methods already implemented include:

- Sprinkler head design and layout to reach turf grass only without over-spray
- Use of onsite weather stations and rain gauges to determine irrigation scheduling

- Lined ponds throughout the community that store reclaimed and stormwater for irrigation use
- Mulching around plants to conserve soil moisture
- High frequency irrigation limited to tees and greens
- Fairway irrigation frequency minimized
- Non-playable areas are not irrigated
- Low-pressure and high pressure trigger to stop pumping should a line break occur
- Night time irrigation schedule to reduce evaporative losses
- Dual water lines with separate irrigation system
- Use of xeriscape materials and microirrigation
- Rainfall shutoff devices to prevent irrigation during rain events
- Elimination of overseeding on greens and tees, fairways, roughs, and landscape areas

Suitability and Capability of the Source:
Both reclaimed water and stormwater from the onsite ponds have historically been able to provide amounts adequate to irrigate the total acreage. The backup groundwater allocation is for emergency use when stormwater and reclaimed water are insufficient.

Lowest Acceptable Quality Water Source:
This project utilizes reclaimed water from the City of Deland as its main source for irrigation. The secondary source of surface water is also a lower quality source as it is from stormwater runoff from the community. Groundwater from the Upper Floridan aquifer is intended to only be used as a backup source when other sources are insufficient.

Water Resources Impact Evaluation:
A consumptive use must not cause harm to either onsite or offsite water resources, including lakes, wetlands or other existing offsite land uses. Staff evaluated if the proposed consumptive use would cause harmful hydrologic alterations to natural systems, including wetlands and other surface waters located on and off-site. Irrigation water is supplied predominantly from the onsite stormwater system and from reclaimed water provided by the City of Deland. Groundwater from the Upper Floridan aquifer is only allowed as a backup supply when the other sources are insufficient. Historic use at the project location has not resulted in observed impacts to adjacent wetlands and surface waters. Therefore, staff determined that the proposed use would not alter the existing hydrology and cause an unmitigated adverse impact to natural systems, including wetlands or other surface waters.

Minimum Flows and Levels:
There are eight established Minimum Flows and Levels within a 5-mile radius of the site: Lake Helen, Lake Winnemissett, Lake Colby, North Talmadge, Blue Springs, Three Island Lakes, Lake Gertie, and Trout. Since the primary irrigation sources are reclaimed water and stormwater and groundwater is used as emergency backup when

other sources are insufficient or unavailable, staff determined that the proposed use will not violate established MFLs.

Water Reserved from Use:
There are no water reservations in Volusia County pursuant to subsection 373.223(4), Florida Statutes, that could be impacted by this withdrawal.

Saline Water Intrusion:
Use of groundwater as emergency back up is not expected to cause saline water intrusion and will not occur through use of reclaimed water and stormwater.

INTERFERENCE WITH EXISTING LEGAL USES:
Groundwater use occurs rarely when the stormwater and reclaimed systems are insufficient or unavailable to meet demand. Therefore, staff concludes that reasonable assurances have been provided that the permitted use will not cause interference to any existing legal use of water pursuant to section 1.3.7.2.2, A.H., provided the permittee complies with the existing permit conditions.

PUBLIC INTEREST:
The applicant is a home owners association that irrigates landscaping and a golf course. The proposed use will not adversely affect water resources, qualifies as a reasonable-beneficial use, and is beneficial to the overall collective well-being of the people, the District and the State. Therefore, staff concluded that reasonable assurances have been provided that the proposed use is consistent with the public interest.

Station Information
Site Name: Victoria Park

Well Details								
District ID	**Station Name**	**Casing Diameter (inches)**	**Casing Depth (feet)**	**Total Depth (feet)**	**Capacity (GPM)**	**Source Name**	**Status**	**Use Type**
33124	W-1A (Golf Well)	14	120	400	750	Upper Floridan Aquifer	Active	Landscape/Recreation /Aesthetic

Pump Details						
District ID	**Station Name**	**Pump Intake Diameter (inches)**	**Capacity (GPM)**	**Source Name**	**Status**	**Use Type**
33133	P-1A (Golf Pond Res)	4.5	2000	Surface Water	Active	Landscape/Recreation /Aesthetic

Pump Details						
District ID	Station Name	Pump Intake Diameter (inches)	Capacity (GPM)	Source Name	Status	Use Type
33134	P-1B (Golf Pond GC)	8.65	1500	Surface Water	Active	Landscape/Recreation /Aesthetic
33135	P-2 (Commons Big Pond)	6.6	1200	Surface Water	Active	Landscape/Recreation /Aesthetic
33136	P-3 (Northcote)	8	1000	Surface Water	Active	Landscape/Recreation /Aesthetic
33137	P-4 (Front Gardens)	4.5	1000	Surface Water	Active	Landscape/Recreation /Aesthetic
33138	P-5 (Trails)	6.6	1000	Surface Water	Active	Landscape/Recreation /Aesthetic
33140	P-7 (Back Garden)	6.6	1000	Surface Water	Active	Landscape/Recreation /Aesthetic
33561	P-8 (Oaks)	6	1000	Surface Water	Active	Landscape/Recreation /Aesthetic

Connection Point Details				
District ID	Station Name	Source Name	Status	Use Type
33593	Pond 1 Connection (W golf pond)	Deland, City Of	Active	Landscape/Recreation /Aesthetic
33594	Pond 2 Connection (E Commons)	Deland, City Of	Active	Landscape/Recreation /Aesthetic
33595	Pond 4 Connection (Orange Camp)	Deland, City Of	Active	Landscape/Recreation /Aesthetic
33596	Pond 5 Connection (Trails NW)	Deland, City Of	Active	Landscape/Recreation /Aesthetic
33597	Pond 6	Deland,	Active	Landscape/Recreation

Connection Point Details				
District ID	Station Name	Source Name	Status	Use Type
	Connection (Taylor Rd)	City Of		/Aesthetic
33598	Pond 7 Connection (NE Gardens)	Deland, City Of	Active	Landscape/Recreation /Aesthetic
33599	Pond 8 Connection (Oaks)	Deland, City Of	Active	Landscape/Recreation /Aesthetic
511299	Pond 3 Connection (Northcote)	Deland, City Of	Active	Landscape/Recreation /Aesthetic

Conditions

1. With advance notice to the permittee, District staff with proper identification shall have permission to enter, inspect, observe, collect samples, and take measurements of permitted facilities to determine compliance with the permit conditions and permitted plans and specifications. The permittee shall either accompany District staff onto the property or make provision for access onto the property.

