



TOWN OF LONGBOAT KEY

Incorporated November 14, 1955

Public Works Department
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April 19, 2021

Derrick Hudson, Domestic Wastewater Compliance Inspector
Florida Department of Environmental Protection
Southwest District Office
13051 North Telecom Parkway, Suite 101
Temple Terrace, FL 33637-0926

Re: Town of Longboat Key Consent Order OGC 20-1261
Evaluation Summary Follow Up

Dear Mr. Hudson:

As a follow-up to our letter and transmittal document dated March 26, 2021, please see attached follow up Evaluation Summary with soil sample analysis results and additional elevation data.

Please feel free to contact our department if you need further assistance at (941) 316-1988.

Sincerely,

Isaac Brownman
Public Works Director

Enclosures: ESA Final Evaluation Summary

Cc: Tom Harmer, Town Manager
Maggie Mooney-Portale, Town Attorney
Edwin Steinmeyer, Steinmeyer Fiveash
Bert Warner, Public Works Utility Manager

Technical Memorandum

Date: April 19, 2021

To: Isaac Brownman - Town of Longboat Key Public Works Director
Ricardo Borrromeo – Carollo Engineers

From: Doug Robison, PWS

Subject Longboat Key Sewer Leak Consent Order – Final Evaluation Summary

Introduction

Pursuant to the OGC File No. 20-1261 Consent Order, paragraph 15 and Attachment A, the Town of Longboat Key (Town) has been directed to conduct an *Evaluation Summary* of the mangrove impact areas associated with the access road fill/clearing and the discharge and pooling of raw sewage. On March 12, 2021, ESA conducted field investigations and sample collection to address these Consent Order requirements. The scope of work for this field effort included the following activities:

- Unmanned Aerial Vehicle (UAV) drone flyover of the entire impact area to obtain updated aerial imagery, as well as topographic and thermal signatures;
- Ground delineation of the: 1) road fill/clearing impact area; and 2) sewage leak impact area; and
- Sediment core sample collection in the sewage leak impact area, and a control (adjacent un-impacted) mangrove area.

On March 23, Morgan & Eklund Surveyors conducted a special purpose ground survey of the road fill/clearing and sewage leak impact areas, as well as a pre-restoration topographic survey of the entire impact area and surrounding adjacent un-impacted areas.

In compliance with the Consent Order schedule of deliverable, the Town submitted a *Draft Evaluation Summary* to the Department on March 26, 2021. That document provided a description of the activities and observations conducted on March 12, 2021 by the ESA field team, but did not include the results of the sediment sample analyses and special purposes surveys, as those results were not yet available.

This document constitutes the *Final Evaluation Summary* provided to the Department in compliance with the Consent Order, and includes the results of all required data collection activities. In addition, an interpretation of the data analyses, and general recommendations regarding the proposed restoration plan, are provided.

Drone Flyover

Real-time display imagery from the UAV drone was used to generally view and bound the entire impact area from an elevation of 400 feet above ground level. Almost 9,000 true-color and thermal spectrum photographs were collected using the UAV drone. The signatures of the fill and sewage leak impact areas were clearly observed from the UAV drone's flight elevation. **Figure 1** shows true color aerial imagery of entire impact area, as recorded on the March 12, 2021 UAV drone flyover. The thermal spectrum imagery was useful in confirming the limits of dead mangroves and filled areas.

An anomalous visual signature was observed south and east of the previously delineated sewage leak impact area, and is depicted on **Figure 1**. This area was traversed in the field and quickly determined to be mangrove trees that had been trimmed and/or topped, and not an expansion of the sewage leak impact area. **Figure 2** shows a photograph of trimmed/topped mangroves in this area. The Long Bar Pointe Mitigation Bank Permit issued by FDEP authorizes mangrove trimming in this area, and the observed tree mangrove topping work is presumed to be consistent with this permit.

Ground Delineation and Special Purpose Surveys of Impact Areas

The ESA field team traversed the boundaries of the road fill/clearing and sewage leak impact areas, and tied flagging ribbon to delineate these two impact areas for ground surveys. The special purpose wetland surveys of the road fill/clearing and sewage leak impact areas, and the pre-restoration topographic survey, are provided as **Attachment 1**. The respective boundaries and limits of two impact areas, and the calculated volume of fill material to be removed as part of the site restoration, are as follows:

- Road fill/clearing impact area = **0.51 acres**;
 - 0.35 acres of mangrove and intertidal wetlands
 - 0.16 acres of freshwater wetlands
- Sewage leak impact area = **0.92 acres** (all mangroves and intertidal wetlands); and
- Volume of road fill material to be removed for site restoration = **993 (~1,000) cubic yards**.

Since the sewer force main leak was repaired in July 2020, there has been no additional fill or clearing in this area. The fill road remains open and non-vegetated. Some new mangrove seedlings were observed in portions of the peripheral areas that were cleared but not filled. **Figure 3** shows a photograph of the fill road, and the ESA field team with the UAV drone in operation.

The limits of the sewage leak impact area appeared to be unchanged from that observed in September 2020 when ESA conducted the initial impact assessment. While traversing the sewage leak impact area, a Sulphur-like odor was detected, and portions of this area had a thin algal mat on the sediment surface. Virtually all mangrove trees within the center of the sewage leak impact area were dead or fully defoliated, and there was no indication of tree recovery, no recruitment of new mangrove seedlings, and no viable mangrove propagules in the majority of this area (**Figure 4**). There was also no growth or recruitment of halophytic herbaceous plant species, which often occurs in treefall or canopy loss gaps in mangrove forests.

Compared to the un-impacted mangroves immediately west of the fill road (**Figure 5**), the sewage leak impact area was completely defoliated with no canopy cover and few or no healthy pneumatophores.

However, some smaller mangrove trees on the periphery of the sewage leak impact area, mostly on slightly elevated hummocks, did appear to be recovering with new leaves observed (**Figure 6**). The boundary between the sewage leak impact area and adjacent live mangroves could be clearly seen, both on the aerial imagery and on the ground (**Figure 7**).

Sediment Core Sampling and Analysis

The ESA field team collected nine (9) surface sediment core samples in the sewage leak impact area; two (2) control samples in adjacent un-impacted mangroves at the same elevation; and one (1) field equipment blank. The locations of where sediments samples were collected are shown in **Figure 1**. An attempt was made to collect samples along three west-to-east transects to provide for a stratified-random sample station distribution within the lowest, wettest, and most impacted portion of the sewage leak impact area.

Sediment samples were collected using a 3-inch diameter polycarbonate suction sediment corer, as shown in **Figure 8**. The coring device was pushed into the surface sediments, between mangrove pneumatophores where feasible, until resistance was attained. Each sample typically collected the top 6-8 inches of sediments. Each sediment core sample was generally a mixture of: 1) wet black wet muck; 2) dense dark brown fibrous peat; 3) decomposing mangrove roots and pneumatophores; and 4) larger living and recently dead mangrove roots and pneumatophores. At each sampling location 2-3 core samples were composited and mixed in a clean metal bowl. Sample containers were then filled with the mixed sediment material. The sediment samples were immediately delivered to Benchmark Environmental Analytical Laboratory in Palmetto, Florida, for analysis. The parameters analyzed included:

Nutrients

- Ammonia nitrogen
- Organic Nitrogen
- Total Kjeldahl nitrogen
- Total phosphorus
- Total solids
- Total Organic Carbon

Metals

- Arsenic
- Barium
- Cadmium
- Calcium
- Chromium
- Copper
- Lead
- Molybdenum
- Nickel
- Selenium
- Silver
- Zinc
- Mercury

Organics

- 1-Methylnaphthalene
- 2-Methylnaphthalene
- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo (a) anthracene
- Benzo (a) pyrene
- Benzo (b) fluoranthene
- Benzo (g,h,i) perylene
- Benzo (k) fluoranthene
- Chrysene
- Dibenzo (a,h) anthracene
- Fluoranthene
- Flourene
- Indeno (1,2,3-cd) pyrene
- Naphthalene
- Phenanthrene
- Pyrene.

The results of the sediment sample analyses are provided in **Attachment 2**, including a summary spreadsheet and the raw laboratory results. It should be noted that there are no federal or state standards for ambient nutrient or contaminant concentrations in wetland sediments. Rather, toxicity literature is used to determine safe concentrations for benthic and sediment-dwelling organisms. The guidance document utilized for such determinations in Florida wetlands is *Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters* (MacDonald et al., 2003). Based on extensive sediment analyses and toxicity studies, MacDonald et al. (2003) prepared a summary table (Table 5-1) of contaminant concentrations for two measures of potential impact to sediment dwelling organisms in Florida wetlands:

- **Threshold Effect Concentration (TEC)** = concentrations below which harmful effects are unlikely to be observed; and
- **Probable Effect Concentration (PEC)** = concentrations above which harmful effects are likely to be observed.

From the summary spreadsheet provided in **Attachment 2**, the following observations can be made with regard to the sediment chemistry analyses:

- Concentrations of nutrients, metals, and organics were not significantly different between the sewage leak impact area stations and the un-impacted mangrove control stations;
- While the concentrations of metals exceeded the TEC in some stations, no stations had concentrations above the PEC for any of the analyzed metals;

- Of the 162 organics analyses conducted, only 19 (11.7%) had values above the laboratory Minimum Detection Limit (MDL), or between the MDL and the Practicable Quantification Limit (PCL), while 88.3 percent of the organics analyses were below detection limits; and
- No stations had concentrations above the TEC for any of the analyzed organics.

From these observations two key conclusions can be made: 1) sediment quality in the sewage leak impact area and the control area are essentially the same; and 2) sediments in the areas assessed are not nutrient enriched, nor contaminated with respect to metals or organics concentrations. Accordingly, it is further concluded that the observed mangrove die-off associated with the sewage leak was caused by hydrologic stress (e.g., suffocation of pneumatophores and adventitious roots) rather than by chemical stress associated with any contaminants.

Restoration Plan Recommendations

The follow-on deliverable required by the Consent Order upon Department approval of this *Final Evaluation Summary* is the submittal of a *Restoration Plan* for the areas impacted by the sewage leak and the road fill/clearing impact areas. This section briefly discusses our proposed approach to restoration of these two impact areas, respectively.

Sewage Leak Impact Area

Based on the activities and observations described above, ESA concludes that there has been no expansion of the sewage leak mangrove impact area since the initial assessment was conducted in September 2020. In fact, from the field delineation of this area the total area of the sewage leak impact area is 0.91 acres, or 0.34 less in area than the original estimate of 1.25 acres, which was based on aerial photointerpretation. However, while the sewage leak impact area has not expanded, there has also been little or no natural recovery within the central portion of this area since the leak was repaired in July 2020.

Based on the results of the sediment chemistry analyses, it is concluded that the observed mangrove die-off in the sewage leak impact area was not the result of chemical stress caused by sewage contaminants, but rather was the result of hydrologic stress associated with continuous inundation for an undetermined period of time. Sediments in mangrove forests are typically anoxic, and oxygen for below-ground roots is provided by above-ground root structures, including pneumatophores and adventitious roots. Therefore, mangroves need exposure to unrestricted tidal flow and fluctuating water levels to maintain healthy growth and reproduction.

Blocked or restricted tidal flow and pooling of stagnant water over time can lead to a phenomenon referred to as a “mangrove heart attack” (Lewis et al., 2016). This phenomenon has been observed globally, and results from natural (accretion) or man-made (filling) hydrologic restrictions within mangrove forests that reduce efficient tidal flushing. This in turn results in the pooling of stagnant water, and the suffocation of mangrove pneumatophores and adventitious roots, in hydrologically-restricted areas, leading to mangrove mortality.

The sewage leak impact area appears to be a slightly lower, semi-isolated depression within a larger black mangrove forest basin. Along the eastern edge of the sewage leak impact area is a small open water pool surrounded by stunted, but living, black mangroves. This pool and the larger sewage leak impact area does not appear to have frequent or efficient tidal circulation or flushing, and the stunted black mangroves are evidence that poor tidal circulation existed prior to the sewage leak. Additional evidence of poor tidal flushing is the observed algal mat on the sediment surface and the lack of mangrove propagules in this area. Therefore, it appears as though the sewage leak caused the pooling of organic-rich water for an undetermined amount of time resulted in acute hydrologic stress. In essence, the sewage leak caused an acute mangrove heart attack in this hydrologically-restricted and poorly-flushed area.

It is recommended that the sewage leak impact area be restored using the following measures:

- Topping of dead mangrove trees to allow for greater sunlight exposure;
- Planting of 1-gallon nursery-grown mangroves on 3-foot centers distributed according to the pre-impact zonation of red, black and white mangroves; and
- Excavation of a shallow swale(s) hydrologically connecting the sewage leak impact area to Sarasota Bay, constructed within the existing force main easement, to increase tidal circulation and flushing, and to enhance natural recruitment of mangrove propagules.

The construction of a shallow swale(s) to improve tidal flushing and circulation in the restoration areas will further enhance recovery in an area that was hydrologically-restricted prior to the sewage leak. Furthermore, based on the results of the sediment chemistry analyses, there is no justification for removing sediments in the sewage leak impact area. Rather, the existing sediments have healthy nutrient and organic concentrations, and will support both the flourishing of planted material as well as natural recruitment of propagules.

Road Fill/Clearing Impact Area

The construction of the temporary haul road to repair the sewer force main leak resulted in the clearing, filling, and burial of 0.51 acres of disturbed freshwater wetlands (0.16 acres) and mangroves (0.35 acres). This area can best be restored by:

- Removing the approximate 1,000 cubic yards of fill material used for road construction;
- Re-grading the impacted area to adjacent natural elevations;
- Planting the re-graded area with mangroves on 3-foot centers; and
- Enhancement of tidal circulations and flushing through the construction of a shallow swale(s) connecting with Sarasota Bay.

It should be noted that the Town has a pending Environmental Resource Permit application (DEP Application No.: 41-0393941-001-EI) under review by the Department to construct a redundant sewer force main adjacent to and north of the existing force main. The proposed alignment of the new force

main is shown in **Attachment 3**. This plan exhibit indicates that the majority of the temporary road fill/clearing impact area will be cleared and temporarily filled during the construction of the new force main.

Therefore, the Town is requesting flexibility in the timing of the road fill/clearing impact area restoration. Specifically, the Town is requesting that the full restoration of this area be delayed until after the construction of the new force main. Otherwise, if this area is restored within the next few months, then the planted mangroves will have to be temporarily cleared and filled again with the construction of the new force main, requiring a second restoration.

One alternative could be to remove the haul road fill material and stockpile it on nearby uplands for use during the construction of the new force main. During the interim time period before the construction of the new force main, the re-graded area would provide intertidal habitat without the planted mangroves (e.g., intertidal mud flat habitat). This would facilitate the restoration and recovery of the adjacent sewer leak impact area. When the new force main is constructed, the entire fill road area would be fully restored as described above.

Prior to the submittal of the required Restoration Plan, the Town requests further dialogue with the Department to discuss the timing of the restoration of the road fill/clearing impact area.

References Cited

Lewis, R.R, E.C. Milbrandt, B. Brown, K.W. Krauss, A.S Rovai, J.W. Beever, and L.L. Flynn. 2016. Stress in mangrove forests: early detection and preemptive rehabilitation are essential for future successful worldwide mangrove forest management. *Marine Pollution Bulletin*; Volume 109, Issue 2, Pages 764-771.

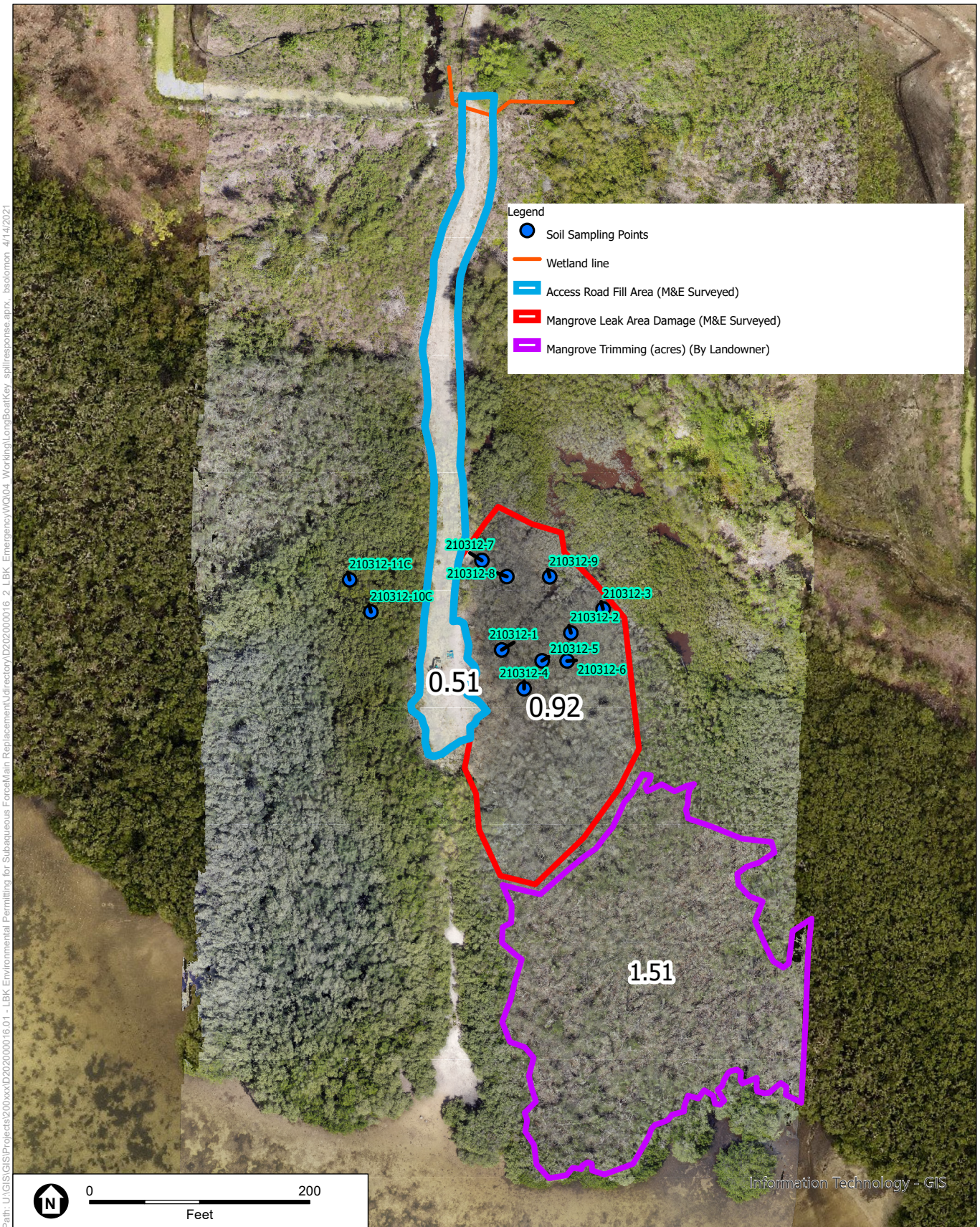
MacDonald, D.D., C.G. Ingersoll, D.E. Smorong, R.A. Lindskoog, G. Sloane and T. Biernacki. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Technical Report prepared by MacDonald Environmental Services, Ltd. and the U.S. Geological Survey for the Florida Department of Environmental Protection, Tallahassee, Florida.

