EMERGENCY DREDGING OF A TERMINAL TANKER DOCK DUE TO IMPACTS FROM THE RECENT BACK-TO-BACK HURRICANES IN THE NORTHEAST FLORIDA AREA

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Presentation Outline

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- Overview of Jacksonville Terminal Facility
- Historical Dredging Activities
- Hurricane Impacts to Jacksonville, Florida and Terminal Tanker Dock
- Sediment Characterization Program
- Dredging & Disposal Permitting Efforts
- Future Dredging Activities / Conclusions

Jacksonville Terminal Facility Overview

- Petroleum Refined Products Company – stores and distributes refined products including gasolines, lube oils, and residual fuel
- Currently operates in the United States, Canada, Mexico, and St. Eustatius in the Caribbean
- Currently operates with more than 9,700 miles of pipeline and 75 terminals and storage facilities

- Jacksonville Facility – 3 terminals with 30 storage tanks
- Proposed dredging area located near the main terminal facility

Jacksonville Terminal Facility Overview

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Main Terminal Tanker Dock

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- Ship head T-Head Concrete
  - LOA = 875 ft
- Maximum Draft = 38 ft MLLW
- Minimum Requirements for Tanker Dock:
  - 2.5 ft under keel clearance in Federal Navigation Channel (FNC) in the St. Johns River
  - 0.5 ft alongside the berth
- Docking Requirements:
  - 36 ft MLLW for incoming vessels during flood current
- Minimum Dredging Depth Requirements
  - 40 ft MLLW plus 2 ft overdredge

Historical Dredging Activities

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- Dredging was performed in 2009 by the USACE, Jacksonville District (USACE-SAJ)
- The 2009 Dredging Event was performed as part of the Jacksonville Harbor Berth Deepening and Maintenance Dredging Project
  - **Area was previously dredged to a maximum depth of -42 ft MLLW)**
  - **The -42 ft MLLW dredge depth included a design depth of -40 ft MLLW plus 2 ft of allowable overdredge**
  - **Tanker ships docking at the berth must maintain a minimum under keel clearance of 2.5 ft on the west side of the FNC in the St. Johns River**

2015 Bathymetric Survey

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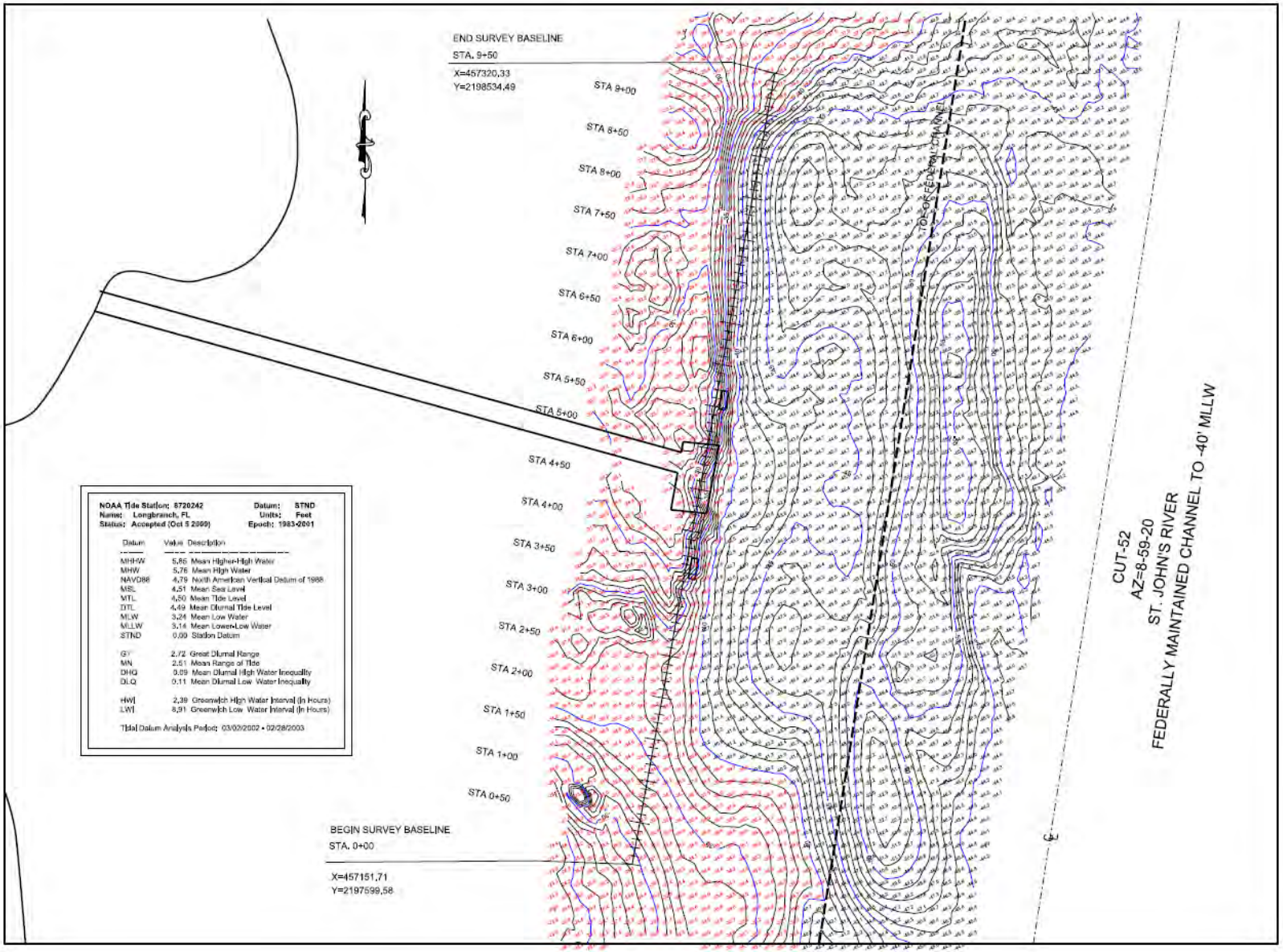

