PREPARED BY

Mead & Hunt

DRAFT

Technical Memo:

Review of Custer's Palm Harbor, the Gardens and Palm Harbor Subdivisions

April 2022

Andrew M. Giannini, PE
FL Reg. No. 46601

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1. Introduction

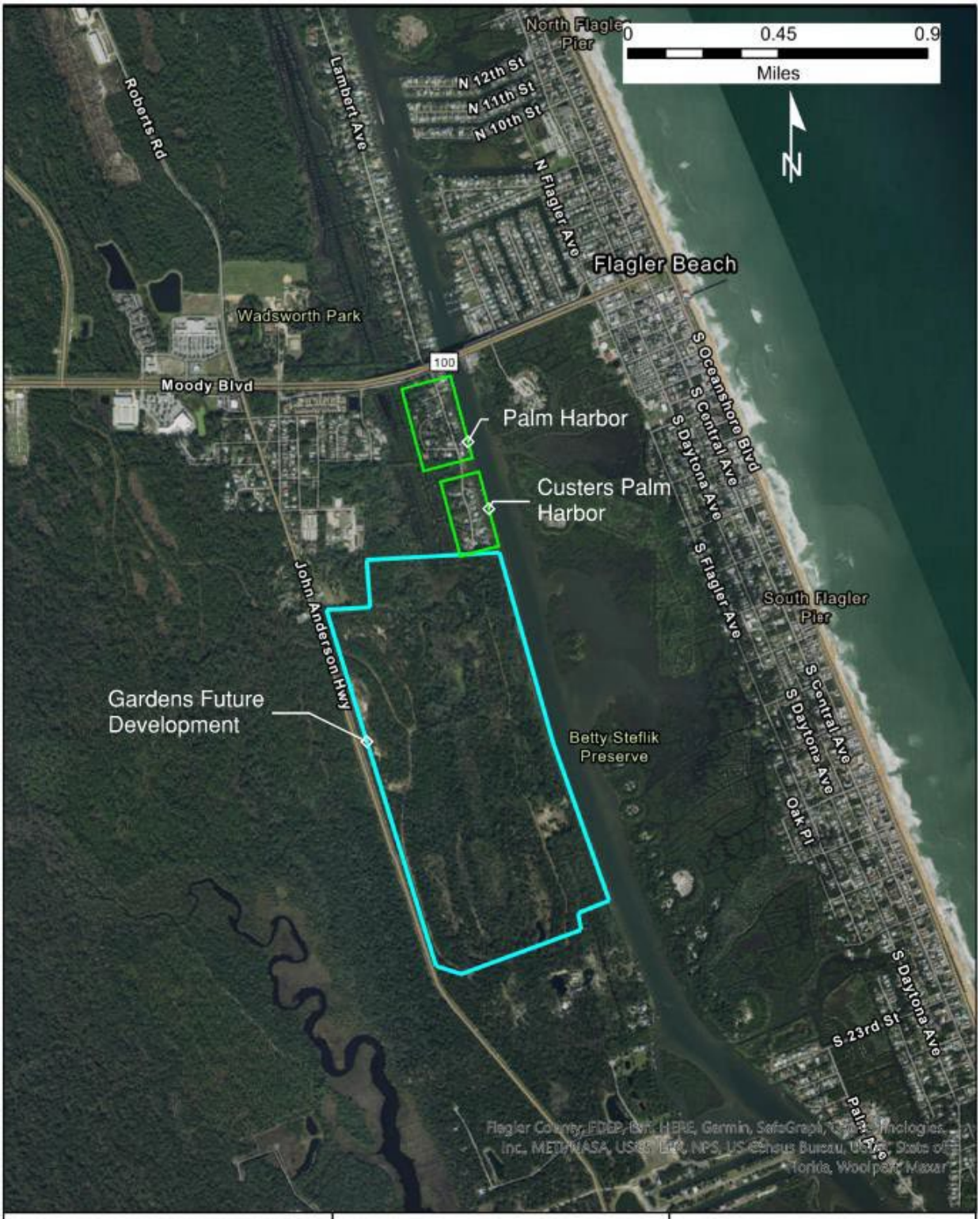
The City of Flagler Beach tasked Mead & Hunt with the work assignment shown below to address concerns put forth by residents in the neighboring communities. The scope of the work included engaging with the Gardens Development owners and evaluating stormwater permitting process, evaluating the Custer's Palm Harbor stormwater system, and evaluating the Palm Harbor stormwater conveyance system.

