PELICAN BAY SERVICES DIVISION
Municipal Services Taxing & Benefit Unit

NOTICE OF PUBLIC MEETING **SEPTEMBER 2, 2020**

THE WATER MANAGEMENT COMMITTEE OF THE PELICAN BAY SERVICES DIVISION WILL MEET AT 3:00 PM ON WEDNESDAY, SEPTEMBER 2 AT THE BOARD OF COUNTY COMMISSIONERS CHAMBERS, THIRD FLOOR, COLLIER COUNTY GOVERNMENT CENTER, 3299 TAMIAMI TRAIL EAST, NAPLES, FL 34108.

AGENDA

1. Pledge of Allegiance
2. Roll call
3. Agenda approval
4. Approval of 1/23/20 meeting minutes
5. Audience comments
6. Lake bank remediation update on Lake 2-9
7. Detailed review of ABB Oakmont Lake proposal
8. Update on ABB's estimates on next 2 potential lakes in Bridgeway
9. Drainage pipes and stormwater easement management options
10. Other committee member comments
11. Adjournment

**indicates possible action items*

ANY PERSON WISHING TO SPEAK ON AN AGENDA ITEM WILL RECEIVE UP TO THREE (3) MINUTES PER ITEM TO ADDRESS THE BOARD. THE BOARD WILL SOLICIT PUBLIC COMMENTS ON SUBJECTS NOT ON THIS AGENDA AND ANY PERSON WISHING TO SPEAK WILL RECEIVE UP TO THREE (3) MINUTES. THE BOARD ENCOURAGES YOU TO SUBMIT YOUR COMMENTS IN WRITING IN ADVANCE OF THE MEETING. ANY PERSON WHO DECIDES TO APPEAL A DECISION OF THIS BOARD WILL NEED A RECORD OF THE PROCEEDING PERTAINING THERETO, AND THEREFORE MAY NEED TO ENSURE THAT A VERBATIM RECORD IS MADE, WHICH INCLUDES THE TESTIMONY AND EVIDENCE UPON WHICH THE APPEAL IS TO BE BASED. IF YOU ARE A PERSON WITH A DISABILITY WHO NEEDS AN ACCOMMODATION IN ORDER TO PARTICIPATE IN THIS MEETING YOU ARE ENTITLED TO THE PROVISION OF CERTAIN ASSISTANCE. PLEASE CONTACT THE PELICAN BAY SERVICES DIVISION AT (239) 597-1749 OR VISIT PELICANBAYSERVICESDIVISION.NET.

PELICAN BAY SERVICES DIVISION
WATER MANAGEMENT COMMITTEE MEETING
JANUARY 23, 2020

The Water Management Committee of the Pelican Bay Services Division met on Thursday, January 23 at 1:30 p.m. at the SunTrust Bank Building, 801 Laurel Oak Drive, Suite 302, Naples, FL 34108. The following members attended.

Water Management Committee
Denise McLaughlin, Chair
Tom Cravens
Jacob Damouni *(absent)*
Michael Weir

Pelican Bay Services Division Staff
Neil Dorrill, Administrator
Chad Coleman, Operations Manager
Lisa Jacob, Project Manager
Alex Mumm, Sr. Field Supervisor *(absent)*
Barbara Shea, Interim Operations Analyst

Also Present
Jim Carr, Agnoli, Barber & Brundage
Susan O'Brien, PBSD Board

APPROVED AGENDA (AS PRESENTED)

1. Pledge of Allegiance
2. Roll call
3. Agenda approval
4. Approval of 11/21/19 meeting minutes
5. Audience comments
6. Current projects
   a. St. Maarten/St. Thomas Lake 2-9
   b. Bay Colony Beach Dune Swale
   c. Grosvenor/Dorchester drainage basin
7. Prioritizing lake bank restoration projects for next FY21 budget
8. Review of Pollution Control Report
9. Review of algae problem in target lakes
10. Other committee member comments
11. Adjournment

ROLL CALL

Mr. Damouni was absent and a quorum was established

AGENDA APPROVAL

Mr. Cravens motioned, Mr. Weir seconded to approve the agenda as presented. The motion carried nnanimously.

APPROVAL OF 11/21/19 MEETING MINUTES

Mr. Cravens motioned, Mr. Weir seconded to approve the 11/21/19 meeting minutes as presented. The motion carried unanimously.

AUDIENCE COMMENTS

Ms. O'Brien requested that Mr. Dorrill provide the PBSD Board with an update on the Operations Analyst Position and "who's doing what" by the existing staff during this interim period.

CURRENT PROJECTS

ST. MAARTEN/ST. THOMAS LAKE 2-9

Ms. Jacob commented that the Lake 2-9 lake bank restoration project is scheduled to begin in April.

BAY COLONY BEACH DUNE SWALE

Ms. Jacob reported that the Bay Colony Beach Dune Swale project is out for bid; bids are due back on Feb. 12.

GROSVENOR/DORCHESTER DRAINAGE BASIN

Ms. Jacob commented that she expects our ABB engineer, Mr. Jim Carr, to finalize the design plans for the Grosvenor/Dorchester drainage basin project by tomorrow. Once received, she will put the project out for bid. Mr. Dorrill commented that the project will include mahoe removal only in areas affecting the re-alignment of the swale.

Ms. O'Brien asked for clarification on the length of time and complexity of this project. Ms. McLaughlin suggested that when the drainage pipes were unblocked, unnatural drainage flows were created, causing additional work to be needed.

PRIORITIZING LAKE BANK RESTORATION PROJECTS FOR FY21 BUDGET

The committee reviewed and discussed the prioritized list by critical need of lake bank remediation of our PB lakes, which was created by ABB a few years ago. Mr. Carr commented that he estimates costs of remediation have risen by approximately 40% since this list was created. The committee and staff tasked Mr. Carr to update the estimated cost of remediation for the top 7 lakes on the list (omitting Lake 2-9 for which a project is currently in process). Mr. Coleman noted that lakes 1-6, 4-1, and 2-5 are on our list of targeted algae lakes and in the top 10 of our prioritized lake bank remediation list. Mr. Carr suggested that it would be worthwhile to do a walk around all of our lakes to determine whether any of the lake bank conditions have changed.

Mr. Dorrill commented that he will contact Mr. Dave Mangan, General Manager of the Club Pelican Bay golf course, to determine whether he feels we should address lake bank remediation of lakes 2-8 and 4-11 (within the golf course) in light of the recent golf course restoration work.

Ms. O'Brien suggested that we consider asking an engineer from the South Florida Water Management District to do a walk around at the top seven lakes that are under our consideration for lake bank remediation and share with us what they are expecting us to do relative to our permits. Mr. Dorrill commented that he is not interested in doing this.

Ms. O'Brien commented that the board has had discussions to bundle lake bank projects and include these into our upcoming large project financing package.

REVIEW OF POLLUTION CONTROL REPORT

Ms. McLaughlin reported that she recently had a meeting with Mr. Coleman, Mr. Mumm, and Ms. Jacob to discuss the report of recommendations to improve water quality, prepared by the County's Pollution Control Dept. A list of all the recommendations along with (1) priority, (2) staff required, (3) doing now?, (4) cost, (5) complexity, and (6) a proposed plan for each item was included in the agenda packet. The committee and staff discussed the first 11 items on the list, and follow up that was agreed upon is as follows:

- Mr. Dorrill will look into the feasibility of bagging grass clippings.
- The possibility of the PBF employing an inspector that safeguards against water quality impacts to the stormwater system could be included for discussion at a future PBF/PBSD workshop. The committee suggested that the PBF would be the more appropriate entity to take on this responsibility as they have enforcement capability.
- Mr. Dorrill will ask staff to identify a test lake to plant littoral plants to study whether these plants will cause a reduction in algae.
- Mr. Dorrill will contact the Grey Oaks community to obtain information on the device they are using to mechanically remove algae.
- Mr. Coleman will determine whether all of our lakes with algae problems have aerators installed.
- Ms. Jacob will contact our environmental consultant, Mr. Jeremy Sterk, to determine whether he would be able to systematically determine whether our aerators are causing algae reduction in our lakes.

ADJOURNMENT

The meeting was adjourned at 2:59 p.m.

