

MEMORANDUM

To: City of Palm Bay Utilities Department

From: Infrastructure Solution Services

Date: July 18, 2023

Subject: Revised Ashton Park Water Level of Service Hydraulic Analysis
Technical Memorandum

1.0 Purpose

At the request of Palm Bay Utilities (PBU), Infrastructure Solution Services (ISS) performed water hydraulic model simulations for the proposed Ashton Park development in the far southeast of the City along Micco Rd to the east of I-95. The purpose of this evaluation is to determine the water system improvements necessary to provide water service to this development. The City-wide water model recently developed for the Water Master Plan was utilized in this evaluation, with the 20-year planning horizon controlling for necessary system improvements. The first revision of this level of service analysis was completed on April 26, 2023. This second revision builds upon the original analysis and incorporates updated development plans provided by Construction Engineering Group.

2.0 Future Demands

2.1 Concurrent Future Developments

Projected water equivalent residential connection (ERC) totals have been provided by the City for all future developments within the City, with each water ERC equal to 225 gpd in accordance with PBU standards. Significant expansion is expected in the southeastern portion of the City within the 20-year planning horizon.

Table 2-1 below shows the future developments and projected demands in proximity to Ashton Park.

Table 2-1 – Southeastern Future Developments and Projected Demands

| Development | Projected ERCs | Annual Average Daily Water Demand (gpd) |
|-----------------------------|----------------|---|
| Rolling Meadows | 2,339 | 526,275 |
| Waterstone/Cypress Bay West | 2,413 | 542,925 |
| Cypress Bay | 593 | 133,425 |
| Emerald Lakes West | 3,775 | 849,375 |
| Emerald Lakes East | 2,179 | 490,275 |
| Pete Holdings | 1,966 | 442,350 |
| Willowbrook | 6,000 | 1,350,000 |
| Calumet Farms | 3,304 | 743,400 |
| Total: | 22,569 | 5,078,000 |

2.2 Basis of Estimation

The City furnished ISS with a revised version of the Master Plan for the Ashton Park development, prepared by Construction Engineering Group dated May 18th, 2023 and attached in Appendix A. This document was used to update the projected ERC totals for the Ashton Park development. A density summary provided a total of 5,484 anticipated residential lots/units in the development, divided into eight different lot/unit types. Additionally, acreage values totaling approximately 152 acres were provided for each of four anticipated commercial use types. The layout drawing provided appears to show building footprints, parking lots, and other developments details in these commercial spaces that may provide a more refined estimate of the development than the total acreage values provided. Such details would improve the ERC estimation exercise that follows.

2.3 Projected Residential Flows

All residential lots were considered single family homes for ERC estimation purposes, with the exception of the 746 multi-family units that were considered 1- or 2-bedroom multi-family units.

2.4 Projected School Flows

School requirements were estimated using the methodology described in the *Proposed Ashton Park Development School Impact Analysis – Capacity Determination CD-2023-02* letter dated January 19, 2023 and prepared by the School Board of Brevard County. Student generation rates were applied to the updated development projection and compared against the provided available school capacities as shown in **Table 2-2** below. This analysis was performed for the purpose of conceptual sizing of the proposed school building for determining water demand.

Table 2-2 – Ashton Park Projected Student Generation

| Students Generated | Single-Family Student Generation Rate (students/home) | Single Family Homes | Single-Family Students Projected | Multi-Family Student Generation Rate (students/unit) | Multi-Family Units | Multi-Family Students Projected |
|--------------------|---|---------------------|----------------------------------|--|--------------------|---------------------------------|
| Elementary | 0.24 | 4,738 | 1,137 | 0.11 | 746 | 82 |
| Middle | 0.07 | 4,738 | 332 | 0.02 | 746 | 15 |
| High | 0.12 | 4,738 | 569 | 0.05 | 746 | 37 |

The School Impact Analysis determined that there was not sufficient capacity in the concurrency service area to accept the elementary, middle, or high school students projected from Ashton Park. Additionally, the elementary and middle schools in the adjacent concurrency area also lacked capacity to accommodate projected Ashton Park students, while Palm Bay High School in the adjacent concurrency area was able to accommodate the 606 projected Ashton Park high school students. Thus, Ashton Park schools were conceptualized as one elementary school with 1,219 students and one middle school with 347 students for the purpose of estimating water demand.