In more specific terms, the project involved reviewing the Gardens stormwater permitting process to provide an opinion of whether the proposed development will or will not have detrimental impacts to existing residents with regard to drainage, evaluating the Custer's Palm Harbor stormwater system to develop a plan of action to re-establish the original operation of such, and evaluating the Palm Harbor stormwater conveyance system to plan improvements needed to effectively address stormwater runoff.

The scope of work identified in the accepted proposal includes:

1. Field Review of project areas as list above. Generate comments on findings.
2. Determine if there are additional options for further improvements, refinement of the existing improvements and/or recommended maintenance.
3. Draft a letter report describing findings and recommendations for additional improvements and list of recommended maintenance measures along with estimated construction costs and a suggested schedule of implementation.
4. Review letter report with City and obtain comments.
5. Finalize letter report to include City comments

FIGURE 1-1: LOCATION MAP



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2. Tasks Associated with This Effort

The following is a summary of the tasks associated with efforts put forth in the review along with a list of deliverables identified as required.

A. The Gardens Development

Mead & Hunt notified St. Johns River Water Management District (SJRWMD) and Flagler County (County) of the City of Flagler Beach's concerns with the potential of the Gardens development to impact the downstream areas. MEAD & HUNT provided a letter to each agency describing the concerns. A meeting was also held to discuss these concerns with the developer's engineer. A summary of the meeting is included in Appendix 'A'. Copies of letters sent to SJRWMD and Flagler County are located in Appendix 'A'.

Mead & Hunt also reviewed the SJRWMD Environmental Resource Permit (ERP) data available from the SJRWMD online permit database. Items reviewed included the approved development plans and the stormwater calculations for the site.

B. Evaluate Custer's Palm Harbor Stormwater System

Mead & Hunt requested the original design plans from the Engineer of Record (EOR) and compared the original design to the witnessed existing conditions. Mead & Hunt utilized available topographic and LIDAR mapping to confirm existing conditions. Verification of the named permittee on the existing SJRWMD permit and recommendations to the City and City Attorney on the transfer of the permit to the City was included. It is recommended that the City Attorney oversee any easement and/or property acquisition, along with notification and coordination with existing permittee and property owners. Mead & Hunt developed a scope of improvements needed to restore the original functionality of the stormwater system and recommended to improve the operation of the system.

C. Evaluate Palm Harbor Stormwater System

Mead & Hunt reviewed the site conditions and interviewed a limited number of property owners to ascertain information on how the existing conveyance system performs. Mead & Hunt utilized available topographic and LIDAR mapping to confirm existing conditions. Mead & Hunt analyzed the conveyance system and develop a scope of improvements recommended to improve the operation of the system.

3. Site Investigation

Custer's Palm Harbor

A representative from Mead and Hunt visited Custer's Palm Harbor, and Palm Harbor neighborhoods on February 25th, 2022. During the site visit, the existing ponds, berms, outfalls, and overall neighborhood was assessed. Starting at the retention pond on the west side of Custer's Palm Harbor, it was noticed that much of the retention area was occupied by a stump from a tree. The permit plans show the detention area was to be much larger than exists now - see ***Figures 3-1 & 3-2***. The pond can be excavated to match the permit plans, to allow more detention volume.

During a review of the berm along the western property boundary, it was evident that a hog issue exists in this neighborhood. The berm along the west edge of the development, designed to hold water in the detention pond, was damaged due to hog rutting in many places. It was also evident that the top of the berm elevation was approximately the same elevation as the grades in the back yards of the homes. Some residents mentioned that as the detention pond fills it reaches their back porches and bubbles up through the existing storm structure in the road.

The east pond at the north end of Custer's Palm Harbor appears to be well maintained and functioning. When reviewing this with the residents, they expressed no concerns. This pond was designed to take in water from the inlet in the road picking up from the curb and letting the water percolate through the ground. When the pond fills up, it flows through the sea wall rocks on the east side and exits into the river.

As mentioned above, the residents were interviewed to allow them to express their concerns. One of the concerns mentioned was the existing twin 48" pipes that run under the road shown in ***Figure 3-3.*** These pipes connect the wetland slough on the west side of Custer's Palm Harbor to the river. During severe storms, residents have noticed extreme flows in the twin pipes, which may be evidence that the pipes are undersized. During the high flows, higher stages in the slough are experienced which causes anxiety to residents who see the water rising in their back yards.

Directly at the discharge point at the east side of the pipes, there appears to be an insufficient amount of rip rap, creating erosion. It appears the high flows are also eroding the adjacent riverfront properties. Residents mentioned that they have installed rip rap themselves to help prevent erosion of their yards. It was also noted that all the sand from this outfall has been washed into the neighbor's yard and under their dock.