2. Nothing in this permit should be construed to limit the authority of the St. Johns River Water Management District to declare a water shortage and issue orders pursuant to Chapter 373, F.S. In the event of a declared water shortage, the permittee must adhere to the water shortage restrictions, as specified by the District. The permittee is advised that during a water shortage, reports shall be submitted as required by District rule or order.

3. Prior to the construction, modification or abandonment of a well, the permittee must obtain a water well permit from the St. Johns River Water Management District or the appropriate local government pursuant to Chapter 40C-3, F.A.C. Construction, modification, or abandonment of a well will require modification of the consumptive use permit when such construction, modification, or abandonment is other than that specified and described on the consumptive use permit application form.

4. Leaking or inoperative well casings, valves, or controls must be repaired or replaced as required to eliminate the leak or make the system fully operational.

5. The permittee's consumptive use of water as authorized by this permit shall not interfere with legal uses of water existing at the time of permit application. If interference occurs, the District shall revoke the permit, in whole or in part, to curtail or abate the interference, unless the interference associated with the permittee's consumptive use of water is mitigated by the permittee pursuant to a District-approved plan.

6. The permittee's consumptive use of water as authorized by this permit shall not have significant adverse hydrologic impacts to off-site land uses existing at the time of permit application. If significant adverse hydrologic impacts occur, the District shall revoke the permit, in whole or in part, to curtail or abate the adverse impacts, unless the impacts associated with the permittee's consumptive use of water are mitigated by the permittee pursuant to a District-approved plan.

7. The permittee shall notify the District in writing within 30 days of any sale, transfer, or conveyance of ownership or any other loss of permitted legal control of the Project and/or related facilities from which the permitted consumptive use is made. Where permittee's control of the land subject to the permit was demonstrated through a lease, the permittee must either submit documentation showing that it continues to have legal control or transfer control of the permitted system/project to the new landowner or new lessee. All transfers of ownership are subject to the requirements of Rule 40C-1.612, F.A.C. Alternatively, the permittee may surrender the consumptive use permit to the District, thereby relinquishing the right to conduct any activities under the permit.

8. A District-issued identification tag shall be prominently displayed at each withdrawal site by permanently affixing such tag to the pump, headgate, valve, or other withdrawal facility as provided by Rule 40C-2.401, F.A.C. The permittee shall notify the District in the event that a replacement tag is needed.

9. The permittee's consumptive use of water as authorized by this permit shall not adversely impact wetlands, lakes, rivers, or springs. If adverse impacts occur, the District shall revoke the permit, in whole or in part, to curtail or abate the adverse impacts, unless the impacts associated with the permittee's consumptive use of water are mitigated by the permittee pursuant to a District-approved plan.

10. The permittee's consumptive use of water as authorized by this permit shall not reduce a flow or level below any minimum flow or level established by the District or the Department of Environmental Protection pursuant to Section 373.042 and 373.0421, F.S. If the permittee's use of water causes or contributes to such a reduction, then the District shall revoke the permit, in whole or in part, unless the permittee implements all provisions applicable to the permittee's use in a District-approved recovery or prevention strategy.

11. The permittee's consumptive use of water as authorized by the permit shall not cause or contribute to significant saline water intrusion. If significant saline water

intrusion occurs, the District shall revoke the permit, in whole or in part, to curtail or abate the saline water intrusion, unless the saline water intrusion associated with the permittee's consumptive use of water is mitigated by the permittee pursuant to a District-approved plan.

12. The permittee's consumptive use of water as authorized by the permit shall not cause or contribute to flood damage. If the permittee's consumptive use causes or contributes to flood damage, the District shall revoke the permit, in whole or in part, to curtail or abate the flood damage, unless the flood damage associated with the permittee's consumptive use of water is mitigated by the permittee pursuant to a District-approved plan.

13. All consumptive uses authorized by this permit shall be implemented as conditioned by this permit, including any documents incorporated by reference in a permit condition. The District may revoke this permit, in whole or in part, or take enforcement action, pursuant to Section 373.136 or 373.243, F.S., unless a permit modification has been obtained to address the noncompliance. The permittee shall immediately notify the District in writing of any previously submitted information that is later discovered to be inaccurate.

14. This permit does not convey to the permittee any property rights or privileges other than those specified herein, nor relieve the permittee from complying with any applicable local government, state, or federal law, rule, or ordinance.

15. A permittee may seek modification of any term of an unexpired permit. The permittee is advised that Section 373.239, F.S., and Rule 40C-2.331, F.A.C., are applicable to permit modifications.

16. If chemicals are to be injected into the irrigation system, the permittee shall install and maintain a backflow prevention device on all wells or surface pumps that are connected to the irrigation system.

17. All irrigation shall be in conformity with the requirements set forth in subsection 40C-2.042(2), F.A.C.

18. All submittals made to demonstrate compliance with this permit must include CUP number 68916-4 labeled on the submittal. Submittals should be made on-line at www.sjrwmd.com/permitting whenever possible.

19. This permit will expire on October 15, 2041.

20. Maximum annual surface water withdrawals from the onsite storm water ponds for 389.2 acres urban landscape and 195 acres golf course irrigation is 263.0 million gallons (0.721 mgd, annual average). The average annual water use should be less than this amount in all years except for a 2-in-10 year drought.

When available, additional surface water may be used if needed and must be used prior to utilizing groundwater.