Attachments

Attachment 1 – Special Purpose Wetland and Topographic Survey.

Attachment 2 – Sediment Chemistry Analysis Summary and Lab Results.

Attachment 3 – Permit Plans for New Force Main Construction in Fill Road Area.



SOURCE: ESA, 2021.

Town of Longboat Key - Sewer Force Main Leak Area

Figure 1



Figure 2 – Mangrove tree trimming/topping area southeast of the sewage leak impact area.



Figure 3 – ESA field team mobilizing on the access fill road with the UAV drone in flight.



Figure 4 – Sewage leak mangrove impact area.



Figure 5 – Un-impacted mangrove control area.



Figure 6 – Recovering mangrove is sewage leak impact area.



Figure 7 – Boundary of sewage leak impact area and un-impacted mangroves.



Figure 8 – Sediment corer with sample from sewage leak impact area.

TOPOGRAPHIC SURVEY MANGROVE RESTORATION TOWN OF LONGBOAT KEY, FLORIDA

-FOR-

ENVIRONMENTAL SCIENCE ASSOCIATES

COMMISSION NO.: 35665-3
DATE: MARCH 30, 2021

PREPARED BY:

Morgan & Eklund Inc.
PROFESSIONAL SURVEY CONSULTANTS
LB #4298



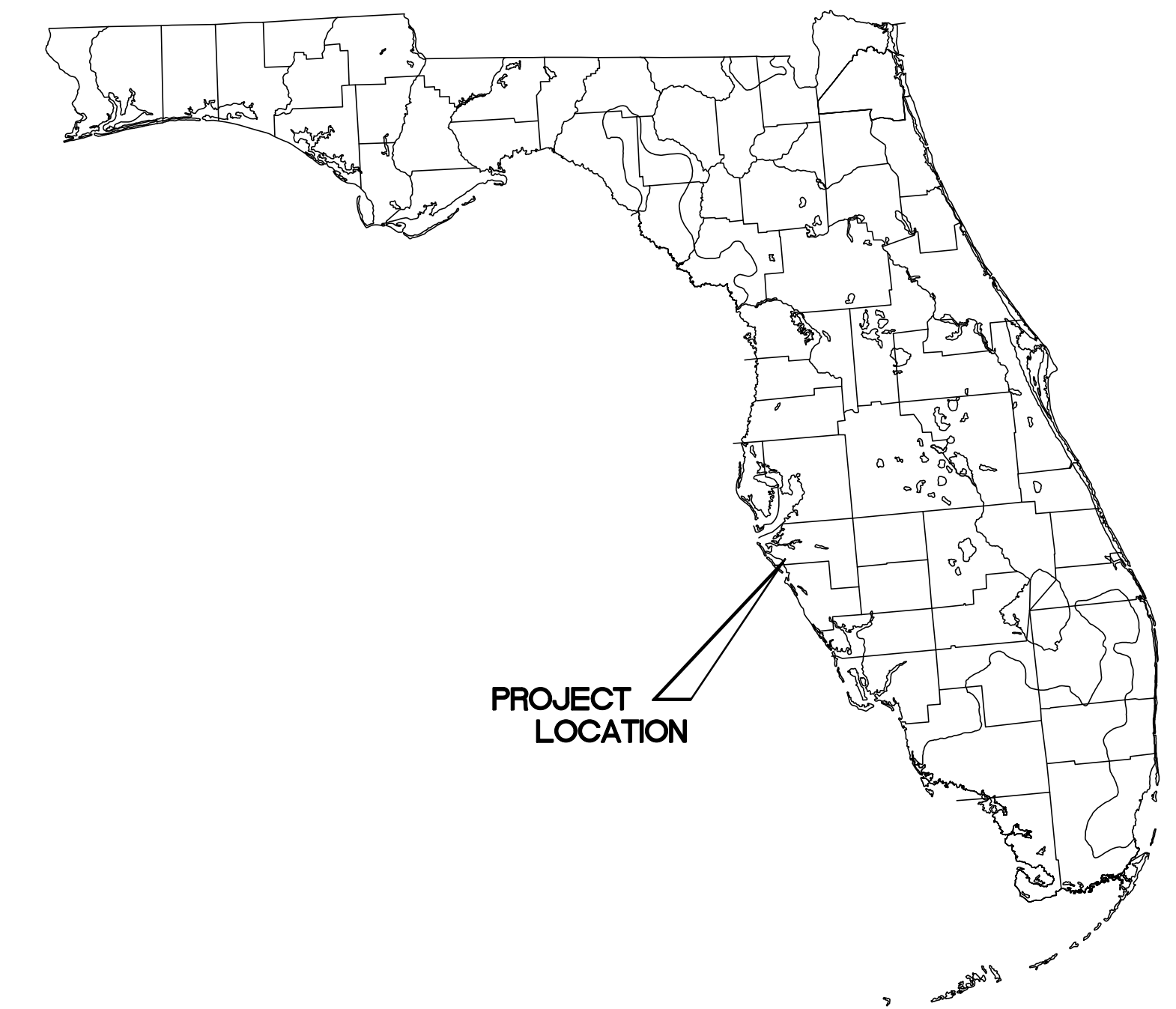
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LOCATION MAP
1" INCH = 3,000 FEET



PROJECT LOCATION

SURVEY NOTES:

1. GRID COORDINATES SHOWN ARE IN FEET, AND ARE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983, NGS ADJUSTMENT OF 1990 (NAD 83/99).
2. GRID COORDINATES ARE BASED ON MONUMENTS AS SHOWN IN THE CONTROL TABLE.
3. ELEVATIONS SHOWN ARE IN FEET AND ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. ELEVATIONS ARE BASED ON MONUMENTS AS SHOWN IN THE CONTROL TABLE.
5. TOPOGRAPHIC INFORMATION DEPICTED ON THIS SURVEY REPRESENTS THE EXISTING CONDITIONS ON THE DATE OF THE FIELD SURVEY.
6. HORIZONTAL POSITIONING UTILIZED A TRIMBLE SPS 986 REAL TIME KINEMATIC (RTK) DUAL FREQUENCY GPS RECEIVER WITH REAL TIME CORRECTIONS APPLIED FROM A TRIMBLE SPS 986 DUAL FREQUENCY BASE STATION OCCUPYING NETWORK CONTROL POSITIONED USING MONUMENTATION AS SHOWN ON THE CONTROL TABLE.
7. AERIAL IMAGERY WAS TAKEN IN 2015 AND WAS PROVIDED BY THE FLORIDA DEPARTMENT OF TRANSPORTATION
8. AERIAL IMAGERY IS DISPLAYED HEREON FOR INFORMATION PURPOSES ONLY, NO PHOTOGRAPHIC ACCURACY IS IMPLIED BY THIS MAP.
9. NOT VALID WITHOUT THE SIGNATURE AND ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.
10. UNDERGROUND UTILITIES AND IMPROVEMENTS NOT LOCATED.

CONTROL TABULATION

POINT	NAD 83/99		SPCS 0902		NAVD 88		US SURVEY FEET		DESCRIPTION
	NORTHING	EASTING	NORTHING	EASTING	ELEVATION	AGENCY	STAMPING		
101	1111541.23	448059.66			5.04	MAN. CD.	GIS 086	CONCRETE MONUMENT	
102	1132620.94	432524.81			4.15	MAN. CD.	GIS 106	CONCRETE MONUMENT	
103	1116450.95	444982.92			4.04	MAN. CD.	GIS 109	CONCRETE MONUMENT	
412					8.06	NGS	BUNNELL 2014	DEEP ROD MONUMENT	
413					10.45	NGS	BEVERLY BEACH	DEEP ROD MONUMENT	

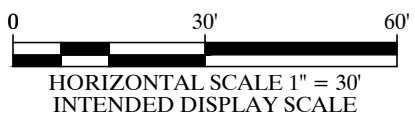
SHEET INDEX

SHEET NO.	DESCRIPTION
1	COVER SHEET
2	ELEVATION DATA
3	ELEVATION CONTOURS
4-5	CROSS SECTIONS

CERTIFICATE OF SURVEYOR - I HEREBY CERTIFY THAT THE INFORMATION SHOWN HEREON IS IN ACCORDANCE WITH A RECENT FIELD SURVEY MADE UNDER MY DIRECTION, AND THAT IT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND MEETS THE STANDARDS OF PRACTICE AS SET FORTH BY THE FLORIDA BOARD OF PROFESSIONAL LAND SURVEYORS IN CHAPTER 5J-17, FLORIDA ADMINISTRATIVE CODE, PURSUANT TO SECTION 472.027, FLORIDA STATUTES.

FIELD BOOKS: MANATEE 2, PAGES 76-79

DAVID W. COGGIN, PSM
PROFESSIONAL SURVEYOR AND MAPPER # 6359
STATE OF FLORIDA



SEE SHEET 1 FOR NOTES

Morgan & Eklund Inc.
PROFESSIONAL SURVEY CONSULTANTS

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DAVID W. COGGIN, PLS.
 PROFESSIONAL LAND SURVEYOR #6359
 STATE OF FLORIDA