_____

Denise McLaughlin, Chair

Minutes approved [___] *as presented* OR [___] *as amended* ON _____] *date*

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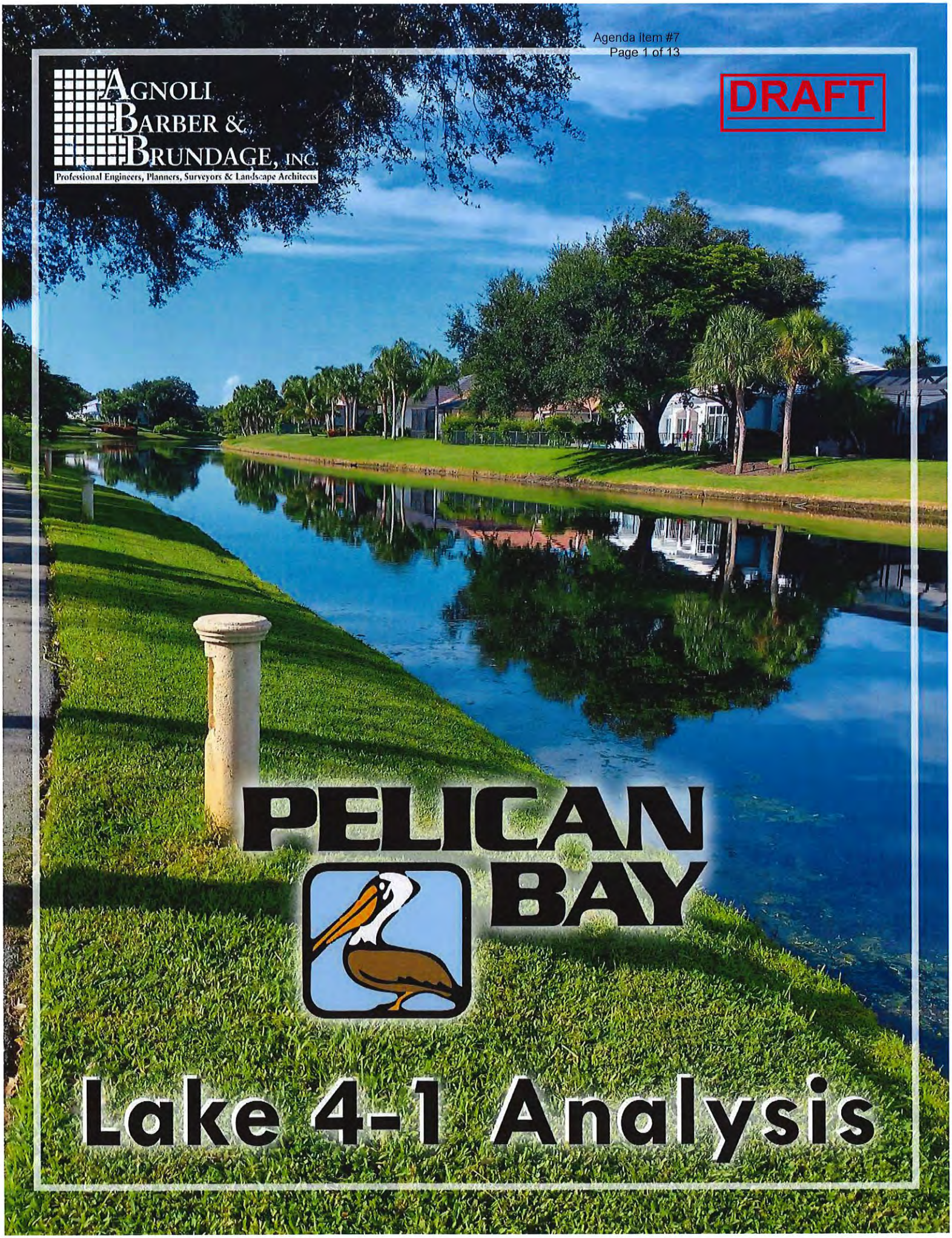
AGNOLI BARBER & BRUNDAGE, INC.
Professional Engineers, Planners, Surveyors & Landscape Architects



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Lake 4-1 Analysis

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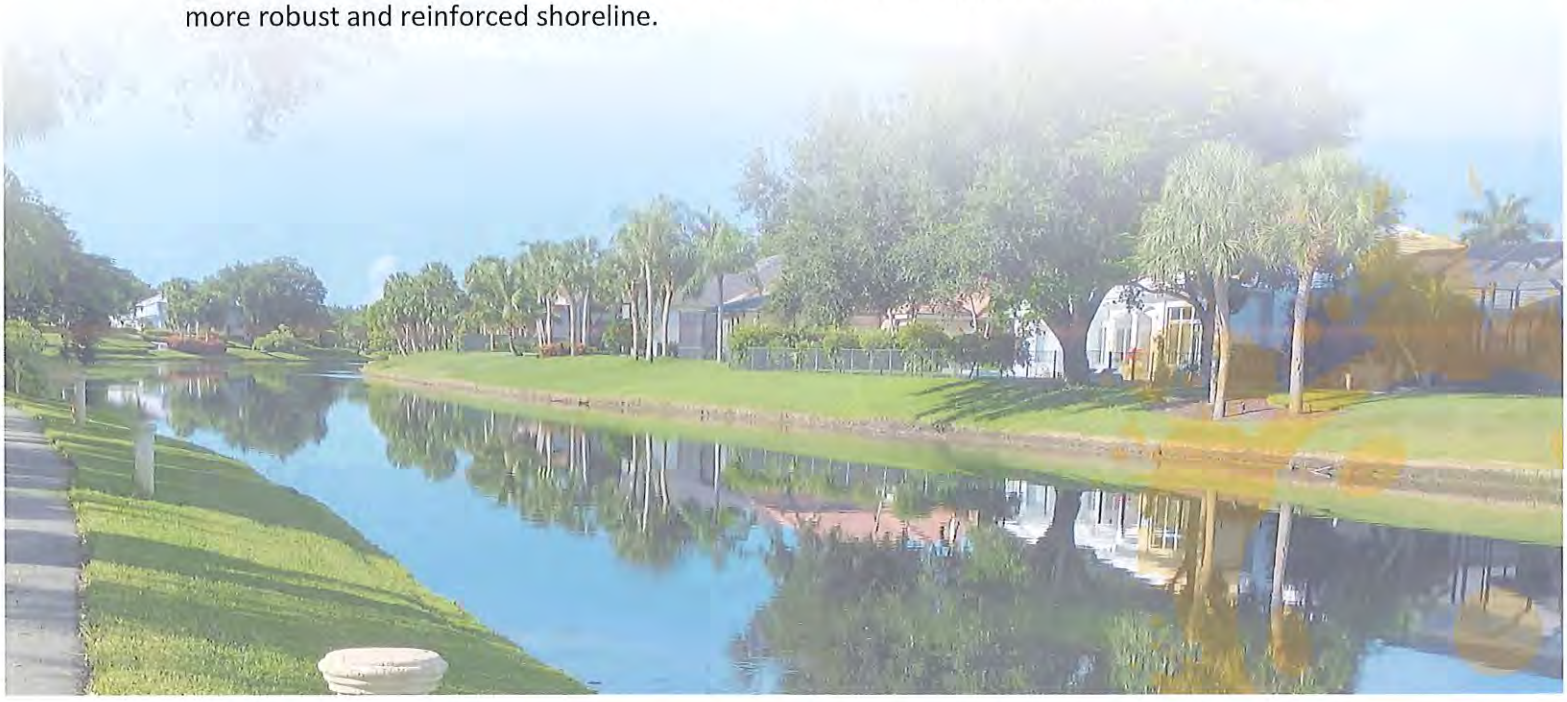
Background

Erosion can be defined as the gradual removal or movement of soil from one area to another caused by water, wind, or other natural causes. Lake bank erosion is very common is southwest Florida due to the variance in seasons it faces. It can be caused by strong winds that damage the shoreline such as in events like Hurricane Irma and overland runoff.

A site visit was conducted on August 6th, 2020 for lake 4-1 at Pelican Bay to measure erosion and assess the condition of the lake banks. Even though all indications of erosion are noted when conducting site visit, the primary form of analytical data that is taken to determine the degree of erosion are measurements of both escarpment height and slope. Escarpment height can be defined as any sudden drop-off that separates the lake bank from the elevation just inside the water's edge. It is important to note that drop-offs are common for any lake however anything over 9 inches exceeds the permitted threshold for the South Florida Water Management District (SFWMD) permit. The slope can be defined as the degree of inclination of the ground. The slope is an indicator of erosion because the slope determines the rate at which water flows over the top of lake banks, its action will accelerate the process of erosion. Like the escarpment height, there is a permitted limit of how steep the slope may be. Any slope greater than 4:1, meaning a length of four feet for every foot in depth, is considered out of compliance with the SFWMD permit.

Wind is a major factor in creating waves, fortunately for Lake 4-1 the longest distance from the east to the west side of the lake is about 260 linear feet however the length from north to south is quite significant. Approximately 2600 linear feet separates the north and south sides of the lake, leaving it prone to erosion. Incoming cold fronts and increased wind from storms can create waves that worsen the condition of the lake banks and create additional problems. The long fetch allows the waves to build up energy before crashing into the lake bank requiring a more robust and reinforced shoreline.