2.5 Projected Commercial Flows

2.5.1 Police and Fire Stations

Police and fire flows were approximated based on comparable facilities.

2.5.2 Town Center, Retail, and Other Commercial Uses

The proposed Town Center commercial land use was treated as "Neighborhood Commercial District" per Section 185 of the Palm Bay Code of Ordinances with a maximum allowable building coverage of 30%. It was assumed that this area would consist of 20% restaurants and 80% shops, all single-story, based on comparison to similar planned developments throughout the state. The proposed Commercial/Retail and Commercial/Flex Industrial land uses were treated as "Community Commercial District" and "Light Industrial and Warehousing District" per Section 185 of the Palm Bay Code of Ordinances with maximum allowable building coverages of 35% and 50%, respectively. Floor spaces were assumed to be single-story and use type was assumed to be "shopping centers without food or laundry" per Florida Administrative Code Section 64E-6.008 to account for the variety of potential usages.

2.6 Projected Total Ashton Park Flows

Upon completion of the development at the 20-year planning horizon, Ashton Park is projected to generate approximately 6,800 ERCs of water demand. This is equivalent to approximately 1.5 million gallons per day

(MGD) on an average annual daily flow (AADF) basis. For reference, the current City-wide water flows are approximately 7.5 MGD AADF. **Table 2-3** below shows the basis for the ERC estimation for the Ashton Park development.

Table 2-3 – Ashton Park ERC Estimation

| Land Use | Count | Unit | Projected ERCs | Annual Average Daily Water Flow (gpd) |
|--------------------------------|-----------------------------|--|----------------|---------------------------------------|
| Single Family Home | 4,738 homes | x 1 ERC / home ¹ | 4738 | 1,066,100 |
| Multi-Family (1 or 2 bedrooms) | 746 units | x 0.883 ERC / unit ¹ | 659 | 148,200 |
| Elementary School | 1,219 students | x 0.028 ERC / student ¹ | 34 | 7,700 |
| Middle School | 347 students | x 0.075 ERC / student ¹ | 26 | 5,900 |
| Police/Fire Facilities | 2 stations | x 5 ERC / station ² | 10 | 2,300 |
| Town Center (20% restaurants) | 107,900 sq ft floor space | x 50% dining space x 1 seat / 15 sq ft x 0.113 ERC / seat ¹ | 406 | 91,400 |
| Town Center (80% shops) | 431,500 sq ft floor space | x 0.1 gpd / sq ft x 1 ERC / 225 gpd ³ | 205 | 46,200 |
| Commercial/Retail | 441,400 sq ft floor space | x 0.1 gpd / sq ft x 1 ERC / 225 gpd ³ | 210 | 47,300 |
| Commercial/Flex Industrial | 1,082,200 sq ft floor space | x 0.1 gpd / sq ft x 1 ERC / 225 gpd ³ | 515 | 116,000 |
| Total: | | | 6,800 | 1,530,000 |

¹From PBU Standards

²Approximation based on comparable facilities

³From Florida Administrative Code Section 64E-6.008

The updated development master plan reduced the projected water demand by approximately 50%, though Ashton Park remains a significant development in the City's service area. The original City projection for Ashton Park, at the time referred to as Micco Village, was 600 ERCs and the previous estimation completed in April 2023 was approximately 13,000 ERCs. With the updated ERC estimation of 6,800 ERCs, Ashton Park accounts for 23% of all anticipated new development flows in the south of the City.

Under the 20-year planning horizon, total water demand in the City are 17.6 MGD. Water demand for the 20-year planning horizon are presented in **Table 2-4** below.

Table 2-4 – 20-Year Planning Horizon Anticipated Total Water Demand

| Component | 20-Year Projected ERCs | Annual Average Daily Water Demand (MGD) |
|--|------------------------|---|
| Ashton Park | 6,800 | 1.53 |
| Other Southern Future Developments (downstream of booster station) | 7,920 | 1.78 |
| Other Southern Future Developments (upstream of booster station) | 14,649 | 3.30 |
| Remainder of the City | 48,667 | 10.95 |
| Total: | 78,000 | 17.6 |

3.0 20-Year Planning Horizon

The 20-year planning horizon was utilized to determine the total scope of system improvements necessary to provide water service to the Ashton Park development. Significant improvements in the system that are incorporated into the 20-year planning horizon including the original 600 ERCs for Ashton Park (previously known as Micco Village) are presented in

Table 3-1 below.