21. The average annual withdrawals from the Upper Floridan aquifer for emergency back-up supply use is 47.2 million gallons (0.13 mgd average), which may be exceeded during a 2-in-10 year drought, to a maximum withdrawal of 60.2 million gallons (0.17 mgd average). All available reclaimed water and surface water must be utilized prior to using groundwater. The emergency groundwater backup shall not be used until a notification from the City of Deland indicating that reclaimed water cannot be supplied and surface water levels are below minimum levels set for the onsite surface water ponds. The use of groundwater as an emergency supplemental source must be reported separately and submitted bi-annually with the water data use. Documentation verifying the insufficient reclaimed water supply and surface water availability must also be included.

22. Total withdrawal from the following wells must be recorded continuously, totaled monthly, and reported to the District at least every six months for the duration of this permit using Water Use Pumpage Report Form (EN-50).

Wells

Station Name	Station ID
W-1A	33124

Pumps

Station Name	Station ID
P-1A	33133
P-1B	33134
P-2	33135
P-3	33136
P-4	33137
P-5	33138
P-7	33140
P-8	33561

Connection Points

Station Name	Station ID
Pond 1 Connection	33593
Pond 2 Connection	33594
Pond 3 Connection	511299
Pond 4 Connection	33595
Pond 5 Connection	33596
Pond 6 Connection	33597

Pond 7 Connection	33598
Pond 8 Connection	33599

The meter reading or quantity withdrawn must be reported in gallons. Reporting is required, even if there is no use. The reporting dates each year will be as follows:

Reporting Period	Report Due Date
January - June	July 31
July - December	January 31

23. Prior to use, all proposed wells must be equipped with totalizing flow meters. All flow meters must measure within +/- 5% of actual flow, be verifiable and be installed according to the manufacturer's specifications.

24. The permittee must maintain all flowmeters and alternative methods for measuring flow. In case of failure or breakdown of any meter, the District must be notified in writing within 5 days of its discovery. A defective meter must be repaired or replaced within 30 days of its discovery.

25. The permittee must have all flow meters checked for accuracy at least once every 10 years, specifically before December 11 2022, and recalibrated if the difference between the actual flow and the meter reading is greater than 5%. Flow Meter Accuracy Report Form (EN-51) must be submitted to the District within 10 days of the inspection/calibration.

26. The permittee must implement the Water Conservation Plan submitted to the District on March 6, 2020, in accordance with the schedule contained therein.

27. Documentation that staff gauges and water level control devices have been installed in the existing surface water pond must be submitted by December 31, 2022. The documentation must include staff gauges and float valve elevations in NGVD and the seasonal normal and low water levels.

28. The float valve system to restrict groundwater withdrawals and staff gauges must be properly set and maintained. In case of failure or breakdown of the float valve or staff gauge, the District must be notified in writing within 5 days of its discovery and the flow of the well should be shut off until the float valve and staff gauge are repaired or replaced. A defective float valve or staff gauge must be repaired or replaced within 30 days of its discovery.

29. The lowest quality water source, such as reclaimed water, must be used as irrigation water in place of groundwater when available and deemed feasible pursuant to District rules and applicable state law.

30. The permittee shall submit to the District a compliance report pursuant to subsection 373.236(4), F.S. by August 23, 2031. The report shall contain sufficient information to demonstrate that the permittee's use of water will continue, for the remaining duration of the permit, to meet the conditions for permit issuance set forth in the District rules that existed at the time the permit was issued for 20 years by the District. At a minimum, the compliance report must include:

    (a) documentation of the percentage of total irrigation which has been supplied by an alternative source, such as surface and reclaimed water, over the last reporting period;
    (b) information documenting that allocations from all sources in the permit will continue to be needed for the remainder of the permit duration;

Appendix B

Geotechnical Report

Subsurface Exploration
Drainage Improvements Project
Taylor Road
DeLand, Florida

Ardaman & Associates, Inc.

CORPORATE HEADQUARTERS
8008 S. Orange Avenue, Orlando, Florida 32809 - Phone: (407) 855-3860 Fax: (407) 859-8121

Branch Office Locations

Florida: Bartow, Cocoa, Fort Myers, Miami, Orlando, Port St. Lucie, Sarasota, Tallahassee, Tampa, West Palm Beach
Louisiana: Baton Rouge, New Orleans, Shreveport
Texas: Houston

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

November 22, 2024
File No. 24-23-5248

Jones Edmunds
13545 Progress Boulevard, Suite 100
Alachua, Florida 32615

Attention: Dr. Bruce Myhre, PhD, PE

Subject: Subsurface Exploration
Taylor Road Drainage Improvements Project
DeLand, Florida
P.O. Number 22015-038-01

Dear Dr. Myhre:

As requested and authorized, we have completed a subsurface exploration for the subject project. The purposes of performing this exploration were to collect soil stratigraphy and permeability data, as well as groundwater level data, at the location of the existing stormwater pond within the project area. In addition, we have estimated the normal seasonal high groundwater level at the boring location. This report documents our findings.

SITE LOCATION AND SITE DESCRIPTION

The site for the proposed drainage improvements is located adjacent to an existing stormwater pond on the north side of Taylor Road in Deland, Florida (Section 23, Township 17 South, Range 30 East). The general site location is shown superimposed on the DeLand, Florida U.S.G.S. quadrangle map presented on Figure 1.

The site is currently grassed and developed with an existing stormwater pond.

1300 N. Cocoa Boulevard, Cocoa, Florida 32922 Phone: (321) 632-2503

Florida: Bartow, Cocoa, Fort Myers, Miami, Orlando, Port St. Lucie, Sarasota, Tallahassee, Tampa, West Palm Beach
Louisiana: Baton Rouge, New Orleans, Shreveport
Texas: Houston

REVIEW OF SOIL SURVEY MAPS

Based on information obtained online from the Web Soil Survey as operated by the U.S. Department of Agriculture Natural Resources Conservation Service, the site is located in an area mapped as the “Immokalee sand, depressional” soil series. A description of this soil type, as obtained from the Soil Survey, is provided below.

Immokalee sand, depressional (#30):

“Immokalee sand, depressional” is a nearly level, very poorly drained soil that occurs on depressions and drainageways of marine terraces. A representative soil profile consists of sand to a depth of 80 inches. The groundwater is approximately near the surface according to the Web Soil Survey.