2018 Bathymetric Survey

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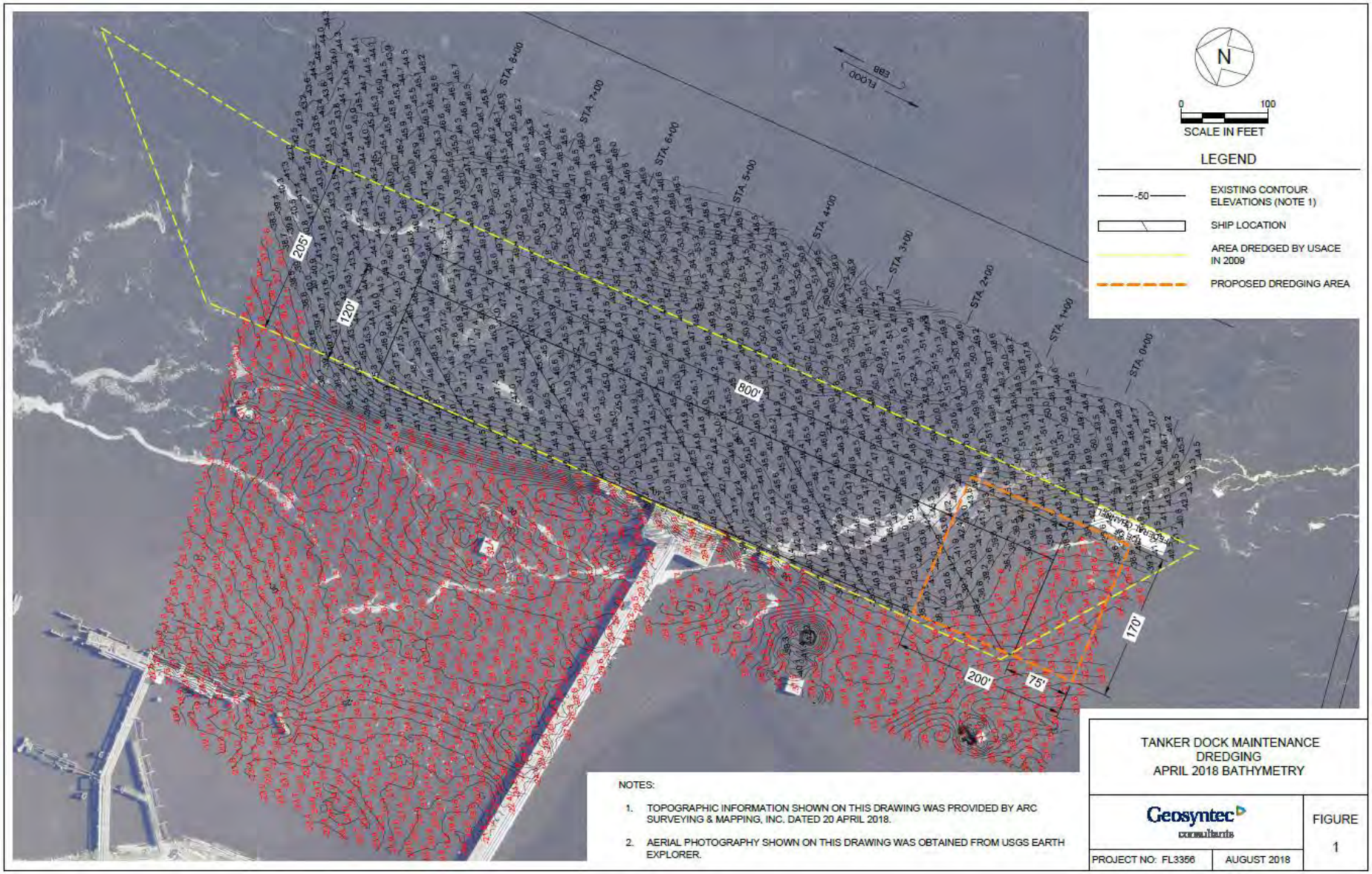