Table 3-1 – 20-Year Planning Horizon System Improvements

| Improvement | Quantity | Size |
|--|-----------|---------------------------|
| Pipe extension from Preserves at Stonebriar to Babcock St along FPL Powerline Easement | 14,700 LF | 16" |
| Pipe extension and loop through Rolling Meadows and Willowbrook to San Filippo Dr and to SRWTP | 55,000 LF | 16" |
| Pipe extension from Babcock St through Waterstone/Cypress Bay West | 10,500 LF | 16" |
| Pipe extension along Babcock St from St Johns Heritage Pkwy to Calumet Farms | 13,500 LF | 16" |
| Loop along Micco Rd from Babcock St to St Johns Heritage Pkwy | 13,100 LF | 12" |
| Pipe extension along Babcock St from Waterstone to St Johns Heritage Pkwy | 3,300 LF | 16" |
| Pipe extension along St Johns Heritage Pkwy from Babcock St to Southern Booster Pump Station | 4,000 LF | 16" |
| Pipe extension along St Johns Heritage Pkwy from Southern Booster Pump Station through Emerald Lakes West | 6,000 LF | 16" |
| Pipe extension along St Johns Heritage Pkwy from Emerald Lakes West through Emerald Lakes East and Pete Holdings | 12,700 LF | 12" |
| Construction of Southern Booster Pump Station with pumps | 5 pumps | 35 hp (x1) 100 hp (x4) |

To serve the majority of future developments in the south of the City, the construction of a southern booster pump station with ground storage tanks is necessary. This station is required to provide adequate fire flow and maintain acceptable pressures under the max day and peak hour conditions. A pipe extension along south Babcock with loop into the St Johns Heritage Pkwy extension supports demands in these southern developments and prevents dead end routing that may be detrimental to water quality.

A schematic of this original 20-year system with peak hour pressures and velocities is shown in **Figure 3-1** below.

