

**AGENDA
PIRATE HARBOR WATERWAY
MUNICIPAL SERVICE BENEFIT UNIT (MSBU)**

**ADVISORY BOARD REGULAR MEETING
THURSDAY, FEBRUARY 8, 2024**

**10:30 a.m. Punta Gorda Charlotte Library
401 Shreve Street, Punta Gorda, Florida**

BOARD MEMBERS: Robert DiMuzio, Chair
Chuck Falesch, Vice-Chair
George Herl
Phillip Smallwood

COUNTY STAFF: Erica LeMaster, Community Liaison

PURPOSE: Regular Meeting

1. Call to Order / Roll Call
2. Changes to the Agenda / Motion to Approve Changes
3. Election of Officers
4. Annual Review – Sunshine Law, Roberts Rules of Order, Public Records
5. Citizen Input on Agenda Items (3-Minute Limit)
6. Approval of Minutes: November 15, 2023
7. Unfinished Business
 - a. Interior Dredge Project
 - b. FY23 Post-storm Survey
 - c. Sea Grass Mitigation Monitoring
 - d. Marine Markers
8. Citizen Input on Agenda Items (3-Minute Limit)
9. New Business
 - a. Financial Reports
10. Advisory Board Open Discussion
11. Citizen Input on MSBU Items (3-Minute Limit)
12. Meeting Schedule / Items for Next Agenda
13. Motion to Adjourn

**MINUTES
PIRATE HARBOR WATERWAY
MUNICIPAL SERVICE BENEFIT UNIT (MSBU)**

**ADVISORY BOARD REGULAR MEETING
THURSDAY FEBRUARY 2, 2024**

**10:38 a.m. – 12:32 p.m.
Punta Gorda Charlotte Library
401 Shreve Street, Punta Gorda, Florida**

Members Present: Robert DiMuzio, Chair
Charles Falesch, Vice-Chair
George Herl
Phil Smallwood

Members Absent: None
County Staff: Erica LeMaster, Community Liaison
Guests: None

Call to Order / Roll Call:

The meeting was called to order at 10:38 a.m. A roll call was taken, and a quorum was present.

Changes to the Agenda / Motion to Approve Changes:

None

Sunshine Law, Roberts Rules of Order and Public Records:

The Advisory Board watched the Sunshine Law and Roberts Rules of Order video presented by the County Attorney. Ms. LeMaster reviewed where to find the Records Management Department contact information on the webpage and noted a public record request can be submitted to any county employee; there were no questions on Public Records Law.

Election of Officers:

- Chair: The board voted unanimously for Robert Dimuzio to continue as chair. There were no other nominations.
- Vice-Chair: The board voted unanimously for Charles Falesch to continue as chair. There were no other nominations.

Citizen Input on Agenda Items (3 Minute Limit):

None

Approval of Minutes:

The draft minutes from November 15, 2023, were unanimously approved as submitted.

Unfinished Business:

a. Interior Dredge Project:

Ms. LeMaster informed the group that we have received all necessary permits for a dredge project. Mr. Logan will provide further updates at the next regular scheduled meeting. The group discussed the bid process and had questions regarding how the county advertises bids. The group also discussed the length permits stay active, and if an extension would be possible if needed.

b. FY23 Post-Storm Survey:

The group discussed the previous motion to wait until FY2025 to have the next bathymetric survey of the internal channel and to instead use the preconstruction survey. The group questioned the financials showing the 25,000-survey line item and if that would be added to the next year's survey. The group was advised that the funds don't carry over to the next fiscal year.

c. Seagrass Mitigation Monitoring:

Ms. LeMaster distributed the fourth annual seagrass mitigation monitoring results. Advising the group that they have one year left but could potentially have to extend monitoring due to the lack of positive results. Mr. Logan will be talking to the agencies to discuss the outside influences that may be contributing to the limited success. The board discussed the algae bloom and the affects that may have had on the results, as well as other monitoring options.

New Business:

a. Financial Reports:

The FY24 Adopted and the FY25 Approved budget were reviewed. The FY23 annual report were reviewed. The FY24 quarter one financials were reviewed. Ms. LeMaster included Denise Kolerski via TEAMS to answer financial questions regarding the Debt Proceeds line item, survey line item, Aquatic Weed Public Services line item which is budgeted for the Seagrass Mitigation Monitoring. Discussion ensued regarding the percentage that must remain in the reserves budget.

Citizen Input on MSBU Items (3 Minute Limit):

None

Advisory Board Open Discussion:

The group discussed a need for water quality testing in Pirate Harbor. They discussed the proposed budget for a dredge project and discussed possibly raising the assessment in FY25 to help cover the increased project costs.

Meeting Schedule / Items for Next Agenda:

Future meetings are tentatively scheduled at 10:30 a.m. at the Punta Gorda Charlotte Library as follows:

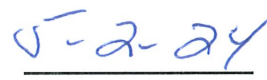
- May 2, 2024

The meeting adjourned at 12:32 p.m.

Submitted by: Erica LeMaster
Public Works Department



Chair Signature



Date

Pirate Harbor Waterway MSBU
2 Year Budget
FY2024 & FY2025

Estimated ERU's and Cost per ERU

Vacant and Occupied

Estimated ERU's

Cost per ERU

Current FY23 Rate

Current Maximum Rate

	FY2024	FY2025
	327.000	327.000
\$	335.00	\$ 335.00
\$	335.00	
\$	828.25	

Beginning Balance

Revenues

Assessments & Earnings

Assessments

Interest

Net Inc/(Decr) Fair Market Value-Investments

Misc Rev

Excess Fees /Tax Collector

Less 5% Reserve - FS 129.01(2)b

Grant & Subsidy Revenue

Interfund Trf-Canal Maint

Loans & Borrowing

Debt Proceeds

Total Revenue

Expenditures

Contract Services

Engineering

Other Contractual Svcs

Contract Services; other

Survey

Navigational Trimming

Public Works Services

Equip Repl Charges-PubWrks

Operating Exp-PubWrks

	Adopted Budget FY2024	Approved Budget FY2025
\$	288,850	\$ 259,964
	109,545	109,545
	1,011	910
	-	-
	-	-
	-	-
	(5,528)	(5,523)
	-	-
	391,000	-
\$	496,028	\$ 104,932
	-	-
	-	-
	25,000	25,000
	-	-
	256	256
	7,049	7,049

	Adopted Budget FY2024	Approved Budget FY2025
Internal Charges		
<i>Central/Indirect Svcs</i>	1,984	2,083
Purchased Services		
<i>Admin Svcs-PubWrks</i>	-	-
<i>Reimb-Aquatic Weed Chrgs</i>	15,000	15,000
<i>Advertising-Legal</i>	-	-
<i>Collection Fee-Tax Collector</i>	2,191	2,191
Materials and Supplies		
Capital Outlay		
<i>Imprv-Other Than Bldgs</i>	-	-
Debt Services		
<i>Principal</i>	-	78,200
<i>Interest</i>	15,610	12,728
<i>Other Debt Service Costs</i>	-	-
Project Costs		
<i>Pirate Harbor Dredging FY23</i>		
<i>Engineering</i>	90,133	-
<i>Dredging</i>	350,000	-
<i>Labor</i>	17,691	-
Total Expenditures	524,914	142,507
Reserves (Ending Fund Balance)	\$ 259,964	\$ 222,389
<i>Reserve %</i>	33.1%	60.9%

Version Date

9/20/2023

Capital Maintenance Schedule
Public Works - MSBU/TU Dredging
2024-2025

Project Costs (in thousands)

Project Name	2024	2025	2026	2027	2028	2029	TOTAL
Alligator Creek - Entrance Channel	410	0	0	0	0	0	410
Buena Vista/Edgewater North WW Maintenance Dredging	451	0	0	0	0	0	451
Don Pedro/Knight/Palm Island Re-nourishment FY20	606	118	121	127	0	0	972
Don Pedro/Knight/Palm Island Re-nourishment FY28	0	0	0	55	9,770	195	10,020
Gulf Cove WW Dredging	1,834	54	46	37	28	19	2,018
Harbour Heights WW Maintenance Dredging	279	0	0	0	0	0	279
Hayward Canal Exterior Dredging	193	0	0	0	0	0	193
Manasota Key Beach Nourishment	1,114	480	221	257	0	0	2,072
Manasota Key Beach Nourishment FY28	0	0	0	125	22,055	486	22,666
Manchester WW Maintenance Dredging FY22	861	0	0	0	0	0	861
NWPC Interior Channel Dredging FY22	719	0	0	0	0	0	719
NWPC Exterior Dredging	102	255	0	0	0	0	357
Pirate Harbor Dredging FY23	473	13	10	7	3	1	507
South Gulf Cove WW Maintenance Dredging	1,680	0	0	0	0	0	1,680
Stump Pass Maintenance Dredging FY22	43	0	0	0	0	0	43
Stump Pass Maintenance Dredging FY26	0	162	4,568	64	65	131	4,990
Suncoast WW Maintenance Dredge	0	0	0	0	0	0	0
TOTAL	8,766	1,082	4,966	671	31,922	832	48,239

Charlotte County

Capital Maintenance Schedule
 Public Works - MSBU/TU Dredging Long Range Plan
 2024-2025

MSBU / MSTU Fund Name	Type of Dredge	Year Last Dredged	Dredging cycle/est. useful life	Planned Dredging	
				Year	Year
Ackerman Waterway (done with Manchester WW)	Spot	2020	7	FY 2026	
Alligator Creek Waterway	Entrance channel	2017	7	FY 2024	
Buena Vista Waterway	Access channel and main canal	2016	7	FY 2024	
Don Pedro/Knight Is Beach Renourishment	Renourishment	2020	8	FY 2028	
Edgewater North Waterway	Maintenance	N/A	10	none scheduled	
Gulf Cove Waterway	Exterior	2010	5	FY 2026	
Gulf Cove Waterway	Interior	2019	10	FY22 & FY23	
Harbour Heights Waterway	Canals and access channels	2017	7	FY 2025	
Hayward Canal Waterway	Finger channels	2019	10	none scheduled	
Hayward Canal Waterway	Main Channel	2019	5	FY 2024	
Manchester Waterway	Spot	2020	7	FY 2024	
North Manasota Key Beach Renourishment	Renourishment	2020	8	FY 2028	
Northwest Port Charlotte Waterway	Exterior	2009	5	FY 2026	
Northwest Port Charlotte Waterway	Interior	2014	10	FY 2024	
Pirate Harbor Waterway	Interior	2013	7	FY 2024	
South Bridge Waterway	Canals and access channels	2013	7	none scheduled	
South Gulf Cove Waterway	Spot	2016	7	FY25 & FY26	
Stump Pass Dredging	Channel and renourishment	2022	4	FY 2026	
Suncoast Waterway	Canals and access channels	2014	7	none scheduled	

Pirate Harbor Waterway MSBU
Fund Financial Report - 5 Year Annual Report
Oct. 1, 2018 - Sept. 30, 2023

	Actual FY2019	Actual FY2020	Actual FY2021	Actual FY2022	Adopted Budget FY2023	Actual FY2023
Beginning Balance	\$ 732,890	\$ 707,373	\$ 183,929	\$ 174,598	\$ 219,240	\$ 233,048
Revenues						
Assessments & Earnings						
Assessments	55,288	63,596	63,375	105,758	109,545	105,789
Interest	15,496	3,649	1,026	1,934	568	10,955
Net Inc/(Decr) Fair Market Value-Investments	9,707	1,579	(968)	(4,448)	-	2,161
Misc Rev	-	-	-	-	-	-
Excess Fees /Tax Collector	339	-	382	582	-	573
Less 5% Reserve - FS 129.01(2)b	-	-	-	-	(5,506)	-
Grant & Subsidy Revenue						
Interfund Trf-Canal Maint	-	-	-	-	-	-
Loans & Borrowing						
Debt Proceeds	-	-	-	-	391,000	-
Total Revenue	\$ 80,829	\$ 68,824	\$ 63,815	\$ 103,826	\$ 495,607	\$ 119,478
Expenditures						
Contract Services						
Engineering	-	-	-	-	-	-
Other Contractual Svcs	-	-	-	-	-	-
Contract Services; other						
Survey	-	-	30,510	9,249	25,000	-
Navigational Trimming	-	-	-	-	-	-
Public Works Services						
Equip Repl Charges-PubWrks	-	-	-	-	1,789	-
Operating Exp-PubWrks	9,691	11,837	6,616	3,108	2,866	3,459
Internal Charges						
Central/Indirect Svcs	848	1,715	1,801	5,477	1,637	1,637
Purchased Services						
Admin Svcs-PubWrks	-	-	-	-	-	-
Reimb-Aquatic Weed Chrgs	-	282	893	9,649	10,000	13,720
Advertising-Legal	-	-	-	-	-	-
Collection Fee-Tax Collector	759	813	811	1,337	1,145	1,277
Materials and Supplies						
Capital Outlay						
Imprv-Other Than Bldgs	-	-	-	-	-	-
Debt Services						
Principal	-	-	-	-	-	-
Interest	-	-	-	-	15,610	-
Other Debt Service Costs	-	-	-	-	-	-
Project Costs						
Pirate Harbor Dredging FY23						
Engineering	39,971	104,061	5,986	10,058	96,329	4,543
Dredging	55,078	473,560	26,530	-	350,000	-
Labor (not reported separate prior to FY23)	-	-	-	6,498	21,316	3,119
Total Expenditures	106,346	592,268	73,146	45,376	525,692	27,754
Reserves (Ending Fund Balance)	\$ 707,373	\$ 183,929	\$ 174,598	\$ 233,048	\$ 189,155	\$ 324,772
Reserve %	86.9%	23.7%	70.5%	83.7%	26.5%	92.1%

Date Prepared: 12/28/2023

PIRATE HARBOR ENTRANCE CHANNEL DREDGING
SEAGRASS MONITORING REPORT

**FOURTH ANNUAL SURVEY OF MITIGATION, CONTROL, AND IMPACT
SITES**



DEP Permit 0128695-008-EI

USACE Permit SAJ-2006-01964(SP-ACM)

Prepared for

**Charlotte County Board of County Commissioners
18500 Murdock Circle
Port Charlotte, FL 33948-1094**

**December 19, 2023
CEC File No. 23.132**

Prepared by
 **COASTAL
ENGINEERING
CONSULTANTS
INC**

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 SCOPE OF WORK 3

 2.1 SEAGRASS MITIGATION SITE..... 3

 2.1.1 Survey Protocols..... 3

 2.1.2 Reporting 3

 2.1.3 Success Criteria 4

 2.2 IMPACT SITE..... 4

3.0 SEAGRASS MITIGATION..... 5

 3.1 SITE SELECTION 5

 3.2 SEAGRASS TRANSPLANTING..... 5

 3.3 SEAGRASS HABITAT RESTORATION..... 8

4.0 ASSESSMENT..... 11

 4.1 SEAGRASS MITIGATION SITES 11

 4.1.1 Mitigation Site North..... 11

 4.1.2 Mitigation Site South..... 13

 4.1.3 Subsidence 15

 4.2 IMPACT SITE..... 16

5.0 CONCLUSION 19

 5.1 MITIGATION SITES 19

 5.2 IMPACT SITE..... 19

 5.3 DISCUSSION..... 20

 5.4 RECOMMENDATIONS 21

6.0 REFERENCES 23

LIST OF FIGURES

FIGURE 1. LOCATION MAP 2

FIGURE 2. PLAN VIEW OF PERMITTED MITIGATION SITE NORTH 6

FIGURE 3. TYPICAL CROSS SECTION OF PERMITTED MITIGATION SITE NORTH..... 6

FIGURE 4. PLAN VIEW OF PERMITTED MITIGATION SITE SOUTH..... 7

FIGURE 5. TYPICAL CROSS SECTION OF PERMITTED MITIGATION SITE SOUTH 7

FIGURE 6. POST-CONSTRUCTION SURVEY OF MITIGATION SITE NORTH 9

FIGURE 7. POST-CONSTRUCTION SURVEY OF MITIGATION SITE SOUTH..... 10

FIGURE 8. SEAGRASS MONITORING SURVEYS OF BUFFER ZONE ADJACENT TO IMPACT SITE 18

LIST OF TABLES

TABLE 1. BRAUN-BLANQUET ABUNDANCE SCORES 3

TABLE 2. SUMMARY OF SEAGRASS TRANSPLANTING..... 5

TABLE 3. SUMMARY OF SEAGRASS RESTORATION 8

TABLE 4. MITIGATION SITE NORTH SEAGRASS MONITORING SUMMARY 13

TABLE 5. MITIGATION SITE SOUTH SEAGRASS MONITORING SUMMARY..... 15

TABLE 6. SUMMARY OF SEAGRASS AREAS WITHIN BUFFER ZONE..... 16

LIST OF APPENDICES

APPENDIX 1. SEAGRASS MITIGATION PLAN

APPENDIX 2. MITIGATION SITE PHOTOGRAPHS

APPENDIX 3. CONTROL SITES FOURTH ANNUAL MONITORING PERCENT COVER AND BRAUN-BLANQUET SCORES

APPENDIX 4. MITIGATION SITES FOURTH ANNUAL MONITORING PERCENT COVER AND BRAUN-BLANQUET SCORES

APPENDIX 5. IMPACT SITE FOURTH ANNUAL MONITORING PERCENT COVER AND BRAUN-BLANQUET SCORES

1.0 INTRODUCTION

The dredging of the Pirate Harbor Entrance Channel was conducted in the Fall of 2019 to improve navigation to the Pirate Harbor residential waterfront community. The Project is located within Charlotte Harbor, a Class II, Outstanding Florida Waterbody, Gasparilla Sound-Charlotte Harbor Aquatic Preserve (Figure 1). The permits authorize periodic dredging, both maintenance and non-maintenance, of approximately 5,500 cubic yards of sediment for the initial project and 5,500 cubic yards for subsequent projects. The permitted dredge area includes approximately 4.93 acres of submerged lands within a 45-foot wide access channel. The permitted dredge depths include -4.0 feet Mean Low Water (MLW) (-5.2 feet NAVD88) for non-maintenance and -5.0 feet MLW (-6.2 feet NAVD88) for maintenance.