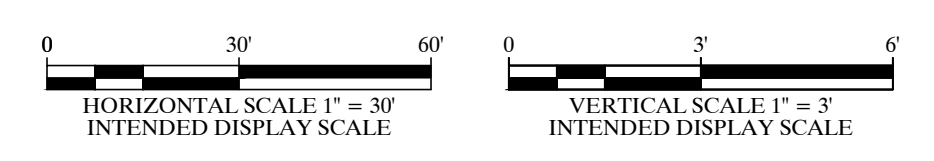
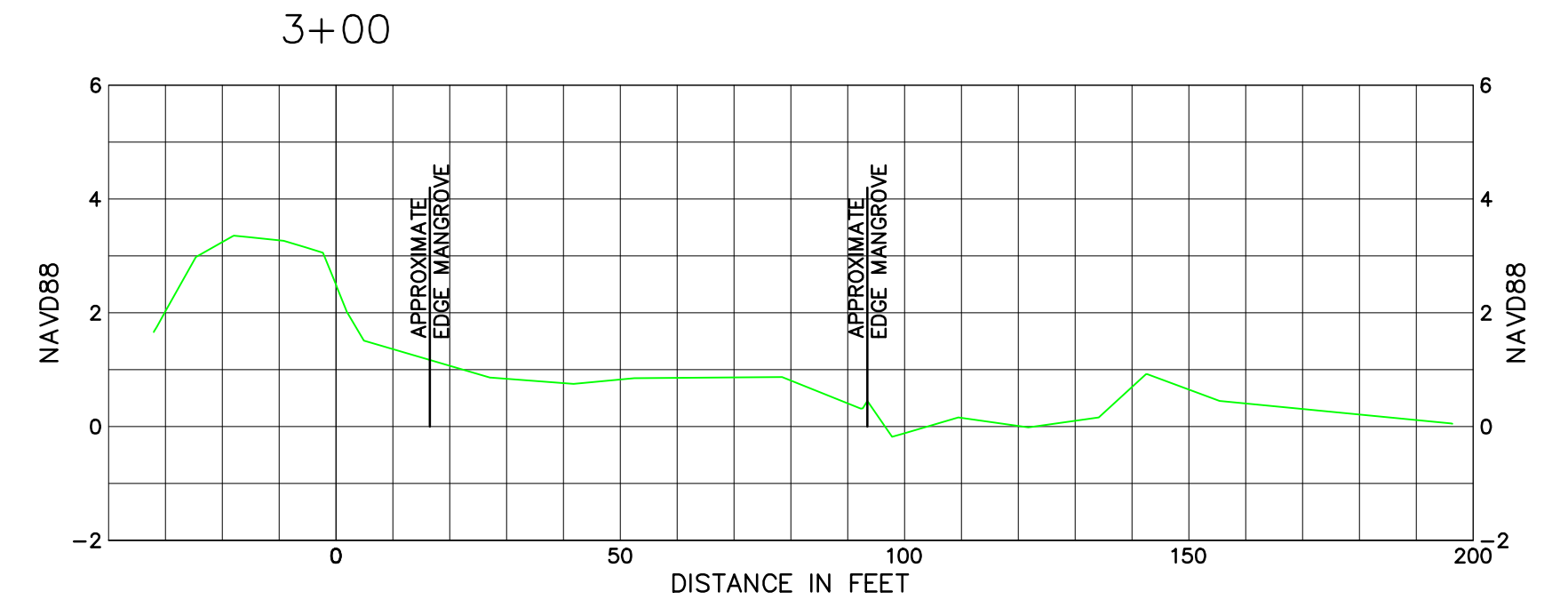
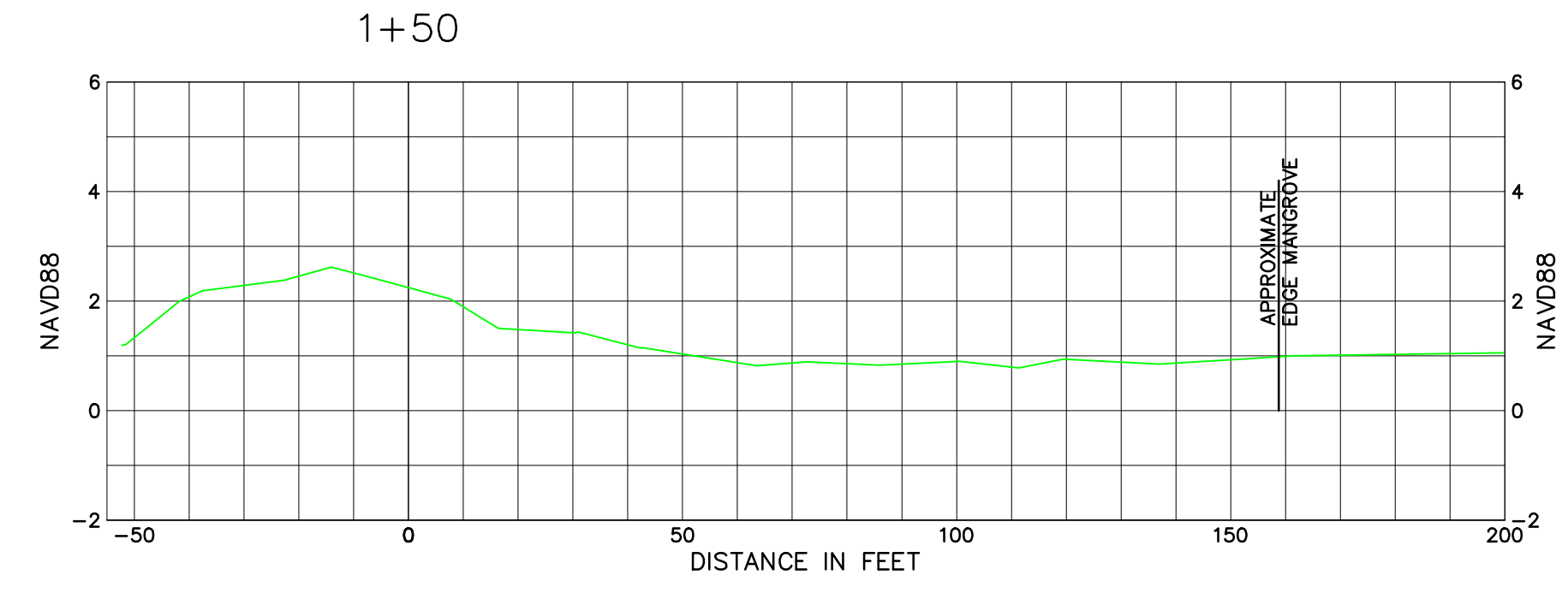
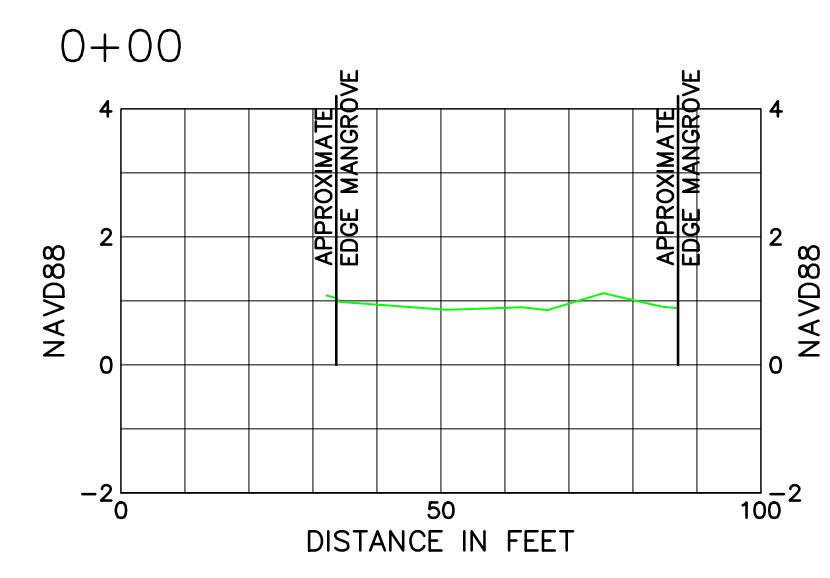
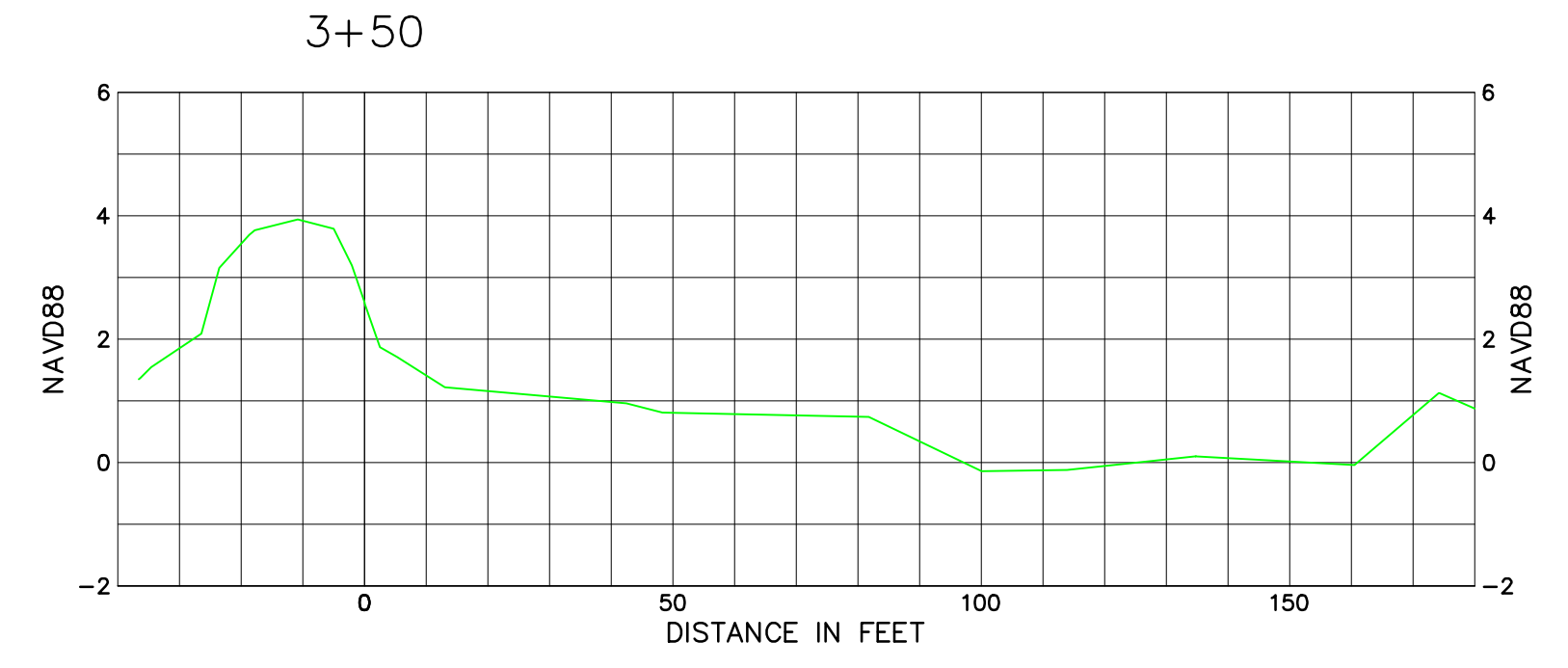
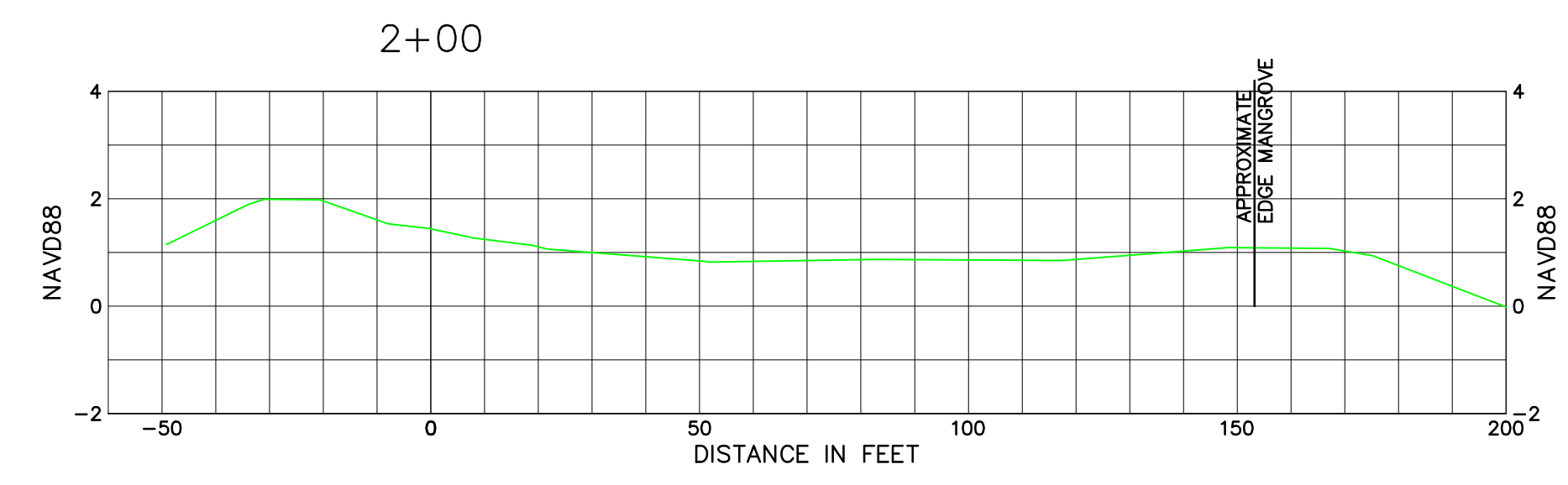
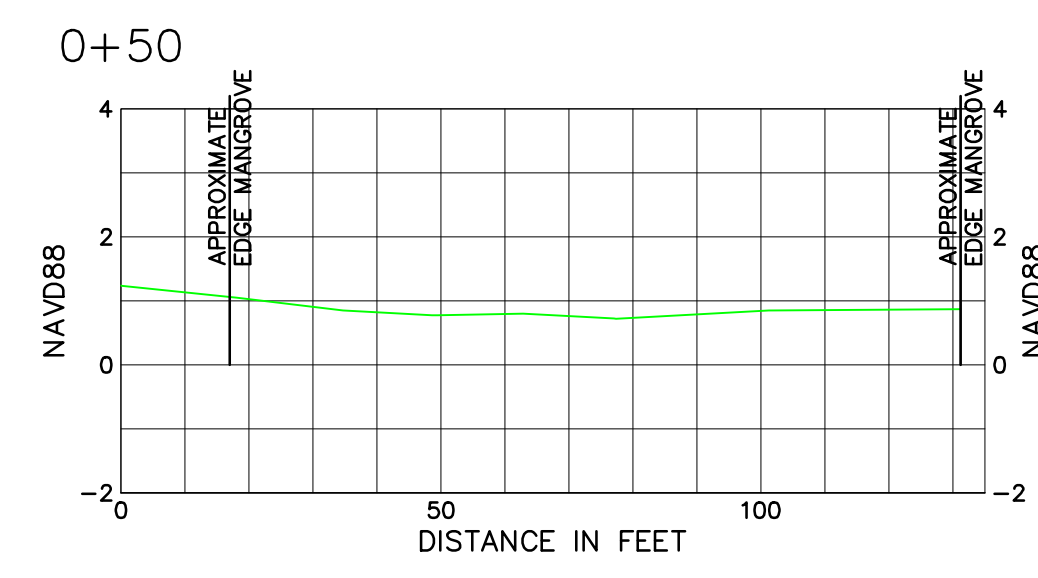
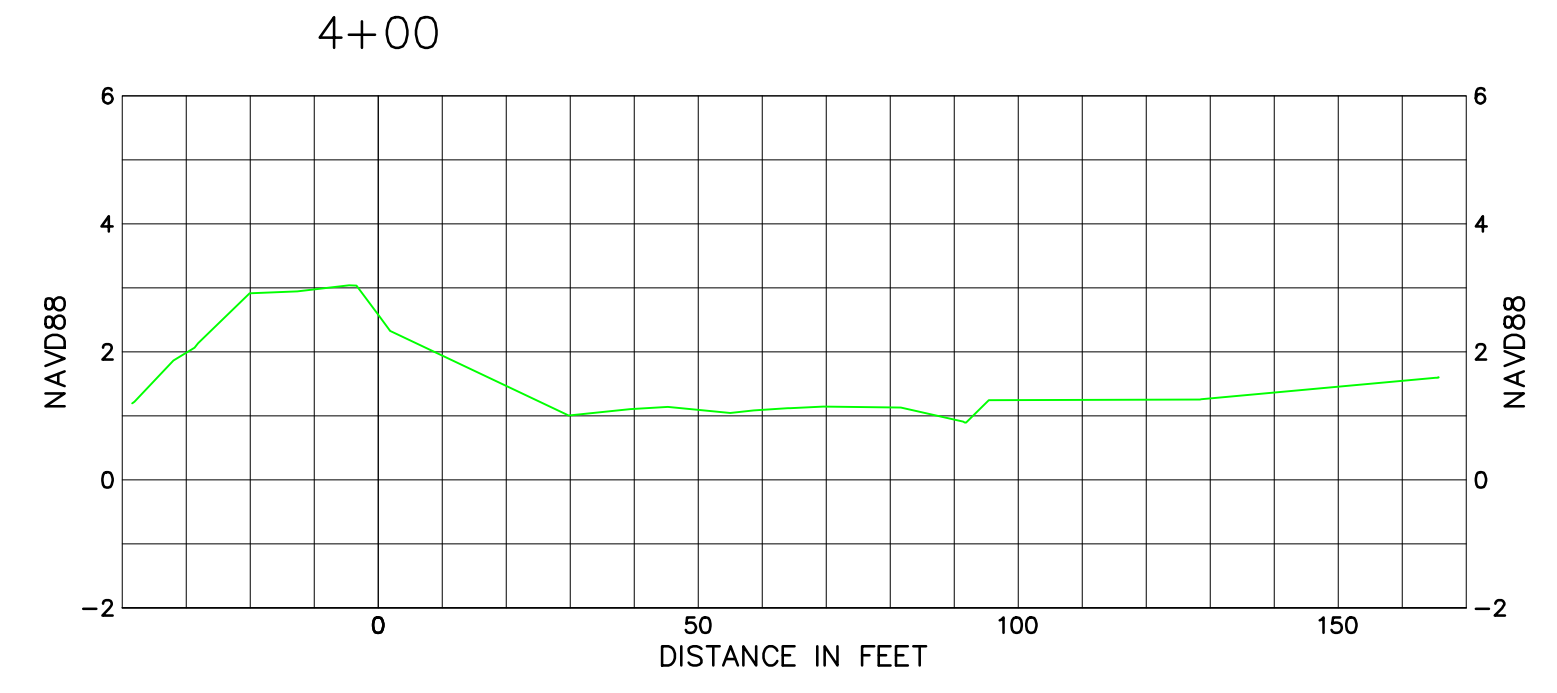
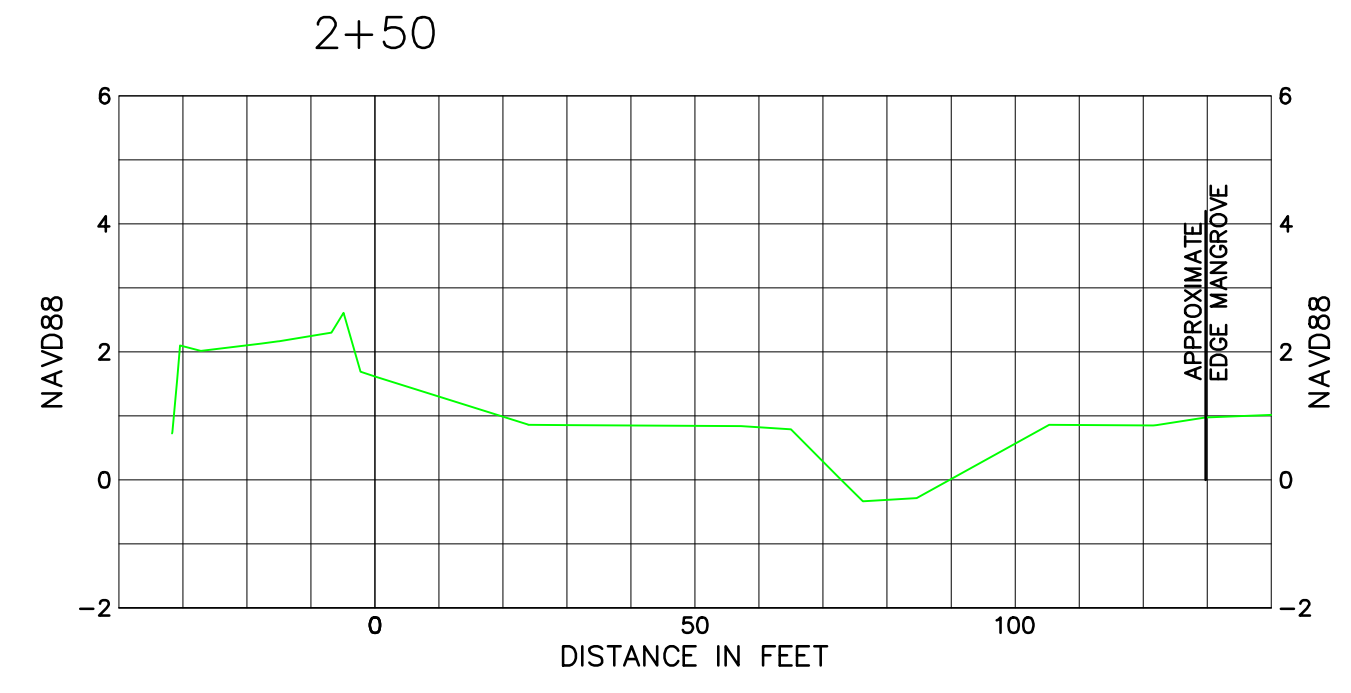
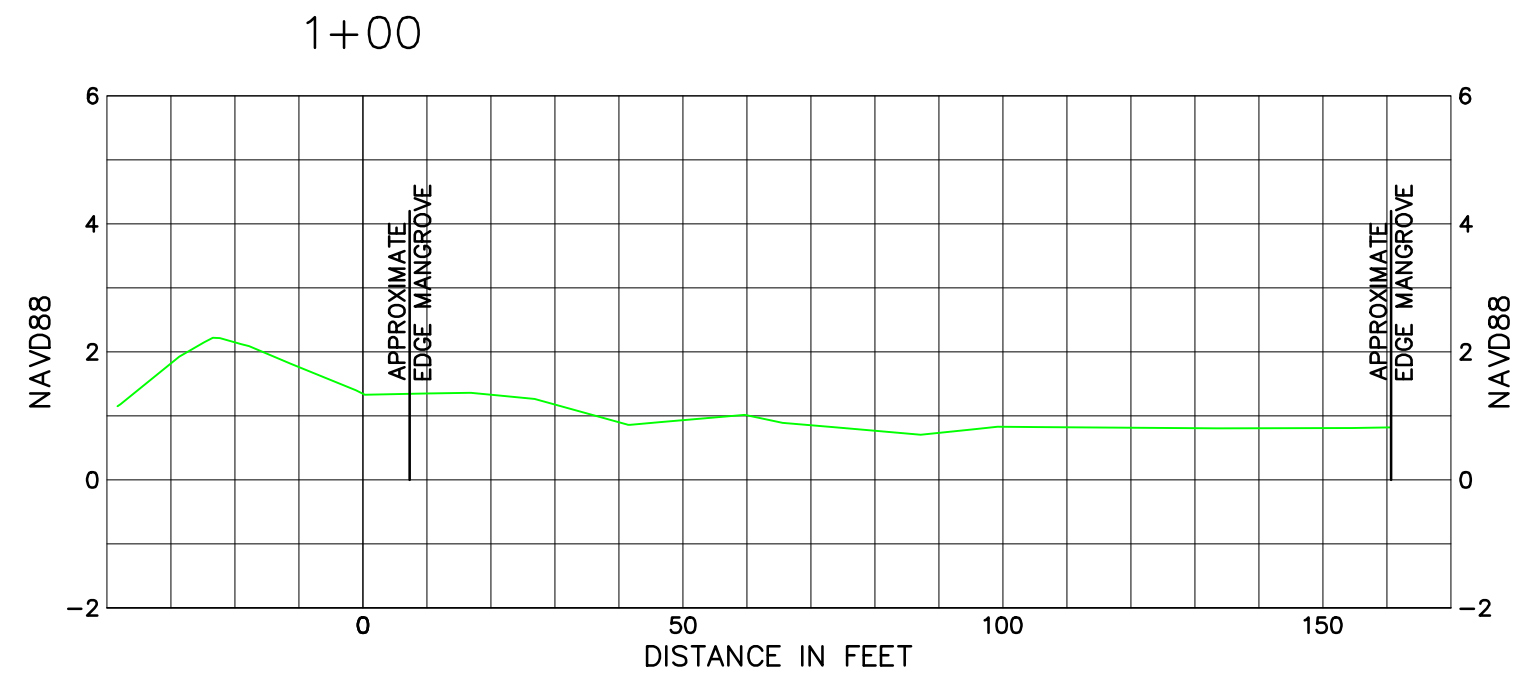
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MANGROVE RESTORATION				DATE 3/30/21
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- FOR - ENVIRONMENTAL SCIENCE ASSOCIATES				
DRAWN BY LFP	CHECKED BY DWC	FIELD BOOK PAGE NO.	SEE COVER	DATE OF SURVEY 3/25/21

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<p>HORIZONTAL SCALE: 1" = 30' INTENDED DISPLAY SCALE</p>	<p>Morgan & Eklund Inc.</p> <p>PROFESSIONAL SURVEY CONSULTANTS</p> <p>4909 US HIGHWAY #1 VERO BEACH, FL 32967 PHONE: (772) 388-5364 FAX: (772) 388-3165</p> <p>1001 NORTH AMERICA WAY SUITE 211 MIAMI, FL 33132 PHONE: (305) 364-5158 LB #4298</p>	<p>CERTIFICATE OF SURVEYOR - I HEREBY CERTIFY THAT THE INFORMATION SHOWN HEREON IS IN ACCORDANCE WITH A RECENT FIELD SURVEY MADE UNDER MY DIRECTION, AND THAT IT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND MEETS THE STANDARDS OF PRACTICE AS SET FORTH BY THE FLORIDA BOARD OF PROFESSIONAL LAND SURVEYORS IN CHAPTER 61-17, FLORIDA ADMINISTRATIVE CODE, PURSUANT TO SECTION 472.027, FLORIDA STATUTES.</p> <p>DAVID W. COGGIN, PLS PROFESSIONAL LAND SURVEYOR #63359 STATE OF FLORIDA</p>	<p>ELEVATION CONTOURS (NAVD 88)</p> <p>TOPOGRAPHIC SURVEY</p> <p>MANGROVE RESTORATION</p> <p>TOWN OF LONGBOAT KEY, FLORIDA</p> <p>- FOR -</p> <p>ENVIRONMENTAL SCIENCE ASSOCIATES</p>		<p>COMMISSION NO. 35665-3</p> <p>SCALE 1" = 30'</p> <p>DATE 3/30/21</p>
			<p>SEE SHEET 1 FOR NOTES</p>	<p>DRAWN BY LFP</p> <p>CHECKED BY DWC</p> <p>FIELD BOOK PAGE NO.</p> <p>SEE COVER</p> <p>DATE OF SURVEY 3/25/21</p>	<p>SHEET 3 OF 5</p>