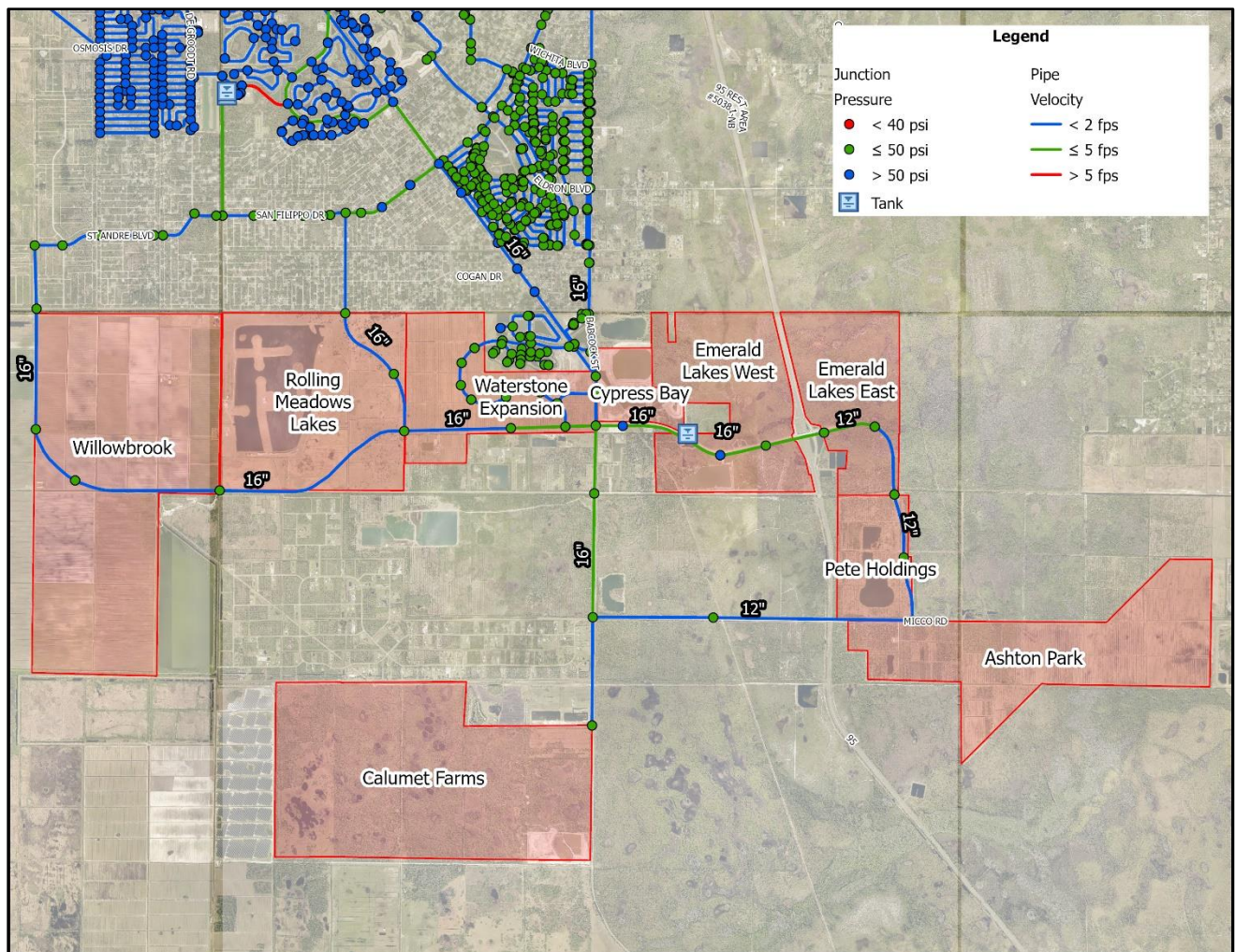


Figure 3-1 – 20-Year Planning Horizon Peak Hour Pressures and Velocities

4.0 Ashton Park Connection

Prior to the connection of Ashton Park, the hydraulic model for the 20-year planning horizon showed peak hour pressures throughout the system, including the southern developments along the St Johns Heritage Pkwy forcemain, all above 40 psi and capable of providing required fire flow.

With the connection of Ashton Park and no additional system improvements, the hydraulic model showed the peak hour pressures throughout the southern region of the City fell between 10 and 20 psi and fire flow was not able to be provided in the southern area. Thus, connecting the Ashton Park development to the Palm Bay system will require a number of additional system improvements utilizing one of the two alternatives provided hereafter.

4.1 Option 1: No Emerald Lakes East or West - Dual Pipe, Southern Booster Station, and SRWTP Expansion

Due to contrasting development schedules, the City requested an evaluation of the additional system improvements required to accommodate Ashton Park assuming no development occurs at the Emerald Lakes East and West properties. This is a reduction of nearly 6,000 ERCs from the St Johns Heritage Pkwy watermain extension. This scenario entirely removes these demands and associated piping within Emerald Lakes East and West, assuming no development at all occurs on these properties. This scenario also eliminated the construction of the 12-in main crossing under I-95 and extending towards Ashton Park from the north.

Average day demands from Ashton Park alone are approximately 1,060 gpm with peak hour demands of approximately 2,500 gpm, both of which are expected to be met with 40 psi residual pressure. Based on coordination with the City, it is assumed that “industrial” fire flow of 3,500 gpm for Ashton Park will not be required; therefore, the Option 1 and Option 2 scenarios were evaluated for “commercial” fire flow of 2,500 gpm. The fire flow requirement of 2,500 gpm was provided at 20 psi in addition to the max day demand of 1,590 gpm.

In order to provide capacity for the additional Ashton Park demands while maintaining acceptable system pressures and providing adequate fire flow, the system improvements presented in **Table 4-1** below are required.