During the 2019 Project, approximately 4,400 cubic yards were excavated. The dredged material was offloaded in a self-contained upland disposal site constructed on a vacant lot within the subdivision. Material was then hauled off to a permanent disposal site.

It was computed that implementing the Project's proposed dredge plans would result in unavoidable impacts to 0.19 acres of seagrass beds, including *Thalassia testudinum* and *Halodule wrightii*, within the dredge footprint measured to the projected top of the dredge cut. To offset the impacts, the County was required to restore 0.38 acres of seagrass habitat in Charlotte Harbor, install signage, and implement educational and other public interest requirements. Zero impacts were allowed within the buffer zone adjacent to the Impact Site. The buffer zone is the 50-foot width, north and south of the Impact Site (dredge cut). The approved Seagrass Mitigation Plan (Plan) is provided in Appendix 1.

The Time-Zero, 6-Month, First Annual, Second Annual, and Third Annual monitoring surveys were conducted by Coastal Engineering Consultants, Inc. (CEC) on September 25, 2019, June 9, 2020, September 3, 2020, September 9, 2021, and September 26 and 27, 2022, respectively (CEC, 2020a; CEC, 2020b; CEC, 2020c; CEC, 2021; CEC, 2023).

This report presents the fourth annual survey of the Seagrass Mitigation and Control Sites and buffer zone adjacent to the Impact Site. The monitoring survey was conducted on October 31, 2023.

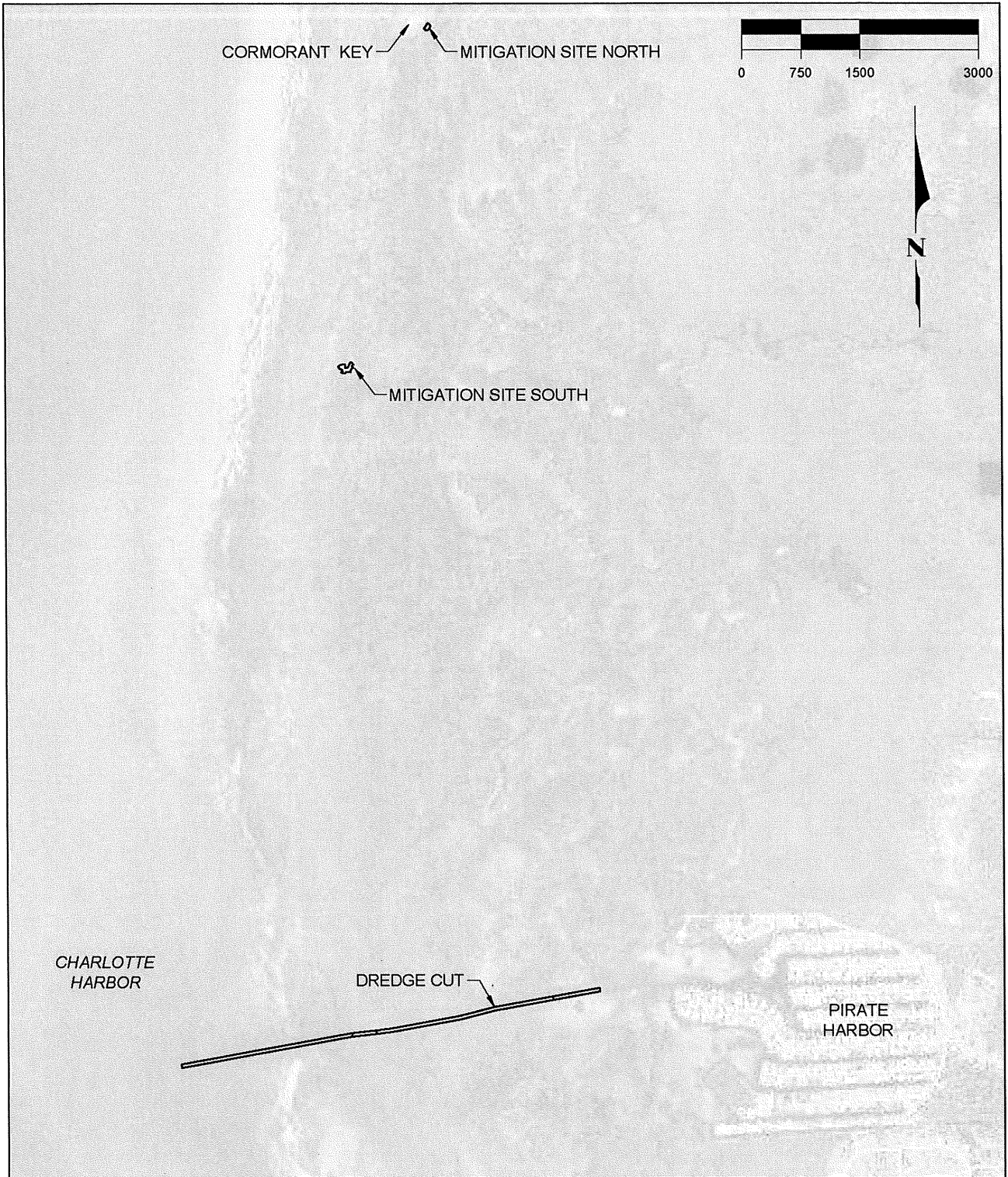


Figure 1. Location Map

2.0 SCOPE OF WORK

2.1 SEAGRASS MITIGATION SITE

2.1.1 Survey Protocols

Collect qualitative and quantitative data at the Mitigation Site and Control Site. The qualitative assessment shall visually assess species composition, aboveground biomass, epiphyte coverage, and overall condition. Quantitative surveys shall be made by randomly placing a 0.25 m² quadrat within each site and determining the percent cover of each seagrass species present and a combined percent coverage of all species. For each quadrat, a score based on the percent cover of each species individually and all species combined (composite) shall be assigned percent coverage and converted to the Braun-Blanquet abundance (BB) scale according to the below table.

Table 1. Braun-Blanquet Abundance Scores

Description	Score
Species absent from quadrat	0
Species represented by a solitary short shoot, < 5 % cover	0.1
Species represented by a few (< 5%) short shoots, < 5% cover	0.5
Species represented by a many (> 5%) short shoots, < 5% cover	1
Species represented by many (> 5%) short shoots 5%-25% cover	2
Species represented by many (> 5) short shoots, 25%-50% cover	3
Species represented by many (> 5) short shoots, 50%-75% cover	4
Species represented by many (> 5) short shoots, 75%-100% cover	5

Collect bathymetry data at the Mitigation and Control Sites when seagrass surveys are conducted. Evaluate the Mitigation Site for subsidence, specifically, determine if more than 15% of the mitigation site subsided to a depth greater than the deepest depth (NAVD88) of seagrass growing within a 50-foot-wide buffer surrounding the Mitigation Site.

2.1.2 Reporting

The Monitoring Reports shall include the following:

- (a) Date of the survey,
- (b) Color photographs,
- (c) Brief description of the extent of work completed since the previous report,
- (d) Combined percent aerial coverage of seagrass (total and by species),
- (e) Condition of sediment fill,
- (f) Mapping of any new prop scars or blowouts,
- (g) Plan for compliance with the permit to demonstrate any necessary corrective action to non-compliance or limited success.

2.1.3 Success Criteria

To determine the success of the mitigation plan, the Mitigation Site will be compared to the Control Site. A sufficient number of 0.25 m² quadrats to sample 5 percent of the Mitigation Site and Control Site will be assessed each year for percent cover and density (percent and BB scores). The seagrass mitigation plan will be deemed successful when all of the following criteria are met:

- Mitigation Site shall achieve percent aerial coverage of seagrasses equal to 80 percent of the Control Site,
- Mitigation Site shows an insignificant level of sediment subsidence,
- Mitigation Site has achieved viable, sustainable ecological and hydrological functions defined as the unassisted persistence of the required acreage of seagrass coverage for a two-year period.

2.2 IMPACT SITE

To assess if the effects of dredging are having an adverse effect on seagrasses adjacent to the dredged channel seagrasses within the dredged channel (Impact Site) and 50-foot buffer zone (north and south of the dredge cut) will be mapped using sub-meter accurate GPS. Conduct a qualitative assessment by visually assessing species composition, aboveground biomass, epiphyte coverage, and overall condition of seagrasses in the buffer zone. Quantitative sampling of seagrass percent cover by species and collectively shall be done using randomly placed 0.25 m² quadrats in the buffer zone at 100-foot stations. The data collected shall be used to calculate BB cover-abundance scores for each seagrass patch located. Prepare and submit a monitoring report following the above reporting protocols as they pertain to the Impact Site.

3.0 SEAGRASS MITIGATION

3.1 SITE SELECTION

In order to provide the optimal chance for mitigation success, multiple mitigation areas were included in the permits. The primary location was located near Cormorant Key. Based on the pre-construction surveys, the northern area of the permitted location, denoted hereafter as Mitigation Site North (MSN), was selected for seagrass transplanting and sediment bag placement. The permitted plan and typical section for MSN are shown in Figures 2 and 3, respectively.

The alternate mitigation area is located between Cormorant Key and the Impact Site, see Figure 1. Based on the pre-construction surveys, the entire area of the permitted location, denoted hereafter as Mitigation Site South (MSS), was selected for seagrass transplanting and sediment bag placement. The permitted plan and typical section for MSS are shown in Figures 4 and 5, respectively.

3.2 SEAGRASS TRANSPLANTING

The U.S. Army Corps of Engineers permit required transplanting existing seagrasses from the Impact Site to the Mitigation Site prior to dredging. Transplanting took place between August 1 and August 14, 2019. Seagrass was harvested via the bare shoot method and transplanted in a 2-foot by 2-foot grid within the Transplanted Areas. A total of 351 planting units were installed in MSN and 1,682 planting units were installed in MSS. Planting units consisted of predominately *Halodule wrightii* (four to five rhizomes secured to a metal stake with a minimum of four shoots and an apical meristem).

The constructed Transplant Areas within MSN and MSS were approximately 1,255 square feet (SF) (0.029 acres [AC]) and 5,993 SF (0.137 AC), respectively. Each area received transplanted seagrass from the Impact Site. A total of 0.166 acres were planted and are being monitored for success criteria. A summary of seagrass transplanting is presented in Table 2.

Table 2. Summary of Seagrass Transplanting

Mitigation Site	Transplanted Area SF (AC)
North	1,255 (0.029)
South	5,993 (0.137)
Total	7,244 (0.166)