FIELD EXPLORATION PROGRAM

SPT Boring

The field exploration program included performing one Standard Penetration Test (SPT) boring. The SPT boring was advanced to a depth of 30 feet below the existing ground surface generally using the methodology outlined in ASTM D-1586. A summary of this field procedure is included in the Appendix.

Soil samples recovered during performance of the boring were visually classified in the field and representative portions of the samples were transported to our laboratory in sealed sample jars.

The groundwater level at the boring location was measured during drilling. The boring was backfilled with soil cuttings upon completion.

Permeability Test Sampling

A bulk sample of soil was collected at a depth of approximately 5 feet below existing ground surface during drilling at the location of Boring TH-1. The soil sample was taken to our laboratory in a sealed sample bag and remolded into one 3-inch diameter Shelby-tube sample for soil permeability testing. The results of the permeability test are presented in the Laboratory Program section of this report.

Test Locations

The approximate location of the boring is schematically illustrated on an aerial photograph plan shown on Figure 2. This location was determined in the field by estimating distances from existing site features and should be considered accurate only to the degree implied by the method of measurement used.

LABORATORY PROGRAM

Representative soil samples obtained during our field sampling operation were packaged and transferred to our laboratory for further visual examination and classification. The soil samples were classified using visual-manual procedures in general accordance with the Unified Soil Classification System (ASTM D-2488). The resulting soil descriptions are shown on the soil boring profile presented on Figures 3 and 4.

In addition, we conducted percent fines analyses (ASTM D1140) on selected soil samples obtained from the boring. The results of these tests are presented adjacent to the sample depth on the boring profile presented on Figure 4.

A constant head permeability test was performed on the soil sample collected during drilling and remolded into a 3-inch diameter Shelby tube in our laboratory. The result of the laboratory permeability test is tabulated in the table below.

Sample Location	Approximate Sample Depth (feet)	Measured Permeability (inches/hour)
TH-1	4.5 - 6	12

It is noted that a suitable factor of safety should be used with the value presented in the table above. In addition, for the type of soil tested, a transformation ratio of 1 horizontal to 1 vertical is appropriate (i.e.; the estimated ratio of horizontal to vertical permeability). We recommend using a soil porosity of 30 percent for pond recovery calculations.

GENERAL SUBSURFACE CONDITIONS

General Soil Profile

The results of the field exploration and laboratory programs are graphically summarized on the soil boring profile presented on Figures 3 and 4. The stratification of the boring profile represents our interpretation of the field boring log and the results of laboratory examinations of the recovered samples. The stratification lines represent the approximate boundary between soil types. The actual transitions may be more gradual than implied.

The results of the boring indicate the following general soil profile:

Depth Below Ground Surface (feet)		Description (Unified Soil Classification)
From	To	
0	9	Very Loose Fine Sand (SP) and Fine Sand with Silt (SP-SM)
9	17.5	Loose Fine Sand (SP)
17.5	30	Loose to Medium Dense Clayey Fine Sand (SC) and Silty Fine Sand (SM)

The encountered fine sand (SP) and fine sand with silt (SP-SM) soils (Strata Nos. 1 and 2 on Figures 3 and 4) are generally considered to be relatively permeable. The underlying clayey fine sand (SC) and silty fine sand (SM) (Strata Nos. 3 and 4 on Figures 3 and 4) are likely considerably less permeable and should be considered to be aquitards for retention pond drawdown evaluation.

Typically, for pond drawdown calculation purposes, the surface of the aquitard that underlies and is closest to the pond bottom is considered to be the "base of aquifer". However, despite its low soil permeability, an aquitard does allow some transmission of water. The permeability of an aquitard(s) could be included in pond recovery calculations, however, the calculation typically requires more complex groundwater flow modeling.

The above soil profile is outlined in general terms only. Please refer to Figures 3 and 4 for soil profile details.

Groundwater Level

The groundwater level was measured in the borehole during drilling. As shown on Figure 4, groundwater was encountered at a depth of approximately 2.3 feet below the existing ground surface on the date indicated. Fluctuation in groundwater levels should be anticipated throughout the year primarily due to seasonal variations in rainfall and other factors that may vary from the time the boring was conducted.

NORMAL SEASONAL HIGH GROUNDWATER LEVEL

The groundwater level is affected by a number of factors. The amount of rainfall and the drainage characteristics of the soils, the land surface elevation, relief points such as drainage ditches, lakes, rivers, swamp areas, etc., and distance to relief points are some of the more important factors influencing the groundwater level.

The normal seasonal high groundwater level each year is the level in the August-September period at the end of the rainy season during a year of normal (average) rainfall. The water table elevations associated with a higher than normal rainfall and in the extreme case, flood, would be higher to much higher than the normal seasonal high groundwater level, and could occur at times outside of the August-September period. The normal high water levels would more approximate the normal seasonal high groundwater levels.

In addition to evaluating the conditions above, we have reviewed annual precipitation data available from the Melbourne Office of the National Weather Service. Based on this data, the annual rainfall to date in Volusia County is approximately 52.1 inches, which is approximately at the normal amount of rainfall for this time of year.

Based on our interpretation of the site conditions using our boring logs, we estimate the normal seasonal high groundwater level at the boring location to be approximately ½ foot above the groundwater level measured at the time of our field exploration.

CLOSURE

The conclusions submitted herein are based on the data obtained from the soil boring presented on Figures 2 through 4. This report does not reflect any variations which may occur adjacent to the boring. The nature and extent of the variations adjacent to the boring may not become evident until during additional exploration or construction. If variations then appear evident, it will be necessary to re-evaluate the conclusions presented in this report after performing on-site observations during the construction period and noting the characteristics of the variations.

This study does not include an evaluation of the environmental (ecological or hazardous/toxic material related) condition of the site and subsurface.

This report has been prepared for the exclusive use of Jones Edmunds in accordance with generally accepted geotechnical engineering practices for the purpose of the Taylor Road drainage improvements project. No other warranty, expressed or implied, is made.