Hurricane Impacts to Jacksonville, Florida

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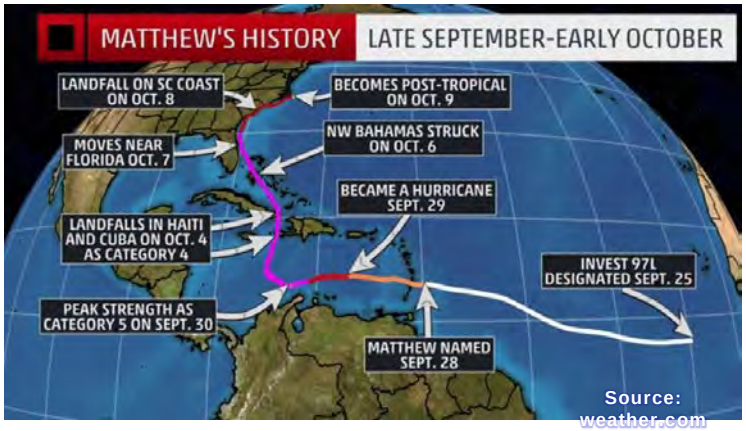
- **Hurricane Matthew** impacted Jacksonville, Florida in early October 2016
- Wind gusts in Jacksonville, Florida reached 64 miles per hour
- City audit reported $53.5 million in damage

Hurricane Matthew Actual Track



- **Hurricane Irma** impacted Jacksonville, Florida in early September 2017
- Wind gusts in Jacksonville, Florida reached 75 miles per hour
- Transitioned from a Category 2 to Category 1 Hurricane as it passed through Jacksonville, Florida