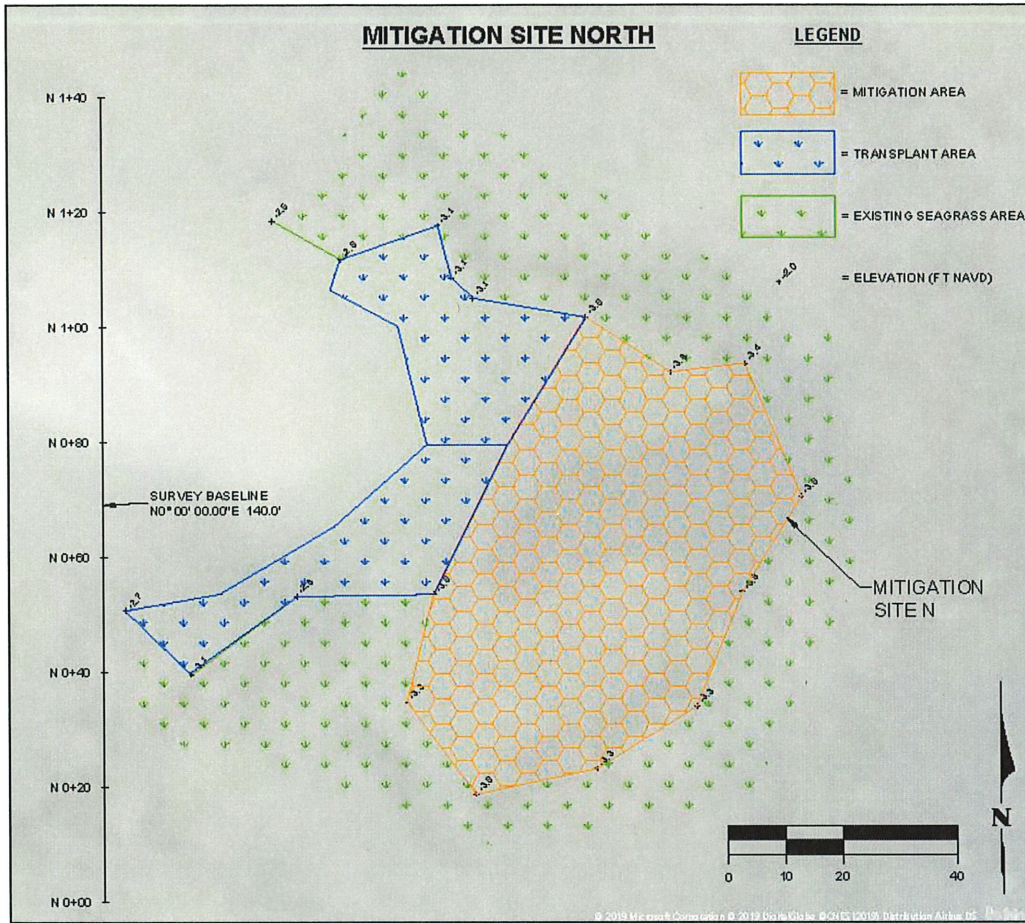


Figure 2. Plan View of Permitted Mitigation Site North

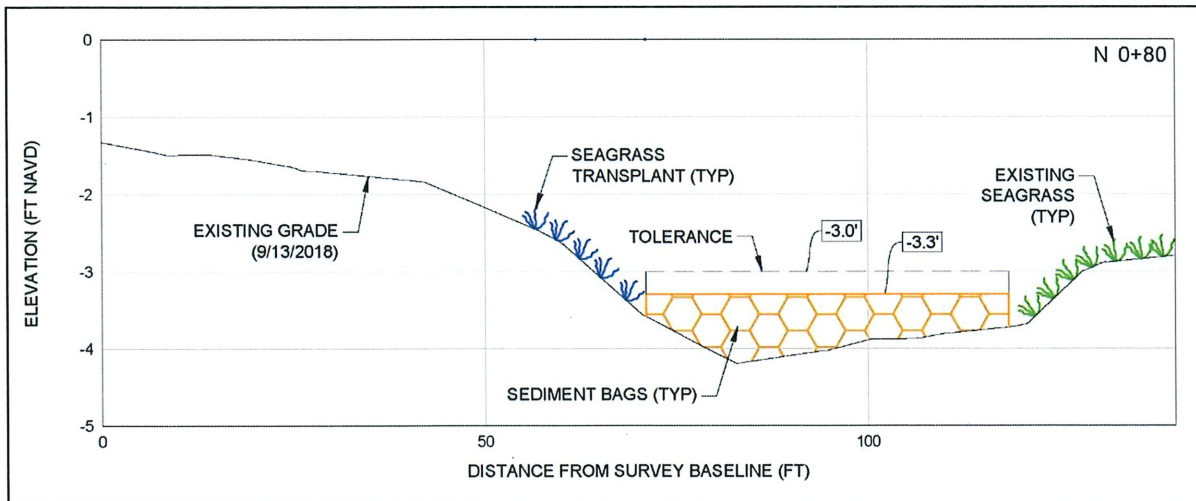


Figure 3. Typical Cross Section of Permitted Mitigation Site North

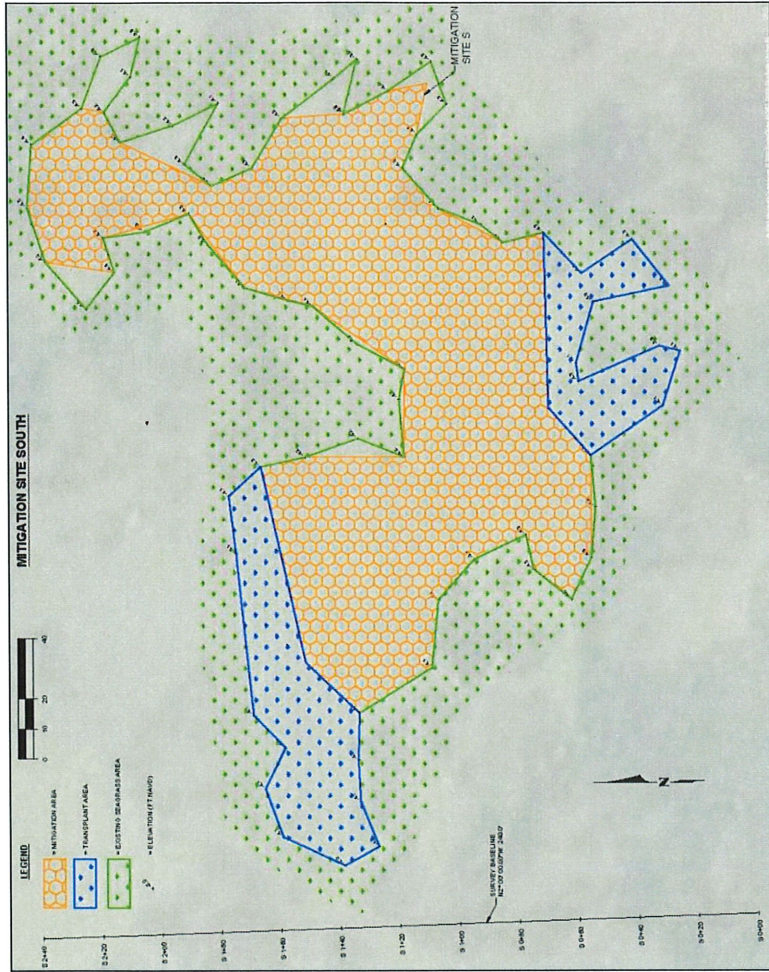


Figure 4. Plan View of Permitted Mitigation Site South

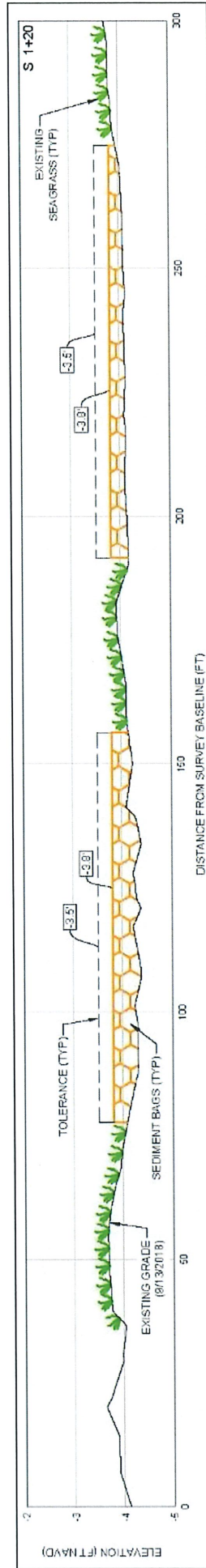


Figure 5. Typical Cross Section of Permitted Mitigation Site South

3.3 SEAGRASS HABITAT RESTORATION

In order to restore the area for seagrass cultivation, biodegradable bags filled with sediment were placed in the Mitigation Sites to raise the deeper areas to the level of the surrounding seagrasses. Compatible sediment dredged from the channel and sediment imported from an adjacent project, was used to fill the biodegradable bags. Placement of all bags was done following the methods described in the Plan, and no sediment bags were placed on existing seagrass. Sediment bags were installed between September 25 and November 13, 2019.

The average depth and deepest depth of the seagrass growing adjacent to MSN were -2.5 feet. NAVD88 and -3.7 feet. NAVD88, respectively. Approximately 4,367 SF (0.10 AC) of sediment bags were placed in MSN. Based on the post-construction survey, 92 percent of the measured area was at or above the design elevation of -3.3 feet. NAVD88 (Figure 6).

The average depth and deepest depth of the seagrass growing adjacent to MSS were -3.6 feet. NAVD88 and -4.3 feet. NAVD88, respectively. Approximately 13,393 SF (0.31 AC) of sediment bags were placed in MSS. Based on the post-construction survey, 90 percent of the measured area was at or above the design elevation of -3.8 feet NAVD88 (Figure 7).

Table 3. Summary of Seagrass Restoration

Mitigation Site	Accepted Area SF (AC)	% Greater Than Design Elevation
North	4,085 (0.094)	92%
South	13,057 (0.300)	90%
Total	17,142 (0.394)	

Prior to construction, one 50 meters x 10 meters Control Site was established within 25 meters of the edge of each Mitigation Site. On September 25, 2019, a qualitative assessment was made by visually assessing species composition, aboveground biomass, epiphyte coverage, and overall condition of the seagrass within the Control Sites in accordance with the Plan, (CEC, 2020a).

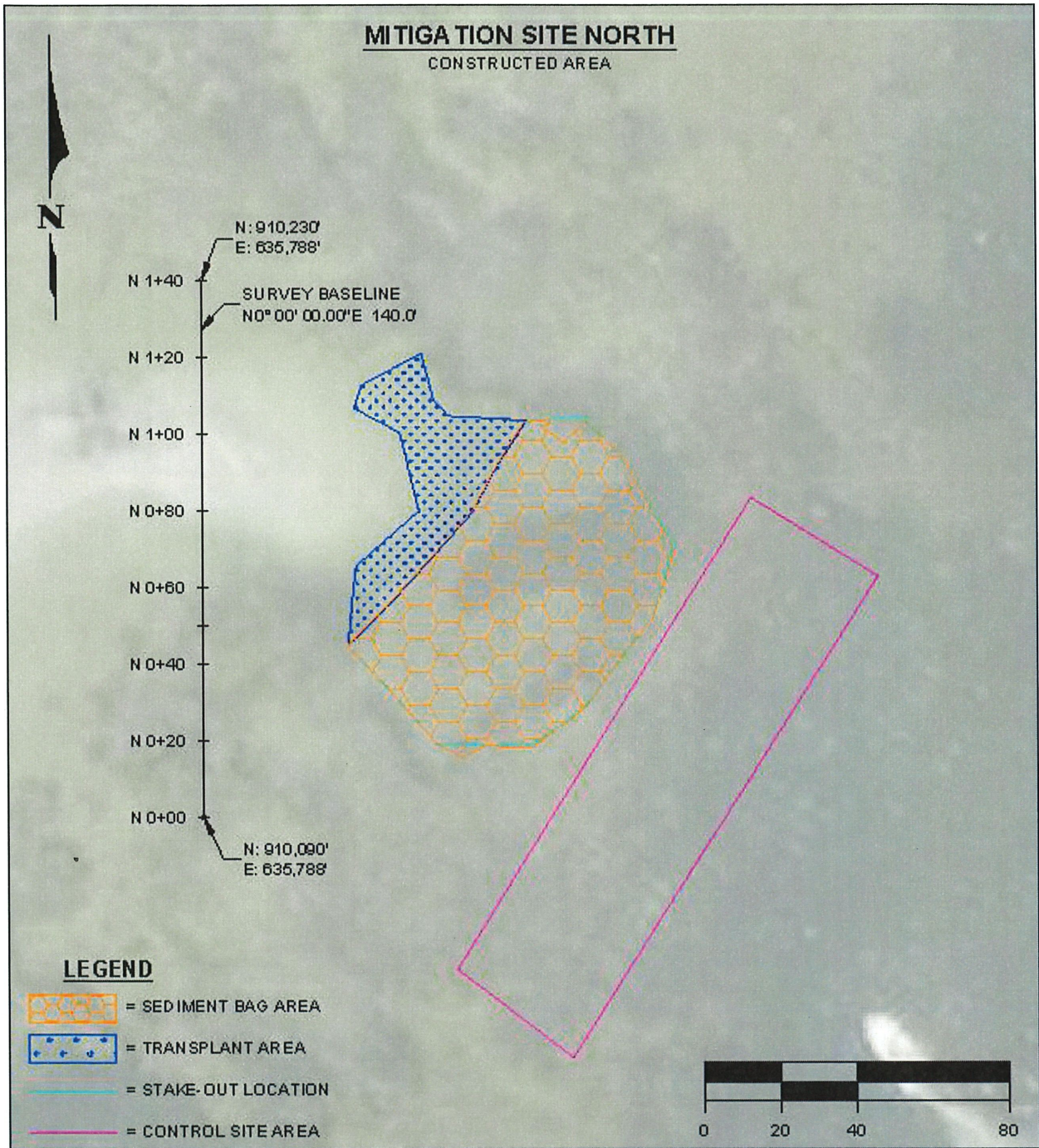


Figure 6. Post-Construction Survey of Mitigation Site North

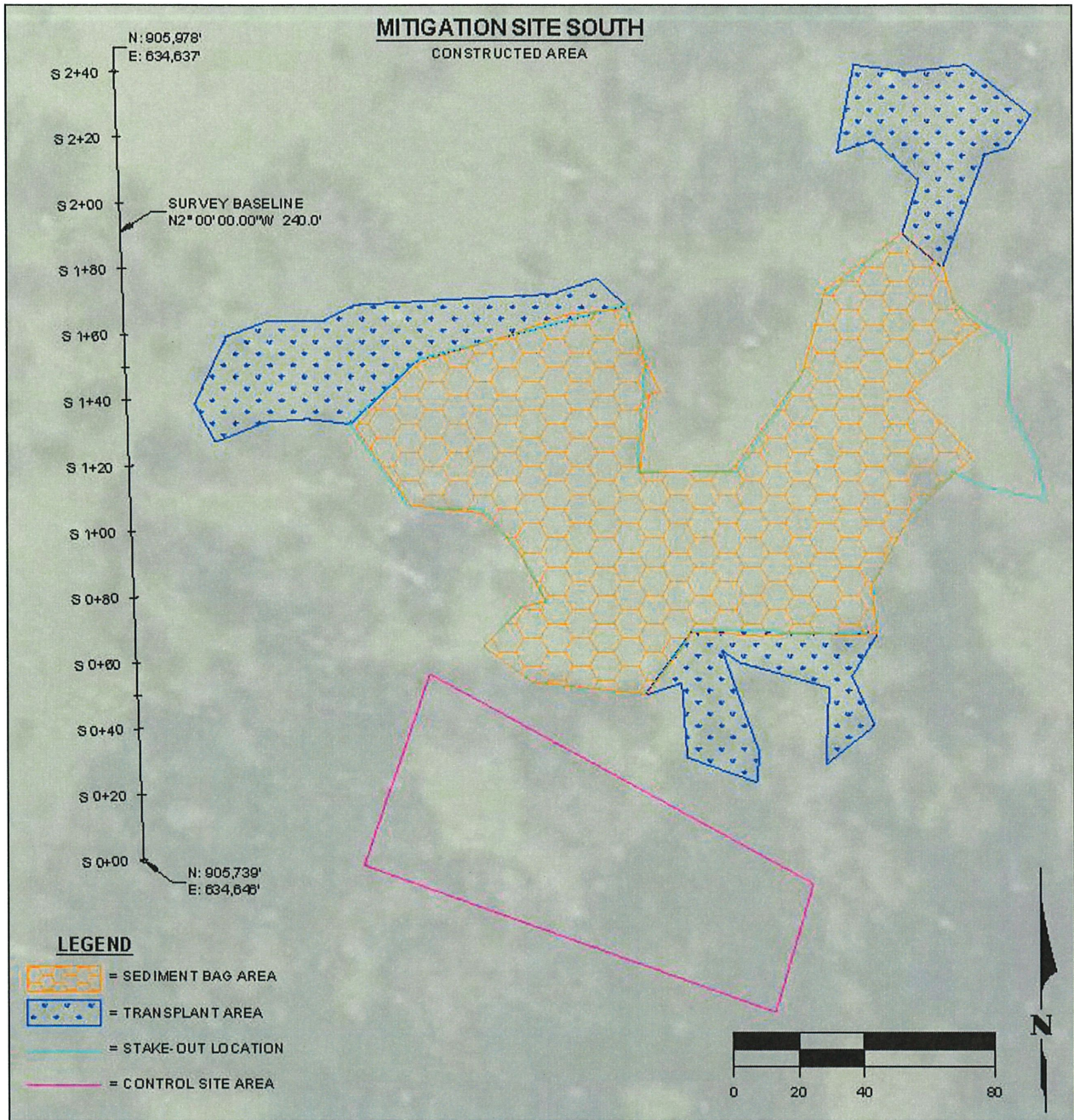


Figure 7. Post-Construction Survey of Mitigation Site South

4.0 ASSESSMENT

4.1 SEAGRASS MITIGATION SITES

4.1.1 Mitigation Site North

Following completion of the Transplant Area, post-construction survey observations yielded aerial coverage of approximately 3 percent. Seagrass within the Transplant Area were primarily *Halodule wrightii* with a small amount of *Thalassia testudinum*. The Sediment Bag Area was void of any seagrass. The composite aerial coverage of the MSN was approximately 0.7 percent.

The Control Site, centered approximately 30 feet southwest of MSN, was comprised of sparse *Thalassia testudinum*. Based on the post-construction survey, the aerial coverage within the Control Site was approximately 9 percent.

During the 6-month monitoring survey, *Halodule wrightii* with a small amount of *Thalassia testudinum* were observed in the Transplant Area. A small patch of *Thalassia testudinum* was observed on the edge of the Sediment Bag Area. The aerial coverage within the Transplant Area was approximately 24 percent and approximately 0.4 percent within the Sediment Bag Area. The composite aerial coverage of MSN was approximately 6 percent.