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Analysis

Lake 4-1 is bound by Green Tree Drive to the west and Oakmont Parkway to the east. The lake is surrounded by residential properties and a greenway on the east side of the lake bank. The rooftops, roads, and greenway along the lake banks act as impervious surfaces that prevent runoff from percolating into the ground, producing runoff directed to the lowest point of elevation which is the lake. To reduce erosion, the optimal solution is to have a drain or structure to collect and control the flow of the water, however in this case, majority of rainfall flows directly into Lake 4-1. The consistent flowing of water over the lake bank runs down the surface weakening and deteriorating the soil allowing ledges and steep slopes to form.

Some of the depth found around the lake banks during inspection can be attributed to geo-tube put in place from previous erosion prevention effort. This geo-tube anchors much of the soil to the bank and holds the soil in place as water runs over it. This allows the part of the bank not held in place by the fabric sock to be pushed farther into the lake. The geo-tube then begins to fail and slide into the lake itself, no longer serving its purpose.

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The pedestrian side has some steep side slopes abutting the lake bank that need to be remediated to meet the 4:1 slope requirement. Excess runoff produced by the roofs of the homes may contribute to this issue however the homes on the east side, abutting the pathway, should have downspouts connected into the storm water system along the roads in front of the homes.

The escarpment height around much of the lake was higher than the 9-inch limit for the SFWMD permit showing critical signs of erosion along the bank, reaching depths of up to 30 inches in some places. It was most critical along the east side of the lake where you can see exposed geo-tube from previous erosion prevention efforts. However, this fabric has begun to fail and is now sliding into the water no longer preventing erosion along the bank.

There is an outfall structure on the north side of the lake bank that showed signs of erosion behind the headwall. Typically, headwall is used to stabilize the soil around drainage structures to prevent the structure from falling into the water. In the picture below, the headwall has been exposed due to the receding lake bank. This presents not only a problem of erosion but may put the structure at risk in the long-term.

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Financial Summary

Given the amount of lake bank Lake 4-1 provides, there are different restoration options depending on expenses and degree of erosion. Generally, there are two methods of restoration, installing a Geoweb system or simply regrading the existing lake bank to comply with the standards.

Geoweb is a three-dimensional system made up of interconnected cells that reinforces the lake bank due to the infill inside of these cells. The type of infill selected depends on the extent of the erosion, however in this case, compacted soil would be used. This will allow vegetation to grow through the cells keeping the aesthetic view of a natural lake. This would require minimal maintenance however it would out-weigh the cost of severe erosion. The other option is to re-grade the existing lake bank to restore it to the permitted conditions. This can also be done with the installation of additional fill. However, it must be noted that only regrading the lake bank will delay the critical erosion rather than prevent it. Without a prevention method in place, this issue will occur over time.

The field data collected in Appendix A, determines that there are areas that are more severe than others. Therefore, different options regarding the extent of restoration has been provided below. For further financial information, refer to the tables in Appendix B.

Option A

Throughout Lake 4-1, the most common form of erosion is the escarpment height which exceeds 9-inches failing to comply with the SFWMD permit. However, there are areas where slope and the escarpment height are both an issue, specifically the southeast corner of the lake. As seen in Appendix A, this would be the most minimal amount of restoration (approximately 550 linear feet).

Option B

Eventually, the entire lake will have to be restored so doing larger portions at a time will most likely work more efficiently and effectively. Comparing the east and west side of the lake,

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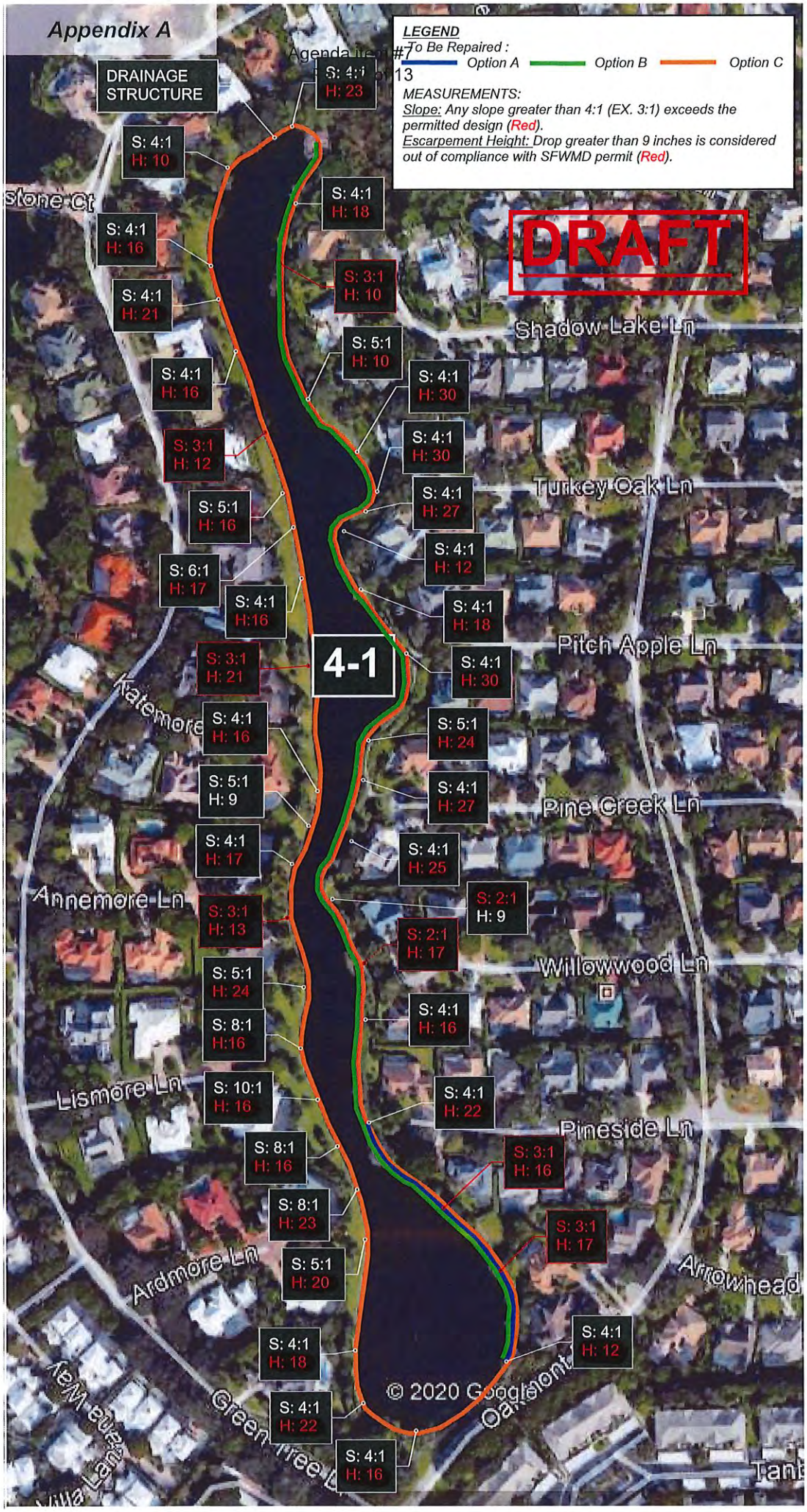
the east side has steeper slopes as well as deeper drops. Option B presents restoring the east side in its entirety which will be more expensive however will prevent problems in the future as well as avoid continuous construction.

Option C

Option C proposes restoring the entirety of Lake 4-1. While this may be beneficial in avoiding multiple periods of construction, this will require a significant cost which would most likely not appeal to the community.