Hurricane Irma Actual Track

2018 Bathymetric Survey - Isopach

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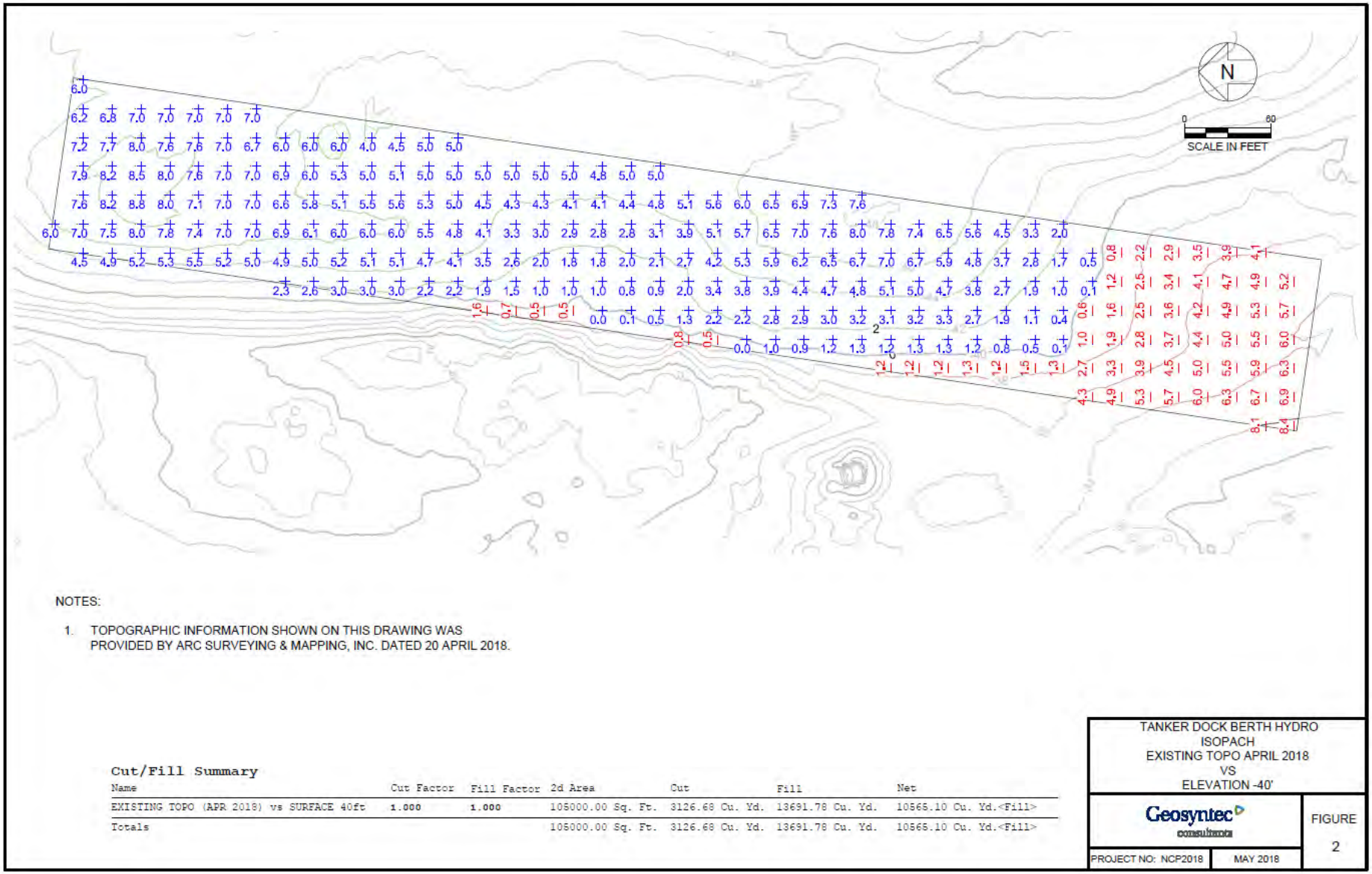

NOTES:

1. TOPOGRAPHIC INFORMATION SHOWN ON THIS DRAWING WAS PROVIDED BY ARC SURVEYING & MAPPING, INC. DATED 20 APRIL 2018.

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
EXISTING TOPO (APR 2018) vs SURFACE 40ft	1.000	1.000	105000.00 Sq. Ft.	3126.68 Cu. Yd.	13691.78 Cu. Yd.	10565.10 Cu. Yd.<Fill>
Totals			105000.00 Sq. Ft.	3126.68 Cu. Yd.	13691.78 Cu. Yd.	10565.10 Cu. Yd.<Fill>

TANKER DOCK BERTH HYDRO
ISOPACH
EXISTING TOPO APRIL 2018
VS
ELEVATION -40'