The aerial coverage within the Control Site during the 6-month survey was approximately 13 percent. Only *Thalassia testudinum* was observed.

During the first annual monitoring survey, only *Halodule wrightii* was observed in the Transplant Area. A small patch of *Thalassia testudinum* and *Halodule wrightii* was observed within the Sediment Bag Area. The aerial coverage within the Transplant Area was approximately 38 percent and approximately 1 percent within the Sediment Bag Area. The composite aerial coverage of MSN was approximately 10 percent.

The aerial coverage within the Control Site during the first annual survey was approximately 16 percent. Only *Thalassia testudinum* was observed.

During the second annual monitoring survey, only *Halodule wrightii* was observed in the Transplant Area. A small patch of *Halodule wrightii* was observed within the Sediment Bag Area. The aerial coverage within the Transplant Area was approximately 20 percent and approximately 1 percent within the Sediment Bag Area. The composite aerial coverage of MSN was approximately 6 percent.

The aerial coverage within the Control Site during the second annual survey was approximately 16 percent. Only *Thalassia testudinum* was observed.

A dense layer of filamentous algae was observed during the second annual survey. The algae covered most of the MSN and Control Site. While algae has been observed during the other monitoring surveys, the conditions observed during the second annual survey were much more

Pirate Harbor Entrance Channel Dredging – Fourth Annual Seagrass Monitoring Report

widespread and prolific. The Florida Fish and Wildlife Conservation Commission (FWC) reported a massive outbreak of green filamentous algae in Charlotte County in 2020 (FWC 2020; WMD 2020). This outbreak significantly impacted the seagrass beds within Charlotte Harbor, most notably along the eastern wall of the harbor which encompasses the Project area.

During the third annual monitoring survey, *Thalassia testudinum* and *Halodule wrightii* were observed in the Transplant Area. Only *Thalassia testudinum* was observed within the Sediment Bag Area where it was recruiting in from the surrounding grass beds. The aerial coverage within the Transplant Area was approximately 12 percent and approximately 2 percent within the Sediment Bag Area. The composite aerial coverage of MSN was approximately 4 percent.

The aerial coverage within the Control Site during the third annual survey was approximately 9 percent. Only *Thalassia testudinum* was observed.

A dense layer of filamentous algae was observed during the third annual survey. The algae covered most of the MSN and Control Site. The conditions observed were similar to those observed during the second annual monitoring survey.

During the fourth annual monitoring survey, only *Thalassia testudinum* was observed in the Transplant Area. *Thalassia testudinum* and *Halodule wrightii* were observed within the Sediment Bag Area where they were recruiting in from the surrounding grass beds predominately through asexual reproduction (i.e. runners). Additionally, both seagrass species were observed within the interior of the Transplant Area. The aerial coverage within the Transplant Area was approximately 7 percent and approximately 3 percent within the Sediment Bag Area. The composite aerial coverage of MSN was approximately 4 percent.

The aerial coverage within the Control Site during the fourth annual survey was approximately 16 percent. Only *Thalassia testudinum* was observed.

Filamentous algae was observed in the MSN and Control Site.

A summary of the monitoring data for MSN is presented in Table 4.

Table 4. Mitigation Site North Seagrass Monitoring Summary

Survey	Date	Percent Aerial Coverage (%)				
		Transplant Area	Sediment Bag Area	Composite	Control Site	Composite Relative to Control Site*
Time-Zero / Post-Construction	9/25/2019	3	0	0.7	9	8
6-Month	6/9/2020	24	0.4	6	13	46
Year 1	9/3/2020	38	1	10	16	63
Year 2	9/9/2021	20	1	6	16	38
Year 3	9/26-27/2022	12	2	4	9	44
Year 4	10/31/2023	7	3	4	16	25

* Per the approved Mitigation Plan, mitigation sites are required to have an aerial coverage equal to 80 percent of the control site to be deemed successful.

4.1.2 Mitigation Site South

Following completion of the Transplant Area, post-construction survey observations yielded aerial coverage of approximately 3 percent. Seagrass within the Transplant Area was primarily *Thalassia testudinum*. The Sediment Bag Area was void of any seagrass. The composite aerial coverage of MSS was approximately 0.9 percent.

The Control Site, centered approximately 50 feet south of MSS, was comprised of sparse *Thalassia testudinum*. Based on the post-construction survey, the aerial coverage within the Control Site was approximately 2 percent.

During the 6-month monitoring survey no seagrass was observed within the Transplant Area or Sediment Bag Area of MSS. The aerial coverage within the Control Site was approximately 2 percent and was comprised of sparse *Thalassia testudinum*.

During the first annual monitoring survey a very small, sparse patch of *Thalassia testudinum* was observed within the Transplant Area. Due to the sparseness of the patch (1 percent coverage) aerial coverage within the Transplant Area was approximately 0 percent. Multiple small patches of *Thalassia testudinum* were observed within the Sediment Bag Area. Aerial coverage was approximately 0.1 percent. Due to the sparseness of the seagrass present in MSS, the composite aerial coverage was approximately 0 percent.

The aerial coverage within the Control Site during the first annual survey was approximately 2 percent. Only *Thalassia testudinum* was observed.

During the second annual monitoring survey a very small, sparse patch of *Thalassia testudinum* was observed within the Transplant Area. Due to the sparseness of the patch (1 percent coverage) aerial coverage within the Transplant Area was approximately 0 percent. No seagrass was

Pirate Harbor Entrance Channel Dredging – Fourth Annual Seagrass Monitoring Report

observed within the Sediment Bag Area. Aerial coverage was approximately 0 percent. Due to the sparseness of the seagrass present in MSS, the composite aerial coverage was approximately 0 percent.

The aerial coverage within the Control Site during the second annual survey was approximately 8 percent. *Thalassia testudinum* and *Halodule wrightii* were observed.

Similar to the MSN, a dense layer of filamentous algae was observed during the second annual survey. The algae covered most of the MSS and Control Site. While algae has been observed during the other monitoring surveys, the conditions observed during the second annual survey were much more widespread and prolific noting the outbreaks reported by FWC and WMD during the second monitoring period.

During the third annual monitoring survey, two small patches of *Thalassia testudinum* were observed within the Transplant Area. Due to the sparseness of the patches (roughly 3 percent coverage) aerial coverage within the Transplant Area was less than 1 percent. No seagrass was observed within the Sediment Bag Area. Aerial coverage was approximately 0 percent. Due to the sparseness of the seagrass present in MSS, the composite aerial coverage was approximately 0 percent.

The aerial coverage within the Control Site during the third annual survey was approximately 3 percent. Only *Thalassia testudinum* was observed.

Similar to the MSN, a dense layer of filamentous algae was observed during the third annual survey. The algae covered most of the MSS and Control Site. The conditions observed were similar to those observed during the second annual monitoring survey.

During the fourth annual monitoring survey *Thalassia testudinum* and *Halodule wrightii* were observed within the Transplant Area and Sediment Bag Area. Within the Transplant Area, most of the seagrass observed in the MSS was recruiting in from the surrounding grass beds. Within the interior of the Sediment Bag Area, isolated areas of *Halodule wrightii* were observed. The aerial coverage within the Transplant Area was approximately 0.8 percent and approximately 0.3 percent within the Sediment Bag Area. The composite aerial coverage of MSS was approximately 0.5 percent.

The aerial coverage within the Control Site during the fourth annual survey was approximately 10 percent. Only *Thalassia testudinum* was observed.

Similar to the MSN, filamentous algae was observed during the fourth annual survey.

A summary of the monitoring data for MSS is presented in Table 5.

Table 5. Mitigation Site South Seagrass Monitoring Summary

Survey	Date	Percent Aerial Coverage (%)				
		Transplant Area	Sediment Bag Area	Composite	Control Site	Composite Relative to Control Site*
Time-Zero / Post-Construction	9/25/2019	3	0	0.9	2	45
6-Month	6/9/2020	0	0	0	2	0
Year 1	9/3/2020	0	0.1	0	2	0
Year 2	9/9/2021	0	0	0	8	0
Year 3	9/26-27/2022	0.4	0	0.1	3	3
Year 4	10/31/2023	0.8	0.3	0.5	10	5

* Per the approved Mitigation Plan, mitigation sites are required to have an aerial coverage equal to 80 percent of the control site to be deemed successful.

Representative photographs of the Mitigation Sites are presented in Appendix 2. The percent cover and Braun-Blanquet scores for the Control Sites are presented in Appendix 3 and the percent cover and Braun-Blanquet scores for the Mitigation Sites are presented in Appendix 4.

4.1.3 Subsidence

In accordance with the Plan, the Mitigation Sites met the subsidence monitoring criteria. The bottom elevation within the Mitigation Sites remained relatively stable during the one-year monitoring period. No further subsidence monitoring is required. Refer to the First Annual Survey of Mitigation, Control, and Impact Sites for data and results (CEC, 2020).

4.2 IMPACT SITE

In accordance with the Plan, monitoring surveys were conducted to assess if dredging the channel had any adverse effects on seagrasses within the 50-foot buffer of the Impact Site for three consecutive years. A pre-dredging survey was conducted on September 13, 2018, a post-dredging survey was conducted on October 29, 2019, the first annual survey was conducted September 3, 2020, the second annual survey was conducted September 9, 2021, and the third annual survey was conducted September 26 and 27, 2022.

Monitoring data confirmed that no additional impacts to seagrass within a 50-foot buffer zone occurred attributed to the dredging project or use of the channel. No further monitoring of the buffer zone adjacent to the Impact Site was required per the Plan.

Although not required per the Plan, the County opted to continue monitoring the buffer zone. The fourth-year annual survey was conducted on October 31, 2023. Table 6 and Figure 10 present the results of the monitoring surveys and comparison of the seagrass areas within the buffer zone.

Table 6. Summary of Seagrass Areas within Buffer Zone

Survey	Date	Area (SF)	Area (AC)
Pre-Construction	9/13/2018	42,469	0.97
Time-Zero / Post-Construction	10/29/2019*	44,508	1.02
Year 1	9/3/2020	47,708	1.09
Year 2	9/9/2021	58,337	1.34
Year 3	9/26-27/2022	64,692	1.48
Year 4	10/31/2023	46,701	1.07

*Note the 2019 survey included a seagrass polygon of approximately 2,071 SF that was not mapped in 2018. This area will be included in future monitoring surveys.

The fourth annual qualitative assessment was made on October 31, 2023, by visually assessing species composition, aboveground biomass, epiphyte coverage, and overall condition of the seagrass within the buffer zone. Quadrats were randomly placed in the buffer zone at 100-foot stations. For each quadrat, a score based on the percent cover of each species individually and all species combined was assigned percent coverage and converted to the BB scale. The percent cover and Braun-Blanquet scores for the Impact Site are presented in Appendix 5. As no post-dredge qualitative assessment was conducted, the Time-Zero qualitative assessment was utilized as a baseline for comparison purposes.

The conditions of the seagrass areas were typical of what has been observed in previous surveys; a mix of *Thalassia testudinum*. Generally, the seagrass beds maintained a shape similar to that documented in the post-construction survey, however the seagrass beds receded in size when compared to the third-year monitoring survey. Based on the monitoring results, the seagrass beds within the 50-foot buffer zone have increased in size, approximately 5 percent, since the post-construction survey. A dense mat of filamentous algae was observed covering the channel bottoms

Pirate Harbor Entrance Channel Dredging – Fourth Annual Seagrass Monitoring Report

and extending up the channel side slopes. This had not been observed in prior monitoring surveys. The recruiting seagrass adjacent to the channel may have been impacted by the filamentous algae.

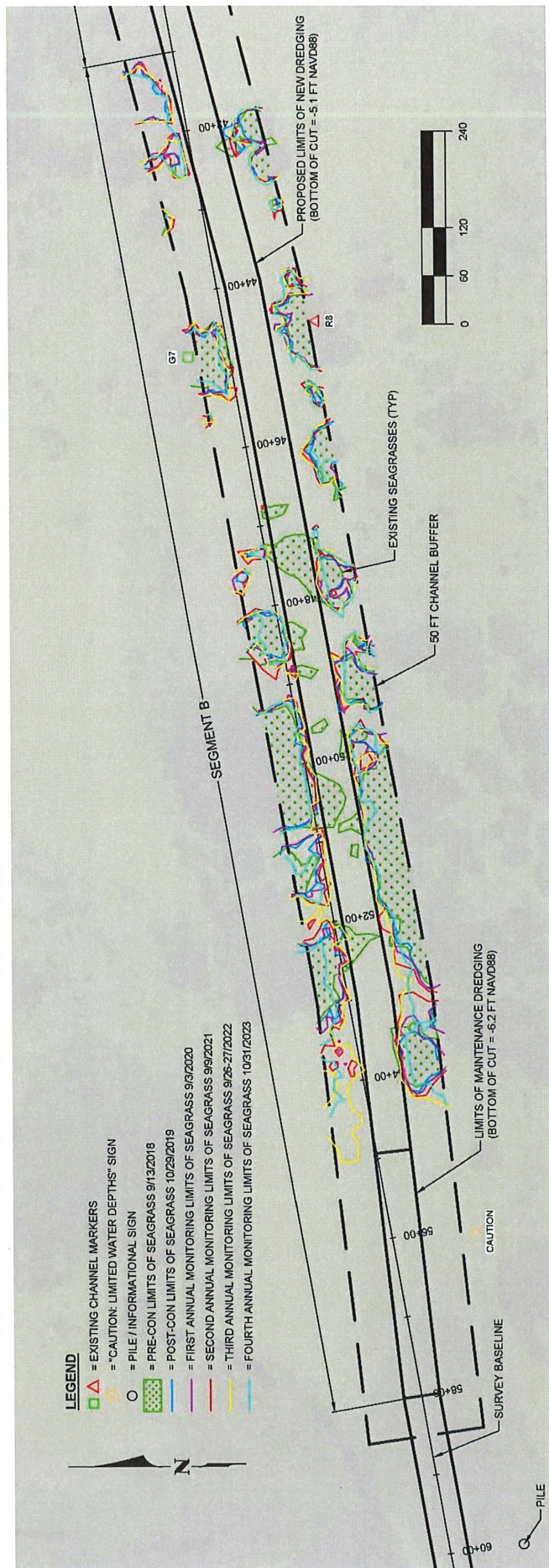


Figure 8. Seagrass Monitoring Surveys of Buffer Zone Adjacent to Impact Site

5.0 CONCLUSION

5.1 MITIGATION SITES

The dredging of the Pirate Harbor Entrance Channel was conducted in the Fall of 2019. Approximately 4,400 CY were excavated from the permitted dredge area which resulted in unavoidable impacts to 0.19 AC of seagrass bed. In accordance with the Permits and approved Seagrass Mitigation Plan, the County is required to restore 0.38 AC of seagrass habitat in Charlotte Harbor.

Two Mitigation Sites, MSN and MSS, were identified as areas void of seagrass and being deeper than the surrounding seagrass bed. Prior to dredging, seagrass was removed from the Impact Site and transplanted to the Mitigation Sites. Approximately 0.166 AC of seagrass were transplanted.

Where the bottom elevation in the Mitigation Sites was lower than that of the surrounding seagrass beds, biodegradable sandbags were placed to raise the substrate level. Approximately 0.394 AC of seagrass habitat were restored. A Control Site was established for future monitoring at each Mitigation Site.

Monitoring data of MSN indicates there was a reduction in overall aerial coverage since the first annual monitoring survey. Aerial coverage of 4 percent is consistent with the prior monitoring survey. Compared to the prior monitoring survey, seagrass coverage within the Transplant Area decreased, to approximately 7 percent while coverage within the Sediment Bag Area increased slightly, to approximately 3 percent and seagrass coverage within the Control Site increased to approximately 16 percent.

Monitoring data of MSS and its respective Control Site indicated the seagrass transplanting remains generally unsuccessful, although small, sparse patches of *Thalassia testudinum* and *Halodule wrightii* were observed within the Transplant Area and Sediment Bag Area. Compared to the prior monitoring survey, seagrass coverage within the Transplant Area increased, to approximately 0.8 percent while coverage within the Sediment Bag Area increased, to approximately 0.3 percent. Seagrass coverage within the Control Site increased to approximately 10 percent.