Appendix A
Agenda Item #7
13
LEGEND
To Be Repaired :
Option A
Option B
Option C
MEASUREMENTS:
Slope: Any slope greater than 4:1 (EX. 3:1) exceeds the permitted design (Red).
Escarpement Height: Drop greater than 9 inches is considered out of compliance with SFWMD permit (Red).
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DRAINAGE STRUCTURE
4-1
Stone Ct
Shadow Lake Ln
Turkey Oak Ln
Pitch Apple Ln
Pine Creek Ln
Willowwood Ln
Pineside Ln
Annemore Ln
Lismore Ln
Ardmore Ln
Arrowhead
Oakmont
Green Tree
Tant
© 2020 Google
S: 4:1 H: 23
S: 4:1 H: 10
S: 4:1 H: 18
S: 4:1 H: 16
S: 3:1 H: 10
S: 4:1 H: 21
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APPENDIX B

OPTION A

Preliminary Budget Estimate

Item No.	Description	Unit	Quantity	Unit Cost	Total Cost

GEO-WEB SYSTEM

1	Mobilization	LS	1	$ 3,000	$ 3,000
2	Landscape Replacement (Sod, Native Vegetation) (10' wide x 550 LF)	SF	5,500	$ 3	$ 16,500
3	Irrigation Replacement in impacted areas (10' wide x 550 LF)	SF	5,500	$ 2	$ 11,000
4	Littoral Plantings @ 2 per linear foot of modified lake bank	EA	1,100	$ 4	$ 4,400
5	In Place Compacted, Imported Fill ((550 LF x 2' x 8')x2)/27=652 CY	CY	652	$ 100	$ 65,200
6	Silt Fence	LF	550	$ 2	$ 1,100
7	Turbidity Barrier	LF	600	$ 30	$ 18,000
8	Yard Drain Connections @ approx. 2 per lot/home (includes ADS 12" Yard Drain)	EA	4	$ 1,000	$ 4,000
9	Sandy Top Soil with 10%-12% Organics (3" deep over impacted areas) (550 LF x 8' x 3")	CY	41	$ 100	$ 4,074
10	GeoWeb - GW 30V3 (12' wide) (Includes backfill, 57 stone, anchors, non-woven fabric)	SF	6,600	$ 15	$ 99,000

GRAND TOTAL	=	**$ 226,274**

RE-GRADE

Without Additional Fill

1	Mobilization	LS	1	$ 3,000	$ 3,000
2	Landscape Replacement (Sod, Native Vegetation) (10' wide x 550 LF)	SF	5,500	$ 3	$ 16,500
3	Irrigation Replacement in impacted areas (10' wide x 550 LF)	SF	5,500	$ 2	$ 11,000
4	Littoral Plantings @ 2 per linear foot of modified lake bank	EA	1,100	$ 4	$ 4,400
5	Silt Fence	LF	550	$ 2	$ 1,100
6	Turbidity Barrier	LF	600	$ 30	$ 18,000
7	Yard Drain Connections @ approx. 2 per lot/home (includes ADS 12" Yard Drain)	EA	4	$ 1,000	$ 4,000

GRAND TOTAL	=	**$ 58,000**

RE-GRADE OPTION With Additional Fill

8	In Place Compacted, Imported Fill ((550 LF x 2' x 8')x2)/27=652 CY	CY	652	$ 100	$ 65,200

GRAND TOTAL	=	**$ 123,200**

Note: Estimated costs are pre-survey and are approximate. Cost estimates do not include survey, site permitting or design plans.

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OPTION B

Preliminary Budget Estimate

Item No.	Description	Unit	Quantity	Unit Cost	Total Cost

GEO-WEB SYSTEM

1	Mobilization	LS	1	$ 3,000	$ 3,000
2	Landscape Replacement (Sod, Native Vegetation) (10' wide x 2800 LF)	SF	28,000	$ 3	$ 84,000
3	Irrigation Replacement in impacted areas (10' wide x 2800 LF)	SF	28,000	$ 2	$ 56,000
4	Littoral Plantings @ 2 per linear foot of modified lake bank	EA	5,600	$ 4	$ 22,400
5	In Place Compacted, Imported Fill ((2800 LF x 2' x 8')x2)/27=3319 CY	CY	3,319	$ 100	$ 331,900
6	Silt Fence	LF	2,800	$ 2	$ 5,600
7	Turbidity Barrier	LF	100	$ 30	$ 3,000
8	Yard Drain Connections @ approx. 2 per lot/home (includes ADS 12" Yard Drain)	EA	80	$ 1,000	$ 80,000
9	Sandy Top Soil with 10%-12% Organics (3" deep over impacted areas) (2800 LF x 8' x 3")	CY	207	$ 100	$ 20,741
10	GeoWeb - GW 30V3 (12' wide) (Includes backfill, 57 stone, anchors, non-woven fabric)	SF	33,600	$ 15	$ 504,000

GRAND TOTAL	=	$ 1,110,641

RE-GRADE

Without Additional Fill

1	Mobilization	LS	1	$ 3,000	$ 3,000
2	Landscape Replacement (Sod, Native Vegetation) (10' wide x 2800 LF)	SF	28,000	$ 3	$ 84,000
3	Irrigation Replacement in impacted areas (10' wide x 2800 LF)	SF	28,000	$ 2	$ 56,000
4	Littoral Plantings @ 2 per linear foot of modified lake bank	EA	5,600	$ 4	$ 22,400
5	Silt Fence	LF	2,800	$ 2	$ 5,600
6	Turbidity Barrier	LF	100	$ 30	$ 3,000
7	Yard Drain Connections @ approx. 2 per lot/home (includes ADS 12" Yard Drain)	EA	80	$ 1,000	$ 80,000

GRAND TOTAL	=	$ 254,000

RE-GRADE OPTION With Additional Fill

8	In Place Compacted, Imported Fill ((2800 LF x 2' x 8')x2)/27=3319 CY	CY	3,319	$ 100	$ 331,900

GRAND TOTAL	=	$ 585,900

Note: Estimated costs are pre-survey and are approximate. Cost estimates do not include survey, site permitting or design plans.

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OPTION C

Preliminary Budget Estimate

Item No.	Description	Unit	Quantity	Unit Cost	Total Cost

GEO-WEB SYSTEM

1	Mobilization	LS	1	$ 3,000	$ 3,000
2	Landscape Replacement (Sod, Native Vegetation) (10' wide x 5600 LF)	SF	56,000	$ 3	$ 168,000
3	Irrigation Replacement in impacted areas (10' wide x 5600 LF)	SF	56,000	$ 2	$ 112,000
4	Littoral Plantings @ 2 per linear foot of modified lake bank	EA	11,200	$ 4	$ 44,800
5	In Place Compacted, Imported Fill ((5600 LF x 2' x 8')x2)/27=6637 CY	CY	6,637	$ 100	$ 663,700
6	Silt Fence	LF	5,600	$ 2	$ 11,200
7	Turbidity Barrier	LF	100	$ 30	$ 3,000
8	Yard Drain Connections @ approx. 2 per lot/home (includes ADS 12" Yard Drain)	EA	76	$ 1,000	$ 76,000
9	Sandy Top Soil with 10%-12% Organics (3" deep over impacted areas) (5600 LF x 8' x 3")	CY	415	$ 100	$ 41,481
10	GeoWeb - GW 30V3 (12' wide) (Includes backfill, 57 stone, anchors, non-woven fabric)	SF	67,200	$ 15	$ 1,008,000

GRAND TOTAL	=	**$ 2,131,181**

RE-GRADE

Without Additional Fill

1	Mobilization	LS	1	$ 3,000	$ 3,000
2	Landscape Replacement (Sod, Native Vegetation) (10' wide x 5600 LF)	SF	56,000	$ 3	$ 168,000
3	Irrigation Replacement in impacted areas (10' wide x 5600 LF)	SF	56,000	$ 2	$ 112,000
4	Littoral Plantings @ 2 per linear foot of modified lake bank	EA	11,200	$ 4	$ 44,800
5	Silt Fence	LF	5,600	$ 2	$ 11,200
6	Turbidity Barrier	LF	100	$ 30	$ 3,000
7	Yard Drain Connections @ approx. 2 per lot/home (includes ADS 12" Yard Drain)	EA	76	$ 1,000	$ 76,000

GRAND TOTAL	=	**$ 418,000**

RE-GRADE OPTION With Additional Fill

8	In Place Compacted, Imported Fill ((5600 LF x 2' x 8')x2)/27=6637 CY	CY	6,637	$ 100	$ 663,700

GRAND TOTAL	=	**$ 1,081,700**

Note: Estimated costs are pre-survey and are approximate. Cost estimates do not include survey, site permitting or design plans.