Table 4-1 – Option 1 Ashton Park Required System Improvements

| Improvement | Quantity | 20-Year Size | Ashton Park Required Size |
|---|-----------|---------------------------|---------------------------|
| Booster Station Return Pipe from Southern Booster Station to Babcock St | 4,000 LF | - | 24" |
| Pipe Upsizing along Babcock St from St Johns Heritage Pkwy to Micco Rd | 8,000 LF | 16" | 24" |
| Pipe Upsizing along Micco Rd from Babcock St to Ashton Park | 13,600 LF | 12" | 24" |
| Upsizing of Southern Booster Pump Station pumps | 3 pumps | 35 hp (x1) 100 hp (x4) | 35 hp (x1) 125 hp (x4) |
| Construction of ground storage tanks at Southern Booster Pump Station | - | - | 0.5 MG |
| Pipe extension along Micco Rd within Ashton Park | 14,500 LF | - | 24" |
| Expansion of the water supply and treatment capacity of the SRWTP | - | - | 0.5 MGD |

A schematic of this system, including the Ashton Park required improvements, is shown in **Figure 4-1** below.

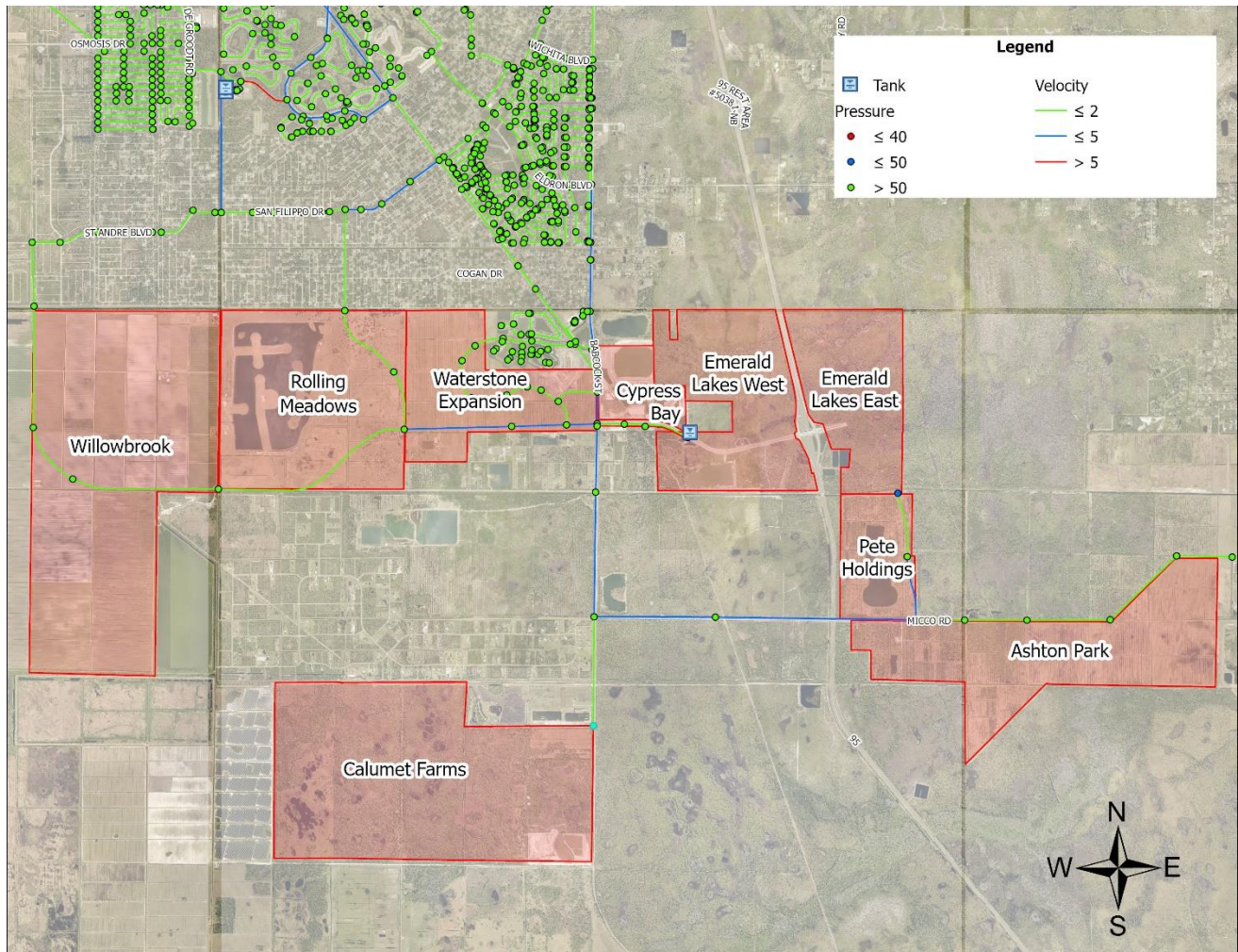


Figure 4-1 – Ashton Park Option 1 Improvements Peak Hour Pressures and Velocities