5.2 IMPACT SITE

Monitoring data of the 50-foot buffer zone adjacent to the Impact Site indicated the seagrass beds have remained healthy and their size has increased since post-construction conditions.

In accordance with the Plan, no adverse impacts to the seagrass beds within the Impact Site were identified during the Plan required three-year monitoring period. No further monitoring of the Impact Site is required.

5.3 DISCUSSION

It is understood that DEP conducted a site inspection of MSN and MSS on June 10, 2022. The compliance letter dated September 23, 2022 stated *Thalassia testudinum* was observed in MSN. No seagrass was documented in MSS. These findings are consistent with the third-year monitoring noting a very small amount of *Thalassia testudinum* was documented in MSS (CEC, 2023). DEP recommended conducting the remaining monitoring, five years total, and reevaluating if the success criteria has been met at that time.

Two hurricanes impacted the Project area between the third-year and fourth-year monitoring surveys.

Hurricane Ian made landfall on September 28, 2022 as a Category 4 hurricane near Cayo Costa, Florida, approximately 15 miles southwest of the Project area. The storm made a second landfall south of Punta Gorda, less than 10 miles north of the Project area, and continued north-northeast across the state. Hurricane Ian brought intense winds, heavy rainfall, and storm surge to Charlotte County. According to the Coastal and Heartland National Estuary Partnership, Port Charlotte received rainfall in excess of 20 inches within 48 hours. USGS documented a highwater mark within the Pirate Harbor community at 4.5 feet NAVD88. As the stormwater and storm surge drained from the coastal and inland communities, it carried an unprecedented amount of debris and pollutants to downstream waterbodies (“Hurricane Ian”). Charlotte Harbor received a significant amount of this potentially polluted runoff as it is the receiving body of the Peace River Basin and Myakka River Basin, an area encompassing almost 3,000 square miles.

Hurricane Idalia made landfall in the Big Bend region of Florida on August 30, 2023 as a Category 3 hurricane. As the storm traveled north up the Gulf of Mexico, it underwent rapid intensification (from a Category 1 to Category 4 hurricane) prior to making landfall. Hurricane Idalia brought rainfall in excess of 6 inches to Charlotte County. Punta Gorda and Port Charlotte experienced a storm surge of 2 to 4 feet. While not as impactful as Hurricane Ian, it is reasonable to assume Hurricane Idalia’s stormwater and storm surge transported potential pollutants into Charlotte Harbor.

The magnitude of each storm's impact on the seagrass beds within the Project area is unknown. However, it is likely that the seagrass within Charlotte Harbor was adversely impacted by the influx of pollutants post-storm.

As *Halodule wrightii* was predominately planted within the Transplant Area, it is likely that over time the predominant species within the Mitigation Sites will shift from a pioneering species (*Halodule wrightii*) to a more permanent, stable species (*Thalassia testudinum*). Based on observations, it is possible the beginning of this shift may be taking place as *Thalassia testudinum* was documented within the Transplanted Areas and *Halodule wrightii* was documented in the interior of the Sediment Bag Areas. This may infer the Transplant Areas have achieved some level of stability allowing *Thalassia testudinum* to recruit while *Halodule wrightii* has begun the initial recruitment of the Sediment Bag Areas by spreading seeds within an area that has otherwise been void of seagrass.

Filamentous algae has been observed within the Mitigation and Control Sites during multiple surveys. The impact of the algae on the seagrasses and the mitigation work is unknown.

5.4 RECOMMENDATIONS

The MSN results met the subsidence criteria after the first year. The Transplant Area met and exceeded the aerial coverage requirement of 80 percent of the Control Site for a two-year period, after the first two years. However, the Sediment Bag Area has not met these criteria after the four years of monitoring. In accordance with the Plan, a fifth-year annual monitoring survey will be performed to evaluate the success of MSN noting it is unknown if the filamentous algae continues to contribute to the decrease in seagrass coverage in the MSN.

While MSS results met the subsidence criteria after the first year, it has not met the aerial coverage requirement of the Control Site for a two-year period. It is reasonable to believe the absence of filamentous algae is correlated to the highest aerial coverage documented in MSS following the post-construction survey. In accordance with the Plan, a fifth-annual annual monitoring survey will be performed to evaluate the success of MSS.

The 50-foot buffer zone adjacent to the Impact Site has been monitored to confirm that no additional impacts to seagrasses have occurred which can be attributed to the dredging project or use of the channel. By improving navigation, boaters are utilizing the marked channel to ingress / egress the Pirate Harbor subdivision; thus reducing the prop scarring and impacts to the seagrass beds adjacent to the channel. No further monitoring of the buffer zone is required per the Plan. However, the County will continue to monitor the buffer zone to document if the aerial coverage

Pirate Harbor Entrance Channel Dredging – Fourth Annual Seagrass Monitoring Report

within the buffer zone rebounds after the two storm events. If the fifth-year monitoring survey demonstrates increased aerial coverage, it would be prudent to consider this increase in seagrass as an offset for the MSN and MSS required mitigation.

Per DEP's recommendation, the County shall fulfill the monitoring requirements in accordance with the Plan and initiate consultation with the DEP and USACE after the fifth-year annual monitoring survey to determine if additional mitigation measures are warranted. Further monitoring will also help quantify and determine the storm impacts, if any.

6.0 REFERENCES

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APPENDIX 1. SEAGRASS MITIGATION PLAN

ATTACHMENT C
PIRATE HARBOR OUTER CHANNEL DREDGING
SEAGRASS MITIGATION PLAN
CEC File No. 14.132
June 29, 2016
Revised February 10, 2016
Revised March 9, 2017
Updated February 7, 2018

I. INTRODUCTION

The goal of the proposed project is to dredge an existing marked channel that provides access to the Pirate Harbor community. A 1959 US Army Corps of Engineers permit authorized dredging to create the channel. For unknown reasons the mid-portion of the channel does not appear to have been dredged when the channel was created in the early 1960s. This mitigation plan addresses seagrasses within the mid-portion of the channel and in the dredge template. No seagrasses are present in the inner and outer segments of the channel.

Approximately 0.19 acres of seagrass were found in 13 areas within the central 2,300 feet of the channel (Figures 1 and 2). Dredging is needed to provide vessels currently using the channel with adequate water depth to safely access the Pirate Harbor community and the navigable waters of Charlotte Harbor.

To minimize the unavoidable impacts to seagrasses within the dredge template the following measures were used to avoid and minimize impacts to seagrasses:

1. In the area where seagrasses are present in the dredge footprint, the channel was realigned to a best fit that avoids and minimizes impacts to the existing seagrasses.
2. The dredge depth for the portion of the channel where seagrasses are present has been reduced from -6.2 feet NAVD to -5.1 feet NAVD. This reduced the side slopes and thus some direct and indirect impacts on seagrasses along the edge of the channel.
3. The existing channel markers will be relocated and the marked channel width will be decreased. This will avoid and minimize ongoing impacts to seagrasses within the current channel but will be outside of the new channel alignment after dredging.
4. Seagrass prop scarring awareness signs will be placed at the inner and outer entrances to the Pirate Harbor channel alerting boaters that prop scarring is prohibited.

Mitigation will be required to offset the unavoidable impacts to seagrass growing within a portion the proposed dredge template (Figure 1). As a result of ongoing discussions with DEP, CHAP, FWC, USACE and NMFS staff, this plan has been developed to offset the unavoidable seagrass impacts resulting from the proposed dredging.

II. IMPACT SITE

The proposed dredge site (impact site) was first surveyed for seagrasses in 2005. The results of that survey identified 0.15 acres of seagrass in the dredge footprint calculated at the bottom of the dredge cut. The percent of seagrass coverage ranged from 2% to 15%.

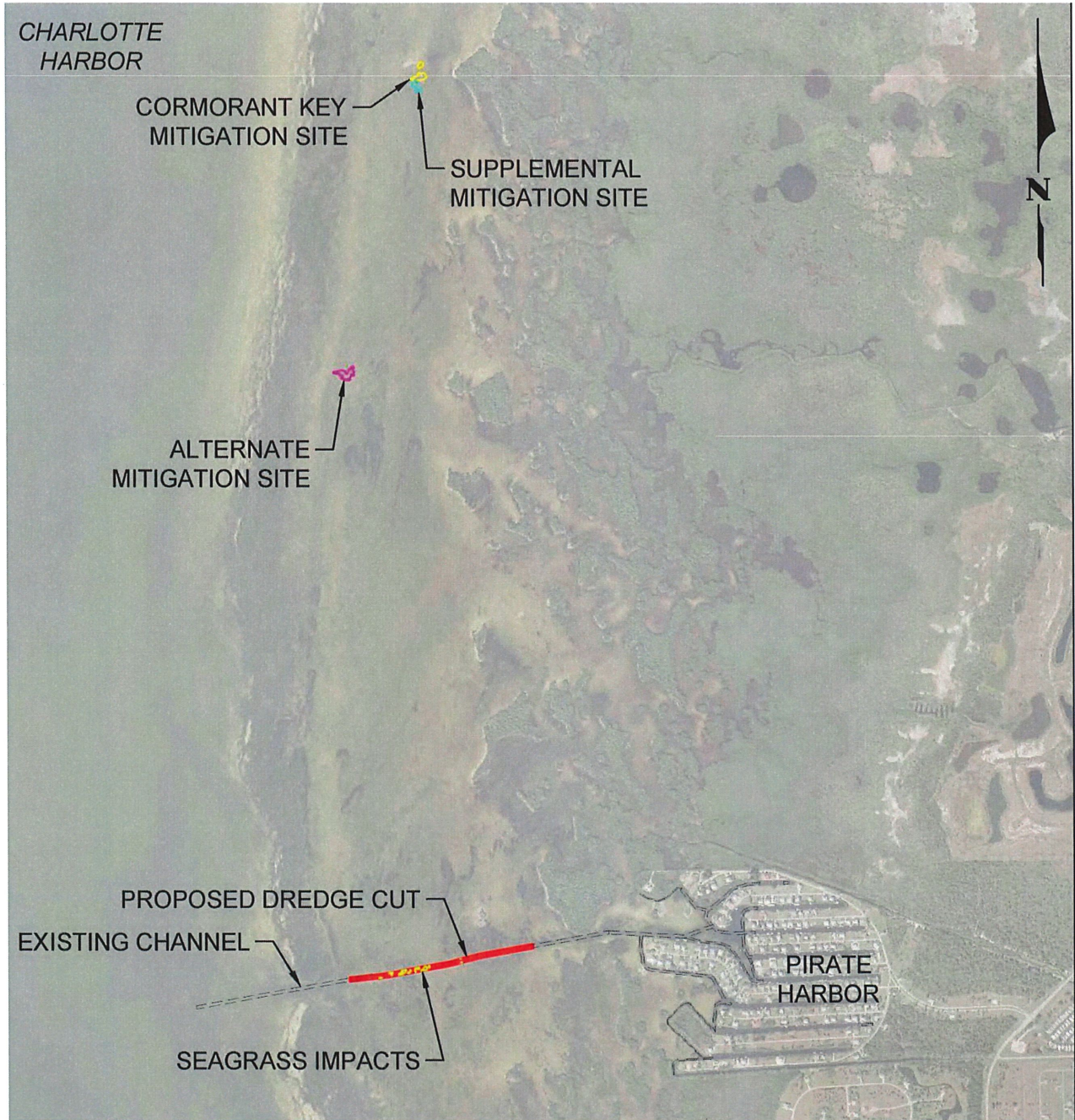


Figure 1. Project Location Map

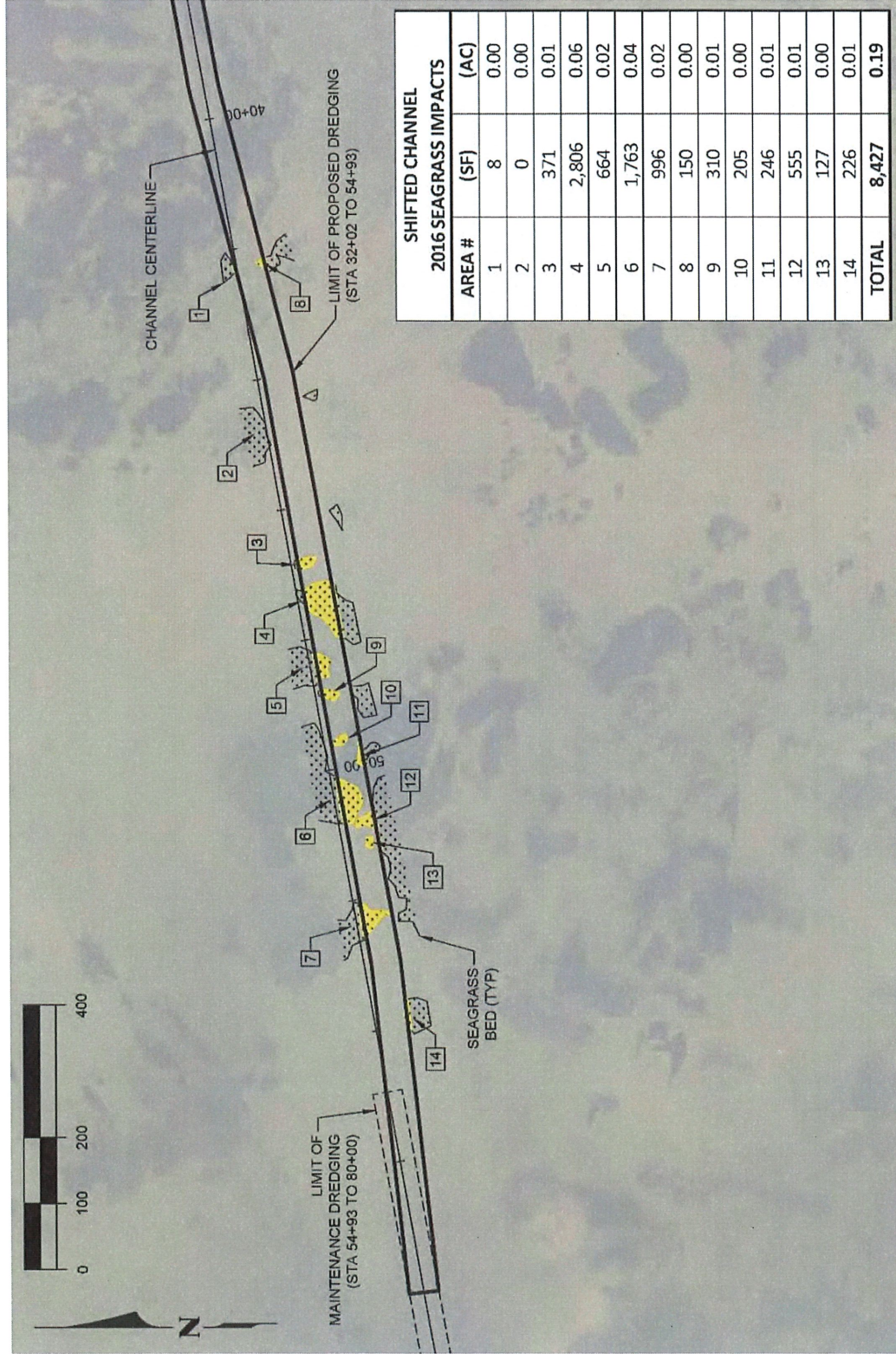


Figure 2. Proposed Channel Realignment and Seagrass Impact Areas

On July 2, 2014, an updated seagrass survey was performed by CEC in support of filing the ERP application for the Project. The results of that survey identified 0.20 acres of seagrass in the dredge footprint calculated at the top of the dredge cut. The percent coverage ranged from 0% to 30% with one area ranging up to 70%. It is noted that using the top of the dredge cut as the footprint provides the maximum potential impact from dredging as it includes the side slopes that may or may not experience a loss of seagrass as a result of dredging.