Palm Harbor Subdivision

With regard to the Palm Harbor subdivision, residents expressed concerns with standing water after minor rainfall events. There is a low point in the road at the end of Palm Harbor next to the lift station - shown in ***Figure 3-4***. The standing water at this area is a nuisance, leaving residents no choice but to drive through it. Flooding spreads into the resident's yard directly next to the lift station.

FIGURE 3-1:CUSTERS WEST POND

FIGURE 3-2: CUSTERS WEST POND

FIGURE 3-3: TWIN 48" OUTFALLS

FIGURE 3-4: LOW POINT IN PALM HARBOR

4. Summary of Tasks Completed and Recommendations for Further Improvements

A. The Gardens Development Phases 1A, 1B, 1C, 2A, 2B, and 2C

(1) SJRWMD Notification

The tasks included contacting SJRWMD and Flagler County to notify them that the City of Flagler Beach had concerns with The Gardens development and they had obtained Mead & Hunt's services to review the development. A letter was sent to each agency. Copies of each letter are included in Appendix 'A'.

(2) Meeting

A meeting was scheduled and held at the City Community Development office with the engineer, Parker Mynchenberg and Associates (PMA). Steve Buswell represented PMA at the meeting which also included Lee Richards, City of Flagler Beach, David King, Matt Guzinski and Andrew Giannini from Mead & Hunt.

Several concerns were discussed in detail. A meeting summary was prepared which summarized our discussions. A copy of the meeting summary is in Appendix 'A'. The items discussed included the City's concerns – residents of the Custer's Palm Harbor feelings that there could be drainage issue exacerbated above what they are experiencing now. It was mentioned that there are issues with the Custer's Palm Harbor drainage system that are being caused by failing infrastructure and high river levels. The City of Flagler Beach has agreed to become the maintenance entity for the Custer's Palm Harbor system. More is discussed in the next section of this memorandum.

Mr. Buswell was extremely transparent in our meeting. He explained that the SJRWMD staff was very diligent in their review. This was due to the number of objector letters received by the District. There were over 140 letters of objection to the development. Most were concerning the growth and damage to the environment. SJRWMD staff required several analyses of PMA to confirm there would be no detrimental effects to the downstream areas. These analyses are listed below, and PMA was able to abide by each and obtain the environmental resource permit.

a. 10-year compensatory storage analysis – required on site storage to meet 10-year floodplain volumes
b. Reduction of post-development peak discharge and volumes below the pre-development peak discharges and volumes.
c. Analysis of different soil criteria in the hydrology to confirm the worst-case scenario was analyzed.

(3) Stormwater Report Review

PMA's stormwater calculations and modeling prepared in PondPack Ver 9.0029 were reviewed for the proposed Gardens development. As shown in ***Figures 4-2,*** the white arrows show the flow of water over the existing area that will be developed into the Gardens community. Most of the water west of the existing wetlands naturally flows east into the wetlands. The water drains from the North and South wetlands through three locations. The first is on the south side through an existing outfall. The second is on the north side through the twin 48" discharge pipes in Custers Palm Harbor, and the third option is that it can flow north under the SR 100 bridge. All of these outfalls eventually reach the tidal influenced intracoastal waterway, or Matanzas River.

When designing the Gardens drainage system, impacts to the wetlands were greatly avoided, keeping the natural flow of water consistent with predevelopment like conditions. This is shown in the Post development ***Figure 4-3.*** When looking at the nodal Diagram shown in ***Figure 4-1,*** it was noticed that the only discharge location considered was the south existing outfall. The model does not consider sending any water north, as shown in ***Figures 4-2 & 4-3.*** The Existing Modeling Nodal Diagram suggests that all the water captured in Wet-N-Pre and Wet-N-Post (Northern Wetland) is all captured and sent south to the existing south wetland, then discharged through the south outfall point. The following table shows the comparison between the pre-development and post- development peak discharges.

TABLE 4-1: PRE-POST ANALYSIS

5.3.1 OUT-(RIVER):

Storm Event	Peak Rate of Discharge (cfs)	
	PRE	POST
Mean-Yr / 24-Hr	10.98	6.78
25-Yr / 24-Hr	105.92	67.73
100-Yr / 24-Hr	156.00	99.22

Looking into this further using the modeling results provided by Parker Mynchenberg, the stage in feet for Wet-N-Pre and Post was evaluated. It was noticed that the stage of the north wetland was consistently about a foot higher in the post condition compared to pre-development. The stage height of the wetland increases with the amount of water discharged to this area. It is also important to note that the north wetland increased in size from 37 to 42 acres pre vs post development.