We are pleased to be of assistance to you on this phase of the project. When we may be of further service to you or should you have any questions, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.
Florida Registry 5950

Janie C. Ross
Assistant Project Engineer

Jason P. Manning, P.E.
Branch Manager
Florida License No. 53265

JCR/JPM/dk

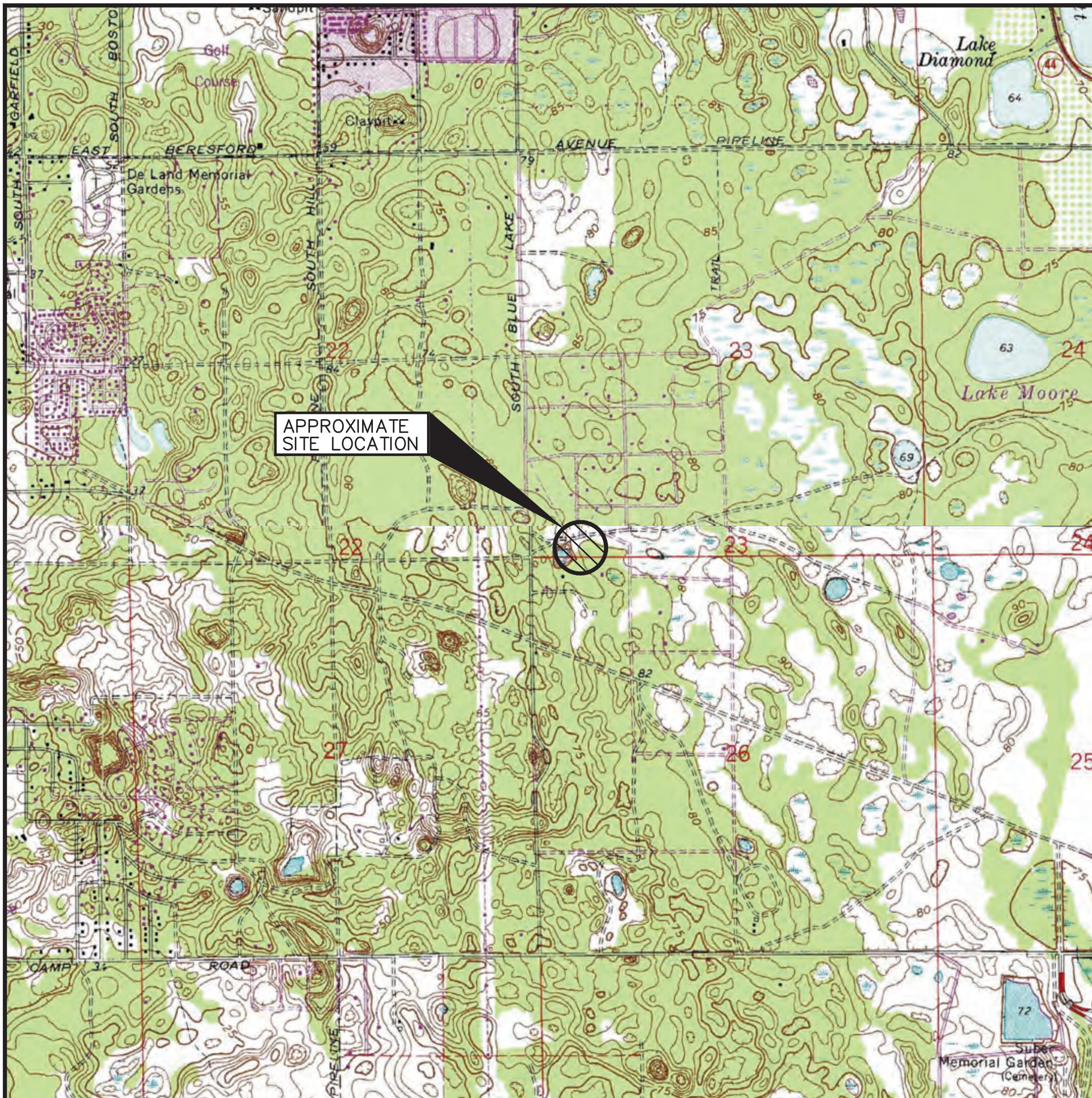
JASON PARKER MANNING
LICENSE
No. 53265
STATE OF FLORIDA
PROFESSIONAL ENGINEER

THIS DOCUMENT HAS BEEN DIGITALLY SIGNED AND SEALED BY:

Jason P Manning

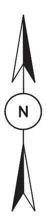
Digitally signed by Jason P Manning
Date: 2024.11.25 08:25:49 -05'00'

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED. THIS SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.



SECTION 23
TOWNSHIP 17 SOUTH
RANGE 30 EAST

OBTAINED FROM U.S.G.S. QUAD MAP: DELAND, FLORIDA



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SCALE: 1"=2000'

QUADRANGLE LOCATION

SITE LOCATION MAP

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE EXPLORATION
DRAINAGE IMPROVEMENTS – TAYLOR ROAD
VOLUSIA COUNTY, FLORIDA