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SEE SHEET 1 FOR NOTES

Morgan & Eklund Inc.
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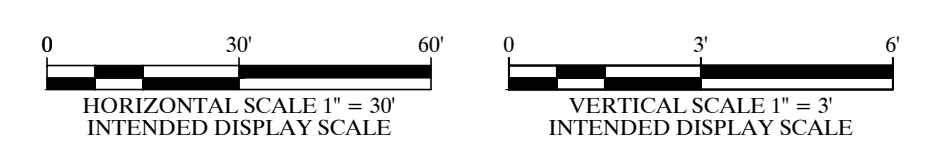
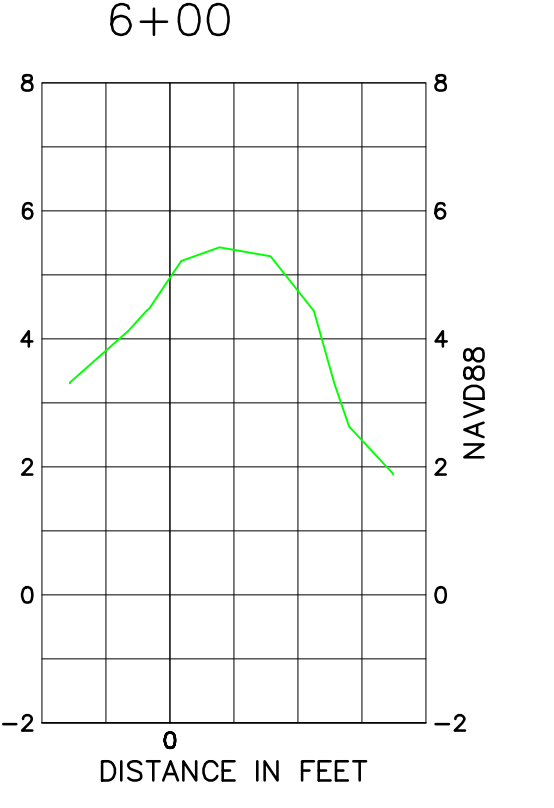
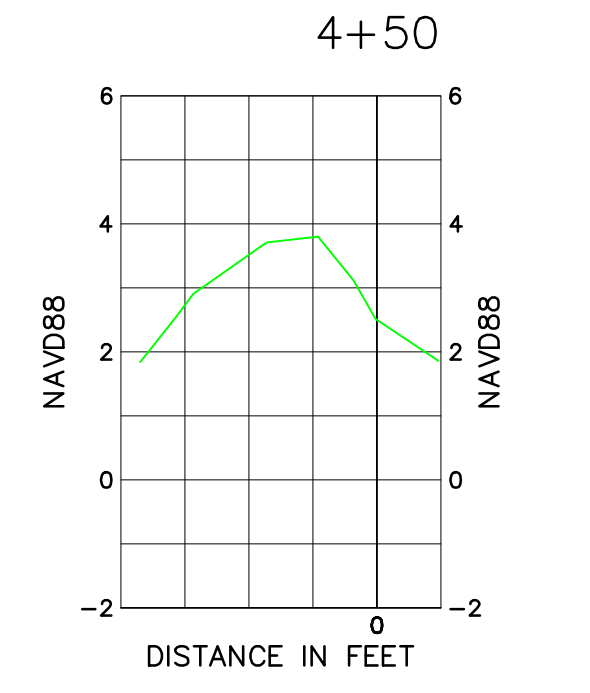
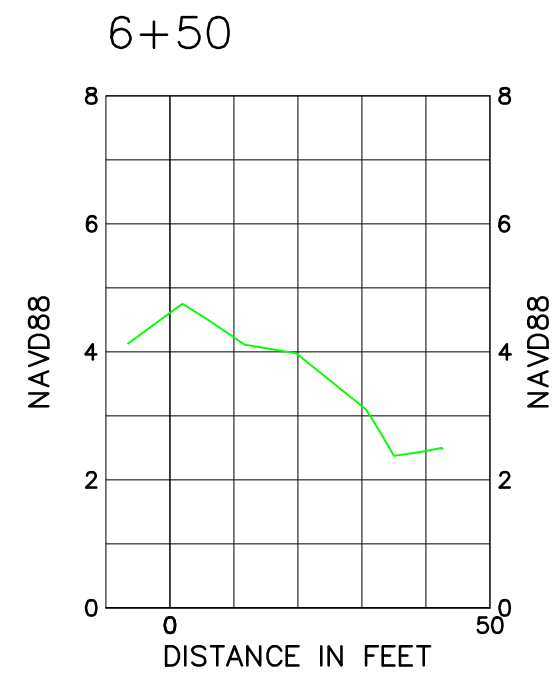
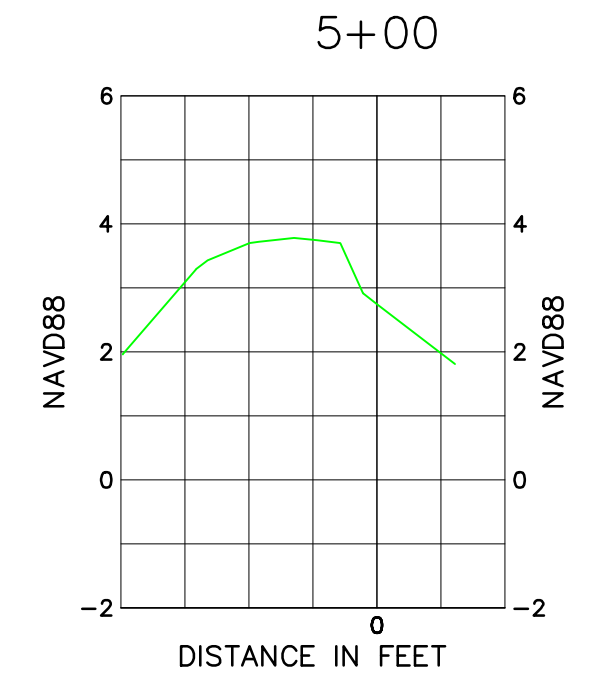
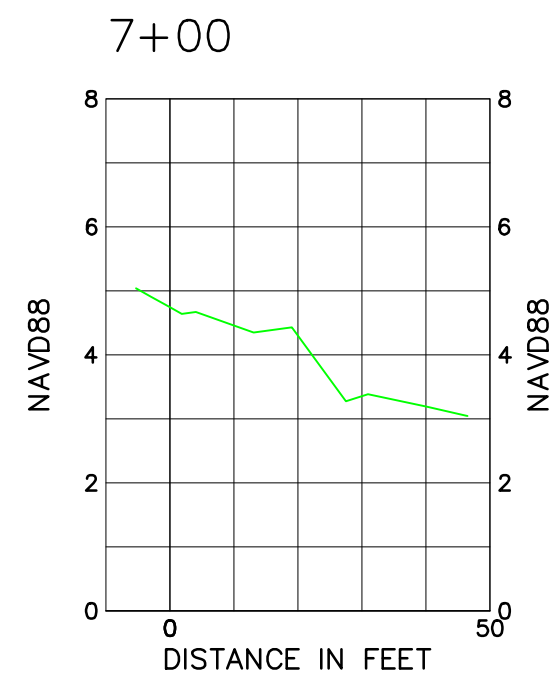
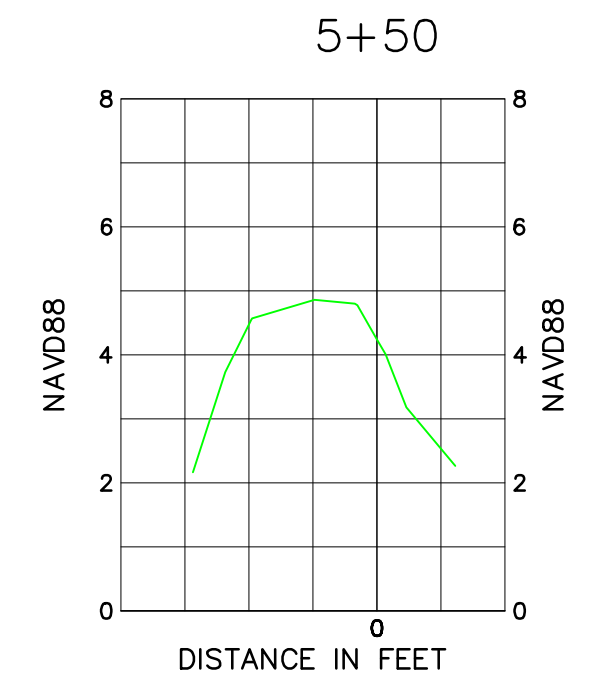
4909 US HIGHWAY #1 VERO BEACH, FL 32967
 PHONE: (772) 388-5364
 FAX: (772) 388-3165

1001 NORTH AMERICA WAY SUITE 211 MIAMI, FL 33132
 PHONE: (305) 364-5158
 LB #4298

CERTIFICATE OF SURVEYOR - I HEREBY CERTIFY THAT THE INFORMATION SHOWN HEREON IS IN ACCORDANCE WITH A RECENT FIELD SURVEY MADE UNDER MY DIRECTION AND THAT IT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND MEETS THE STANDARDS OF PRACTICE AS SET FORTH BY THE FLORIDA BOARD OF PROFESSIONAL LAND SURVEYORS IN CHAPTER 61-17, FLORIDA ADMINISTRATIVE CODE, PURSUANT TO SECTION 472.027, FLORIDA STATUTES.

DAVID W. COGGIN, PLS
 PROFESSIONAL LAND SURVEYOR #6359
 STATE OF FLORIDA

CROSS SECTIONS (NAVD 88)				COMMISSION NO. 35665-3
TOPOGRAPHIC SURVEY				SCALE 1" = 30'
MANGROVE RESTORATION				DATE 3/30/21
TOWN OF LONGBOAT KEY, FLORIDA				
- FOR -				
ENVIRONMENTAL SCIENCE ASSOCIATES				
DRAWN BY LFP	CHECKED BY DWC	FIELD BOOK PAGE NO.	SEE COVER	DATE OF SURVEY 3/25/21
				SHEET 4 OF 5



SEE SHEET 1 FOR NOTES

Morgan & Eklund Inc.
PROFESSIONAL SURVEY CONSULTANTS

4909 US HIGHWAY #1 VERO BEACH, FL 32967
 PHONE: (772) 388-5364
 FAX: (772) 388-3165

1001 NORTH AMERICA WAY SUITE 211 MIAMI, FL 33132
 PHONE: (305) 364-5158
 LB #4298

CERTIFICATE OF SURVEYOR - I HEREBY CERTIFY THAT THE INFORMATION SHOWN HEREON IS IN ACCORDANCE WITH A RECENT FIELD SURVEY MADE UNDER MY DIRECTION AND THAT IT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND MEETS THE STANDARDS OF PRACTICE AS SET FORTH BY THE FLORIDA BOARD OF PROFESSIONAL LAND SURVEYORS IN CHAPTER 61-17, FLORIDA ADMINISTRATIVE CODE, PURSUANT TO SECTION 472.027, FLORIDA STATUTES.

DAVID W. COGGIN, PLS
 PROFESSIONAL LAND SURVEYOR #6359
 STATE OF FLORIDA

CROSS SECTIONS (NAVD 88) TOPOGRAPHIC SURVEY MANGROVE RESTORATION TOWN OF LONGBOAT KEY, FLORIDA - FOR - ENVIRONMENTAL SCIENCE ASSOCIATES				COMMISSION NO. 35665-3
SCALE 1" = 30'				DATE 3/30/21
DRAWN BY LFP	CHECKED BY DWC	FIELD BOOK PAGE NO.	SEE COVER	DATE OF SURVEY 3/25/21
SHEET 5 OF 5				

J:\Projects\2021\35665-3\Drawings\35665-3.dwg, 31 Mar 2021, 10:58 AM

**Town of Longboat Key Force Main Leak
Sediment Chemistry Data Summary**

Units	Sewer Leak Impact Area Stations										Control Area Stations			TEC ¹	PEC ²	
	#1	#2	#3	#4	#5	#6	#7	#8	#9	Mean*	#10	#11	Mean*			
Nutrients																
Ammonia Nitrogen	% dry weight	0.013	0.008	0.009	0.006	0.007	0.009	0.002	0.006	0.007	0.007	0.009	0.010	0.010		
Organic Nitrogen	% dry weight	1.55	1.80	1.63	2.03	2.25	1.91	0.32	1.34	1.80	1.63	1.59	1.47	1.53		
Total Kjeldahl Nitrogen	% dry weight	1.55	1.81	1.64	2.04	2.26	1.92	0.32	1.35	1.81	1.63	1.60	1.48	1.54		
Total Phosphorus	% dry weight	0.186	0.100	0.080	0.125	0.167	0.102	0.055	0.101	0.100	0.113	0.208	0.175	0.192		
Total Solids	% dry weight	19.5	15.5	16.6	15.0	14.4	15.0	48.4	19.4	14.4	19.8	8.75	14.2	11.5		
Total Organic Carbon	mg/kg	322,000	380,000	405,000	442,000	510,000	431,000	214,000	430,000	386,000	391,111	459,000	414,000	436,500		
Metals																
Arsenic	mg/kg	1.37 I	2.85 I	1.85 U	26.9	6.78 I	4.08	1.28 I	1.58 U	1.83 U	5.39	3.510 U	4.82 I	4.17	9.8	33
Barium	mg/kg	18.6	15.5	7.76	147	41.5	9.86	11.3	13.5	11.9	30.77	7.42	32.1	19.76	20	60
Cadmium	mg/kg	.558 I	.845 I	1.39	2.59	1.56	1.49	0.414	0.774 I	1.21	1.20	1.91 I	1.71	1.81	1.0	5
Calcium	mg/kg	10,850	6,962	5,963	160,698	58,714	8,091	37,274	6,895	13,732	34,353	8,271	10,855	9,563	NG	NG
Chromium	mg/kg	24.7	25.0	8.76	79.1	23.8	16.2	9.96	20.0	11.2	24.30	11.0	64.1	37.55	43	110
Copper	mg/kg	41.6	28.3	11.7	685	217	55.6	14.4	43.8	68.2	129.51	51.5	131	91.25	32	150
Lead	mg/kg	10.8	12.7	15.6	57.1	22.1	12.4	9.48	11.6	9.05	17.87	6.28 I	31.7	15.85	36	130
Molybdenum	mg/kg	2.85	5.72	4.46	27.8	20.0	9.19	0.239 I	4.57	10.80	9.51	22.1	6.05	14.08	NG	NG
Nickel	mg/kg	6.12	5.95	2.09	35.00	11.1	4.48	2.21	4.41	3.04	8.27	2.80	13.7	8.25	23	49
Selenium	mg/kg	.862 U	3.64 I	3.13	1.27 U	1.28 U	2.5	.357 U	4.91	3.27	2.36	2.38 I	5.87	4.13	NG	NG
Silver	mg/kg	.413 I	0.837	0.339 I	2.23	1.55	0.871	7.22	1.02	0.974	1.72	0.992 I	2.36	1.68	1.0	2.2
Zinc	mg/kg	52.2	26.2	73.4	1544	608	127	38.7	43	167	297.72	104	99.8	101.90	120	460
Mercury	mg/kg	.296 I	0.322 I	0.14 U	0.908	0.628	0.376 I	.145 I	0.315 I	0.275 I	0.38	0.371 I	0.941	0.66	0.18	1.1
Organics																
1-Methylnaphthalene	mg/kg	0.14 U	0.16 U	0.16 U	0.17 U	0.18 U	0.18 U	0.074 U	0.24 U	0.29 U	0.18	0.34 U	0.29 U	0.32	NG	NG
2-Methylnaphthalene	mg/kg	0.14 U	0.16 U	0.16 U	0.17 U	0.18 U	0.18 U	0.074 U	0.24 U	0.29 U	0.18	0.34 U	0.29 U	0.32	NG	NG
Acenaphthene	mg/kg	0.11 U	0.14 U	0.14 U	0.14 U	0.15 U	0.15 U	0.062 U	0.20 U	0.24 U	0.15	0.28 U	0.24 U	0.26	0.7	8.9
Acenaphthylene	mg/kg	0.11 U	0.14 U	0.14 U	0.14 U	0.15 U	0.15 U	0.062 U	0.20 U	0.24 U	0.15	0.28 U	0.24 U	0.26	0.6	13
Anthracene	mg/kg	0.11 U	0.13 U	0.12 U	0.13 U	0.14 U	0.13 U	0.057 U	0.19 U	0.22 U	0.14	0.26 U	0.22 U	0.24	5.7	85
Benzo(a)anthracene	mg/kg	0.14 U	0.16 U	0.16 U	0.42	0.33	0.18 U	0.074 U	0.24 U	0.29 U	0.22	0.34 U	0.29 U	0.32	11	110
Benzo(a)pyrene	mg/kg	0.14 U	0.17 U	0.17 U	0.43	0.27	0.18 U	0.077 U	0.25 U	0.30 U	0.22	0.35 U	0.30 U	0.33	15	150
Benzo(b)fluoranthene	mg/kg	0.14 U	0.16 U	0.16 U	0.68	0.48	0.22	0.074 U	0.24 U	0.29 U	0.27	0.34 U	0.29 U	0.32	NG	NG
Benzo(g,h,i)perylene	mg/kg	0.15 U	0.18 U	0.18 U	0.33	0.25	0.19 U	0.082 U	0.27 U	0.32 U	0.22	0.37 U	0.32 U	0.35	NG	NG
Benzo(k)fluoranthene	mg/kg	0.096 U	0.11 U	0.11 U	0.22	0.18 I	0.12 U	0.052 U	0.17 U	0.20 U	0.14	0.24 U	0.20 U	0.22	NG	NG
Chrysene	mg/kg	0.15 U	0.17 U	0.17 U	0.41	0.33	0.19 U	0.079 U	0.26 U	0.31 U	0.23	0.36 U	0.31 U	0.34	17	130
DiBenzo(a,h)anthracene	mg/kg	0.12 U	0.14 U	0.14 U	0.14 U	0.16 I	0.15 U	0.064 U	0.21 U	0.25 U	0.15	0.29 U	0.25 U	0.27	3.3	14
Fluoranthene	mg/kg	0.20	0.17 U	0.17 U	0.86	0.52	0.24	0.079 U	0.26 U	0.31 U	0.31	0.36 U	0.31 U	0.34	42	220
Flourene	mg/kg	0.11 U	0.13 U	0.12 U	0.13 U	0.14 U	0.13 U	0.057 U	0.19 U	0.22 U	0.14	0.26 U	0.22 U	0.24	7.7	54
Indeno(1,2,3-cd)pyrene	mg/kg	0.15 U	0.17 U	0.17 U	0.18 U	0.19 U	0.19 U	0.079 U	0.26 U	0.31 U	0.19	0.36 U	0.31 U	0.34	NG	NG
Naphthalene	mg/kg	0.15 U	0.18 U	0.18 U	0.18 U	0.20 U	0.19 U	0.082 U	0.27 U	0.32 U	0.19	0.37 U	0.32 U	0.35	18	56
Phenanthrene	mg/kg	0.10 U	0.12 U	0.12 U	0.12 I	0.13 U	0.13 U	0.054 U	0.18 U	0.21 U	0.13	0.25 U	0.21 U	0.23	20	120
Pyrene	mg/kg	0.15 I	0.10 U	0.17 U	0.71	0.45	0.21	0.077 U	0.25 U	0.30 U	0.27	0.35 U	0.30 U	0.33	20	150

I = Value is between the MDL and PQL values.