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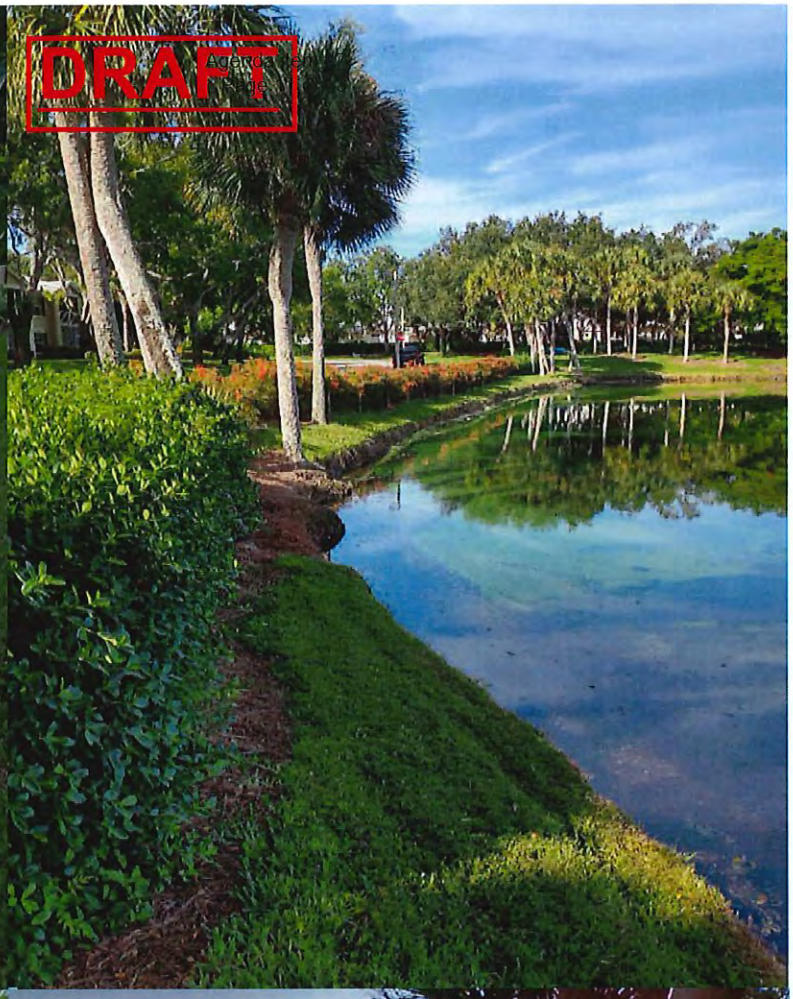
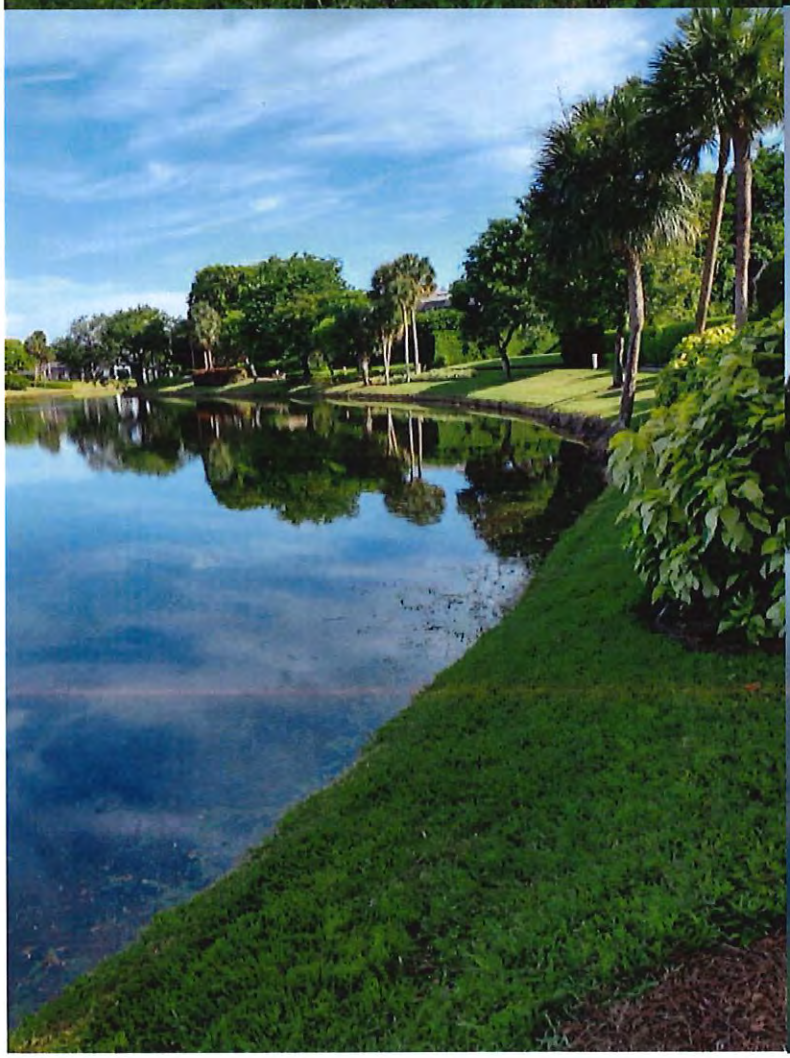
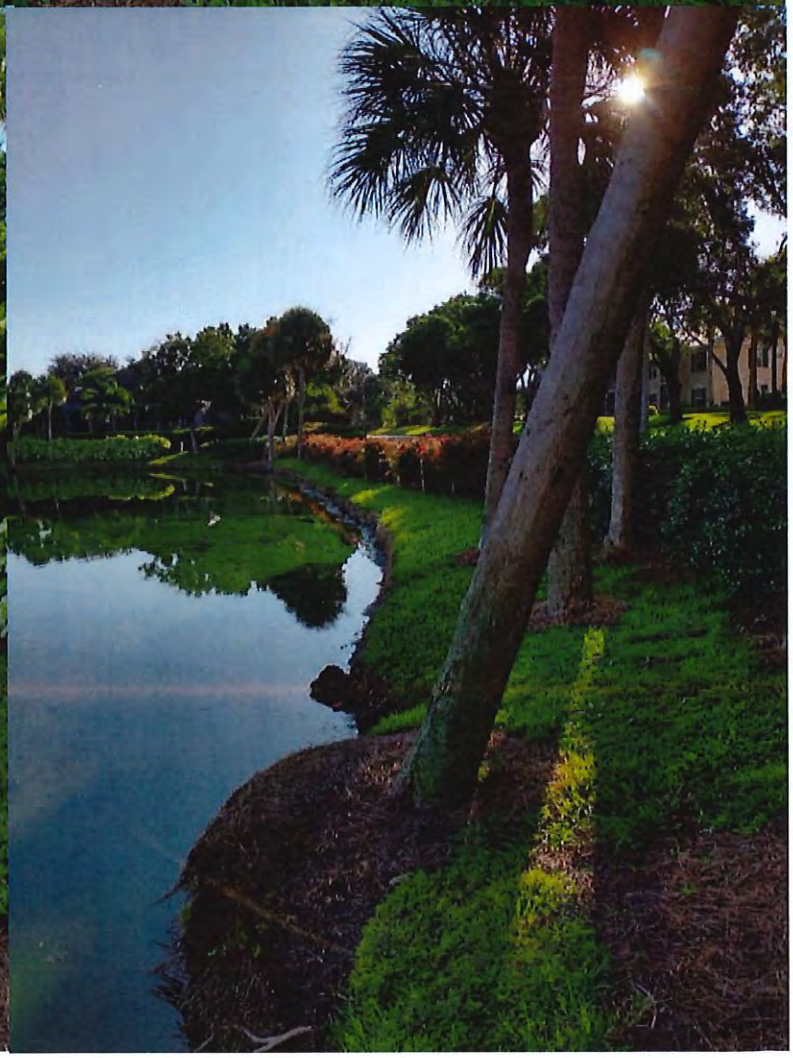
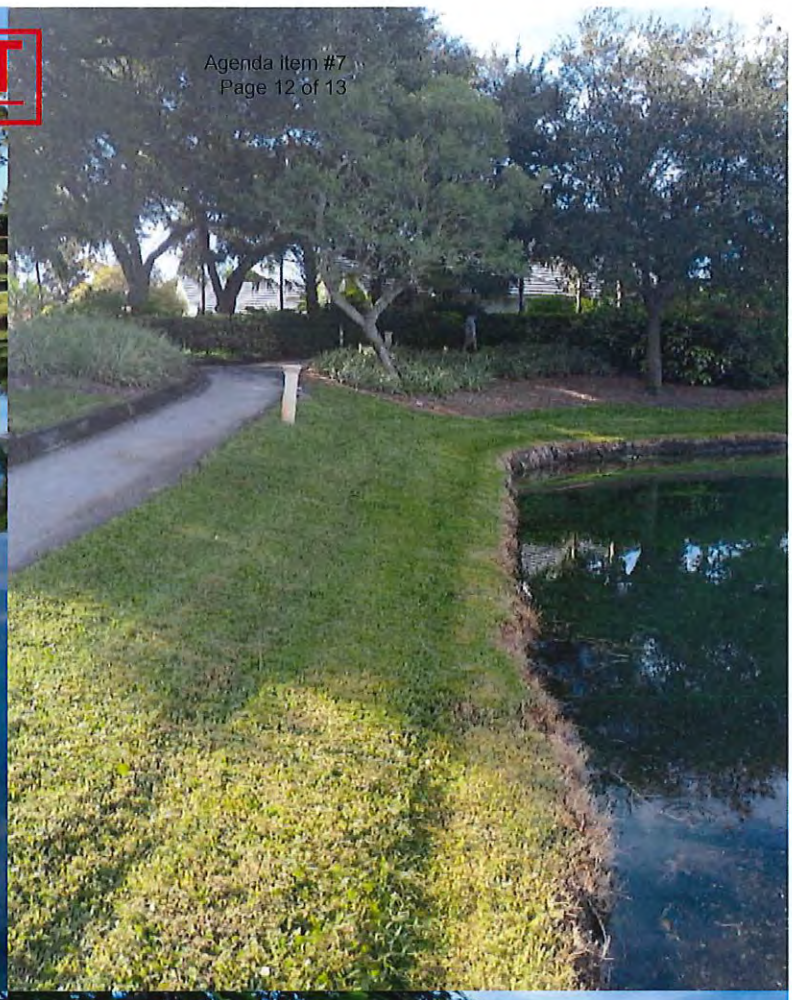
Appendix C- Southeast Corner