DRAWN BY: TAT	CHECKED BY:	DATE: 10/16/24
FILE NO. 24–5248	APPROVED BY:	FIGURE: 1

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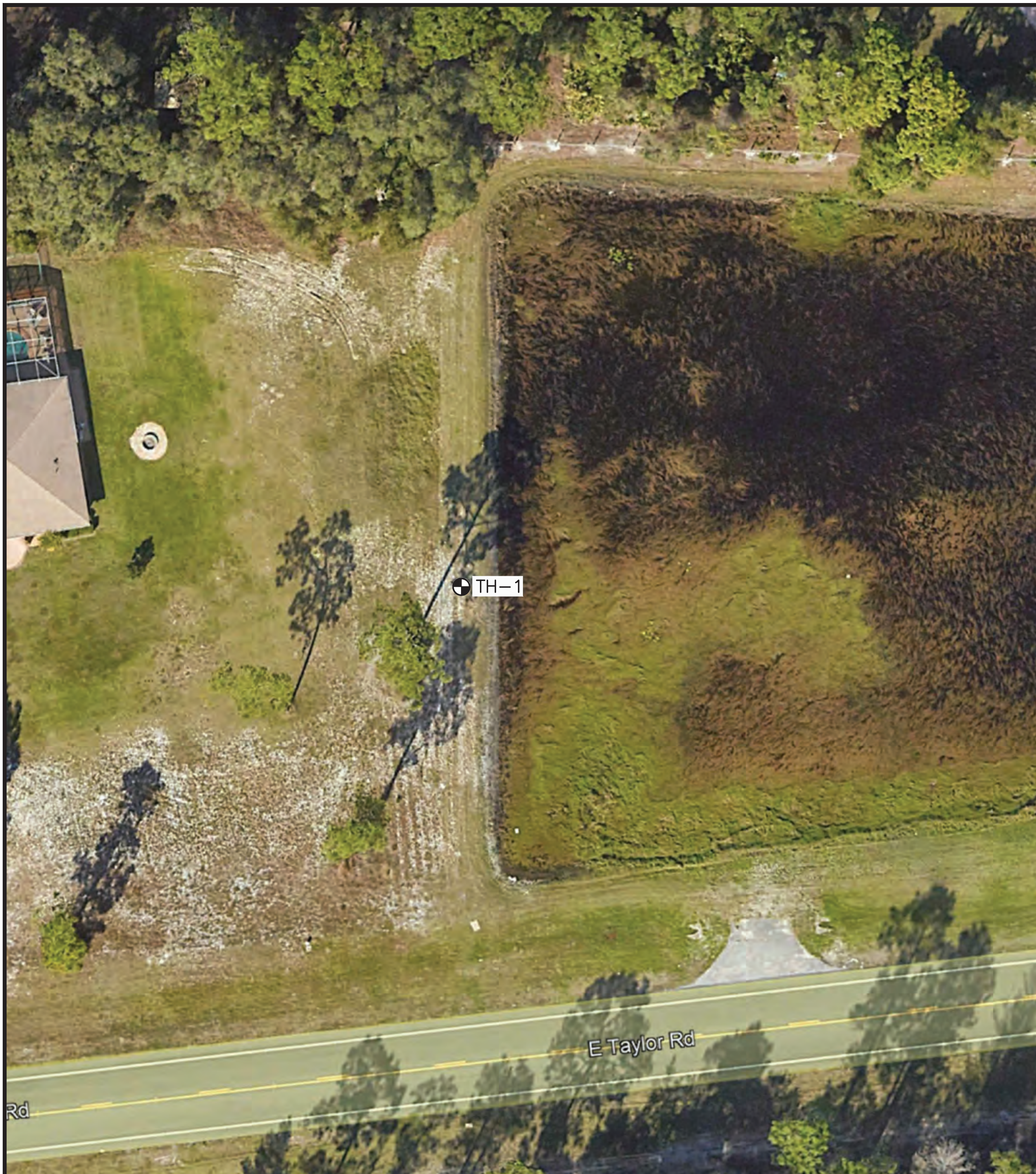

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SCALE: — 1"=50'

LEGEND

TH STANDARD PENETRATION TEST (SPT) BORING LOCATION

BORING LOCATION PLAN

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE EXPLORATION
DRAINAGE IMPROVEMENTS – TAYLOR ROAD
VOLUSIA COUNTY, FLORIDA

DRAWN BY: TAT	CHECKED BY:	DATE: 10/16/24
FILE NO. 24–5248	APPROVED BY:	FIGURE: 2

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LEGEND

SOIL DESCRIPTIONS

1. FINE SAND (SP)
2. FINE SAND WITH SILT (SP–SM)
3. CLAYEY FINE SAND (SC)
4. SILTY FINE SAND (SM)

COLORS

A. LIGHT BROWN TO BROWN
B. GRAYISH–BROWN
C. LIGHT GRAY TO GRAY

TH	STANDARD PENETRATION TEST (SPT) BORING
N	STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
▽	GROUNDWATER LEVEL MEASURED ON DATE DRILLED
–200	PERCENT PASSING NO. 200 SIEVE SIZE (PERCENT FINES)(ASTM D–1140)
SP,SP–SM SM,SC,CH	UNIFIED SOIL CLASSIFICATION SYSTEM

ENGINEERING CLASSIFICATION

I COHESIONLESS SOILS

DESCRIPTION	BLOW COUNT "N"
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM	10 TO 30
DENSE	30 TO 50
VERY DENSE	>50

II COHESIVE SOILS

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, QU, TSF	BLOW COUNT "N"
VERY SOFT	<1/4	0 TO 2
SOFT	1/4 TO 1/2	2 TO 4
MEDIUM	1/2 TO 1	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	>4	>30

WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.