U = Analyte was not detected at or above the MDL value.

* Means include MDL values when analytes were not detected at values above the MDL.

¹TEC = Threshold Effect Concentration = concentrations below which harmful effects are unlikely to be observed (source: MacDonald et al. 2000a).

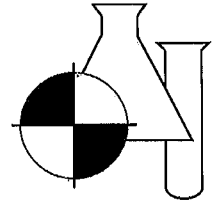
²PEC = Probable Effect Concentration = concentrations above which harmful effects are likely to be observed (source: MacDonald et al. 2000a).

NG = No guidance data available.

MacDonald, D.D. and C.G. Ingersoll. 2002a. A guidance manual to support the assessment of contaminated sediments in freshwater ecosystems. Volume 1 - An ecosystem-based framework for assessing and managing contaminated sediments. Prepared for Florida Department of Environmental Protection. Tallahassee, Florida

BENCHMARK

EnviroAnalytical Inc.



NELAC Certification #E84167

ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 21030829

Environmental Science Asso.
4200 W. Cypress St. Suite 950
Tampa, FL 33607

Project Name : LONGBOAT KEY SPILL SOIL ANALYSIS

Date Received : 03/12/2021

Time Received : 1530

Emily Keenan

Submission Number: 21030829

Sample Number: 001

Sample Description: 210312-1

Sample Date: 03/12/2021

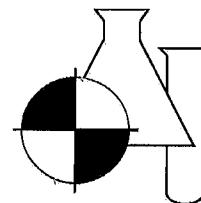
Sample Time: 1124

Sample Method: Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.013	% DRY WT	0.0002	350.1	03/18/2021 14:29	CW
ORGANIC NITROGEN	1.55	% DRY WT	0.0002	351-350.1	03/18/2021 14:29	IE/CW
TOTAL KJELDAHL NITROGEN	1.56	% DRY WT	0.005	351.2	03/17/2021 16:29	IE
TOTAL PHOSPHORUS AS P	0.186	% DRY WT	0.004	365.3	03/16/2021 17:39	CC
ARSENIC	1.37 I	MG/KG	1.37	6010	03/19/2021 13:37	KP/BLB
BARIUM	18.6	MG/KG	0.454	6010	03/19/2021 13:37	KP/BLB
CADMIUM	0.558 I	MG/KG	0.204	6010	03/19/2021 13:37	KP/BLB
CALCIUM	10850	MG/KG	6.81	6010	03/19/2021 13:37	KP/BLB
CHROMIUM	24.7	MG/KG	0.454	6010	03/19/2021 13:37	KP/BLB
COPPER	41.6	MG/KG	0.908	6010	03/19/2021 13:37	KP/BLB
LEAD	10.8	MG/KG	0.681	6010	03/19/2021 13:37	KP/BLB
MOLYBDENUM	2.85	MG/KG	0.454	6010	03/19/2021 13:37	KP/BLB
NICKEL	6.12	MG/KG	0.268	6010	03/19/2021 13:37	KP/BLB
SELENIUM	0.862 U	MG/KG	0.862	6010	03/19/2021 13:37	KP/BLB
SILVER	0.413 I	MG/KG	0.113	6010	03/19/2021 13:37	KP/BLB
ZINC	52.2	MG/KG	0.318	6010	03/19/2021 13:37	KP/BLB
MERCURY	0.296 I	MG/KG	0.12	7471	03/19/2021 10:18	KP/PN
1-METHYLNAPHTHALENE	0.14 U	MG/KG	0.14	8270	03/23/2021 16:35	E83182
2-METHYLNAPHTHALENE	0.14 U	MG/KG	0.14	8270	03/23/2021 16:35	E83182
ACENAPHTHENE	0.11 U	MG/KG	0.11	8270	03/23/2021 16:35	E83182
ACENAPHTHYLENE	0.11 U	MG/KG	0.11	8270	03/23/2021 16:35	E83182
ANTHRACENE	0.11 U	MG/KG	0.11	8270	03/23/2021 16:35	E83182
BENZO(A)ANTHRACENE	0.14 U	MG/KG	0.14	8270	03/23/2021 16:35	E83182
BENZO(A)PYRENE	0.14 U	MG/KG	0.14	8270	03/23/2021 16:35	E83182
BENZO(B)FLUORANTHENE	0.15 I	MG/KG	0.14	8270	03/23/2021 16:35	E83182
BENZO(G,H,I)PERYLENE	0.15 U	MG/KG	0.15	8270	03/23/2021 16:35	E83182

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BENZO(K)FLUORANTHENE	0.096 U	MG/KG	0.096	8270	03/23/2021	16:35	E83182
CHRYSENE	0.15 U	MG/KG	0.15	8270	03/23/2021	16:35	E83182
DIBENZO(A,H)ANTHRACENE	0.12 U	MG/KG	0.12	8270	03/23/2021	16:35	E83182
FLUORANTHENE	0.20	MG/KG	0.15	8270	03/23/2021	16:35	E83182
FLUORENE	0.11 U	MG/KG	0.11	8270	03/23/2021	16:35	E83182
INDENO(1,2,3-CD)PYRENE	0.15 U	MG/KG	0.15	8270	03/23/2021	16:35	E83182
NAPHTHALENE	0.15 U	MG/KG	0.15	8270	03/23/2021	16:35	E83182
PHENANTHRENE	0.10 U	MG/KG	0.10	8270	03/23/2021	16:35	E83182
PYRENE	0.15 I	MG/KG	0.14	8270	03/23/2021	16:35	E83182
TOTAL SOLIDS	19.5	% DRY WT	0.1	SM2540G	03/17/2021	15:47	TG
TOTAL ORGANIC CARBON	322000	MG/KG	2110	USACOE	03/29/2021	10:05	E87156

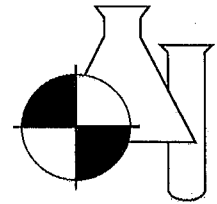
All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

Submission Number: 21030829	Sample Date: 03/12/2021
Sample Number: 002	Sample Time: 1105
Sample Description: 210312-2	Sample Method: Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.008	% DRY WT	0.0002	350.1	03/18/2021 14:34	CW
ORGANIC NITROGEN	1.80	% DRY WT	0.0002	351-350.1	03/18/2021 14:34	IE/CW
TOTAL KJELDAHL NITROGEN	1.81	% DRY WT	0.005	351.2	03/17/2021 16:35	IE
TOTAL PHOSPHORUS AS P	0.100	% DRY WT	0.004	365.3	03/16/2021 17:40	CC
ARSENIC	2.85 I	MG/KG	1.85	6010	03/19/2021 13:37	KP/BLB
BARIUM	15.5	MG/KG	0.614	6010	03/19/2021 13:37	KP/BLB
CADMIUM	0.845 I	MG/KG	0.276	6010	03/19/2021 13:37	KP/BLB
CALCIUM	6962	MG/KG	9.22	6010	03/19/2021 13:37	KP/BLB
CHROMIUM	25.0	MG/KG	0.614	6010	03/19/2021 13:37	KP/BLB
COPPER	28.3	MG/KG	1.23	6010	03/19/2021 13:37	KP/BLB
LEAD	12.7	MG/KG	0.922	6010	03/19/2021 13:37	KP/BLB
MOLYBDENUM	5.72	MG/KG	0.614	6010	03/19/2021 13:37	KP/BLB
NICKEL	5.95	MG/KG	0.363	6010	03/19/2021 13:37	KP/BLB
SELENIUM	3.64 I	MG/KG	1.17	6010	03/19/2021 13:37	KP/BLB
SILVER	0.837	MG/KG	0.154	6010	03/19/2021 13:37	KP/BLB
ZINC	26.2	MG/KG	0.430	6010	03/19/2021 13:37	KP/BLB
MERCURY	0.322 I	MG/KG	0.15	7471	03/19/2021 10:18	KP/PN
1-METHYLNAPHTHALENE	0.16 U	MG/KG	0.16	8270	03/24/2021 12:10	E83182
2-METHYLNAPHTHALENE	0.16 U	MG/KG	0.16	8270	03/24/2021 12:10	E83182
ACENAPHTHENE	0.14 U	MG/KG	0.14	8270	03/24/2021 12:10	E83182
ACENAPHTHYLENE	0.14 U	MG/KG	0.14	8270	03/24/2021 12:10	E83182
ANTHRACENE	0.13 U	MG/KG	0.13	8270	03/24/2021 12:10	E83182
BENZO(A)ANTHRACENE	0.16 U	MG/KG	0.16	8270	03/24/2021 12:10	E83182
BENZO(A)PYRENE	0.17 U	MG/KG	0.17	8270	03/24/2021 12:10	E83182

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NELAC Certification #E84167

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
BENZO(B)FLUORANTHENE	0.16 U	MG/KG	0.16	8270	03/24/2021 12:10	E83182
BENZO(G,H,I)PERYLENE	0.18 U	MG/KG	0.18	8270	03/24/2021 12:10	E83182
BENZO(K)FLUORANTHENE	0.11 U	MG/KG	0.11	8270	03/24/2021 12:10	E83182
CHRYSENE	0.17 U	MG/KG	0.17	8270	03/24/2021 12:10	E83182
DIBENZO(A,H)ANTHRACENE	0.14 U	MG/KG	0.14	8270	03/24/2021 12:10	E83182
FLUORANTHENE	0.17 U	MG/KG	0.17	8270	03/24/2021 12:10	E83182
FLUORENE	0.13 U	MG/KG	0.13	8270	03/24/2021 12:10	E83182
INDENO(1,2,3-CD)PYRENE	0.17 U	MG/KG	0.17	8270	03/24/2021 12:10	E83182
NAPHTHALENE	0.18 U	MG/KG	0.18	8270	03/24/2021 12:10	E83182
PHENANTHRENE	0.12 U	MG/KG	0.12	8270	03/24/2021 12:10	E83182
PYRENE	0.17 U	MG/KG	0.17	8270	03/24/2021 12:10	E83182
TOTAL SOLIDS	15.5	% DRY WT	0.1	SM2540G	03/17/2021 15:47	TG
TOTAL ORGANIC CARBON	380000	MG/KG	3840	USACOE	03/29/2021 10:30	E87156

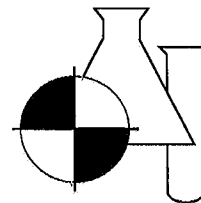
All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

Submission Number: 21030829	Sample Date: 03/12/2021
Sample Number: 003	Sample Time: 1044
Sample Description: 210312-3	Sample Method: Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.009	% DRY WT	0.0002	350.1	03/18/2021 14:38	CW
ORGANIC NITROGEN	1.63	% DRY WT	0.0002	351-350.1	03/18/2021 14:38	IE/CW
TOTAL KJELDAHL NITROGEN	1.64	% DRY WT	0.005	351.2	03/17/2021 16:44	IE
TOTAL PHOSPHORUS AS P	0.080	% DRY WT	0.004	365.3	03/16/2021 17:41	CC
ARSENIC	1.85 U	MG/KG	1.85	6010	03/19/2021 13:50	KP/BLB
BARIUM	7.76	MG/KG	0.615	6010	03/19/2021 13:50	KP/BLB
CADMIUM	1.39	MG/KG	0.277	6010	03/19/2021 13:50	KP/BLB
CALCIUM	5963	MG/KG	9.22	6010	03/19/2021 13:50	KP/BLB
CHROMIUM	8.76	MG/KG	0.615	6010	03/19/2021 13:50	KP/BLB
COPPER	11.7	MG/KG	1.23	6010	03/19/2021 13:50	KP/BLB
LEAD	15.6	MG/KG	0.922	6010	03/19/2021 13:50	KP/BLB
MOLYBDENUM	4.46	MG/KG	0.615	6010	03/19/2021 13:50	KP/BLB
NICKEL	2.09	MG/KG	0.363	6010	03/19/2021 13:50	KP/BLB
SELENIUM	3.13 I	MG/KG	1.17	6010	03/19/2021 13:50	KP/BLB
SILVER	0.339 I	MG/KG	0.154	6010	03/19/2021 13:50	KP/BLB
ZINC	73.4	MG/KG	0.430	6010	03/19/2021 13:50	KP/BLB
MERCURY	0.14 U	MG/KG	0.14	7471	03/19/2021 10:18	KP/PN
1-METHYLNAPHTHALENE	0.16 U	MG/KG	0.16	8270	03/24/2021 12:32	E83182
2-METHYLNAPHTHALENE	0.16 U	MG/KG	0.16	8270	03/24/2021 12:32	E83182
ACENAPHTHENE	0.14 U	MG/KG	0.14	8270	03/24/2021 12:32	E83182
ACENAPHTHYLENE	0.14 U	MG/KG	0.14	8270	03/24/2021 12:32	E83182
ANTHRACENE	0.12 U	MG/KG	0.12	8270	03/24/2021 12:32	E83182

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BENZO(A)ANTHRACENE	0.16 U	MG/KG	0.16	8270	03/24/2021	12:32	E83182
BENZO(A)PYRENE	0.17 U	MG/KG	0.17	8270	03/24/2021	12:32	E83182
BENZO(B)FLUORANTHENE	0.16 U	MG/KG	0.16	8270	03/24/2021	12:32	E83182
BENZO(G,H,I)PERYLENE	0.18 U	MG/KG	0.18	8270	03/24/2021	12:32	E83182
BENZO(K)FLUORANTHENE	0.11 U	MG/KG	0.11	8270	03/24/2021	12:32	E83182
CHRYSENE	0.17 U	MG/KG	0.17	8270	03/24/2021	12:32	E83182
DIBENZO(A,H)ANTHRACENE	0.14 U	MG/KG	0.14	8270	03/24/2021	12:32	E83182
FLUORANTHENE	0.17 U	MG/KG	0.17	8270	03/24/2021	12:32	E83182
FLUORENE	0.12 U	MG/KG	0.12	8270	03/24/2021	12:32	E83182
INDENO(1,2,3-CD)PYRENE	0.17 U	MG/KG	0.17	8270	03/24/2021	12:32	E83182
NAPHTHALENE	0.18 U	MG/KG	0.18	8270	03/24/2021	12:32	E83182
PHENANTHRENE	0.12 U	MG/KG	0.12	8270	03/24/2021	12:32	E83182
PYRENE	0.17 U	MG/KG	0.17	8270	03/24/2021	12:32	E83182
TOTAL SOLIDS	16.6	% DRY WT	0.1	SM2540G	03/17/2021	15:47	TG
TOTAL ORGANIC CARBON	405000	MG/KG	3500	USACOE	03/29/2021	10:55	E87156

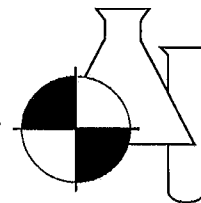
All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

Submission Number:	21030829	Sample Date:	03/12/2021
Sample Number:	004	Sample Time:	1144
Sample Description:	210312-4	Sample Method:	Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.006	% DRY WT	0.0002	350.1	03/18/2021 14:39	CW
ORGANIC NITROGEN	2.03	% DRY WT	0.0002	351-350.1	03/18/2021 14:39	IE/CW
TOTAL KJELDAHL NITROGEN	2.04	% DRY WT	0.005	351.2	03/17/2021 16:45	IE
TOTAL PHOSPHORUS AS P	0.125	% DRY WT	0.004	365.3	03/16/2021 17:42	CC
ARSENIC	26.9	MG/KG	2.01	6010	03/19/2021 13:54	KP/BLB
BARIUM	147	MG/KG	0.667	6010	03/19/2021 13:54	KP/BLB
CADMIUM	2.59	MG/KG	0.300	6010	03/19/2021 13:54	KP/BLB
CALCIUM	160698	MG/KG	10.0	6010	03/19/2021 13:54	KP/BLB
CHROMIUM	79.1	MG/KG	0.667	6010	03/19/2021 13:54	KP/BLB
COPPER	685	MG/KG	1.33	6010	03/19/2021 13:54	KP/BLB
LEAD	57.1	MG/KG	1.00	6010	03/19/2021 13:54	KP/BLB
MOLYBDENUM	27.8	MG/KG	0.667	6010	03/19/2021 13:54	KP/BLB
NICKEL	35.0	MG/KG	0.393	6010	03/19/2021 13:54	KP/BLB
SELENIUM	1.27 U	MG/KG	1.27	6010	03/19/2021 13:54	KP/BLB
SILVER	2.23	MG/KG	0.167	6010	03/19/2021 13:54	KP/BLB
ZINC	1544	MG/KG	0.467	6010	03/19/2021 13:54	KP/BLB
MERCURY	0.908	MG/KG	0.16	7471	03/19/2021 10:18	KP/PN
1-METHYLNAPHTHALENE	0.17 U	MG/KG	0.17	8270	03/24/2021 12:54	E83182
2-METHYLNAPHTHALENE	0.17 U	MG/KG	0.17	8270	03/24/2021 12:54	E83182
ACENAPHTHENE	0.14 U	MG/KG	0.14	8270	03/24/2021 12:54	E83182

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ACENAPHTHYLENE	0.14 U	MG/KG	0.14	8270	03/24/2021	12:54	E83182
ANTHRACENE	0.13 U	MG/KG	0.13	8270	03/24/2021	12:54	E83182
BENZO(A)ANTHRACENE	0.42	MG/KG	0.17	8270	03/24/2021	12:54	E83182
BENZO(A)PYRENE	0.43	MG/KG	0.17	8270	03/24/2021	12:54	E83182
BENZO(B)FLUORANTHENE	0.68	MG/KG	0.17	8270	03/24/2021	12:54	E83182
BENZO(G,H,I)PERYLENE	0.33	MG/KG	0.18	8270	03/24/2021	12:54	E83182
BENZO(K)FLUORANTHENE	0.22	MG/KG	0.12	8270	03/24/2021	12:54	E83182
CHRYSENE	0.41	MG/KG	0.18	8270	03/24/2021	12:54	E83182
DIBENZO(A,H)ANTHRACENE	0.14 U	MG/KG	0.14	8270	03/24/2021	12:54	E83182
FLUORANTHENE	0.86	MG/KG	0.18	8270	03/24/2021	12:54	E83182
FLUORENE	0.13 U	MG/KG	0.13	8270	03/24/2021	12:54	E83182
INDENO(1,2,3-CD)PYRENE	0.18 U	MG/KG	0.18	8270	03/24/2021	12:54	E83182
NAPHTHALENE	0.18 U	MG/KG	0.18	8270	03/24/2021	12:54	E83182
PHENANTHRENE	0.12 I	MG/KG	0.12	8270	03/24/2021	12:54	E83182
PYRENE	0.71	MG/KG	0.17	8270	03/24/2021	12:54	E83182
TOTAL SOLIDS	15.0	% DRY WT	0.1	SM2540G	03/17/2021	15:47	TG
TOTAL ORGANIC CARBON	442000	MG/KG	3300	USACOE	03/29/2021	12:09	E87156