On May 23, 2016, representatives from DEP (Regulatory and Aquatic Preserves), FWC, Charlotte County and CEC conducted a site visit of the proposed area to be dredged denoted as the Impact Site and an area immediately south of Cormorant Key denoted as the Mitigation Site (Figure 1).

Prior to the group's arrival at the proposed dredging site, CEC placed stakes marking the bottom of the 45-foot wide dredge cut and delineating the proposed location channel from Stations 41+00 to 54+00). When the group arrived, they inspected the entire length of the staked-out channel and the adjacent area. The areas of seagrass previously identified by CEC in July 2014 were present and inspected by the group.

During the visit to the Impact Site, several participants observed that a slight shift to the south of the middle portion of the channel could reduce seagrass impacts. The consensus was that doing this might reduce impacts to three areas of seagrass. The County and CEC agreed to conduct a new survey to determine if shifting a portion of the channel slightly to the south would reduce seagrass impacts and prepare revised permit drawings for a channel alignment that minimizes seagrass impacts.

On June 8, 2016 CEC mapped the seagrasses within the original channel alignment and in the immediate area south of the channel (Figure 2). Based on results of the updated seagrass survey, a new alignment was located that reduced seagrass impacts to 0.19 acres measured at the top of the dredge cut.

On December 22, 2016, CEC visited the proposed dredging and mitigation sites with the USACE project manager and NMFS marine biologist. At the request of the NMFS biologist, CEC surveyed the maintenance dredged areas of the channel for the presence of seagrasses. The maintenance dredge portions of the channel were surveyed and no seagrass was found. The previously identified seagrass areas in the mid portion of the channel were reconfirmed.

III. MITIGATION SITES

Primary Mitigation Site

The primary mitigation site, identified as the Cormorant Key site, is located approximately 2.3 miles north of the Impact Site (Figure 1). During the May 23, 2016 site visit, the group explored the area on the south side of Cormorant Key to identify a mitigation site. Based on historic aerial photos available for this area, the proposed mitigation site appears to have had seagrass prior and up to 2008 but have been devoid of seagrass since 2012. The loss of seagrass in the area may be attributable to scouring of the area resulting from prop scarring as there is consistent evidence in the aerial photos that prop scarring has been an issue in this area.

On September 26, 2016 CEC mapped 0.44 acres of potential mitigation area at two sites (A and B) within and adjacent to healthy seagrasses around Cormorant Key (Figure 3). Using Trimble Real Time Kinematic (RTK) units capable of attaining sub-centimeter accuracy, data were collected from the two proposed mitigation sites and the seagrasses surrounding these areas.

The average seagrass elevation surrounding the proposed mitigation sites is -2.5 ft. NAVD88. The average elevation for site A was -3.8 ft. NAVD88 (ranged from -3.3 to -4.1 ft. NAVD88). The average elevation for site B was -3.2 ft. NAVD88 (ranged from -2.8 to -3.6 ft. NAVD88). Based on the data collected, there was an average elevation difference of 1.3 feet for Site A and 0.7 feet (8.4 inches) for Site B.

During the December 22, 2016 site visit CEC observed numerous patches of drift algae in the mitigation site. After visiting with the agency staff, CEC returned to the site. Many of the patches of drift algae contained pieces of *Halodule wrightii* comprised of varying lengths of rhizome including short shoots and bare roots. Some of the pieces were entangled with the drift algae and appeared to be taking root in the sediment. In the case of the latter, the rhizome was at or immediately below the surface.

It is speculated that as drift algae moved over an area of *H. wrightii* some of the seagrass became entangled with the algae and was “ripped out” of the sediment and transported to and deposited in the bare area. Another alternative considered was that *H. wrightii* rhizomes were present beneath the surface in the bare area and were beginning to emerge. This seems less likely since the rhizomes were present in the drift algae or on the surface of the sediment. The fact that we are several months outside of the active growing season does not correspond with the latter alternative. A search of the seagrass biology and ecology literature did not find any references that noted this observation. Further, this area has been devoid of seagrass for years.

The fact that there is natural recruitment into the proposed mitigation site with variable depth differentials is positive when considering this site for the mitigation strategy. With the addition of the sediment bags, this site has opportunity to be a viable mitigation site.

Supplemental Mitigation Site

CEC also identified a 0.19-acre supplemental mitigation site contiguous with Site B (Figure 3) to provide additional bare areas that can be filled to the natural grade of the surrounding seagrasses and help provide the required 0.38 acres of mitigation. The supplemental site has an average elevation of -3.66 ft. NAVD88 (ranged from -2.2 to -4.0 ft. NAVD88) which is consistent with Sites A and B. Based on the data collected, there was an average elevation difference to the surrounding seagrass areas of 1.1 to 1.2 feet.

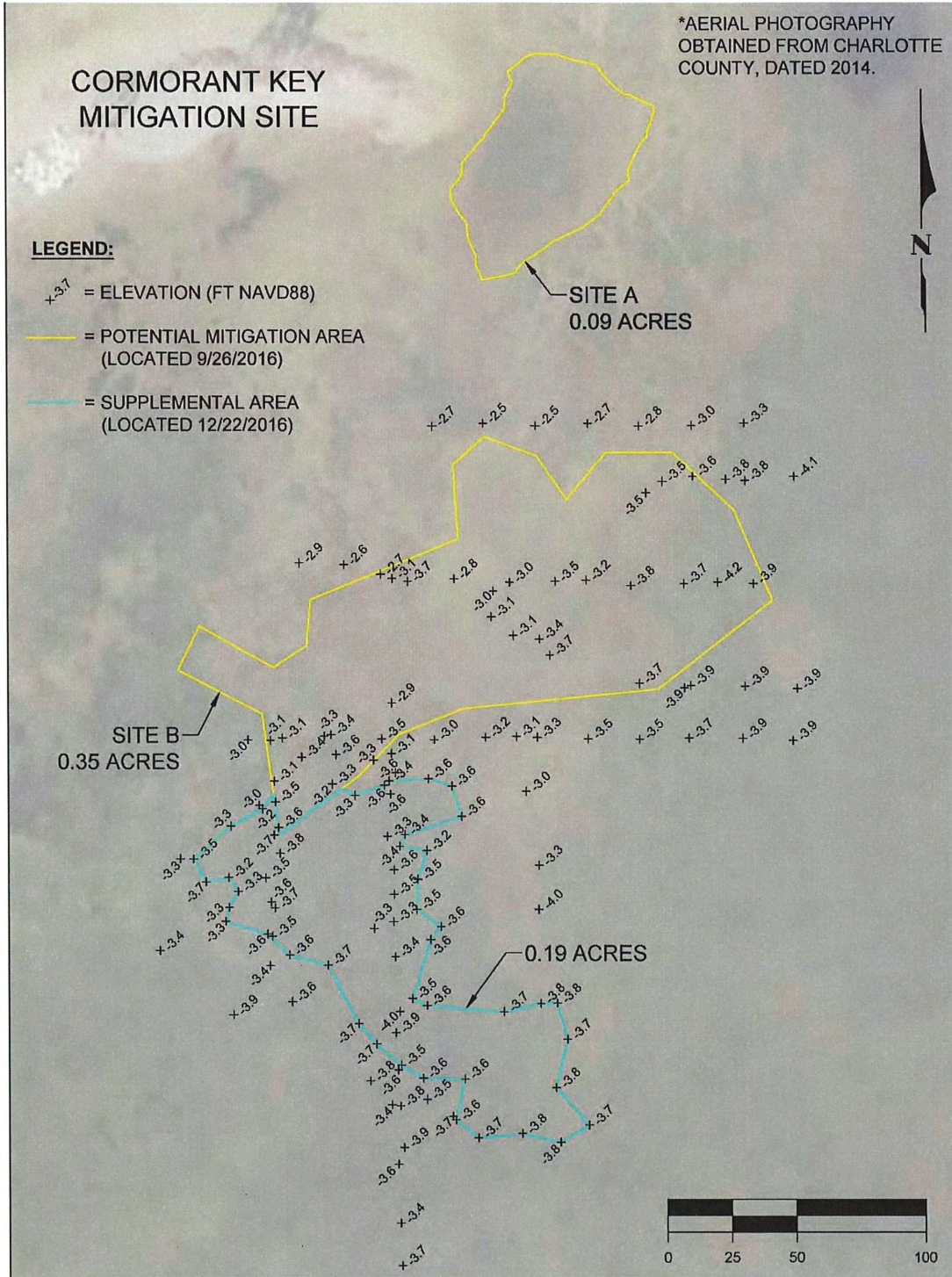


Figure 3. Potential Mitigation Areas (Yellow line) and Supplemental Area (Blue line)

Alternate Mitigation Site

In the event the natural recruitment observed during the December 22, 2016 site visit to the primary mitigation site continues and the bare areas are reduced below the required acreage, an alternative mitigation site was located and surveyed (Figure 1). The alternate site is approximately 0.8 miles south of Cormorant Key and 1.6 miles from the Impact Site, noting it is closer to the Pirate Harbor channel than the primary site. The alternative mitigation site is 0.50 acres (Figure 4). The elevation is -4.19 ft. NAVD88 with a surrounding seagrass elevation of -3.59 ft. NAVD88. Based on the historic aerial photography, this site appears to have been devoid of seagrass since at least January 2008. There is some indication that the area could have been devoid of seagrass as far back as 2004.

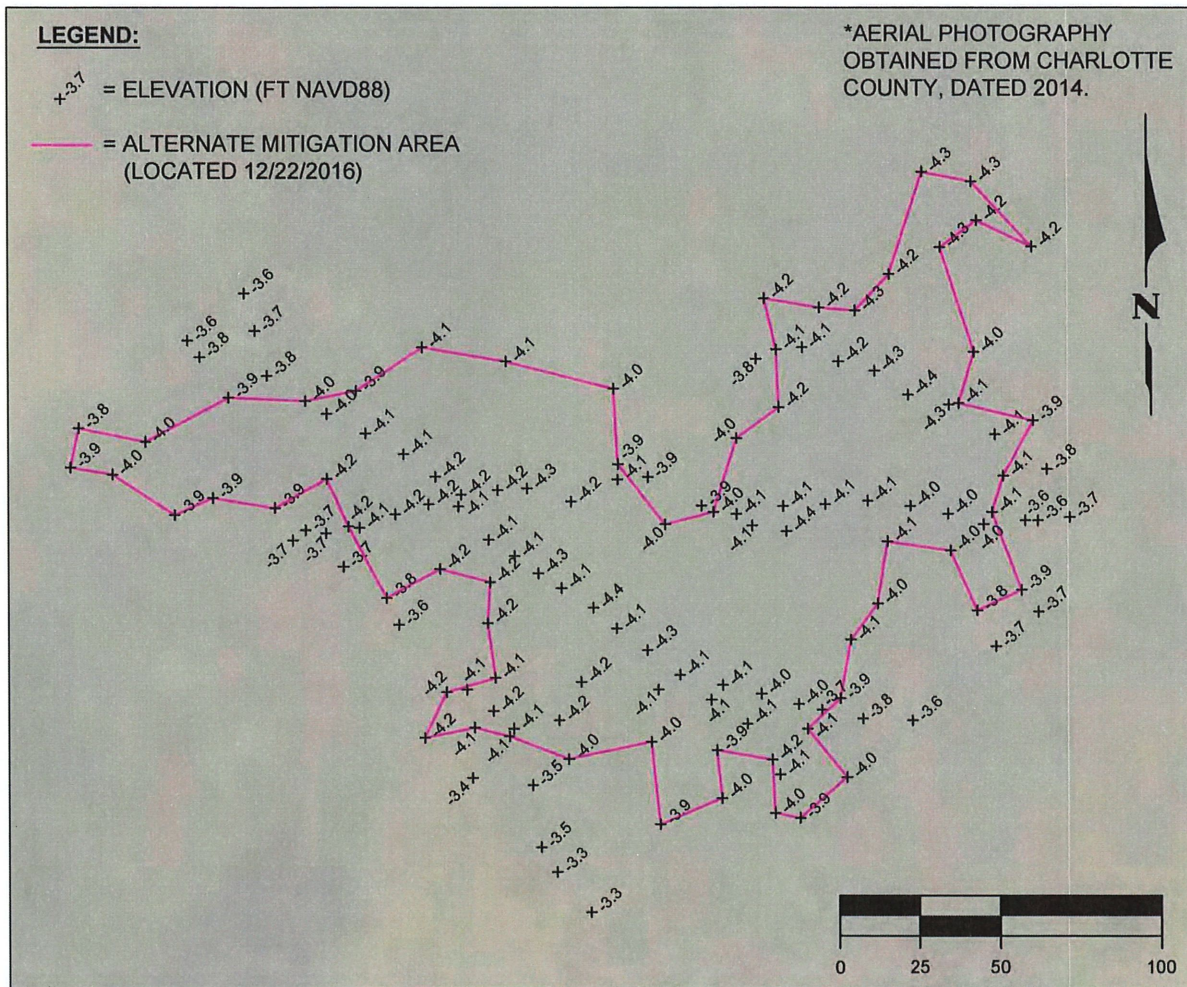


Figure 4. Alternate Mitigation Area

Sediment Analysis and Compatibility

Per the agency request, sediment samples from the Impact Site and the Cormorant Key mitigation sites were collected and analyzed. Table 1 presents the grain size analysis from sediment samples taken from the Impact Site and mitigation sites. As indicated in the Table 1, material from the Impact Site is compatible with the mitigation sites.

Table 1. Sediment analysis Comparison Dredge Site and Mitigation Site

Site	Gravel > No. 4 Sieve (% weight Retained)	Sand (% weight Retained)	Fines <No. 200 Sieve (% weight Retained)	USCS Classification*
Channel (Sta 44+00)	0.00	98.00	2.00	SP
Channel (Sta 50+00)	0.00	98.50	1.50	SP
Mitigation Site A	0.08	95.24	4.68	SP
Mitigation Site B	0.06	96.41	3.53	SP

*SP is poorly graded sand

IV. UMAM ANALYSIS

CEC worked with DEP (Regulatory) to complete a UMAM analysis of the realigned channel using the top of cut to determine the amount of seagrass lost at the Impact Site. Based on a loss of 0.19 acres of seagrass, the Functional Loss = 0.051. At the Cormorant Key mitigation site, the Relative Functional Gain = 0.156. Using the “mitigation needed to offset impacts, when not using a bank” formula, the required amount of mitigation is 0.33 acres. The UMAM forms are provided in Appendix 1.

V. MITIGATION PLAN IMPLEMENTATION

Methods

Within 60 days of the commencement of dredging, the mitigation site(s) will be identified. Priority will be given to the sites near Cormorant Key. Additionally, a 50 m x 10 m control site will be identified and characterized (seagrass species composition, density and water depth). The control site will be located within 25 m of the edge of the mitigation site(s) and will be representative of the seagrasses adjacent to the mitigation site(s). Distance between the mitigation sites may require a second control site to have a control area within 25 m of the edge of each mitigation site. The site(s) selected will be devoid of prop scars.

Sediments dredged from the channel will be used to raise the elevation of 0.38 acres of bare areas within the mitigation site(s) ranging between 0.6 feet and 1.3 feet to match the substrate elevation

of the surrounding areas of seagrass and allow for natural recruitment of seagrasses into the mitigation areas. To enhance seagrass growth at the mitigation site(s), seagrass from the Impact Site will be transplanted to the mitigation site(s). A contractor experienced in seagrass mitigation/restoration will be hired to implement the mitigation plan.

Placement of fill in the mitigation site(s) shall be accomplished by the following method. Initial dredging of the channel will occur in locations where seagrass is not present. The dredged material will be transported by barge to an offload site within the subdivision and dewatered. Biodegradable bags will be filled with dredge sediment at the offload site, transported by barge to the mitigation site(s) and placed in position by hand. No sediment bags will be placed on existing seagrass. Once this material is in place, seagrasses within the dredge template will be transplanted to the mitigation area(s). A baseline bathymetric survey of the mitigation areas will be conducted to confirm the substrate elevation was raised to match the surrounding areas of seagrass.