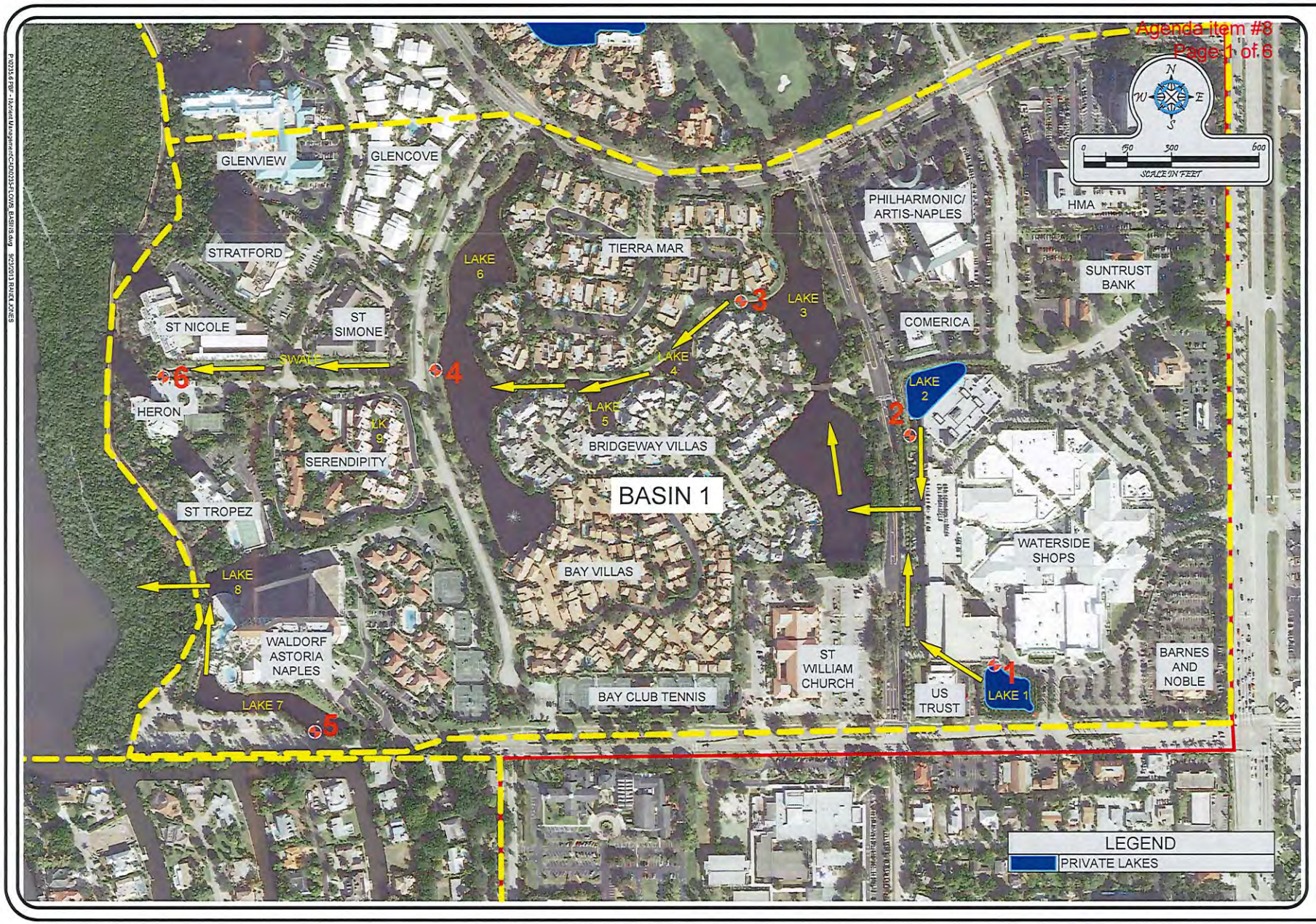






East





CLAM BAY NUTRIENT MANAGEMENT

BASIN 1

TURRELL, HALL & ASSOCIATES, INC.
Marine & Environmental Consulting
3584 Exchange Avenue, Suite 104
Naples, FL 34104-3732
Phone: (239) 643-0166
Fax: (239) 643-0169
email: tandy@turrellhallassociates.com

DRAWN	RMJ	SCALE	TTT
CHECKED	TTH	SHEET	01
PROJECT	0235.6		
DATE	07-11-13		
DRAWING	IP_BASIN 1		

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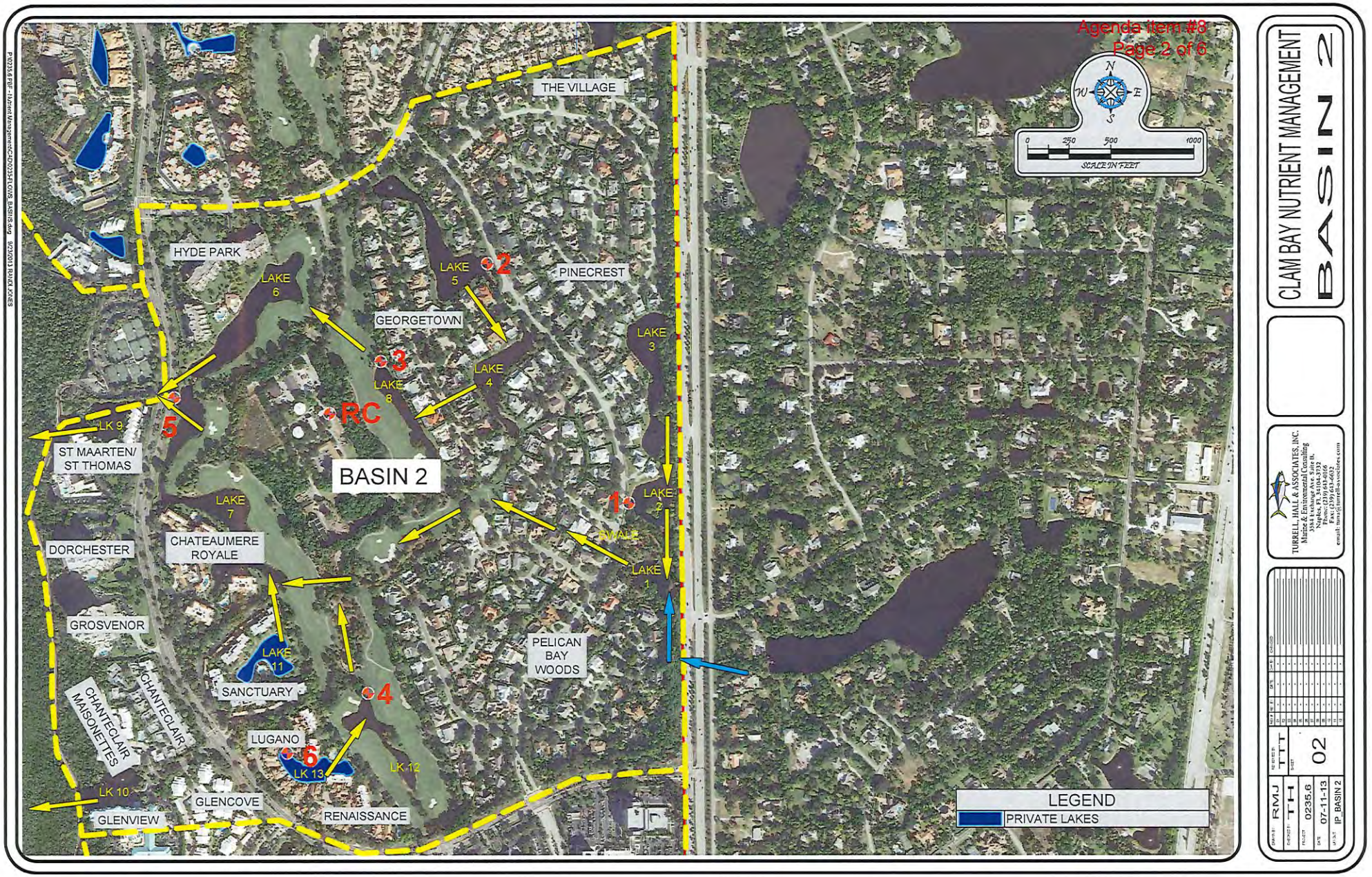