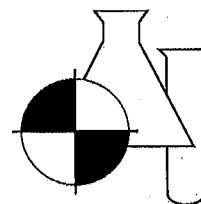
All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

Submission Number:	21030829	Sample Date:	03/12/2021
Sample Number:	005	Sample Time:	1157
Sample Description:	210312-5	Sample Method:	Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.007	% DRY WT	0.0002	350.1	03/18/2021 14:41	CW
ORGANIC NITROGEN	2.25	% DRY WT	0.0002	351-350.1	03/18/2021 14:41	IE/CW
TOTAL KJELDAHL NITROGEN	2.26	% DRY WT	0.005	351.2	03/17/2021 16:46	IE
TOTAL PHOSPHORUS AS P	0.167	% DRY WT	0.004	365.3	03/16/2021 17:43	CC
ARSENIC	6.78 I	MG/KG	2.03	6010	03/19/2021 13:59	KP/BLB
BARIUM	41.5	MG/KG	0.674	6010	03/19/2021 13:59	KP/BLB
CADMIUM	1.56	MG/KG	0.303	6010	03/19/2021 13:59	KP/BLB
CALCIUM	58714	MG/KG	10.1	6010	03/19/2021 13:59	KP/BLB
CHROMIUM	23.8	MG/KG	0.674	6010	03/19/2021 13:59	KP/BLB
COPPER	217	MG/KG	1.35	6010	03/19/2021 13:59	KP/BLB
LEAD	22.1	MG/KG	1.01	6010	03/19/2021 13:59	KP/BLB
MOLYBDENUM	20.0	MG/KG	0.674	6010	03/19/2021 13:59	KP/BLB
NICKEL	11.1	MG/KG	0.398	6010	03/19/2021 13:59	KP/BLB
SELENIUM	1.28 U	MG/KG	1.28	6010	03/19/2021 13:59	KP/BLB
SILVER	1.55	MG/KG	0.169	6010	03/19/2021 13:59	KP/BLB
ZINC	608	MG/KG	0.472	6010	03/19/2021 13:59	KP/BLB
MERCURY	0.628	MG/KG	0.17	7471	03/19/2021 10:18	KP/PN
1-METHYLNAPHTHALENE	0.18 U	MG/KG	0.18	8270	03/24/2021 13:15	E83182

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2-METHYLNAPHTHALENE	0.18 U	MG/KG	0.18	8270	03/24/2021	13:15	E83182
ACENAPHTHENE	0.15 U	MG/KG	0.15	8270	03/24/2021	13:15	E83182
ACENAPHTHYLENE	0.15 U	MG/KG	0.15	8270	03/24/2021	13:15	E83182
ANTHRACENE	0.14 U	MG/KG	0.14	8270	03/24/2021	13:15	E83182
BENZO(A)ANTHRACENE	0.33	MG/KG	0.18	8270	03/24/2021	13:15	E83182
BENZO(A)PYRENE	0.27	MG/KG	0.18	8270	03/24/2021	13:15	E83182
BENZO(B)FLUORANTHENE	0.48	MG/KG	0.18	8270	03/24/2021	13:15	E83182
BENZO(G,H,I)PERYLENE	0.25	MG/KG	0.20	8270	03/24/2021	13:15	E83182
BENZO(K)FLUORANTHENE	0.18 I	MG/KG	0.13	8270	03/24/2021	13:15	E83182
CHRYSENE	0.33	MG/KG	0.19	8270	03/24/2021	13:15	E83182
DIBENZO(A,H)ANTHRACENE	0.16 U	MG/KG	0.16	8270	03/24/2021	13:15	E83182
FLUORANTHENE	0.52	MG/KG	0.19	8270	03/24/2021	13:15	E83182
FLUORENE	0.14 U	MG/KG	0.14	8270	03/24/2021	13:15	E83182
INDENO(1,2,3-CD)PYRENE	0.19 U	MG/KG	0.19	8270	03/24/2021	13:15	E83182
NAPHTHALENE	0.20 U	MG/KG	0.20	8270	03/24/2021	13:15	E83182
PHENANTHRENE	0.13 U	MG/KG	0.13	8270	03/24/2021	13:15	E83182
PYRENE	0.45	MG/KG	0.18	8270	03/24/2021	13:15	E83182
TOTAL SOLIDS	14.4	% DRY WT	0.1	SM2540G	03/17/2021	15:47	TG
TOTAL ORGANIC CARBON	510000	MG/KG	4390	USACOE	03/29/2021	12:34	E87156

All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

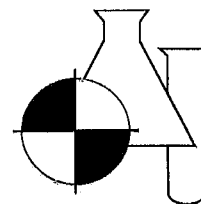
Submission Number: 21030829
 Sample Number: 006
 Sample Description: 210312-6

Sample Date: 03/12/2021
 Sample Time: 1208
 Sample Method: Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.009	% DRY WT	0.0002	350.1	03/18/2021 14:43	CW
ORGANIC NITROGEN	1.91	% DRY WT	0.0002	351-350.1	03/18/2021 14:43	IE/CW
TOTAL KJELDAHL NITROGEN	1.92	% DRY WT	0.005	351.2	03/17/2021 16:47	IE
TOTAL PHOSPHORUS AS P	0.102	% DRY WT	0.004	365.3	03/16/2021 17:44	CC
ARSENIC	4.08	MG/KG	1.78	6010	03/19/2021 14:04	KP/BLB
BARIUM	9.86	MG/KG	0.590	6010	03/19/2021 14:04	KP/BLB
CADMIUM	1.49	MG/KG	0.265	6010	03/19/2021 14:04	KP/BLB
CALCIUM	8091	MG/KG	8.85	6010	03/19/2021 14:04	KP/BLB
CHROMIUM	16.2	MG/KG	0.590	6010	03/19/2021 14:04	KP/BLB
COPPER	55.6	MG/KG	1.18	6010	03/19/2021 14:04	KP/BLB
LEAD	12.4	MG/KG	0.885	6010	03/19/2021 14:04	KP/BLB
MOLYBDENUM	9.19	MG/KG	0.590	6010	03/19/2021 14:04	KP/BLB
NICKEL	4.48	MG/KG	0.348	6010	03/19/2021 14:04	KP/BLB
SELENIUM	2.50 I	MG/KG	1.12	6010	03/19/2021 14:04	KP/BLB
SILVER	0.871	MG/KG	0.147	6010	03/19/2021 14:04	KP/BLB
ZINC	127	MG/KG	0.413	6010	03/19/2021 14:04	KP/BLB

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MERCURY	0.376 I	MG/KG	0.16	7471	03/19/2021	10:18	KP/PN
1-METHYLNAPHTHALENE	0.18 U	MG/KG	0.18	8270	03/24/2021	13:37	E83182
2-METHYLNAPHTHALENE	0.18 U	MG/KG	0.18	8270	03/24/2021	13:37	E83182
ACENAPHTHENE	0.15 U	MG/KG	0.15	8270	03/24/2021	13:37	E83182
ACENAPHTHYLENE	0.15 U	MG/KG	0.15	8270	03/24/2021	13:37	E83182
ANTHRACENE	0.13 U	MG/KG	0.13	8270	03/24/2021	13:37	E83182
BENZO(A)ANTHRACENE	0.18 U	MG/KG	0.18	8270	03/24/2021	13:37	E83182
BENZO(A)PYRENE	0.18 U	MG/KG	0.18	8270	03/24/2021	13:37	E83182
BENZO(B)FLUORANTHENE	0.22	MG/KG	0.18	8270	03/24/2021	13:37	E83182
BENZO(G,H,I)PERYLENE	0.19 U	MG/KG	0.19	8270	03/24/2021	13:37	E83182
BENZO(K)FLUORANTHENE	0.12 U	MG/KG	0.12	8270	03/24/2021	13:37	E83182
CHRYSENE	0.19 U	MG/KG	0.19	8270	03/24/2021	13:37	E83182
DIBENZO(A,H)ANTHRACENE	0.15 U	MG/KG	0.15	8270	03/24/2021	13:37	E83182
FLUORANTHENE	0.24	MG/KG	0.19	8270	03/24/2021	13:37	E83182
FLUORENE	0.13 U	MG/KG	0.13	8270	03/24/2021	13:37	E83182
INDENO(1,2,3-CD)PYRENE	0.19 U	MG/KG	0.19	8270	03/24/2021	13:37	E83182
NAPHTHALENE	0.19 U	MG/KG	0.19	8270	03/24/2021	13:37	E83182
PHENANTHRENE	0.13 U	MG/KG	0.13	8270	03/24/2021	13:37	E83182
PYRENE	0.21	MG/KG	0.18	8270	03/24/2021	13:37	E83182
TOTAL SOLIDS	15.0	% DRY WT	0.1	SM2540G	03/17/2021	15:47	TG
TOTAL ORGANIC CARBON	431000	MG/KG	3490	USACOE	03/29/2021	13:33	E87156

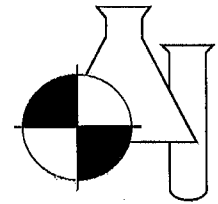
All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

Submission Number: 21030829	Sample Date: 03/12/2021
Sample Number: 007	Sample Time: 1242
Sample Description: 210312-7	Sample Method: Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.002	% DRY WT	0.0002	350.1	03/18/2021 14:45	CW
ORGANIC NITROGEN	0.316	% DRY WT	0.0002	351-350.1	03/18/2021 14:45	IE/CW
TOTAL KJELDAHL NITROGEN	0.318	% DRY WT	0.005	351.2	03/17/2021 16:53	IE
TOTAL PHOSPHORUS AS P	0.055	% DRY WT	0.004	365.3	03/16/2021 18:04	CC
ARSENIC	1.28 I	MG/KG	0.565	6010	03/19/2021 14:09	KP/BLB
BARIUM	11.3	MG/KG	0.188	6010	03/19/2021 14:09	KP/BLB
CADMIUM	0.414	MG/KG	0.085	6010	03/19/2021 14:09	KP/BLB
CALCIUM	37274	MG/KG	2.82	6010	03/19/2021 14:09	KP/BLB
CHROMIUM	9.96	MG/KG	0.188	6010	03/19/2021 14:09	KP/BLB
COPPER	14.4	MG/KG	0.376	6010	03/19/2021 14:09	KP/BLB
LEAD	9.48	MG/KG	0.282	6010	03/19/2021 14:09	KP/BLB
MOLYBDENUM	0.239 I	MG/KG	0.188	6010	03/19/2021 14:09	KP/BLB
NICKEL	2.21	MG/KG	0.111	6010	03/19/2021 14:09	KP/BLB
SELENIUM	0.357 U	MG/KG	0.357	6010	03/19/2021 14:09	KP/BLB

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SILVER	7.22	MG/KG	0.047	6010	03/19/2021	14:09	KP/BLB
ZINC	38.7	MG/KG	0.131	6010	03/19/2021	14:09	KP/BLB
MERCURY	0.145 I	MG/KG	0.05	7471	03/19/2021	10:18	KP/PN
1-METHYLNAPHTHALENE	0.074 U	MG/KG	0.074	8270	03/24/2021	13:58	E83182
2-METHYLNAPHTHALENE	0.074 U	MG/KG	0.074	8270	03/24/2021	13:58	E83182
ACENAPHTHENE	0.062 U	MG/KG	0.062	8270	03/24/2021	13:58	E83182
ACENAPHTHYLENE	0.062 U	MG/KG	0.062	8270	03/24/2021	13:58	E83182
ANTHRACENE	0.057 U	MG/KG	0.057	8270	03/24/2021	13:58	E83182
BENZO(A)ANTHRACENE	0.074 U	MG/KG	0.074	8270	03/24/2021	13:58	E83182
BENZO(A)PYRENE	0.077 U	MG/KG	0.077	8270	03/24/2021	13:58	E83182
BENZO(B)FLUORANTHENE	0.074 U	MG/KG	0.074	8270	03/24/2021	13:58	E83182
BENZO(G,H,I)PERYLENE	0.082 U	MG/KG	0.082	8270	03/24/2021	13:58	E83182
BENZO(K)FLUORANTHENE	0.052 U	MG/KG	0.052	8270	03/24/2021	13:58	E83182
CHRYSENE	0.079 U	MG/KG	0.079	8270	03/24/2021	13:58	E83182
DIBENZO(A,H)ANTHRACENE	0.064 U	MG/KG	0.064	8270	03/24/2021	13:58	E83182
FLUORANTHENE	0.079 U	MG/KG	0.079	8270	03/24/2021	13:58	E83182
FLUORENE	0.057 U	MG/KG	0.057	8270	03/24/2021	13:58	E83182
INDENO(1,2,3-CD)PYRENE	0.079 U	MG/KG	0.079	8270	03/24/2021	13:58	E83182
NAPHTHALENE	0.082 U	MG/KG	0.082	8270	03/24/2021	13:58	E83182
PHENANTHRENE	0.054 U	MG/KG	0.054	8270	03/24/2021	13:58	E83182
PYRENE	0.077 U	MG/KG	0.077	8270	03/24/2021	13:58	E83182
TOTAL SOLIDS	48.4	% DRY WT	0.1	SM2540G	03/17/2021	15:47	TG
TOTAL ORGANIC CARBON	214000	MG/KG	2670	USACOE	03/29/2021	13:58	E87156

All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

Submission Number: 21030829

Sample Number: 008

Sample Description: 210312-8

Sample Date: 03/12/2021

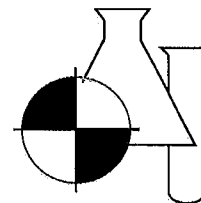
Sample Time: 1232

Sample Method: Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.006	% DRY WT	0.0002	350.1	03/19/2021 13:13	CW
ORGANIC NITROGEN	1.34	% DRY WT	0.0002	351-350.1	03/19/2021 13:13	IE/CW
TOTAL KJELDAHL NITROGEN	1.35	% DRY WT	0.005	351.2	03/17/2021 16:54	IE
TOTAL PHOSPHORUS AS P	0.101	% DRY WT	0.004	365.3	03/16/2021 18:05	CC
ARSENIC	1.58 U	MG/KG	1.58	6010	03/19/2021 14:50	KP/BLB
BARIUM	13.5	MG/KG	0.526	6010	03/19/2021 14:50	KP/BLB
CADMIUM	0.774 I	MG/KG	0.237	6010	03/19/2021 14:50	KP/BLB
CALCIUM	6895	MG/KG	7.89	6010	03/19/2021 14:50	KP/BLB
CHROMIUM	20.0	MG/KG	0.526	6010	03/19/2021 14:50	KP/BLB
COPPER	43.8	MG/KG	1.05	6010	03/19/2021 14:50	KP/BLB
LEAD	11.6	MG/KG	0.789	6010	03/19/2021 14:50	KP/BLB
MOLYBDENUM	4.57	MG/KG	0.526	6010	03/19/2021 14:50	KP/BLB

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NICKEL	4.41	MG/KG	0.310	6010	03/19/2021	14:50	KP/BLB
SELENIUM	4.91	MG/KG	0.999	6010	03/19/2021	14:50	KP/BLB
SILVER	1.02	MG/KG	0.131	6010	03/19/2021	14:50	KP/BLB
ZINC	43.0	MG/KG	0.368	6010	03/19/2021	14:50	KP/BLB
MERCURY	0.315 I	MG/KG	0.13	7471	03/19/2021	10:18	KP/PN
1-METHYLNAPHTHALENE	0.24 U	MG/KG	0.24	8270	03/24/2021	14:20	E83182
2-METHYLNAPHTHALENE	0.24 U	MG/KG	0.24	8270	03/24/2021	14:20	E83182
ACENAPHTHENE	0.20 U	MG/KG	0.20	8270	03/24/2021	14:20	E83182
ACENAPHTHYLENE	0.20 U	MG/KG	0.20	8270	03/24/2021	14:20	E83182
ANTHRACENE	0.19 U	MG/KG	0.19	8270	03/24/2021	14:20	E83182
BENZO(A)ANTHRACENE	0.24 U	MG/KG	0.24	8270	03/24/2021	14:20	E83182
BENZO(A)PYRENE	0.25 U	MG/KG	0.25	8270	03/24/2021	14:20	E83182
BENZO(B)FLUORANTHENE	0.24 U	MG/KG	0.24	8270	03/24/2021	14:20	E83182
BENZO(G,H,I)PERYLENE	0.27 U	MG/KG	0.27	8270	03/24/2021	14:20	E83182
BENZO(K)FLUORANTHENE	0.17 U	MG/KG	0.17	8270	03/24/2021	14:20	E83182
CHRYSENE	0.26 U	MG/KG	0.26	8270	03/24/2021	14:20	E83182
DIBENZO(A,H)ANTHRACENE	0.21 U	MG/KG	0.21	8270	03/24/2021	14:20	E83182
FLUORANTHENE	0.26 U	MG/KG	0.26	8270	03/24/2021	14:20	E83182
FLUORENE	0.19 U	MG/KG	0.19	8270	03/24/2021	14:20	E83182
INDENO(1,2,3-CD)PYRENE	0.26 U	MG/KG	0.26	8270	03/24/2021	14:20	E83182
NAPHTHALENE	0.27 U	MG/KG	0.27	8270	03/24/2021	14:20	E83182
PHENANTHRENE	0.18 U	MG/KG	0.18	8270	03/24/2021	14:20	E83182
PYRENE	0.25 U	MG/KG	0.25	8270	03/24/2021	14:20	E83182
TOTAL SOLIDS	19.4	% DRY WT	0.1	SM2540G	03/17/2021	15:47	TG
TOTAL ORGANIC CARBON	430000	MG/KG	2570	USACOE	03/30/2021	07:24	E87156

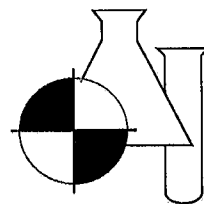
All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