It is recommended that further modeling be completed to show whether the engineer's assumptions are correct. It is suggested that the Wet-N-Pre Post Node (northern wetland) be converted to a storage node to better resemble conditions shown in ***Figures 4-2 & 4-3;*** *and the model include the two 48-inch pipes under Palm Drive that connect to Matanzas River.* Doing this will help quantify the amount of water that could head north towards the existing Custer's Palm Harbor community once the Gardens development is completed. It was noted that the developers are currently entertaining costs from construction firms to begin construction in the coming months.

TABLE 4-2: PRE-DEVELOPMENT NORTH WETLAND WATER HEIGHT

WET-N-PRE	OUT	POND	2	.000	.1000	.00	1.21
WET-N-PRE	OUT	POND	25	.000	.1000	.00	2.04
WET-N-PRE	OUT	POND	100	.000	.1000	.00	2.34

TABLE 4-3:POST-DEVELOPMENT NORTH WETLAND WATER HEIGHT

WET-N-POST	OUT	POND	2	.000	.1000	.00	2.14
WET-N-POST	OUT	POND	2	-.000	.0000	.00 (-Q)	
WET-N-POST	OUT	POND	25	4.697	47.6000	1.20	3.03
WET-N-POST	OUT	POND	25	-.047	18.0000	-.18 (-Q)	
WET-N-POST	OUT	POND	100	11.561	29.9000	3.16	3.39