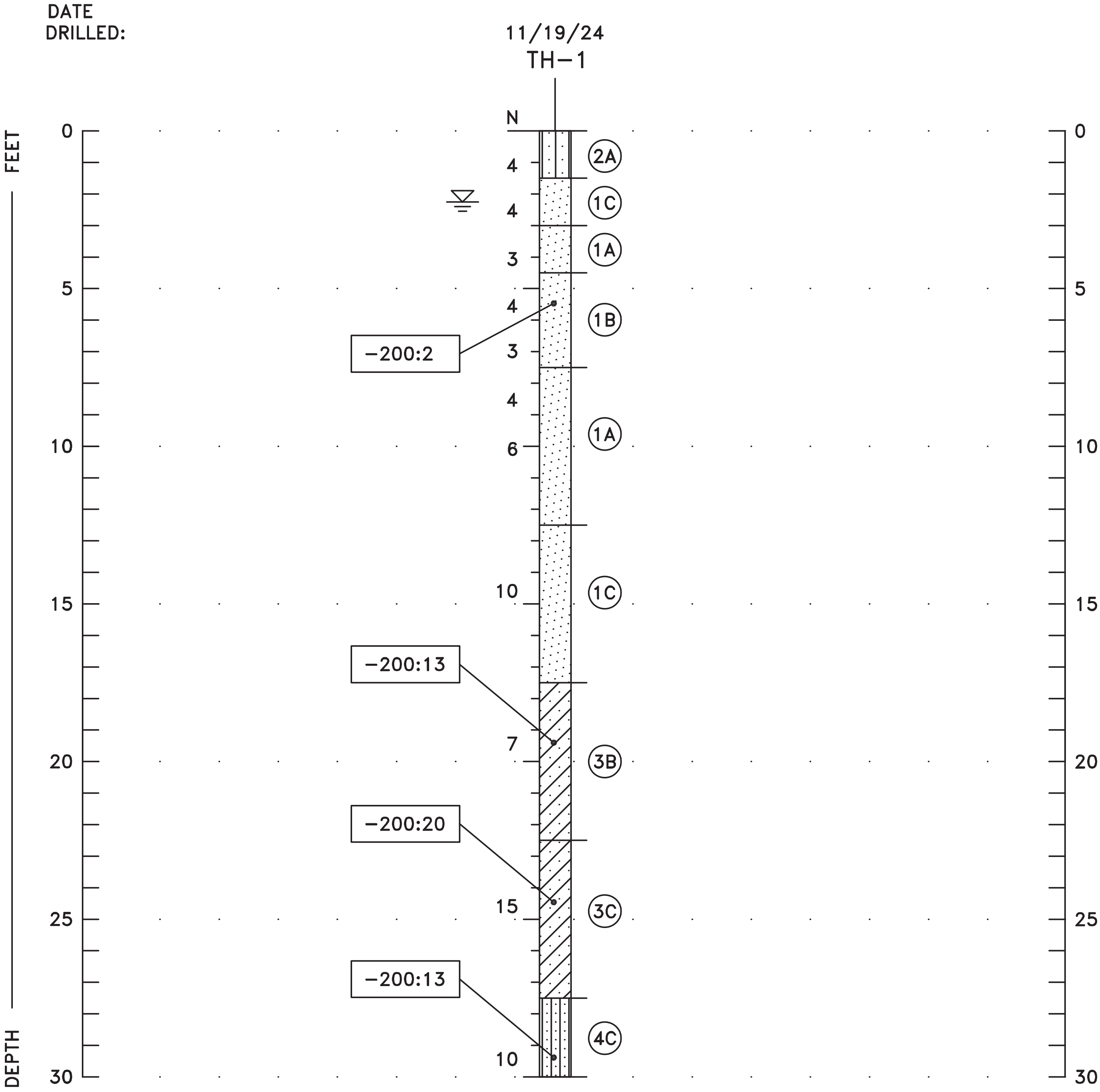
GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.

SOIL PROFILES LEGEND

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE EXPLORATION
DRAINAGE IMPROVEMENTS – TAYLOR ROAD
VOLUSIA COUNTY, FLORIDA

DRAWN BY: TAT	CHECKED BY:	DATE: 11/20/24
FILE NO. 24–5248	APPROVED BY:	FIGURE: 3



SOIL BORING PROFILE

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE EXPLORATION
DRAINAGE IMPROVEMENTS – TAYLOR ROAD
VOLUSIA COUNTY, FLORIDA

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APPENDIX

Standard Penetration Test Procedures

STANDARD PENETRATION TEST

The standard penetration test is a widely accepted test method of *in situ* testing of soils (ASTM D 1586), and Ardaman & Associates generally follows this test method. A 2-foot long, 2-inch O.D. split-barrel sampler attached to the end of a string of drilling rods is driven 18 or 24 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties.

The tests are usually performed at 5-foot intervals. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is a bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or prevent the loss of circulating fluid.

Representative split-spoon samples from the soils are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary.

Appendix C

Planning-Level Cost Breakdown

TABLE 1: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST						
PROJECT NAME: TAYLOR ROAD DRAINAGE IMPROVEMENT				CLIENT: VOLUSIA COUNTY		
ALTERNATIVE 1 - PUMP STATION AND FORCE MAIN				PREPARED BY: B. MYHRE		
ESTIMATE TYPE: ASTM E2516 - CLASS 4				CHECKED BY: T. DO		
PROJECT NUMBER: 22015-038-01				DATE: March 24, 2025		
ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	LOW ESTIMATE	HIGH ESTIMATE	COST
GENERAL						
MOBILIZATION (10%)	LS	1	$403,860	$323,200	$525,100	$403,900
MAINTENANCE OF TRAFFIC (10%)	LS	1	$403,860	$323,200	$525,100	$403,900
PREVENTION, CONTROL, AND ABATEMENT OF EROSION AND WATER POLLUTION (3%)	LS	1	$121,158	$97,000	$157,600	$121,200
PUMP STATION AND FORCE MAIN						
CLEARING AND GRUBBING	AC	1.00	$30,000	$24,000	$39,000	$30,000
CONCRETE HEADWALL 36 INCHES	EA	2	$15,000	$24,000	$39,000	$30,000
36-INCH RCP	LF	48	$350	$13,500	$21,900	$16,800
PUMP STATION	LS	1	$750,000	$600,000	$975,000	$750,000
FORCE MAIN - 16-INCH HDPE HDD	LF	5,800	$500	$2,320,000	$3,770,000	$2,900,000
UTILITY FITTINGS	EA	6	$2,000	$9,600	$15,600	$12,000
DEWATERING	LS	1	$25,000	$20,000	$32,500	$25,000
UTILITY COORDINATION	LS	1	$100,000	$80,000	$130,000	$100,000
INTAKE/OUTFALL STRUCTURE	LS	2	$75,000	$120,000	$195,000	$150,000
RIP-RAP	TN	150	$125	$15,100	$24,500	$18,800
SODDING	SY	1,000	$6	$4,800	$7,800	$6,000
CONSTRUCTION SUBTOTAL				$3,974,400	$6,458,100	$4,967,600
OVERALL ITEMS						
CONTINGENCY (40%)	LS	1	$1,987,040	$1,589,700	$2,583,300	$1,987,100
DESIGN/PERMITTING/DATA COLLECTION (15%)	LS	1	$745,140	$596,200	$968,800	$745,200
			TOTAL	$6,161,000	$10,011,000	$7,700,000