Submission Number:	21030829	Sample Date:	03/12/2021
Sample Number:	009	Sample Time:	1225
Sample Description:	210312-9	Sample Method:	Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.007	% DRY WT	0.0002	350.1	03/19/2021 13:15	CW
ORGANIC NITROGEN	1.80	% DRY WT	0.0002	351-350.1	03/19/2021 13:15	IE/CW
TOTAL KJELDAHL NITROGEN	1.81	% DRY WT	0.005	351.2	03/17/2021 16:55	IE
TOTAL PHOSPHORUS AS P	0.100	% DRY WT	0.004	365.3	03/16/2021 18:06	CC
ARSENIC	1.83 U	MG/KG	1.83	6010	03/19/2021 15:10	KP/BLB
BARIUM	11.9	MG/KG	0.609	6010	03/19/2021 15:10	KP/BLB
CADMIUM	1.21	MG/KG	0.274	6010	03/19/2021 15:10	KP/BLB
CALCIUM	13732	MG/KG	9.14	6010	03/19/2021 15:10	KP/BLB
CHROMIUM	11.2	MG/KG	0.609	6010	03/19/2021 15:10	KP/BLB
COPPER	68.2	MG/KG	1.22	6010	03/19/2021 15:10	KP/BLB

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LEAD	9.05	MG/KG	0.914	6010	03/19/2021	15:10	KP/BLB
MOLYBDENUM	10.8	MG/KG	0.609	6010	03/19/2021	15:10	KP/BLB
NICKEL	3.04	MG/KG	0.359	6010	03/19/2021	15:10	KP/BLB
SELENIUM	3.27	MG/KG	1.16	6010	03/19/2021	15:10	KP/BLB
SILVER	0.974	MG/KG	0.152	6010	03/19/2021	15:10	KP/BLB
ZINC	167	MG/KG	0.426	6010	03/19/2021	15:10	KP/BLB
MERCURY	0.275 I	MG/KG	0.17	7471	03/19/2021	10:18	KP/PN
1-METHYLNAPHTHALENE	0.29 U	MG/KG	0.29	8270	03/25/2021	18:08	E83182
2-METHYLNAPHTHALENE	0.29 U	MG/KG	0.29	8270	03/25/2021	18:08	E83182
ACENAPHTHENE	0.24 U	MG/KG	0.24	8270	03/25/2021	18:08	E83182
ACENAPHTHYLENE	0.24 U	MG/KG	0.24	8270	03/25/2021	18:08	E83182
ANTHRACENE	0.22 U	MG/KG	0.22	8270	03/25/2021	18:08	E83182
BENZO(A)ANTHRACENE	0.29 U	MG/KG	0.29	8270	03/25/2021	18:08	E83182
BENZO(A)PYRENE	0.30 U	MG/KG	0.30	8270	03/25/2021	18:08	E83182
BENZO(B)FLUORANTHENE	0.29 U	MG/KG	0.29	8270	03/25/2021	18:08	E83182
BENZO(G,H,I)PERYLENE	0.32 U	MG/KG	0.32	8270	03/25/2021	18:08	E83182
BENZO(K)FLUORANTHENE	0.20 U	MG/KG	0.20	8270	03/25/2021	18:08	E83182
CHRYSENE	0.31 U	MG/KG	0.31	8270	03/25/2021	18:08	E83182
DIBENZO(A,H)ANTHRACENE	0.25 U	MG/KG	0.25	8270	03/25/2021	18:08	E83182
FLUORANTHENE	0.31 U	MG/KG	0.31	8270	03/25/2021	18:08	E83182
FLUORENE	0.22 U	MG/KG	0.22	8270	03/25/2021	18:08	E83182
INDENO(1,2,3-CD)PYRENE	0.31 U	MG/KG	0.31	8270	03/25/2021	18:08	E83182
NAPHTHALENE	0.32 U	MG/KG	0.32	8270	03/25/2021	18:08	E83182
PHENANTHRENE	0.21 U	MG/KG	0.21	8270	03/25/2021	18:08	E83182
PYRENE	0.30 U	MG/KG	0.30	8270	03/25/2021	18:08	E83182
TOTAL SOLIDS	14.4	% DRY WT	0.1	SM2540G	03/17/2021	15:47	TG
TOTAL ORGANIC CARBON	386000	MG/KG	4220	USACOE	03/30/2021	07:49	E87156

All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

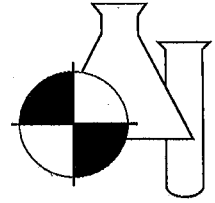
Submission Number: 21030829
 Sample Number: 010
 Sample Description: 210312-10C

Sample Date: 03/12/2021
 Sample Time: 1257
 Sample Method: Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.009	% DRY WT	0.0002	350.1	03/19/2021 13:34	CW
ORGANIC NITROGEN	1.59	% DRY WT	0.0002	351-350.1	03/19/2021 13:34	IE/CW
TOTAL KJELDAHL NITROGEN	1.60	% DRY WT	0.005	351.2	03/17/2021 16:56	IE
TOTAL PHOSPHORUS AS P	0.208	% DRY WT	0.004	365.3	03/16/2021 18:07	CC
ARSENIC	3.510 U	MG/KG	3.510	6010	03/19/2021 15:14	KP/BLB
BARIUM	7.42	MG/KG	1.17	6010	03/19/2021 15:14	KP/BLB
CADMIUM	1.91 I	MG/KG	0.525	6010	03/19/2021 15:14	KP/BLB
CALCIUM	8271	MG/KG	17.5	6010	03/19/2021 15:14	KP/BLB

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CHROMIUM	11.0	MG/KG	1.17	6010	03/19/2021 15:14	KP/BLB
COPPER	51.5	MG/KG	2.33	6010	03/19/2021 15:14	KP/BLB
LEAD	6.28 I	MG/KG	1.75	6010	03/19/2021 15:14	KP/BLB
MOLYBDENUM	22.1	MG/KG	1.17	6010	03/19/2021 15:14	KP/BLB
NICKEL	2.80	MG/KG	0.688	6010	03/19/2021 15:14	KP/BLB
SELENIUM	2.38 I	MG/KG	2.22	6010	03/19/2021 15:14	KP/BLB
SILVER	0.992 I	MG/KG	0.292	6010	03/19/2021 15:14	KP/BLB
ZINC	104	MG/KG	0.816	6010	03/19/2021 15:14	KP/BLB
MERCURY	0.371 I	MG/KG	0.28	7471	03/19/2021 10:18	KP/PN
1-METHYLNAPHTHALENE	0.34 U	MG/KG	0.34	8270	03/24/2021 15:03	E83182
2-METHYLNAPHTHALENE	0.34 U	MG/KG	0.34	8270	03/24/2021 15:03	E83182
ACENAPHTHENE	0.28 U	MG/KG	0.28	8270	03/24/2021 15:03	E83182
ACENAPHTHYLENE	0.28 U	MG/KG	0.28	8270	03/24/2021 15:03	E83182
ANTHRACENE	0.26 U	MG/KG	0.26	8270	03/24/2021 15:03	E83182
BENZO(A)ANTHRACENE	0.34 U	MG/KG	0.34	8270	03/24/2021 15:03	E83182
BENZO(A)PYRENE	0.35 U	MG/KG	0.35	8270	03/24/2021 15:03	E83182
BENZO(B)FLUORANTHENE	0.34 U	MG/KG	0.34	8270	03/24/2021 15:03	E83182
BENZO(G,H,I)PERYLENE	0.37 U	MG/KG	0.37	8270	03/24/2021 15:03	E83182
BENZO(K)FLUORANTHENE	0.24 U	MG/KG	0.24	8270	03/24/2021 15:03	E83182
CHRYSENE	0.36 U	MG/KG	0.36	8270	03/24/2021 15:03	E83182
DIBENZO(A,H)ANTHRACENE	0.29 U	MG/KG	0.29	8270	03/24/2021 15:03	E83182
FLUORANTHENE	0.36 U	MG/KG	0.36	8270	03/24/2021 15:03	E83182
FLUORENE	0.26 U	MG/KG	0.26	8270	03/24/2021 15:03	E83182
INDENO(1,2,3-CD)PYRENE	0.36 U	MG/KG	0.36	8270	03/24/2021 15:03	E83182
NAPHTHALENE	0.37 U	MG/KG	0.37	8270	03/24/2021 15:03	E83182
PHENANTHRENE	0.25 U	MG/KG	0.25	8270	03/24/2021 15:03	E83182
PYRENE	0.35 U	MG/KG	0.35	8270	03/24/2021 15:03	E83182
TOTAL SOLIDS	8.75	% DRY WT	0.1	SM2540G	03/17/2021 15:47	TG
TOTAL ORGANIC CARBON	459000	MG/KG	3910	USACOE	03/30/2021 08:14	E87156

All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

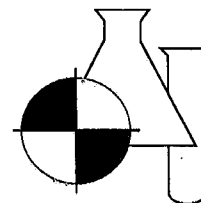
Submission Number: 21030829
 Sample Number: 011
 Sample Description: 210312-11C

Sample Date: 03/12/2021
 Sample Time: 1306
 Sample Method: Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.010	% DRY WT	0.0002	350.1	03/19/2021 13:35	CW
ORGANIC NITROGEN	1.47	% DRY WT	0.0002	351-350.1	03/19/2021 13:35	IE/CW
TOTAL KJELDAHL NITROGEN	1.48	% DRY WT	0.005	351.2	03/17/2021 16:57	IE
TOTAL PHOSPHORUS AS P	0.175	% DRY WT	0.004	365.3	03/16/2021 18:09	CC
ARSENIC	4.82 I	MG/KG	2.00	6010	03/19/2021 15:19	KP/BLB
BARIUM	32.1	MG/KG	0.664	6010	03/19/2021 15:19	KP/BLB

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CADMIUM	1.71	MG/KG	0.299	6010	03/19/2021	15:19	KP/BLB
CALCIUM	10855	MG/KG	9.97	6010	03/19/2021	15:19	KP/BLB
CHROMIUM	64.1	MG/KG	0.664	6010	03/19/2021	15:19	KP/BLB
COPPER	131	MG/KG	1.33	6010	03/19/2021	15:19	KP/BLB
LEAD	31.7	MG/KG	0.997	6010	03/19/2021	15:19	KP/BLB
MOLYBDENUM	6.05	MG/KG	0.664	6010	03/19/2021	15:19	KP/BLB
NICKEL	13.7	MG/KG	0.392	6010	03/19/2021	15:19	KP/BLB
SELENIUM	5.87	MG/KG	1.26	6010	03/19/2021	15:19	KP/BLB
SILVER	2.36	MG/KG	0.166	6010	03/19/2021	15:19	KP/BLB
ZINC	99.8	MG/KG	0.465	6010	03/19/2021	15:19	KP/BLB
MERCURY	0.941	MG/KG	0.17	7471	03/19/2021	10:18	KP/PN
1-METHYLNAPHTHALENE	0.29 U	MG/KG	0.29	8270	03/24/2021	15:24	E83182
2-METHYLNAPHTHALENE	0.29 U	MG/KG	0.29	8270	03/24/2021	15:24	E83182
ACENAPHTHENE	0.24 U	MG/KG	0.24	8270	03/24/2021	15:24	E83182
ACENAPHTHYLENE	0.24 U	MG/KG	0.24	8270	03/24/2021	15:24	E83182
ANTHRACENE	0.22 U	MG/KG	0.22	8270	03/24/2021	15:24	E83182
BENZO(A)ANTHRACENE	0.29 U	MG/KG	0.29	8270	03/24/2021	15:24	E83182
BENZO(A)PYRENE	0.30 U	MG/KG	0.30	8270	03/24/2021	15:24	E83182
BENZO(B)FLUORANTHENE	0.29 U	MG/KG	0.29	8270	03/24/2021	15:24	E83182
BENZO(G,H,I)PERYLENE	0.32 U	MG/KG	0.32	8270	03/24/2021	15:24	E83182
BENZO(K)FLUORANTHENE	0.20 U	MG/KG	0.20	8270	03/24/2021	15:24	E83182
CHRYSENE	0.31 U	MG/KG	0.31	8270	03/24/2021	15:24	E83182
DIBENZO(A,H)ANTHRACENE	0.25 U	MG/KG	0.25	8270	03/24/2021	15:24	E83182
FLUORANTHENE	0.31 U	MG/KG	0.31	8270	03/24/2021	15:24	E83182
FLUORENE	0.22 U	MG/KG	0.22	8270	03/24/2021	15:24	E83182
INDENO(1,2,3-CD)PYRENE	0.31 U	MG/KG	0.31	8270	03/24/2021	15:24	E83182
NAPHTHALENE	0.32 U	MG/KG	0.32	8270	03/24/2021	15:24	E83182
PHENANTHRENE	0.21 U	MG/KG	0.21	8270	03/24/2021	15:24	E83182
PYRENE	0.30 U	MG/KG	0.30	8270	03/24/2021	15:24	E83182
TOTAL SOLIDS	14.2	% DRY WT	0.1	SM2540G	03/18/2021	13:32	TG
TOTAL ORGANIC CARBON	414000	MG/KG	5300	USACOE	03/30/2021	09:04	E87156

All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

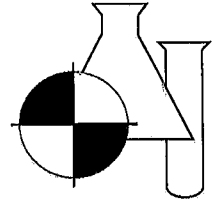
Submission Number: 21030829
 Sample Number: 012
 Sample Description: 210312-Field Blank

Sample Date: 03/12/2021
 Sample Time: 1314
 Sample Method: Grab

Parameter	Result	Units	MDL	Procedure	Analysis Date/Time	Analyst
AMMONIA NITROGEN	0.082	MG/L	0.008	350.1	03/19/2021 13:37	CW
ORGANIC NITROGEN	0.0002 U	% DRY WT	0.0002	351-350.1	03/19/2021 13:37	IE/CW
TOTAL KJELDAHL NITROGEN	0.029	MG/L	0.001	351.2	03/17/2021 16:42	IE
TOTAL PHOSPHORUS AS P	0.004 U	MG/L	0.004	365.3	03/16/2021 17:13	CC

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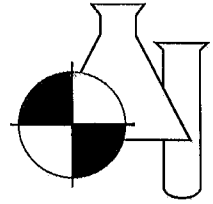
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ARSENIC	0.00602 U	MG/L	0.00602	6010	03/19/2021	11:52	KP/BLB
BARIUM	0.002 U	MG/L	0.002	6010	03/19/2021	11:52	KP/BLB
CADMIUM	0.001 I	MG/L	0.0009	6010	03/19/2021	11:52	KP/BLB
CALCIUM	0.036 I	MG/L	0.030	6010	03/19/2021	11:52	KP/BLB
CHROMIUM	0.002 U	MG/L	0.002	6010	03/19/2021	11:52	KP/BLB
COPPER	0.004 U	MG/L	0.004	6010	03/19/2021	11:52	KP/BLB
LEAD	0.003 U	MG/L	0.003	6010	03/19/2021	11:52	KP/BLB
MOLYBDENUM	0.002 U	MG/L	0.002	6010	03/19/2021	11:52	KP/BLB
NICKEL	0.00118 U	MG/L	0.00118	6010	03/19/2021	11:52	KP/BLB
SELENIUM	0.008 I	MG/L	0.0038	6010	03/19/2021	11:52	KP/BLB
SILVER	0.0005 U	MG/L	0.0005	6010	03/19/2021	11:52	KP/BLB
ZINC	0.002 I	MG/L	0.0014	6010	03/19/2021	11:52	KP/BLB
MERCURY	0.002 U	MG/L	0.002	7471	03/19/2021	10:18	KP/PN
1-METHYLNAPHTHALENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
2-METHYLNAPHTHALENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
ACENAPHTHENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
ACENAPHTHYLENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
ANTHRACENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
BENZO(A)ANTHRACENE	0.050 UC3	UG/L	0.050	8270	03/25/2021	15:59	E83182
BENZO(A)PYRENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
BENZO(B)FLUORANTHENE	0.059 U	UG/L	0.059	8270	03/25/2021	15:59	E83182
BENZO(G,H,I)PERYLENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
BENZO(K)FLUORANTHENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
CHRYSENE	0.051 U	UG/L	0.051	8270	03/25/2021	15:59	E83182
DIBENZO(A,H)ANTHRACENE	0.052 U	UG/L	0.052	8270	03/25/2021	15:59	E83182
FLUORANTHENE	0.051 U	UG/L	0.051	8270	03/25/2021	15:59	E83182
FLUORENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
INDENO(1,2,3-CD)PYRENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
NAPHTHALENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
PHENANTHRENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
PYRENE	0.050 U	UG/L	0.050	8270	03/25/2021	15:59	E83182
TOTAL ORGANIC CARBON	0.271 U	MG/L	0.271	SM5310B	03/23/2021	12:54	JW

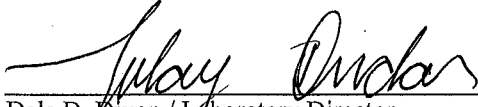
All values reported in UG/KG, MG/KG #/GRAM and MPN/GRAM are on a dry weight basis

BENCHMARK

EnviroAnalytical Inc.



NELAC Certification #E84167


Dale D. Dixon / Laboratory Director
Tülay Tanrisever - Technical Director/QC Officer
Kara Peterson - QA Officer

04/02/2021

Date

DATA QUALIFIERS THAT MAY APPLY:

I = Reported value is between the laboratory MDL and the PQL.
J2 = Estimated value. No control criteria exists for this component.
J3 = Estimated value. Quality control criteria for precision or accuracy not met.
J4 = Estimated value. Sample matrix interference suspected.
L = Off-scale high. Value is known to be > the value reported.
Q = Sample held beyond accepted hold time.
U = Analyte analyzed but not detected at the value indicated.
V = Analyte detected in sample and method blank.
Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.
Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.

NOTES:

2: SOUR calculations are based on Total Solids.
PQL = 4xMDL.

COMMENTS:

C3 = The associated laboratory control sample exhibited high bias; since the result is ND, there is no impact.

For questions and comments regarding these results, please contact us at (941) 723-9986.
Results relate only to the samples.

Benchmark EnviroAnalytical, Inc.