CLAM BAY NUTRIENT MANAGEMENT

BASIN 2

TURRELL, HALL & ASSOCIATES, INC.
Municipal Engineering Consulting
3106 Tamiami Trail North,
Naples, FL 34103-3932
Phone: (239) 643-0106
Fax: (239) 643-0302
email: tuna@turrellhallassociates.com

DRAWN:	RMJ
CHECKED:	TH
PROJECT:	0235.6
DATE:	07-11-13
EXHIBIT:	IP_BASIN 2
SERVICES:	TTT
SHEET:	02

DRAWN BY: RMJ	REVIEWED BY: TTT		
CHECKED BY: TH	SHEET 03		
PROJECT 0235.6			
DATE 07-11-13			
LAYOUT IP_BASIN 3			

TURRELL, HALL & ASSOCIATES, INC.
Marine & Environmental Consulting
3584 Exchange Ave. Suite B,
Naples, FL 34104-3732
Phone: (239) 643-0166
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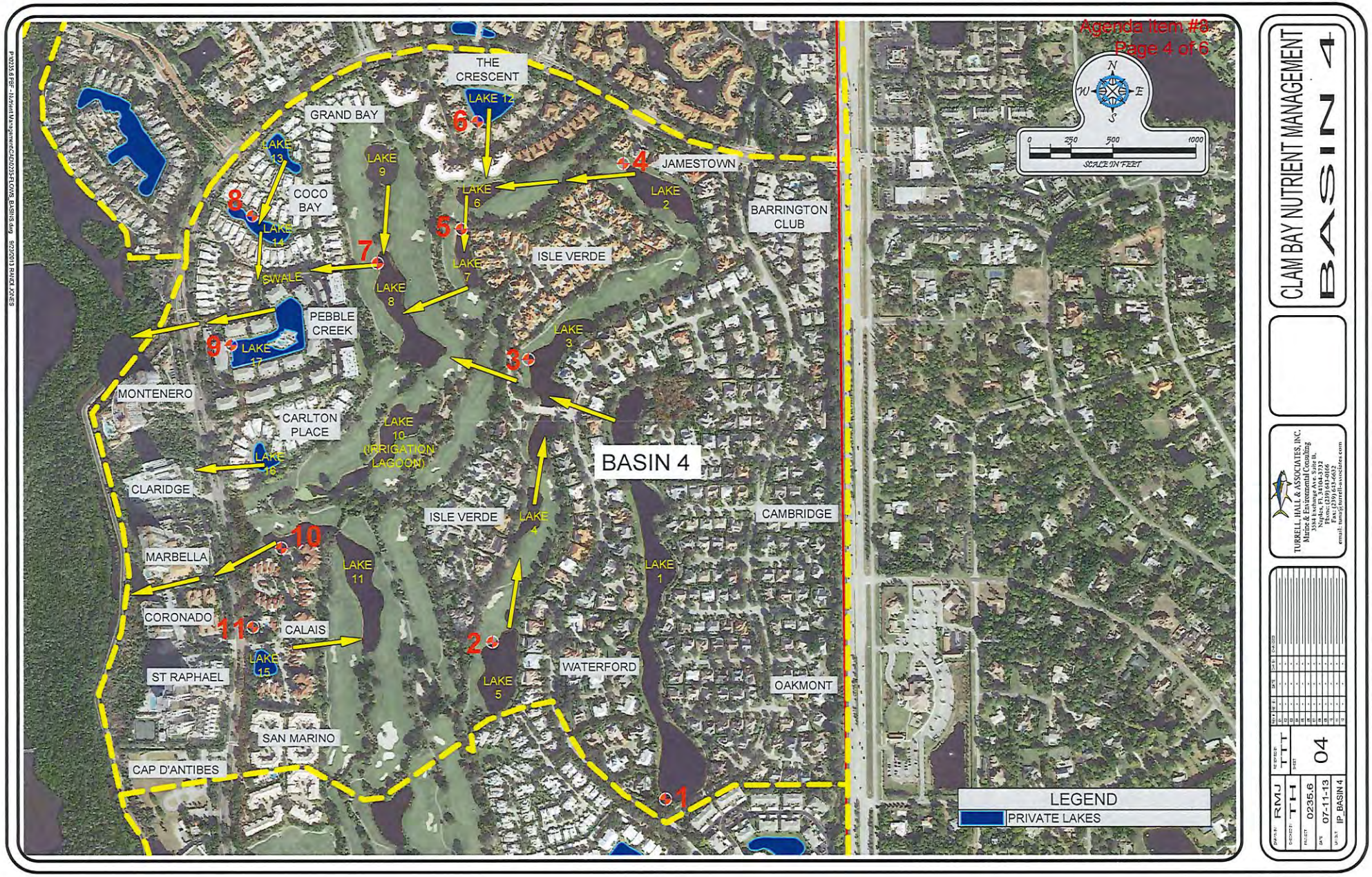
email: tuna@turrell-associates.com

CLAM BAY NUTRIENT MANAGEMENT
BASIN 3



CLAM BAY NUTRIENT MANAGEMENT

BASIN 4

TURRELL, HALL & ASSOCIATES, INC.
Marine & Environmental Consulting
3584 Exchange Ave. Suite B,
Naples, Fl. 34104-3732
Phone: (239) 643-0746
Fax: (239) 643-6032
email: tuna@turrellassociates.com

DRAWN	RMJ	SCHEDULE	TTT
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PROJECT	0235.6		04
DATE	07-11-13		
JOB NO.	IP_BASIN4		

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CLAM BAY NUTRIENT MANAGEMENT

BASIN 5

TURRELL, HALL & ASSOCIATES, INC.
Marine & Environmental Consulting
3106 Tamiami Trail North
Naples, FL 34103-3732
Phone: (239) 643-0166
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email: tuna@turrellassociates.com

DRAWN:	RMJ
DESIGN:	TTH
PROJECT:	0235.6
DATE:	07-11-13
SHEET:	IP_BASIN 5

NO.	BY	DATE	CHECKED

P:\0235.6 PBF - Natural Management\CAD\0235-FLOWS_BASINS.dwg 9/23/2013 RANDY JONES