TABLE 1: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST						
PROJECT NAME: TAYLOR ROAD DRAINAGE IMPROVEMENT				CLIENT: VOLUSIA COUNTY		
ALTERNATIVE 2 - PUMP STATION AND FORCE MAIN, POND ON SOUTH SIDE				PREPARED BY: B. MYHRE		
ESTIMATE TYPE: ASTM E2516 - CLASS 4				CHECKED BY: T. DO		
PROJECT NUMBER: 22015-038-01				DATE: March 24, 2025		
ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	LOW ESTIMATE	HIGH ESTIMATE	COST
GENERAL						
MOBILIZATION (10%)	LS	1	$418,280	$334,700	$543,800	$418,300
MAINTENANCE OF TRAFFIC (10%)	LS	1	$418,280	$334,700	$543,800	$418,300
PREVENTION, CONTROL, AND ABATEMENT OF EROSION AND WATER POLLUTION (3%)	LS	1	$125,484	$100,400	$163,200	$125,500
PUMP STATION AND FORCE MAIN						
CLEARING AND GRUBBING	AC	4.5	$30,000	$108,000	$175,500	$135,000
CONCRETE HEADWALL - 36 INCHES	EA	2	$15,000	$24,000	$39,000	$30,000
36-INCH RCP	LF	48	$350	$13,500	$21,900	$16,800
MITERED END SECTION	EA	2	$5,000	$8,000	$13,000	$10,000
24-INCH x 38-INCH ERCP	LF	60	$420	$20,200	$32,800	$25,200
PUMP STATION	LS	1	$750,000	$600,000	$975,000	$750,000
FORCE MAIN - 12-INCH HDPE HDD	LF	5,800	$300	$1,392,000	$2,262,000	$1,740,000
UTILITY FITTINGS	EA	6	$2,000	$9,600	$15,600	$12,000
DEWATERING	LS	1	$50,000	$40,000	$65,000	$50,000
UTILITY COORDINATION	LS	1	$100,000	$80,000	$130,000	$100,000
INTAKE/OUTFALL STRUCTURE	LS	2	$75,000	$120,000	$195,000	$150,000
REGULAR EXCAVATION	CY	35,000	$25	$700,000	$1,137,500	$875,000
EMBANKMENT	CY	8,000	$30	$192,000	$312,000	$240,000
RIP-RAP	TN	150	$125	$15,100	$24,500	$18,800
SODDING	SY	5,000	$6	$24,000	$39,000	$30,000
CONSTRUCTION SUBTOTAL				$4,116,200	$6,688,600	$5,144,900
OVERALL ITEMS						
CONTINGENCY (40%)	LS	1	$2,057,960	$1,646,400	$2,675,400	$2,058,000
DESIGN/PERMITTING/DATA COLLECTION (15%)	LS	1	$771,735	$617,500	$1,003,400	$771,800
PROPERTY ACQUSITION						
POND PROPERTY	LS	1	$100,000	$80,000	$130,000	$100,000
			TOTAL	$6,461,000	$10,498,000	$8,075,000

TABLE 1: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST						
PROJECT NAME: TAYLOR ROAD DRAINAGE IMPROVEMENT			CLIENT: VOLUSIA COUNTY			
ALTERNATIVE 3 - OUTFALL STRUCTURE WITH GRAVITY FLOW AND NEW POND			PREPARED BY: B. MYHRE			
ESTIMATE TYPE: ASTM E2516 - CLASS 4			CHECKED BY: T. DO			
PROJECT NUMBER: 22015-038-01			DATE: March 24, 2025			
ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	LOW ESTIMATE	HIGH ESTIMATE	COST
GENERAL						
MOBILIZATION (10%)	LS	1	$412,900	$330,400	$536,800	$412,900
MAINTENANCE OF TRAFFIC (15%)	LS	1	$619,350	$495,600	$805,300	$619,400
PREVENTION, CONTROL, AND ABATEMENT OF EROSION AND WATER POLLUTION (3%)	LS	1	$123,870	$99,200	$161,100	$123,900
CONTROL STRUCTURE AND GRAVITY PIPE						
CLEARING AND GRUBBING	AC	4.50	$30,000	$108,000	$175,500	$135,000
CONCRETE HEADWALL - 30 INCHES	EA	2	$15,000	$24,000	$39,000	$30,000
30-INCH RCP	LF	5,800	$300	$1,392,000	$2,262,000	$1,740,000
MITERED END SECTION	EA	2	$5,000	$8,000	$13,000	$10,000
24-INCH x 38-INCH ERCP	LF	60	$420	$20,200	$32,800	$25,200
DBI/STORM MANHOLES	EA	25	$15,000	$300,000	$487,500	$375,000
DEWATERING	LS	1	$300,000	$240,000	$390,000	$300,000
UTILITY COORDINATION	LS	1	$100,000	$80,000	$130,000	$100,000
UTILITY RELOCATIONS	LS	1	$250,000	$200,000	$325,000	$250,000
REGULAR EXCAVATION	CY	35,000	$25	$700,000	$1,137,500	$875,000
EMBANKMENT	CY	8,000	$30	$192,000	$312,000	$240,000
RIP-RAP	TN	150	$125	$15,100	$24,500	$18,800
SODDING	SY	5,000	$6	$24,000	$39,000	$30,000
CONSTRUCTION SUBTOTAL				$4,228,500	$6,871,000	$5,285,200
OVERALL ITEMS						
CONTINGENCY (40%)	LS	1	$2,114,080	$1,691,300	$2,748,400	$2,114,100
DESIGN/PERMITTING/DATA COLLECTION (15%)	LS	1	$792,780	$634,300	$1,030,700	$792,800
PROPERTY ACQUSITION						
POND PROPERTY	LS	1	$100,000	$80,000	$130,000	$100,000
			TOTAL	$6,635,000	$10,781,000	$8,293,000