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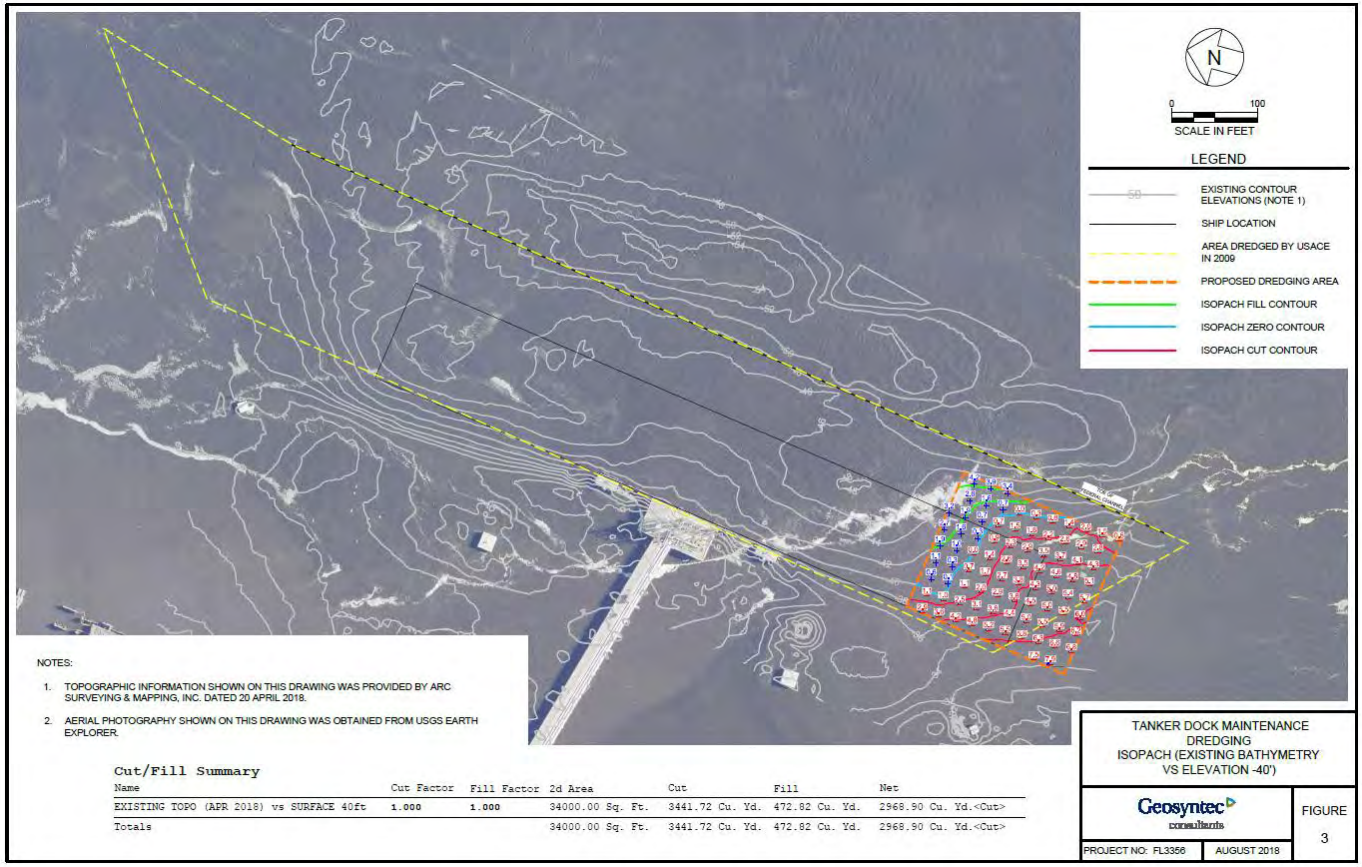
FIGURE 2