DRAWN BY	RMJ
CHECKED BY	TH
PROJECT	0235.6
DATE	07-11-13
UNIT	IP_BASIN 6
REVIEWED BY	TTT
SHEET	06

TURRELL, HALL & ASSOCIATES, INC.
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CLAM BAY NUTRIENT MANAGEMENT

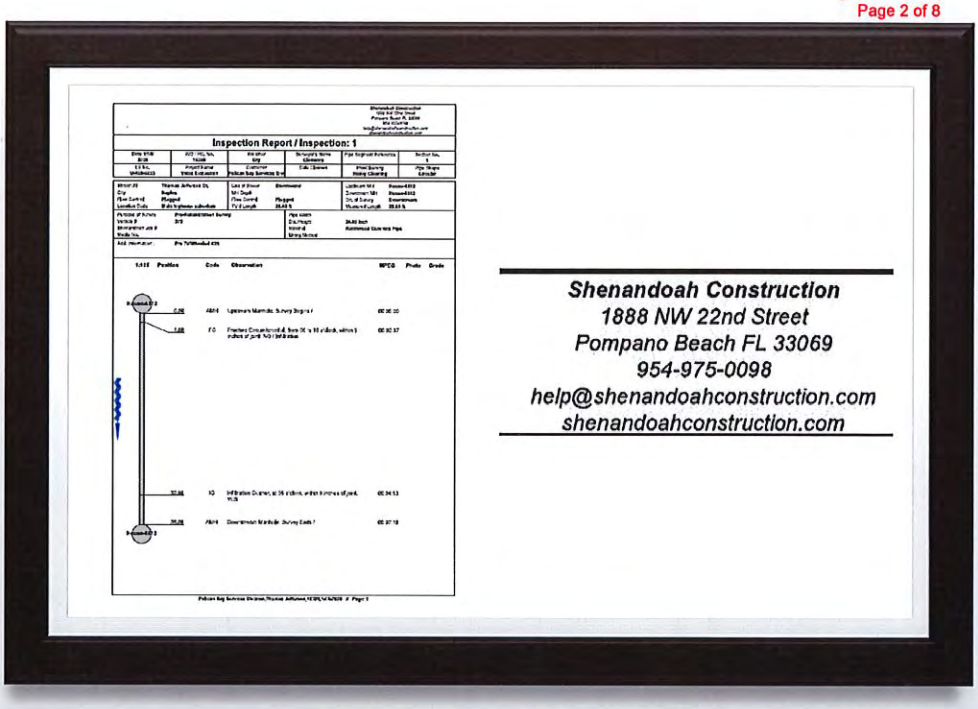
BASIN 6

Basin_Lake Number	Community	Area (sf)	Area (ac)	Perimeter (Linear ft)	Perimeter to be Repaired	Average Escarpment Height (ft)	Maximum Escarpment Height (ft)	Average Slope	Max Slope	Critical Erosion (Linear ft)	Natural Area (Linear ft)	Rip-rap (Linear ft)	Wall	Units	Density (ft per Unit)	Boat Ramps	Structural Proximity (1-3)	Pedestrian Proximity (1-3)	Rear Yard Access (1-3)	Site Access (See Map) (1-5)	Final Scores
4_1	Oakmont Park	326,360	7.49	5,689	5,689	1.7	2.6	4.1:1	2.5:1	975				37	154	1	1	1	3	5	1.7
1_3	Bridge Way / Tierra Mar	202,251	4.65	3,223	1,646	1.4	2.1	4.2:1	2.5:1	606	1,577			22	75	0	1	1	2	3	1.8
3_3	St. Andrews/Willow Brook/ Sand Pointe	114,842	2.64	2,645	2,200	1.5	2.3	3.9:1	3.3:1	2,183	445			40	55	1	2	1	1	4	1.8
2_9	St. Maarten/ St. Thomas	57,054	1.31	1,659	1,250	2.3	2.9	4.1:1	3.3:1			141	269	132	9	1	3	1	2	3	2.1
2_8	Pelican Bay Golf	46,278	1.06	1,354	1,354	1.8	2.7	6.0:1	3.1:1	640				8	169	1	1	3	3	2	2.2
1_6	Bridge Way / Tierra Mar	173,585	3.98	3,373	3,090	1.8	2.3	4.4:1	3.6:1				283	26	119	1	2	1	2	3	2.5
2_5	Georgetown	130,180	2.99	2,671	2,562	1.8	2.2	3.9:1	2.0:1	291	110			14	183	1	1	3	3	3	2.5
5_5	Community Park	112,088	2.57	1,779	1,779	1.3	1.8	5.0:1	3.6:1	1,397				49	36	1	2	1	3	2	2.6
2_3	Ridgewood Park	95,409	2.19	2,125	1,015	1.4	3.0	3.8:1	2.7:1	62	1,110			8	127	1	2	3	3	4	2.6
4_11	Pelican Bay Golf	130,214	2.99	2,706	2,432	1.7	2.4	5.1:1	4.0:1	1,471	274			265	9	0	3	3	2	2	2.7
1_8	Waldorf Astoria	15,715	0.36	619	214	1.0	1.4	3.7:1	2.7:1		135	185	85	106	2.0	1	3	2	3	2	2.9
4_10	Pelican Bay Golf	110,694	2.54	2,542	1,620	1.7	2.6	4.1:1	3.1:1		922			16	101	1	3	1	3	2	2.9
2_10	Chanteclair Maisonettes	17,780	0.41	533	401	1.2	1.8	5.5:1	4.4:1		132			122	3	1	3	2	3	1	3.0
2_7	Pelican Bay Golf	190,068	4.36	4,362	3,728	1.3	2.3	6.3:1	4.0:1	250	634			93	40	1	3	2	3	2	3.0
4_3	Pelican Bay Golf	124,698	2.86	2,441	2,069	1.9	2.4	5.6:1	2.9:1	1,407	372			6	345	1	3	3	1	3	3.1
5_2	L'Ambience of Pelican Bay	133,391	3.06	2,929	1,940	1.5	1.9	3.7:1	2.7:1			160	829	160	12	0	2	3	3	5	3.1
5_3	Avalon	113,107	2.60	1,534	1,534	1.5	1.8	4.1:1	3.3:1					84	18	1	2	3	3	5	3.2
3_6	Pelican Bay Golf	46,715	1.07	896	664	1.7	2.1	13.3:1	10.0:1	1,727	232			30	22	0	3	3	3	1	3.2
3_7	Pelican Bay Golf	52,314	1.22	1,066	1,066	1.6	1.9	7.4:1	5.3:1	839				46	23	0	3	2	3	1	3.2
4_7	Pelican Bay Golf	30,360	0.70	846	846	1.6	1.9	5.9:1	3.8:1	835				4	212	0	2	3	2	2	3.3
3_1	Oak Lake Sanctuary	88,991	2.04	2,077	1,972	0.9	1.5	2.4:1	1.4:1		105			18	110	1	2	2	1	2	3.3
4_9	Pelican Bay Golf	42,224	0.97	788	610	1.5	2.0	7.0:1	6.7:1	348	179			49	12	0	3	3	3	1	3.3
1_7	Waldorf Astoria	39,762	0.91	1,268	1,069	0.9	1.9	3.7:1	2.4:1		31		168	106	10	1	3	2	3	1	3.4
4_5	Pelican Bay Golf	88,809	2.04	1,291	1,291	1.6	2.1	5.2:1	3.6:1	1,291				18	72	1	3	3	3	2	3.4
5_1	Pelican Bay Community Center	76,170	1.75	1,127	1,127	1.0	1.6	4.5:1	3.6:1					200	6	1	3	3	3	3	3.5
5_13	Bay Colony Shores	94,969	2.18	2,110	2,110	1.4	2.2	5.8:1	4.0:1	233				9	234	0	3	3	2	3	3.6
2_4	Georgetown	80,526	1.85	1,918	1,865	1.7	2.2	3.8:1	2.5:1	372	53			14	133	0	3	3	3	3	3.6
4_6	Pelican Bay Golf	28,789	0.66	730	673	1.4	1.6	5.1:1	3.6:1	114	57			26	26	0	3	3	3	1	3.6
4_4	Pelican Bay Golf	26,718	0.61	856	695	1.7	2.0	5.4:1	4.3:1	188	161			14	50	0	3	3	3	2	3.6
4_2	Pelican Bay Golf	67,996	1.56	1,195	767	1.4	1.8	4.9:1	4.0:1	470	428			16	48	1	3	3	3	1	3.7
2_2	Ridgewood Park	44,409	1.02	888	316	1.0	2.2	3.0:1	2.0:1		572			1	316	1	3	2	2	1	3.8
2_6	Pelican Bay Golf	148,130	3.40	2,345	2,154	1.4	1.8	9.0:1	5.0:1		191			90	24	1	3	3	3	1	3.8
3_5	Pelican Bay Golf	72,096	1.66	1,375	1,128	1.2	1.8	7.5:1	3.5:1	463	247			20	56	1	3	3	3	2	3.8
2_12	Pelican Bay Golf	52,370	1.20	1,625	1,279	1.3	1.8	11.1:1	4.0:1		346			45	28	0	3	3	3	1	3.9
5_12	Bay Colony Shores	194,119	4.46	2,405	1,332	1.3	1.8	3.8:1	3.1:1	1,321	1,073			10	133	1	3	3	3	4	4.0
5_11	Bay Colony Shores	82,879	1.90	1,401	1,401	1.3	1.7	6.3:1	5.0:1	114				12	117	0	3	3	3	2	4.1
4_8	Pelican Bay Golf	105,603	2.42	1,877	1,517	1.4	2.0	4.7:1	2.9:1	407	360			1	1,517	0	3	1	3	1	4.1
5_14	Bay Colony Shores	-	0.00	765	765	1.2	1.4	6.3:1	4.4:1	139				8	96	0	3	3	3	2	4.2
5_9	Bay Colony Shores	45,063	1.03	983	983	1.4	1.7	6.4:1	4.4:1					7	140	0	3	3	3	2	4.4
5_10	Bay Colony Shores	47,465	1.09	906	906	1.3	1.5	6.9:1	6.7:1					8	113	0	3	3	3	1	4.5
2_1	Pelican Bay Woods	28,861	0.66	821	386	0.6	1.2	9.5:1	4.4:1		435			3	129	1	3	3	3	1	5.2
1_5	Bridge Way / Tierra Mar	19,642	0.45	770	0	0.7	0.7	5.7:1	5.7:1		0	1,123		14	0	1	2	3	2	4	5.4
6_1	Trieste	73,117	1.68	1,688	0	0.0	0.0	-	-		1,250		438	47	0	1	3	3	3	5	5.4
1_4	Bridge Way / Tierra Mar	12,794	0.29	614	0	0.0	0.0	3.1:1	3.1:1		0	978	50	11	0	0	2	3	2	4	5.5
6_2	Ritz-Carlton Hotel	31,577	0.72	1,402	0	0.0	0.0	-	-		1,402			420	0	0	3	3	3	5	5.5

Thomas Jefferson Ct

24" Stormwater RCP
Evaluate/Repair 2020

01/2020 Inspection Shenandoah



Shenandoah Construction
1888 NW 22nd Street
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Bid award for repairs: Quality Enterprises

02/2020

02/2020

Damaged 24' stormwater pipe

02/2020

02/2020

Job complete 02/2020