FIGURE 4-1: NODAL DIGRAM

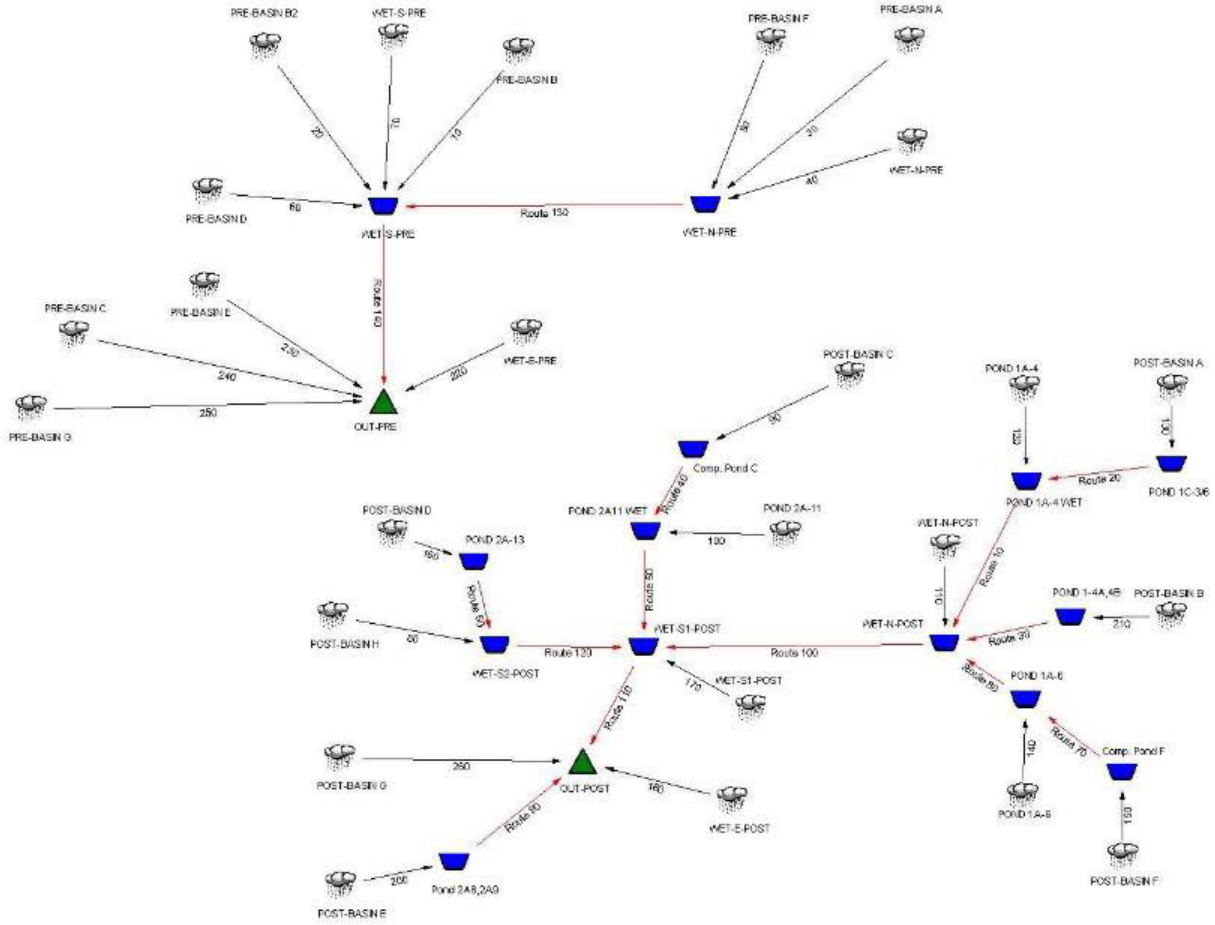


FIGURE 4-2: PRE-DEVELOPMENT

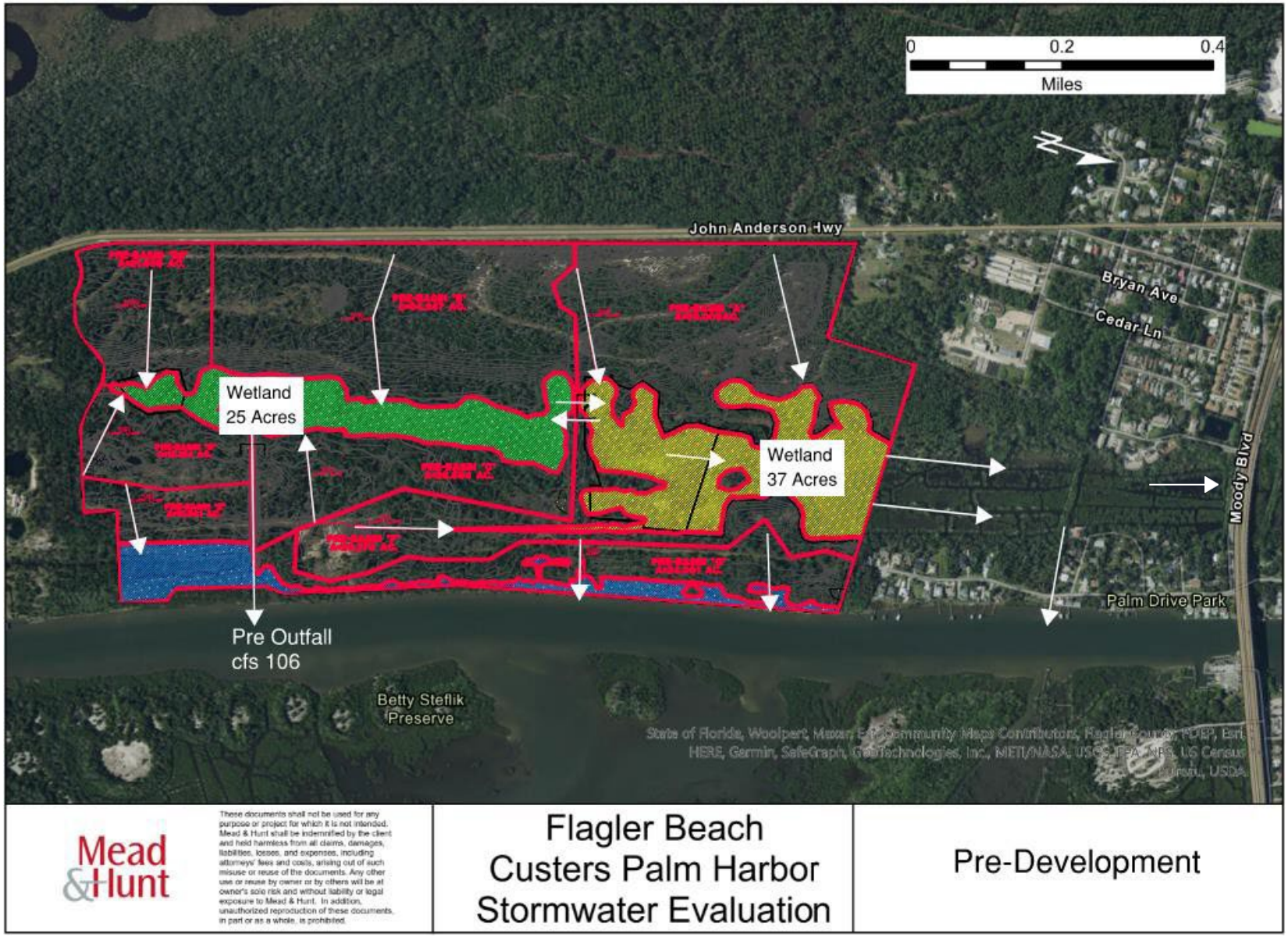
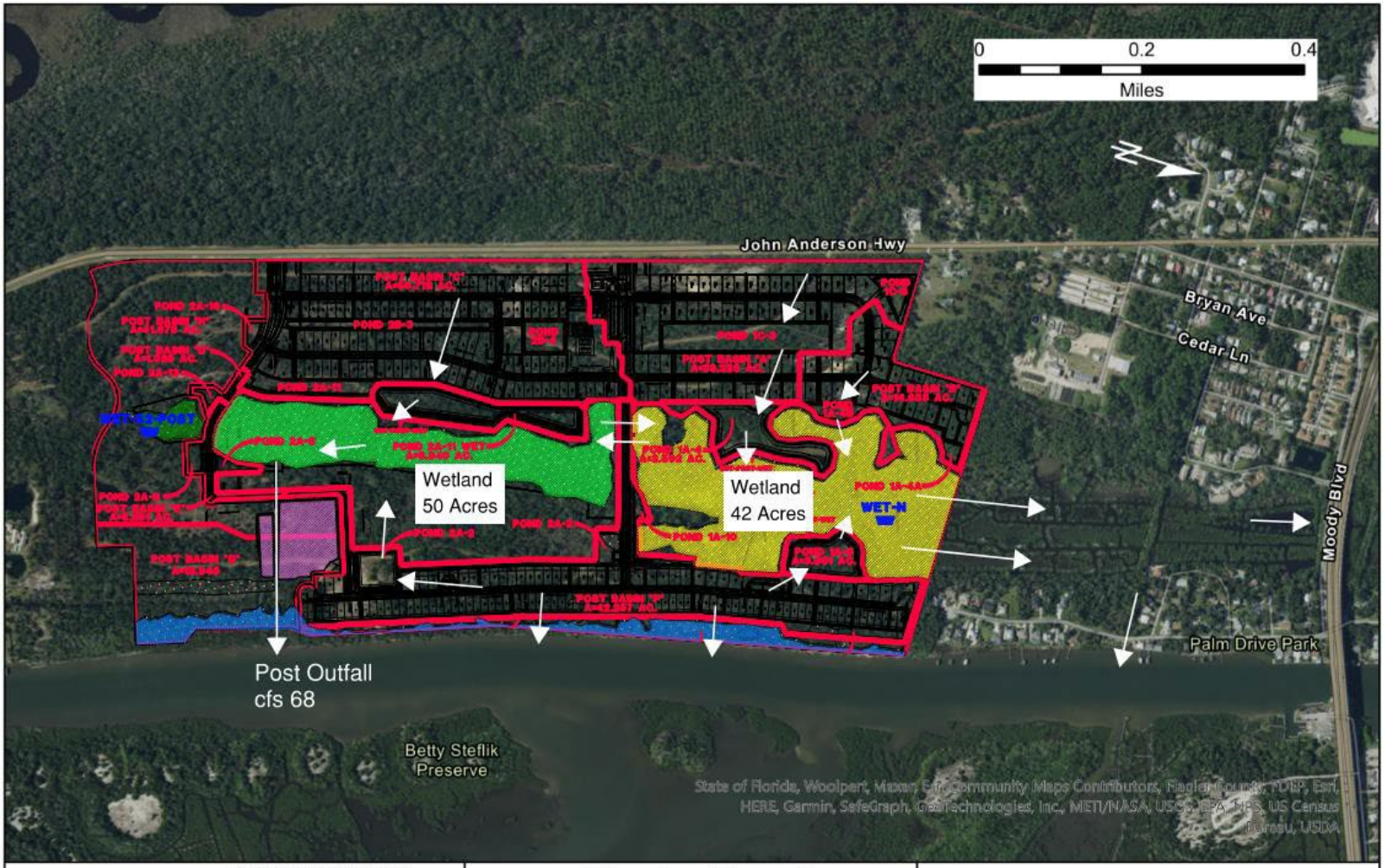


FIGURE 4-3: POST-DEVELOPMENT



B. Custer's Palm Harbor Drainage System Evaluation

As stated in the first section, Mead & Hunt was to request the original design plans from the Engineer of Record (EOR), Parker Mynchenberg and Associates, and compare the original design to the witnessed existing conditions. Mead & Hunt was successful in obtaining the design and as-built drawings from PMA. Based on the field visit, it appears there are several items that should be corrected to bring the drainage system in compliance with the permitted design. The following items were noted as possibly being out of compliance.

a. The berm at western edge of development appeared to be lower than permitted grades and should be re-established to design grades.
b. Regrading of swales and excavation of the detention pond should be done to remove the accumulation of sediment and re-establish design grades of the pond.
c. Pipes and structures should be flushed and cleaned to remove the accumulation of sediment.