This analysis is subject to further refinement following the completion of the 20-year extended period simulation analysis that is part of the ongoing Water Master Planning effort. The further analysis may result in additional system improvements being identified upstream of the Southern Booster Pump Station which will be needed to supply sufficient water to fill the ground storage tanks.

4.2 Option 2: All Future Developments - Dual Pipe, Booster Pumps, and SRWTP Expansion

As with Option 1, this alternative includes construct of additional pipes in parallel to the pipes already required under the 20-year condition. This option also includes the 20-year demands for Emerald Lakes East and West developments. This design would facilitate the required flows to and from the Southern Booster Pump Station and would feed Ashton Park, without altering the other planned water piping along St Johns Heritage Pkwy. The required improvements for this alternative are presented in **Table 4-2** below.

Table 4-2 – Option 2 Ashton Park Required System Improvements

| Improvement | Quantity | 20-Year Size | Ashton Park Required Size |
|--|-----------|---------------------------|--|
| Pipe extension along St Johns Heritage Pkwy from Babcock St to Southern Booster Pump Station | 4,000 LF | 16" | 16" and 16" (dual pipe configuration) |
| Pipe extension along St Johns Heritage Pkwy from Southern Booster Pump Station through Emerald Lakes West | 6,000 LF | 16" | 16" and 16" (dual pipe configuration) |
| Pipe extension along St Johns Heritage Pkwy from Emerald Lakes West through Emerald Lakes East and Pete Holdings | 12,700 LF | 12" | 12" and 16" (dual pipe configuration) |
| Upsizing of Southern Booster Pump Station pumps | 3 pumps | 35 hp (x1) 100 hp (x4) | 35 hp (x1) 125 hp (x4) |
| Construction of ground storage tanks at Southern Booster Pump Station | - | - | 0.5 MG |
| Pipe extension along Micco Rd within Ashton Park | 14,500 LF | - | 24" |
| Expansion of the water supply and treatment capacity of the SRWTP | - | - | 1.5 MGD |

A schematic of this system, including the Ashton Park connection and required improvements, is shown in **Figure 4-2** below.