Only shallow-draft vessels capable of operating and not running aground will be used for all mitigation site work. If necessary, work may be restricted to specific tidal stages when the water levels allow for sufficient depth for safe ingress and egress. No pipeline will be used to transport fill to the mitigation sites.

During construction, the County will monitor the contractor performing the mitigation work to determine if there are any secondary impacts to seagrasses surrounding the mitigation area(s) and along the routes used by motorized vessels/barges as they ingress/egress of the mitigation sites. Once the work is completed, the area surrounding the mitigation area(s) and the route(s) used to access the mitigation site(s) will be surveyed by the County to determine if there were secondary impacts to seagrasses related to work at the site(s). If, at any time during construction or as a part of the postconstruction survey, adverse impacts are detected, the County will inform DEP and USACE and work with the agencies to develop and implement a plan to remediate the impacts.

Protection Measures

Acknowledging that the mitigation sites are within an area frequented by boaters in shallow draft vessels, the County will implement the following protection measures to reduce impacts to the mitigation sites(s) that are created:

- Seagrass education signs will be placed at the Ponce De Leon Park public boat ramp
- Charlotte County will institute a public education program on the County's TV channel
- Charlotte County through Sea Grant will provide awareness and public education about seagrasses
- Seagrass restoration signs will be posted around the mitigation areas
- Charlotte County Marine Patrol and Florida Fish and Wildlife Conservation Commission law enforcement patrols will patrol the water adjacent to the mitigation areas

Monitoring

The mitigation site(s) and control site(s) will be surveyed at the time the mitigation work is completed (Time Zero), 6 months after initial fill placement, 12 months after initial fill placement, and then annually for four more years for a total of five years of monitoring. Monitoring will be done during the seagrass growing season (defined herein as June 1 through September 30). If the mitigation work is completed outside of growing season, Time Zero monitoring activities be conducted in the early portion of the first growing season following completion of the mitigation work.

Qualitative and quantitative data will be collected at the control and mitigation site(s). The qualitative assessment will visually assess species composition, aboveground biomass, epiphyte coverage, and overall condition of the control and mitigation sites. Quantitative surveys of the mitigation and control sites will be made by randomly placing a 0.25 m² quadrat within each site and determining the percent cover of each seagrass species present and a combined percent coverage of all species. For each quadrat, a score based on the percent cover of each species individually and all species combined (Composite) will be assigned according to the Braun-Blanquet abundance (BB) scale.

Additionally, bathymetry data will be collected at the mitigation and control sites when seagrass surveys are conducted. Subsidence of the mitigation site will be evaluated after 6 months and 12 months. Additional sediment will be added if more than 15% of the mitigation site subsides to a depth greater than the deepest depth (NAVD) of seagrass growing within a 50-foot-wide buffer surrounding the mitigation site. The site will be surveyed the following year to determine if the criteria is attained. Additional sediment will be added if necessary.

If the mitigation sites(s) are not on a trajectory toward success within two years of installation, the County will consult with DEP and USACE to determine what additional mitigation measures are warranted. A supplement to this mitigation plan will be prepared and approved by DEP and USACE prior to new mitigation work. If donor units are needed for supplemental planting, the transplant units will not be taken from the Aquatic Preserve's seagrass beds. At the request of the Aquatic Preserve staff, bird stakes and nutrient injections will not be used.

Success Criteria

To determine the success of the mitigation plan, the mitigation site will be compared to the surrounding areas of seagrass. A sufficient number of 0.25 m² quadrats to sample 5% of the mitigation and control sites will be assessed each year for percent cover and density (percent and Braun-Blanquet scores). The seagrass mitigation plan will be deemed successful when all the following criteria are met:

- The mitigation site shall achieve percent aerial coverage of seagrasses equal to 80% of the control site;

- The mitigation site meets the subsidence criteria; and
- The mitigation site has achieved viable, sustainable ecological and hydrological functions defined as the unassisted persistence of the required acreage of seagrass coverage for a two-year period.

Stakeholder Outreach

To aid in the success of the mitigation plan, Charlotte County will initiate a public awareness campaign to inform boaters of the mitigation plan and location of the mitigation site by contacting all boat owners in Pirate Harbor. The goal is to keep boaters from navigating through shallow seagrass areas especially the Cormorant Key area and mitigation site. The efforts to extend seagrass awareness to residents throughout Charlotte County will be accomplished, by implementing the Protection Measures described above. Further, the County will explore ways to coordinate with Florida Sea Grant and use their network within the boating community to increase awareness of the restoration project.

Fiscal Responsibility

Charlotte County is the permittee responsible for the project. The Pirate Harbor Waterways MSTU will provide the funding required for implementing the mitigation plan including maintenance and monitoring for five years.

VI. IMPACT SITE MONITORING PLAN

To assess if the effects of dredging are having an adverse effect on seagrasses adjacent to the dredged channel, post-construction monitoring will be conducted. Seagrasses within a 50-foot buffer zone (north and south) from the dredge cut will be mapped using sub-meter accurate GPS equipment. A qualitative assessment will be made by visually assessing species composition, aboveground biomass, epiphyte coverage, and overall condition of seagrasses in the buffer zone.

Quantitative sampling of seagrass percent cover by species and collectively will be done using randomly placed 0.25 m² quadrats in the buffer zone at 100-foot stations. The data collected will be used to calculate Braun-Blanquet (BB) cover-abundance scores for each seagrass patch located (Braun-Blanquet, 1965).

Sampling will be done in the growing season (June 1 through September 30) immediately before the construction is to begin to establish the baseline condition. A post-construction survey will be completed within 60 days of the end of construction. If the end of construction occurs outside of the growing season, the post-construction survey will be conducted within 30 days of the beginning of the next growing season (June 1 through September 30) and be considered the first annual survey.

A second annual post-construction survey will be done during the next seagrass growing season in order for successive monitoring events to occur during the peak growing season. If at the end

of the second annual post construction survey there is a loss of more than 20% of the pre-construction survey seagrass acreage directly attributed to the dredging project (e.g., compared to significant storm impacts such as a tropical storm or a hurricane that impacts the project area), the County will consult with DEP and USACE to initiate additional mitigation measures to offset the secondary impacts. This includes, but is not limited to, additional seagrass mitigation. A supplement to this mitigation plan will be prepared and approved by DEP and USACE prior to new mitigation work. Annual monitoring of seagrasses along the edges of the channel will continue for a total of three years.

APPENDIX 1

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name <p style="text-align: center;">Pirate Harbor</p>	Application Number <p style="text-align: center;">08-0128695-007</p>	Assessment Area Name or Number <p style="text-align: center;">Channel</p>
Impact or Mitigation <p style="text-align: center;">Impact</p>	Assessment conducted by: <p style="text-align: center;">KWT</p>	Assessment date: <p style="text-align: center;">6/14/2016</p>

Scoring Guidance
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed

Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

<p style="text-align: center;">.500(6)(a) Location and Landscape Support</p> <p>w/o pres or current</p> <table style="width: 100%; text-align: center;"> <tr> <td style="width: 50%; border: 1px solid black;">7</td> <td style="width: 50%; border: 1px solid black;">with 6</td> </tr> </table>	7	with 6	<p>Seagrass is in the area; after dredging, there will be seagrass in the area and the dredge depth beign reduced to - 4 MLW will allow for seagrass to grow into the side slopes. The percentage of seagrass lost to dredging (0.19 ac) is miniscule compared to the area of seagrass in the area.</p>
7	with 6		
<p style="text-align: center;">.500(6)(b)Water Environment (n/a for uplands)</p> <p>w/o pres or current</p> <table style="width: 100%; text-align: center;"> <tr> <td style="width: 50%; border: 1px solid black;">7</td> <td style="width: 50%; border: 1px solid black;">with 7</td> </tr> </table>	7	with 7	<p style="text-align: center;">Dredging should not have any effect on water quality</p>
7	with 7		
<p style="text-align: center;">.500(6)(c)Community structure</p> <p style="text-align: center;">1. Vegetation and/or 2. Benthic Community</p> <p>w/o pres or current</p> <table style="width: 100%; text-align: center;"> <tr> <td style="width: 50%; border: 1px solid black;">7</td> <td style="width: 50%; border: 1px solid black;">with 0</td> </tr> </table>	7	with 0	<p>After dredging, the side slopes will remain as suitable habitat (in terms of depth and sediment structure) so that seagrass can revegetate the side slopes. Post-construction monotoring of these areas would confirm this</p>
7	with 0		

Score = sum of above scores/30 (if uplands, divide by 20)	
current	with
or w/o pres	with
0.7	0.433

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres = 0.267 X 0.19 = 0.051

Delta = [with-current]
0.267

If mitigation
Time lag (t-factor) =
Risk factor =

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name Pirate Harbor	Application Number 08-0128695-007	Assessment Area Name or Number Cormorant Key
Impact or Mitigation Mitigation site	Assessment conducted by: KWT	Assessment date: 6/14/2016

Scoring Guidance
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed

Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

<p>.500(6)(a) Location and Landscape Support</p> <p>w/o pres or current with</p> <p>7 9</p>	<p>62-345. "The value of functions provided by an assessment area to fish and wildlife are influenced by the landscape position of the assessment area and its relationship with surrounding areas....The location of the assessment area shall be considered to the extent that fish and wildlife utilizing the area have the opportunity to access other habitats necessary to fulfill their life history requirements." The current condition of the mitigaion assessment area is a fragmented seagrass meadow with a history of prop scars. There are extensive areas of seagrasses immediatley adjacent to the assessment site. Fish and wildlife utilizing the area will have the opportunity to access the adjacent seagrass habitat. The addition of fill to the mitigaion area will raise the elevation of the submreged land to one favorable for expansion of seagrass into the mitigaion area. Species inhabiting the with mitigaion area will have full opportunity to access the adjacent seagrasses and will benefit from having access to these areas.</p>
<p>.500(6)(b)Water Environment (n/a for uplands)</p> <p>w/o pres or current with</p> <p>8 8</p>	<p>Water quality will not be effected by propsoed mitigation. The mitigation site is not large enough to change the existing water quality in Charlotte Harbor.</p>
<p>.500(6)(c)Community structure</p> <p>1. Vegetation and/or 2. Benthic Community</p> <p>w/o pres or current with</p> <p>2 8</p>	<p>Currently condition is a sandy unvegetated area with benthic infauna; with mitigaion the site is exepcted to become a seagrass community</p>

Score = sum of above scores/30 (if uplands, divide by 20)
current or w/o pres with
0.567 0.833

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres =

Delta = [with-current]
0.266

If mitigation
Time lag (t-factor) = 1.14 (five years)
Risk factor = 1.5

For mitigation assessment areas
RFG = delta/(t-factor x risk) = 0.156

**Mitigation Determination Formulas
(See Section 62-345.600(3), F.A.C.)**

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable)/((t-factor)(risk))

If the acreage of mitigation proposed is known:

(FG) Functional Gain = Relative Functional Gain X Mitigation acres

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored

Bank Assessment Areas	RFG	X	Acres	=	Credits
example					
a.a.1					
a.a.2					
total					

(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assessed in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.

Impact Assessment Area	FL	=	Credits needed
example			
a.a.1			
a.a.2			
total			

(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG).

	FL	/	RFG	=	Acres of Mitigation
example					
a.a.1	0.051		0.156		0.33

If there are multiple impact assessment areas and/or multiple mitigation assessment areas to offset those impacts, or if the proposed mitigation acreage is a given, then the summation of the appropriate functional gain (FG) must be equal to or greater than the summation of respective functional losses (FL)

	FL	<	FG
example			
impact a.a.1	1.1		
a.a.2	0.93		
a.a.3	4.5		
mitigation a.a.4			5.2
a.a.5			1.6
summation	6.53		6.8

APPENDIX 2. MITIGATION SITE PHOTOGRAPHS

Pirate Harbor Entrance Channel Dredging – Fourth Annual Seagrass Monitoring Report