These items can be included in a bid document to allow a private contractor to perform.
Mead & Hunt has verified the permitee in the existing SJRWMD and can assist in transferring the permit, if desired. The ponds in the Custer's Palm Harbor community should be transferred to all the City to maintain the improvements.

C. Palm Harbor Drainage System

There is no drainage infrastructure within the Palm Harbor development which is located to the north of Custer's Palm Harbor. The runoff appears to flow east along Oak Street and Pine Street and empties onto Palm Drive. As discussed above, there is a low area in Palm Drive near the lift station in front of 339 Palm Drive where the runoff accumulates, causing nuisance flooding. This problem can be resolved by constructing swales along Oak Street and Pine Street, inlets at the low area with pipes directing runoff to the canal.

5. Conclusion & Recommendations

A. The Gardens Development
The review of all documents obtained and mentioned in this report, indicates that additional modeling should be performed. The north wetland slough should be modeled as a storage node and the dual 48-inch pipes should be included in the model. This expanded model will allow a better representation of the proposed conditions of the Gardens development.

B. Custer's Palm Harbor
It is recommended the City transfer the permit so that the City is the maintenance entity. Once that is completed, the items stated above should be completed including a) regrading of the western berm to match the permitted design; b) regrade swales and excavate the detention pond to match design grades; and c) clean all structures and pipes to remove accumulated sediment.

C. Palm Harbor
Recommendations includes establishing swales to convey runoff along Oak Street and Pine Street. Also, correct low area in road which seems to be subsiding, and construct inlets at

the low area with connecting pipe to convey runoff to the nearest canal.

6. Cost Estimates and Schedule for Implementation

Below is a summary of the estimated costs of the recommended improvements listed in Section 4. See Appendix B for detailed cost estimates. Please note, costs for annual maintenance by City staff is not included. Areas where only annual maintenance is recommended are not listed in the summary.

TABLE 6-1: RECOMMENDED PROJECT IMPROVEMENTS COSTS

PROJECT AREA	Construction Cost Estimate
Custers Palm Harbor Drainage Improvements	$45,360
Palm Harbor Drainage Improvements	$54,150

Schedule for Implementation

It is recommended the above project improvements be assembled into a single biddable document with a bid advertisement scheduled for the fourth quarter of 2022. Award of the bid and construction to take place during the first quarter of 2023.

7. References

(1) FDOT Historical Cost Information
https://www.fdot.gov/programmanagement/estimates/historicalcostinformation/historicalcost.shtm

February 11, 2022

Susan Graham, P.E.
Senior Professional Engineer
Development Engineering
1769 E. Moody Blvd.
Building 2, Suite 103
Bunnell, FL 32110

Email: sgraham@flaglercounty.org
Hard Copy Mailed Only on Request

Subject: The Gardens ERP No. 80599-8

Dear Ms. Graham,

Our firm has been retained by the City of Flagler Beach to investigate the subject project that was permitted by the Flagler County just last year. The nature of the investigation is to confirm there will be no detrimental influences to the downstream Custer's Palm Harbor property owners.

We understand that the permit requirements include there be no increases in pre-developed discharges for the mean annual and 25-yr/24hr storm events. The City is concerned with other events and volumetric discharges which are not usually part of the drainage analysis.

We are in contact with the developer's engineer in attempting to request they run additional storm events. If we are able to perform the analysis and determine there are no issues, this letter may be a moot point. We just wanted to put Flagler County on notice that the project is being looked over by the City of Flagler Beach.

If you have any questions or require additional information, please contact me.

Sincerely,
MEAD & HUNT, Inc.