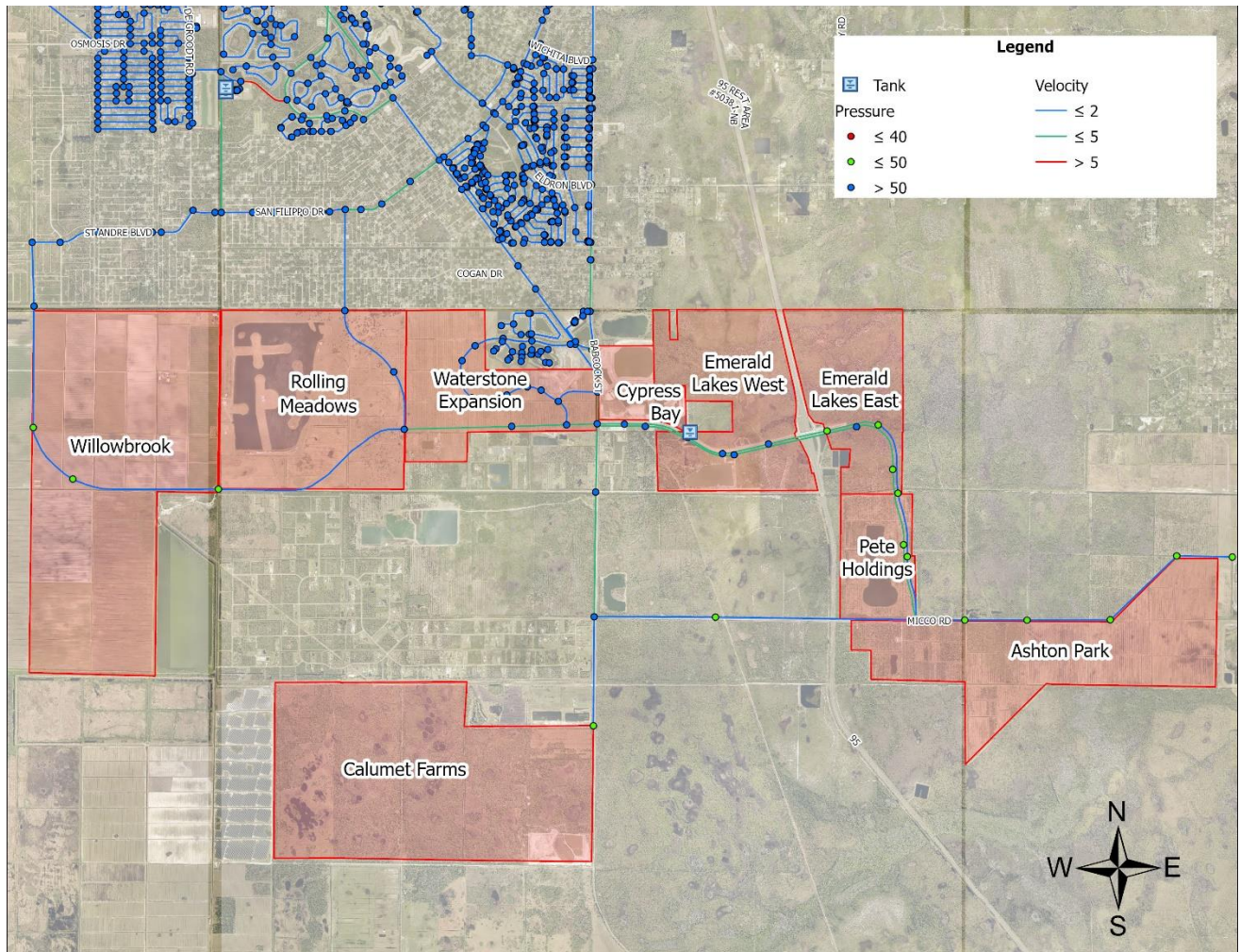


Figure 4-2 – Ashton Park Option 2 Improvements Peak Hour Pressures and Velocities

4.3 Option 3: New Southeastern Water Treatment Plant Construction

Instead of providing water demand to Ashton Park from the SRWTP and Southern Booster Station, a new 4.0 MGD water treatment plant could be constructed within or near Ashton Park. This facility would provide all of the water flow demand for Ashton Park. This option would accommodate the entire Ashton Park development regardless of other development activities while avoiding the construction of additional water transmission piping, existing water treatment plant improvements, booster station improvements and sizeable impact fees due to the City.

5.0 Summary

Ashton Park is projected to place significant demands on the City water system in a region that is expected to receive additional significant demands from other proposed developments. The proposed demand volume,