1711 Twelfth Street East
 Palmetto, FL 34221
 (941) 723-9986
 (941) 723-6061 fax

Client:

Environmental Science Associates

4200 W. Cypress Street
 Tampa, FL 33607
 813-207-7200
 Emily Keenan 813-207-7211 / Cell 727-433-1200 ekeenan@essassoc.com

Project Name: Longboat Key Spill Soil Analysis

Project Number:

Station ID	Sample Matrix / Sample Type	PAH's (8270 SIM)	TOC (SM5310B)	Laboratory Submission #:		Laboratory Sample #
				As Ba Ca Cd Cr Cu Pb Mo Ni Se Ag Zn Hg (7141)	TKN (351.2) NH ₃ (350.1) TP (365.3) DN (calc.)	
210312-1	Soil / Grab	1 x 250mL Amber Glass	1 x 250mL Amber Glass	Plain	Plain	1
210312-2	Soil / Grab	3/12/21 11:24	3/12/21 11:05			2
210312-3	Soil / Grab	3/12/21 10:44	3/12/21 11:44			3
210312-4	Soil / Grab	3/12/21 11:57	3/12/21 12:08			4
210312-5	Soil / Grab	3/12/21 12:42	3/12/21 12:32			5
210312-6	Soil / Grab	3/12/21 12:25	3/12/21 12:57			6
210312-7	Soil / Grab	3/12/21 13:06	3/12/21 13:19			7
210312-8	Soil / Grab					8
210312-9	Soil / Grab					9
210312-10	Soil / Grab					10
210312-11	Soil / Grab					11
210312-12	Soil / Grab					12

1 "Sample Type" is used to indicate whether the sample was a grab (G) or whether it was a composite (C).

2 "Sample Matrix" is used to indicate whether the sample is being discharged to drinking water (DW), groundwater (GW), surface water (SW), soil, sediment (SDMNT), or sludge (SLDG).

3 "Container Type" is used to indicate whether the container is plastic (P) or glass (G).

4 Sample must be refrigerated or stored in wet ice after collection. The temperature during storage should be less than or equal to 6°C (42.8°F). Under "Preservative," list any preservatives that were added to the sample container.


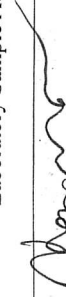
Instructions:

Each bottle has a label identifying sample ID, premeasured preservative contained in the bottle, sample type, client ID, and parameters for analysis. The following information should be added to each bottle label after collection with permanent black ink: date and time of collection, sampler's name or initials, and any field number or ID.

The effluent sample bottles for nitrogen contain premeasured 1:1 sulfuric acid (H₂SO₄). Do not rinse these bottles with sample prior to sampling. All bottles not containing preservative may be rinsed with appropriate sample prior to collection.

The client is responsible for documentation of the sampling event. Please note special sampling events on the sample custody form.

Laboratory Sample Acceptability: pH < 2 BEA Temperature: 6.0 °C

1	Collected / Relinquished by:		Date: 3/12/21	Time: 3:30	Received By:		Date: 3/12/21	Time: 1:30
2	Relinquished by:		Date:	Time:	Received By:		Date:	Time:
3	Relinquished by:		Date:	Time:	Received By:		Date:	Time:
4	Relinquished by:		Date:	Time:	Received By:		Date:	Time:



ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD
 10775 Central Port Dr.
 Orlando, FL 32824
 (407) 828-5314 Fax (407) 850-6945

4810 Executive Park Court, Suite 111
 Jacksonville, FL 32216-6069
 (904) 286-3007 Fax (904) 286-6210

102-A Woodwinds Industrial Court
 Cary, NC 27511
 (919) 467-3090 Fax (919) 467-3515

Client Name Benchmark EA	Project Number 21030829
Address 1711 12th Street East	Project Name/Desc Longboat Key Spill Soil Analysis
City/State/Zip Palmetto Fl 34221	PO # / Billing Info
Tel 941-723-9986	Reporting Contact Bettina
Fax	Billing Contact Nathan
Sampler(s) Name, Affiliation (Print) Client	Facility # (if required)
Sampler(s) Signature	

Requested Turnaround Times
 Note: Rush requests subject to acceptance by the facility
 Standard
 Expedited
 Due 1/1
 Lab Workorder AE02191

Requested Analyzes	Preservation (See Codes) (Combine as necessary)
PAH's (8270 SIM)	

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	Sample Comments
1	21030829-001	03/12/21	1124	Grab	SO	1	O - Field Blank
2	21030829-002	03/12/21	1105	Grab	SO	1	
3	21030829-003	03/12/21	1044	Grab	SO	1	
4	21030829-004	03/12/21	1144	Grab	SO	1	
5	21030829-005	03/12/21	1157	Grab	SO	1	
6	21030829-006	03/12/21	1208	Grab	SO	1	
7	21030829-007	03/12/21	1242	Grab	SO	1	
8	21030829-008	03/12/21	1232	Grab	SO	1	
9	21030829-009	03/12/21	1225	Grab	SO	1	
10	21030829-010	03/12/21	1257	Grab	SO	1	
11	21030829-011	03/12/21	1306	Grab	SO	1	
12	21030829-012	03/12/21	1317	Grab	O	1	
						← Total # of Containers	

Sample Kit Prepared By <i>ADD</i>	Date/Time	Received By <i>Ryan H</i>	Date/Time 3/17/21
Comments		Received By	Date/Time
		Received By	Date/Time
Cooler #s & Temps on Receipt		Condition Upon Receipt	
Client cooler 4.0°C		Acceptable	

Matrix: GW-Groundwater SO-Soil SE-Sediment SW-Surface Water WW-Wastewater A-Air O-Other (detail in comments)
 Preservation: H-HCl N-NH₄OH S-H₂SO₄ NO-NaOH O-Other (detail in comments)
 Note: All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

538306

INTERLABORATORY SAMPLE TRANSMITTAL FORM

Date: 03/15/21

of Samples: 11 Total # of Bottles: 11

Method of Shipment: UPS - Standard, On Ice

Subcontract Laboratory: GEL Laboratories 2040 Savage Rd Charleston, SC 29407 Phone: 843-556-8171 Fax 843-766-1178

Page 1 of 1

Benchmark EnviroAnalytical, Inc.
 1711 12th Street East
 Palmetto, FL 34221
 (941) 723-9986
 (941) 723-6061 fax
 WWW.Benchmarkea.com
 Office QC Check: _____
 Bottle Check: _____

Laboratory Submission #	Collection		Sample Matrix*	Collection Method**	Preservative	Container		Parameters	Comments
	Date	Time				Qty	Capacity		
21030829-001	03/12/21	1124	Soil	Grab	Plain	1	250mL	G	TOC
21030829-002	03/12/21	1105	Soil	Grab	Plain	1	250mL	G	TOC
21030829-003	03/12/21	1044	Soil	Grab	Plain	1	250mL	G	TOC
21030829-004	03/12/21	1144	Soil	Grab	Plain	1	250mL	G	TOC
21030829-005	03/12/21	1157	Soil	Grab	Plain	1	250mL	G	TOC
21030829-006	03/12/21	1208	Soil	Grab	Plain	1	250mL	G	TOC
21030829-007	03/12/21	1242	Soil	Grab	Plain	1	250mL	G	TOC
21030829-008	03/12/21	1232	Soil	Grab	Plain	1	250mL	G	TOC
21030829-009	03/12/21	1225	Soil	Grab	Plain	1	250mL	G	TOC
21030829-010	03/12/21	1257	Soil	Grab	Plain	1	250mL	G	TOC
21030829-011	03/12/21	1306	Soil	Grab	Plain	1	250mL	G	TOC

* Sample Matrix abbreviations: Groundwater (GW), Surface Water (SW), Saline Surface Water (SSW), Fresh Surface Water (FSW), Drinking Water (DW), Sludge (Slag), Solid (Sol), Soil (Soil), Domestic Effluent (Dom Eff), Industrial Effluent (Ind Eff).
 ** Sample Method abbreviations: Grab (G), Composite (C), 24 Hour Composite (24HR Comp).
 *** Container Type abbreviations: Plastic (P), Glass (G).

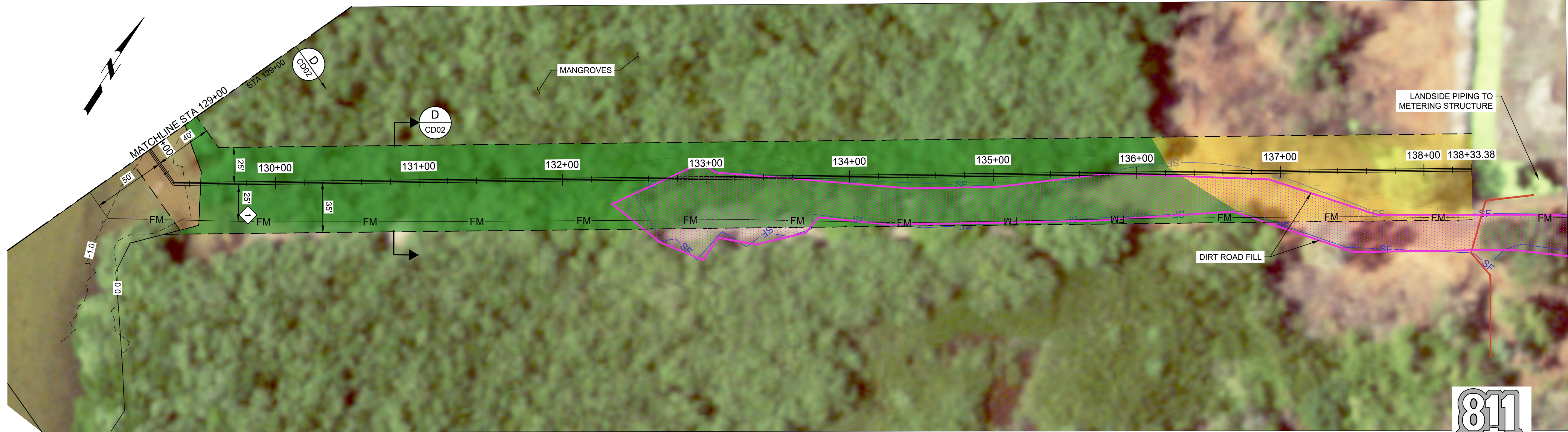
Relinquished By: (Benchmark)	Sign Name: <i>Nathan Hadsell</i> Print Name: Nathan Hadsell	Date: 3-16-21 Time:	Received By: <i>[Signature]</i> UPS	Date: 3/15/21 Time: 9:45
Relinquished By:	Sign Name: Print Name:	Date: Time:	Received By:	Date: Time:

Plot Date: 4/19/2021 8:58:11 AM

FILE NAME: 11006H10C12.dwg

PROJECT NO.: 11006H10

LAST SAVED BY: bhwaves



PLAN
FILE: 11006H1001C100



Know what's below.
Call before you dig.

GENERAL NOTES:

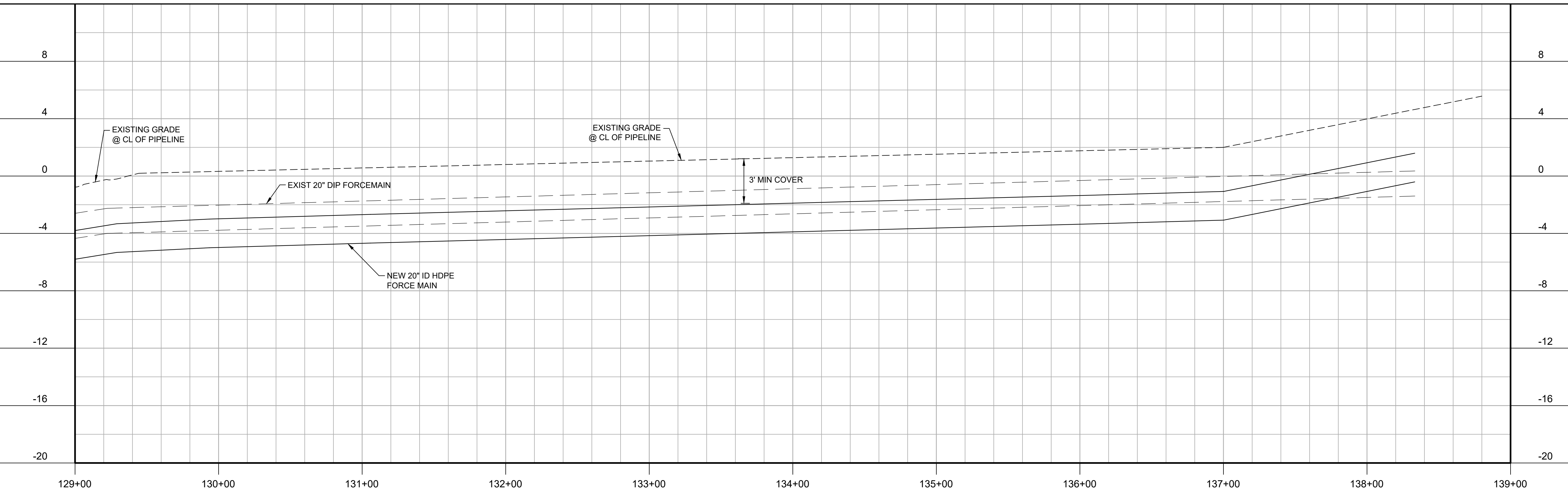
- 50' FROM CL OF NEW 20" ID HDPE FORCE MAIN (FM) PIPE TO EXISTING 20" DIP FORCE MAIN.
- EXISTING 20" DIP FM SHOWN IN PROFILE AS REFERENCE ONLY.
- THE EXISTING FORCE MAIN IS TO REMAIN IN PLACE FOR FUTURE CONDITION ASSESSMENT AND POTENTIAL REHABILITATION. AFTER REHABILITATION, EXISTING FORCE MAIN MAY BE USED AS A REDUNDANT FORCE MAIN OR FOR BRINGING RECLAIMED WATER TO THE TOWN.

KEY NOTES:

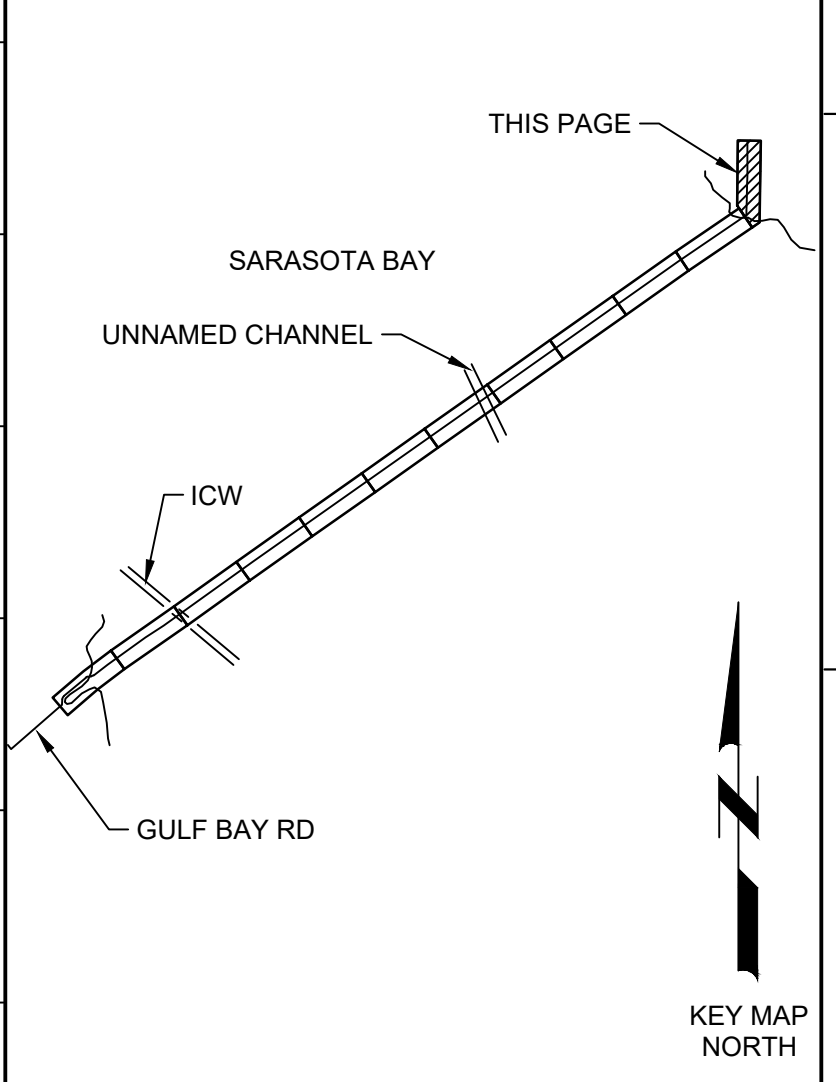
- THIS DIMENSION IS APPROXIMATE DUE TO THE VARIANCE OF THE EXISTING FORCE MAIN.

LEGEND

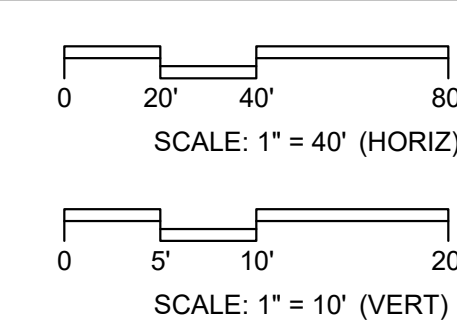
- FM EXISTING FORCE MAIN
- FM PROPOSED FORCE MAIN
- CONSTRUCTION LIMITS
- LIMITS OF JURISDICTIONAL WETLANDS
- ~ SHEET PILE
- ~ TURBIDITY CURTAIN
- NON-VEGETATED BAY BOTTOM
- PATCHY SEAGRASS
- CONTINUOUS SEAGRASS
- OYSTERS
- INTERTIDAL WETLAND (MANGROVES)
- FRESHWATER WETLAND
- UPLANDS
- RIPRAP



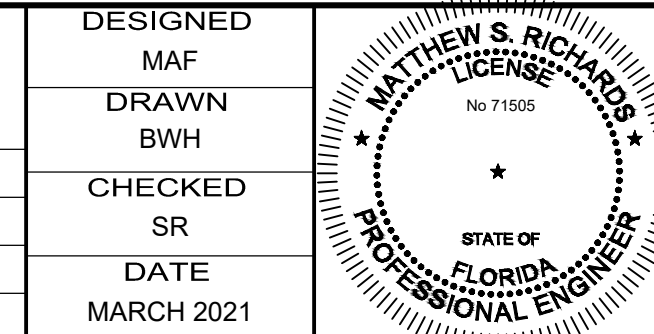
KEY MAP



SCALE



PERMIT PLANS NOT FOR CONSTRUCTION			
DESIGNED MAF			
DRAWN BWH			
CHECKED SR			
DATE MARCH 2021			
REV	DATE	BY	DESCRIPTION
1			
2			



TOWN OF LONGBOAT KEY
ENVIRONMENTAL PERMITTING FOR
SUBAQUEOUS FORCE MAIN
CIVIL
PLAN AND PROFILE
STA 129+00 TO 138+34±

VERIFY SCALES BAR IS ONE INCH ON ORIGINAL DRAWING	JOB NO. 11006H.10
0 1" 1"	DRAWING NO. C12
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	SHEET NO. 13 OF 15