Andrew M. Giannini, P.E.
Senior Project Manager

AMG/ag

cc: Lee Richards, PhD, City of Flagler Beach
David King, P.E., Mead & Hunt

February 11, 2022

Melissa Parsons, PE
Senior Professional Engineer
SJRWMD
4049 Reid Street
Palatka, Florida 32177

Email: mparsons@sjrwmd.com
HardCopy Mailed Only on Request

Subject: The Gardens ERP No. 80599-8

Dear Ms. Parsons,

Our firm has been retained by the City of Flagler Beach to investigate the subject project that was permitted by the SJRWMD on 10/17/21. The nature of the investigation is to confirm there will be no detrimental influences to the downstream Custer's Palm Harbor property owners.

We understand that the permit requirements include there be no increases in pre-developed discharges for the mean annual and 25-yr/24hr storm events. The City is concerned with other events and volumetric discharges which are not usually part of the drainage analysis.

We are in contact with the developer's engineer in attempting to request they run additional storm events. If we are able to perform the analysis and determine there are no issues, this letter may be a moot point. We just wanted to put SJRWMD on notice that the project is being looked over by the City of Flagler Beach.

If you have any questions or require additional information, please contact me.

Sincerely,
MEAD & HUNT, Inc.

Andrew M. Giannini, P.E.
Senior Project Manager

AMG/ag

cc: Lee Richards, PhD, City of Flagler Beach
David King, P.E., Mead & Hunt

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
CITY OF FLAGLER BEACH
CUSTER'S PALM HARBOR

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
A.	***PRELIMINARY ITEMS***				
1	Mobilization	1	LS	$ 2,000.00	$ 2,000.00
2	Erosion and Sediment Control	1	LS	$ 1,000.00	$ 1,000.00
3	Preconstruction Video	1	LS	$ 500.00	$ 500.00
4	Field Locate and Expose Existing Utilities	1	LS	$ 1,000.00	$ 1,000.00
B.	***BERM REHABILITATION***				
1	Re-Grade Berm to Existing	1	LS	$ 10,000.00	$ 10,000.00
2	Furnish & Install Sod	400	SY	$ 5.00	$ 2,000.00
C.	***WEST POND REHABILITATION***				
1	Re-Grade Pond to Existing	1	LS	$ 15,000.00	$ 15,000.00
2	Furnish & Install Sod	600	SY	$ 5.00	$ 3,000.00
D.	***DRAINAGE ITEMS***				
1	Clean Existing Inlets and Pipes	4	EA	$700	$ 2,800.00
E.	***GENERAL***				
1	Layout, As-Built and Record Drawing Preparation	1	LS	$ 500.00	$ 500.00
				Subtotal A thru E	***$37,800.00***
				20% Contingency	$7,560.00
				TOTAL ESTIMATED CONSTRUCTION COST	***$45,360.00***

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the Consultant's professional judgment and experience. The Consultant makes no warranty, express or implied, that the bids or the negotiated cost of the Work will not vary from the Consultant's estimate of probable construction cost. Revised 2.16.2022

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
CITY OF FLAGLER BEACH
PALM HARBOR

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
A.	***PRELIMINARY ITEMS***				
1	Mobilization	1	LS	$5,000.00	$ 5,000.00
2	Erosion and Sediment Control	1	LS	$ 2,000.00	$ 2,000.00
3	Preconstruction Video	1	LS	$ 500.00	$ 500.00
4	Field Locate and Expose Existing Utilities	1	LS	$ 1,500.00	$ 1,500.00
B.	***DRAINAGE ITEMS***				
1	Storm Structure				
	a) Type 'E' Inlet	2	EA	$ 4,800.00	$ 9,600.00
	b) Mitered End Section - 24"	1	EA	$ 1,600.00	$ 1,600.00
2	Storm Pipe				
	b) 24" RCP	150	LF	$ 80.00	$ 12,000.00
3	Bank and Shore Riprap per FDOT Specs	10	SY	$ 75.00	$ 750.00
C.	***GENERAL***				
1	Open Cut and Repair Asphalt	35	SY	$ 95.00	$ 3,325.00
2	Furnish & Install Sod	170	SY	$ 5.00	$ 850.00
3	Traffic Control	1	LS	$ 2,000.00	$ 2,000.00
4	Compliance with Florida "Trench Safety Act"	1	LS	$ 5,000.00	$ 5,000.00
5	Layout, As-Built and Record Drawing Preparation	1	LS	$ 1,000.00	$ 1,000.00
				Subtotal A thru C	***$45,125.00***
				20% Contingency	$9,025.00
				TOTAL ESTIMATED CONSTRUCTION COST	***$54,150.00***

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the Consultant's professional judgment and experience. The Consultant makes no warranty, express or implied, that the bids or the negotiated cost of the Work will not vary from the Consultant's estimate of probable construction cost. Revised 2.16.2022