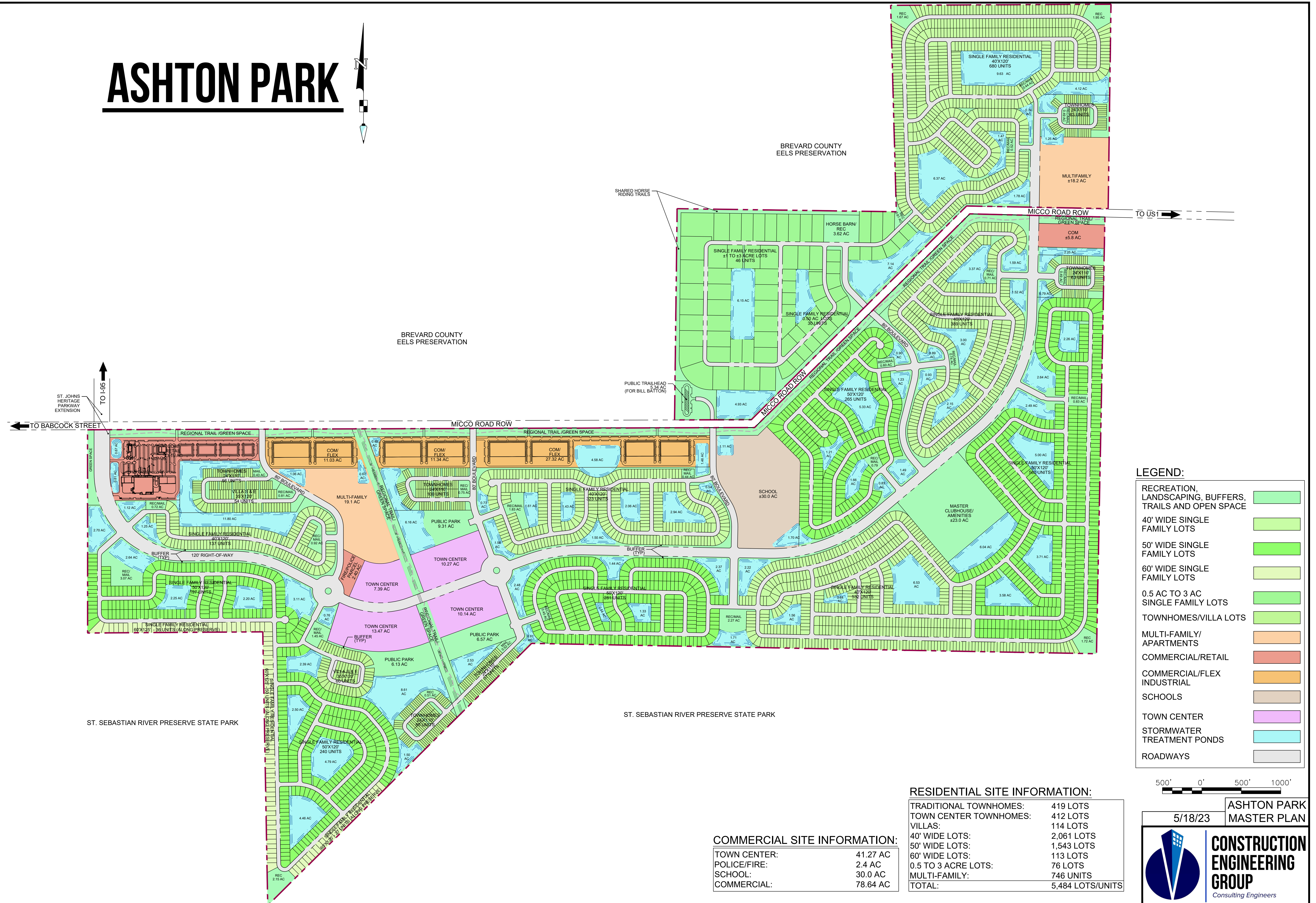
increased fire flow requirement, and distance from the existing SRWTP are all noteworthy, as compared to the existing system. Accordingly, the upsizing of pumps and tanks at the Southern Booster Pump and treatment capacity at the SRWTP are required to provide service to Ashton Park, in addition to constructing parallel pipes along St Johns Heritage Pkwy. The construction of a water treatment plant within or nearby the Ashton Park site described in Option 3 would provide the additional benefit local water treatment and conveyance without the need to modify and enhance the City water system.



Appendix A

Updated Ashton Park Master Plan

ASHTON PARK



From: David Myers <dmyers@infrastructureess.com>
Sent: Thursday, November 14, 2024 10:40 AM
To: Daniel Cardona
Cc: Clayton McCormack; Tim Roberts; Gabriel Bowden
Subject: Ashton Park Updated Development Plan
Attachments: [Ahston Park Revised Layout 11122024.pdf](#); [Revised Ashton Park Water LOS Tech Memo 07182023.pdf](#)

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Daniel,

We reviewed the updated development plan that PBU provided for Ashton Park. Based on our review, we calculated a total of 7,010 ERCs for the updated Ashton Park development. The previous version of Ashton Park has 6,800 ERCs as noted in the Revised Ashton Park Water LOS Analysis dated July 18, 2023. Therefore, the most recent Ashton Park plan has a 210 ERC (3%) increase over the previous plan. It is our opinion that a 3% increase in ERCs will not change the conclusions or recommendations of the July 18, 2023 LOS Analysis. I have attached the updated Ashton Park plan as well as the July 18, 2023 LOS Analysis for reference. Please let us know if you have any questions.

Thanks,
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