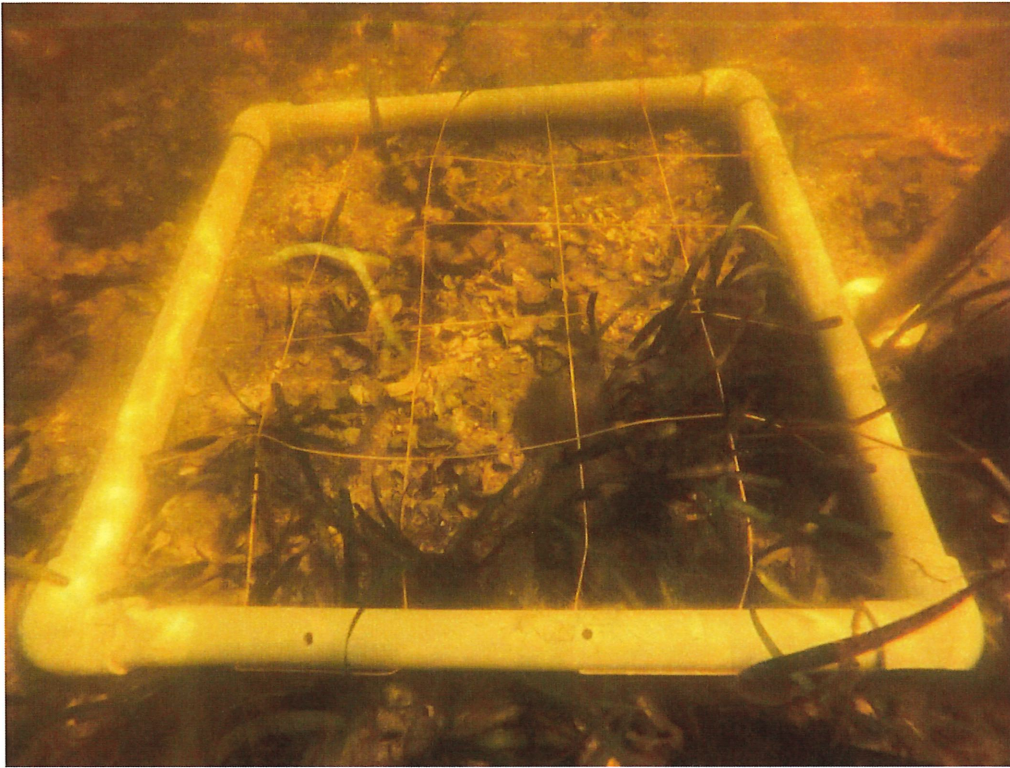


PHOTO 1: *Thalassia testudinum* MSN, 10/31/2023

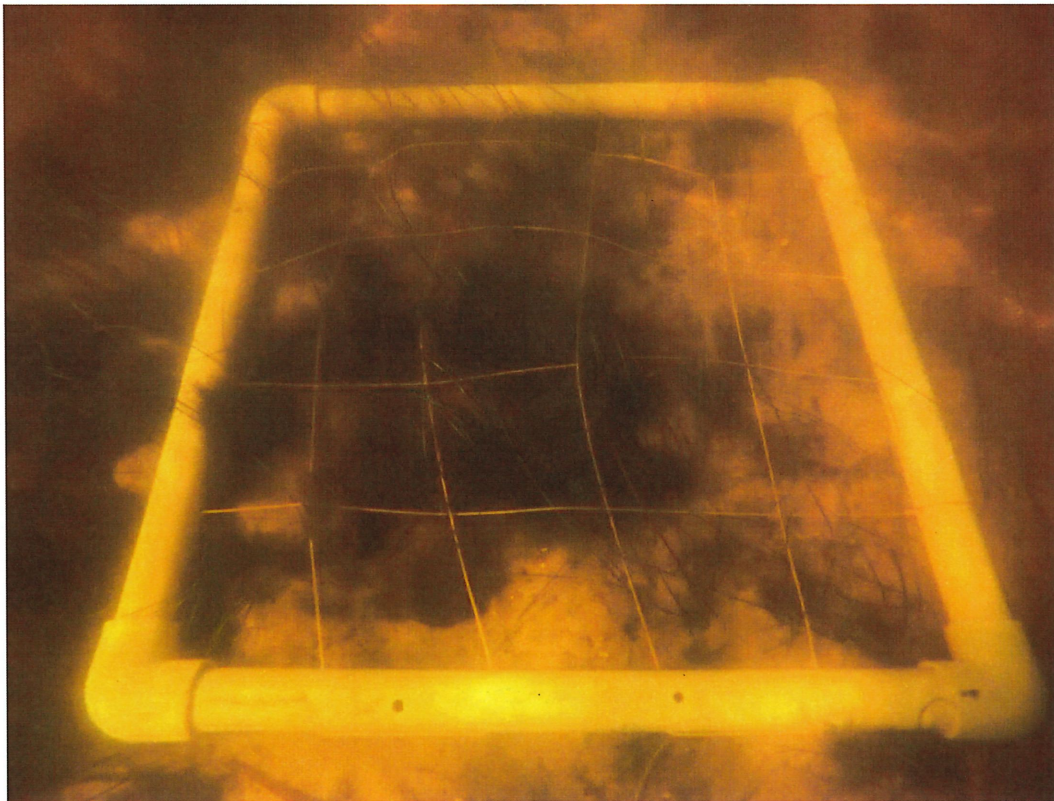


PHOTO 2: *Halodule wrightii* and filamentous algae, 10/31/2023

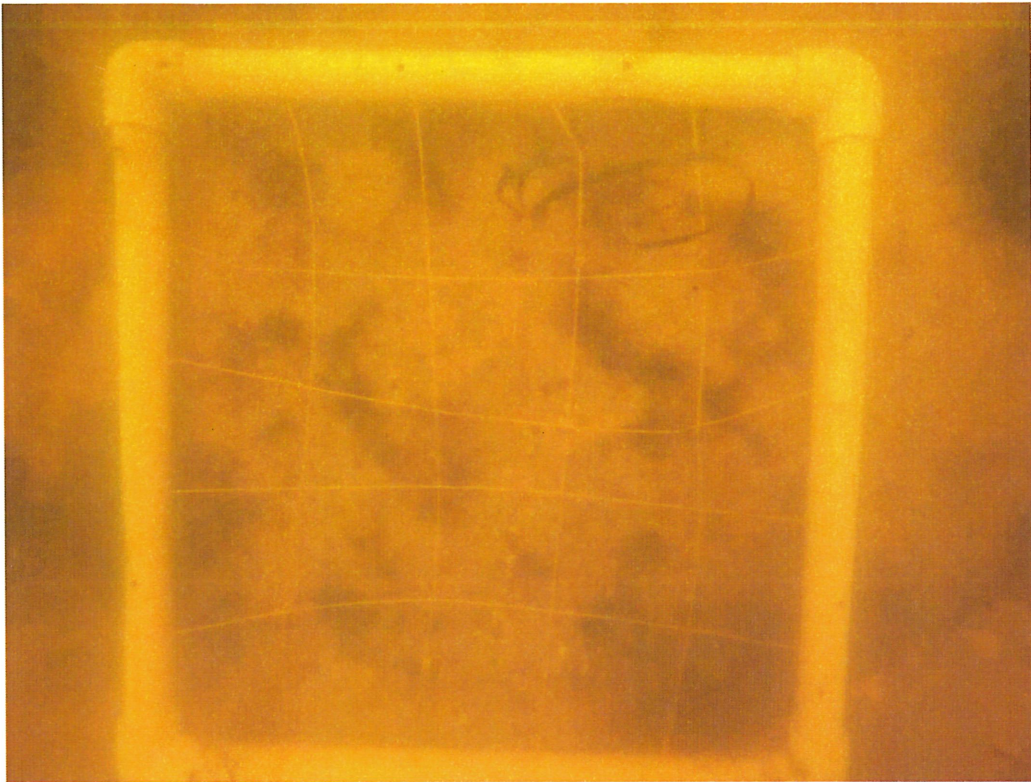


PHOTO 3: *Thalassia testudinum* MSS, 10/31/2023

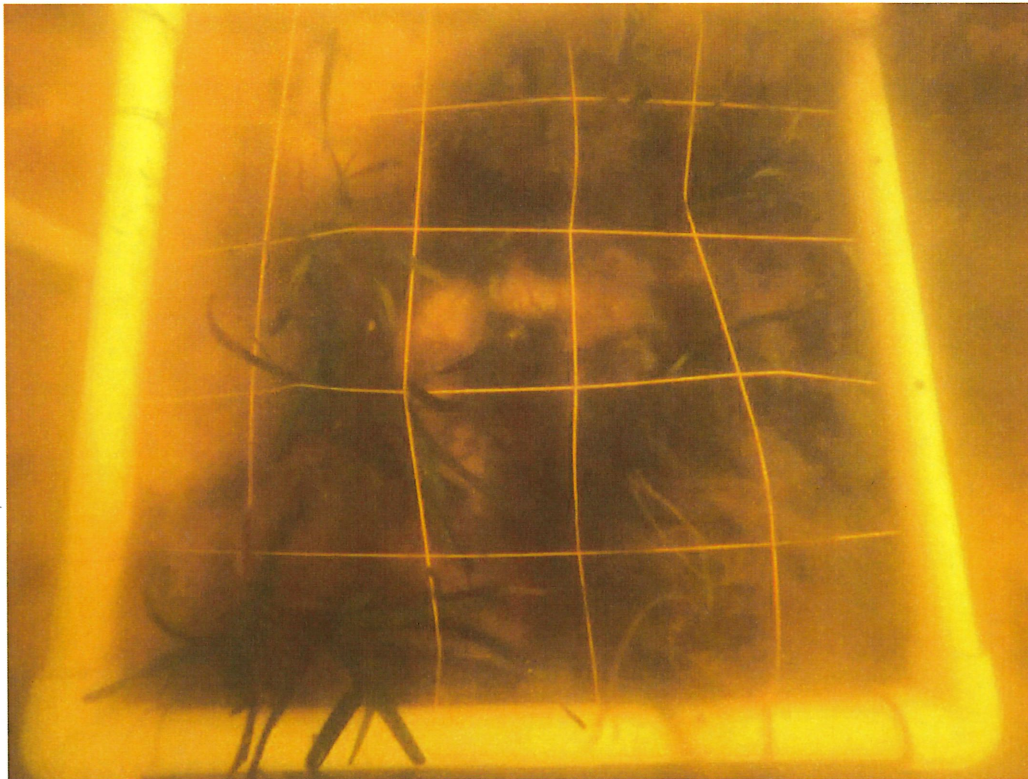


PHOTO 4: *Thalassia testudinum* and sparse drift algae MSS, 10/31/2023

APPENDIX 3. CONTROL SITES FOURTH ANNUAL MONITORING

PERCENT COVER AND BRAUN-BLANQUET SCORES

**2019 PIRATE HARBOR ENTRANCE CHANNEL DREDGING
FOURTH ANNUAL SURVEY - CONTROL SITE MONITORING**

Sampling Date: October 31, 2023

PERCENT COVER					
QUADRAT	CONTROL SITE	T. testudinum	H. wrightii	S. filifomre	Composite
9160	NORTH	0	0	0	0
9161	NORTH	0	0	0	0
9162	NORTH	0	0	0	0
9163	NORTH	3	0	0	3
9164	NORTH	8	0	0	8
9165	NORTH	3	0	0	3
9166	NORTH	3	0	0	3
9167	NORTH	38	0	0	38
9168	NORTH	28	0	0	28
9169	NORTH	73	0	0	73
9054	SOUTH	21	0	0	21
9055	SOUTH	14	0	0	14
9056	SOUTH	17	0	0	17
9057	SOUTH	11	0	0	11
9058	SOUTH	27	0	0	27
9059	SOUTH	0	0	0	0
9060	SOUTH	4	0	0	4
9061	SOUTH	0	0	0	0
9062	SOUTH	3	0	0	3
9063	SOUTH	0	0	0	0

2019 PIRATE HARBOR ENTRANCE CHANNEL DREDGING
 FOURTH ANNUAL SURVEY - CONTROL SITE MONITORING

Sampling Date: October 31, 2023

BRAUN-BLANQUET SCORES					
QUADRAT	CONTROL SITE	T. testudinum	H. wrightii	S. filifomre	Composite
9160	NORTH	0	0	0	0
9161	NORTH	0	0	0	0
9162	NORTH	0	0	0	0
9163	NORTH	1	0	0	1
9164	NORTH	2	0	0	2
9165	NORTH	1	0	0	1
9166	NORTH	1	0	0	1
9167	NORTH	3	0	0	3
9168	NORTH	3	0	0	3
9169	NORTH	4	0	0	4
9054	SOUTH	2	0	0	2
9055	SOUTH	2	0	0	2
9056	SOUTH	2	0	0	2
9057	SOUTH	2	0	0	2
9058	SOUTH	3	0	0	3
9059	SOUTH	0	0	0	0
9060	SOUTH	1	0	0	1
9061	SOUTH	0	0	0	0
9062	SOUTH	1	0	0	1
9063	SOUTH	0	0	0	0

APPENDIX 4. MITIGATION SITES FOURTH ANNUAL MONITORING

PERCENT COVER AND BRAUN-BLANQUET SCORES

2019 PIRATE HARBOR ENTRANCE CHANNEL DREDGING
 FOURTH ANNUAL SURVEY - MITIGATION SITE MONITORING
 Sampling Date: October 31, 2023

PERCENT COVER					
QUADRAT	MITIGATION SITE	T. testudinum	H. wrightii	S. filifomre	Composite
9125	NORTH	29	0	0	29
9127	NORTH	21	0	0	21
9128	NORTH	5	0	0	5
9132	NORTH	37	0	0	37
9137	NORTH	0	28	0	28
9144	NORTH	10	0	0	10
9155	NORTH	1	0	0	1
9159	NORTH	1	0	0	1
1638	SOUTH	2	0	0	2
1641	SOUTH	16	0	0	16
1642	SOUTH	7	0	0	7
9020	SOUTH	2	0	0	2
9022	SOUTH	2	0	0	2
9026	SOUTH	2	0	0	2
9039	SOUTH	0	2	0	2
9047	SOUTH	0	2	0	2
9048	SOUTH	4	0	0	4
9049	SOUTH	0	3	0	3
9050	SOUTH	2	0	0	2
9051	SOUTH	0	11	0	11
9052	SOUTH	1	0	0	1

* QUADRATS ABSENT OF SEAGRASS ARE NOT DOCUMENTED IN THIS TABLE. A TOTAL OF 34 QUADRATS WERE COLLECTED IN THE NORTH MITIGATION SITE AND 121 QUADRATS WERE COLLECTED IN THE SOUTH MITIGATION SITE.

**2019 PIRATE HARBOR ENTRANCE CHANNEL DREDGING
FOURTH ANNUAL SURVEY - MITIGATION SITE MONITORING**

Sampling Date: October 31, 2023

BRAUN-BLANQUET SCORES					
QUADRAT	MITIGATION SITE	T. testudinum	H. wrightii	S. filifomre	Composite
9125	NORTH	3	0	0	3
9127	NORTH	2	0	0	2
9128	NORTH	2	0	0	2
9132	NORTH	3	0	0	3
9137	NORTH	0	3	0	3
9144	NORTH	2	0	0	2
9155	NORTH	0.5	0	0	0.5
9159	NORTH	0.5	0	0	0.5
1638	SOUTH	1	0	0	1
1641	SOUTH	2	0	0	2
1642	SOUTH	2	0	0	2
9020	SOUTH	1	0	0	1
9022	SOUTH	1	0	0	1
9026	SOUTH	1	0	0	1
9039	SOUTH	0	1	0	1
9047	SOUTH	0	1	0	1
9048	SOUTH	1	0	0	1
9049	SOUTH	0	1	0	1
9050	SOUTH	1	0	0	1
9051	SOUTH	0	2	0	2
9052	SOUTH	0.5	0	0	0.5

* QUADRATS ABSENT OF SEAGRASS ARE NOT DOCUMENTED IN THIS TABLE. A TOTAL OF 34 QUADRATS WERE COLLECTED IN THE NORTH MITIGATION SITE AND 121 QUADRATS WERE COLLECTED IN THE SOUTH MITIGATION SITE.

APPENDIX 5. IMPACT SITE FOURTH ANNUAL MONITORING

PERCENT COVER AND BRAUN-BLANQUET SCORES

2019 PIRATE HARBOR ENTRANCE CHANNEL DREDGING
 FOURTH ANNUAL SURVEY - IMPACT SITE MONITORING
 Sampling Date: October 31, 2023

PERCENT COVER						
QUADRAT	STATION	SIDE OF CHANNEL	T. testudinum	H. wrightii	S. filifomre	Composite
1287	42+00	NORTH	0	0	0	0
1274	43+00	NORTH	0	0	0	0
1272	44+00	NORTH	0	0	0	0
1264	45+00	NORTH	7	0	0	7
1252	46+00	NORTH	0	0	0	0
1251	47+00	NORTH	0	0	0	0
1011	48+00	NORTH	0	0	0	0
1031	49+00	NORTH	0	0	0	0
1045	50+00	NORTH	22	0	0	22
1058	51+00	NORTH	0	0	0	0
1076	52+00	NORTH	0	0	0	0
1089	53+00	NORTH	5	0	0	5
1103	54+00	NORTH	0	0	0	0
1305	42+00	SOUTH	4	0	0	4
1321	43+00	SOUTH	0	0	0	0
1333	44+00	SOUTH	2	0	0	2
1347	45+00	SOUTH	1	0	0	1
1245	46+00	SOUTH	1	0	0	1
1227	47+00	SOUTH	0	0	0	0
1211	48+00	SOUTH	4	0	0	4
1182	49+00	SOUTH	2	0	0	2
1163	50+00	SOUTH	2	0	0	2
1152	51+00	SOUTH	1	0	0	1
1144	52+00	SOUTH	11	0	0	11
1131	53+00	SOUTH	2	0	0	2
1116	54+00	SOUTH	6	0	0	6

2019 PIRATE HARBOR ENTRANCE CHANNEL DREDGING
 FOURTH ANNUAL SURVEY - IMPACT SITE MONITORING
 Sampling Date: October 31, 2023

BRAUN-BLANQUET SCORES						
QUADRAT	STATION	SIDE OF CHANNEL	T. testudinum	H. wrightii	S. filifomre	Composite
1287	42+00	NORTH	0	0	0	0
1274	43+00	NORTH	0	0	0	0
1272	44+00	NORTH	0	0	0	0
1264	45+00	NORTH	2	0	0	2
1252	46+00	NORTH	0	0	0	0
1251	47+00	NORTH	0	0	0	0
1011	48+00	NORTH	0	0	0	0
1031	49+00	NORTH	0	0	0	0
1045	50+00	NORTH	2	0	0	2
1058	51+00	NORTH	0	0	0	0
1076	52+00	NORTH	0	0	0	0
1089	53+00	NORTH	2	0	0	2
1103	54+00	NORTH	0	0	0	0
1305	42+00	SOUTH	1	0	0	1
1321	43+00	SOUTH	0	0	0	0
1333	44+00	SOUTH	1	0	0	1
1347	45+00	SOUTH	0.5	0	0	0.5
1245	46+00	SOUTH	0.5	0	0	0.5
1227	47+00	SOUTH	0	0	0	0
1211	48+00	SOUTH	1	0	0	1
1182	49+00	SOUTH	1	0	0	1
1163	50+00	SOUTH	1	0	0	1
1152	51+00	SOUTH	0.5	0	0	0.5
1144	52+00	SOUTH	2	0	0	2
1131	53+00	SOUTH	1	0	0	1
1116	54+00	SOUTH	2	0	0	2