PROJECT NO: NCP2018 | MAY 2018

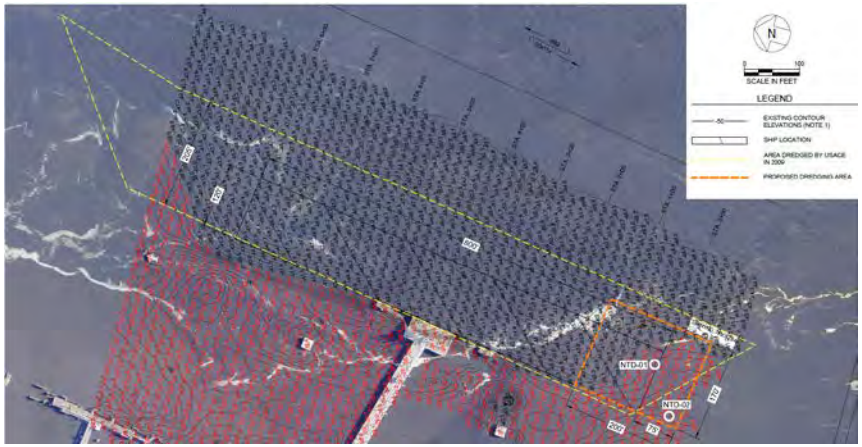
2018 Bathymetric Survey - Shoaled Area

- Results of a bathymetric survey performed on 20 April 2018 indicated that sediments had accumulated on the southern end of the tanker dock
- Apparent shoaling was presumably attributed to the effects of Hurricanes Matthew and Irma (e.g., heavy rains from hurricanes transported sediments from the upstream and caused the increase in sedimentation)



Sediment Characterization Program

- Permit authorization from the USACE-SAJ and FDEP is required to perform dredging
- License agreement with JAXPOART to allow disposal of dredged materials at its dredged material management areas (DMMAs) on the Jacksonville Harbor
- A sediment characterization program was performed to characterize the quality of sediment accumulating in the tanker dock as part of the permitting and approval process
- Two sample locations, NTD-01 and NTD-02, were selected in the proposed dredging area



Sediment Characterization Program

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- Two sediment cores ranging in length from 6 to 9 ft were collected using a vibracore apparatus
- The sediment cores collected were homogenized in the field until uniform in color and texture to generate two composite samples from each core: one from the upper half section and one from the lower half section
- Additional sediment samples were also collected using a Ponar® grab sampler for performing modified elutriate testing

Sediment Characterization Program

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Sample Type	Station	Approx. Location		Samples			Sample Analysis	
		Northing (ft)	Easting (ft)	Total Core Length (ft)	Sample Depth (ft, below sediment surface)	Sample ID	Particle Size	Analytical Testing
Tanker Dock Sediments	NTD-01	2,197,647.2	457,285.8	6	0 - 3	NTD-01A	x	x
					3 - 6	NTD-01B	x	x
	NTD-02	2,197,597.8	457,202.2	9	0 - 4.5	NTD-02A	x	x
					4.5 - 9	NTD-02B	x	x
Duplicate	NTD-02	See NTD-02			0 - 4.5	NTD-02C		x
MS/MSD	NTD-02	See NTD-02			4.5 - 9	NTD-02B-MS/MSD		x
Elutriate	NTD-SD	Ponar Composite		Sediment Grab Sample		Ponar/Elutriate	x	x
	NTD-SW	Surface Water Composite		Surface Water Grab Sample				
Background Water	NTD-SW	Surface Water Composite		Surface Water Grab Sample		Background		x
Sediment Composite	Composite of Sediment Samples from NTD-01, NTD-02, and NTD-SD (Ponar Samples)					Composite	x	

Geotechnical Laboratory Test Results:

Sample ID	Sample Depth (ft, below sediment surface)	Moisture Content (%) (ASTM D2216)	Gravel Content (%) (ASTM D422)	Sand Content (%) (ASTM D422)	Fines Content (%) (ASTM D422)	Silt Content (%) (ASTM D422)	Clay Content (%) (ASTM D422)	Specific Gravity (ASTM D854)
NTD-01A	0-3	34.0	0.0	89.6	10.4	2.5	7.9	
	0-3							
NTD-01B	3-6	30.3	0.0	92.6	7.4			
	3-6							
NTD-02A	0-4.5	93.8	0.0	68.3	31.7	11.0	20.7	
	0-4.5							
NTD-02B	4.5-9	36.9	0.1	83.5	16.4			
	4.5-9							
Ponar	Sediment Grab Sample	79.2	0.0	81.9	18.1	6.3	11.8	2.675
Composite	--	46.7	0.0	84.0	16.0	5.5	10.5	

Analytical Laboratory Test Results

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- The laboratory analytical testing included the typical suite of parameters (i.e., metals and other general physical and chemical constituents in sediments) required by the regulatory agencies as well as BTEX/MTBE and other petroleum hydrocarbon compounds required by JAXPORT
- The analytical results of sediment samples indicated no observed exceedances of the FDEP's cleanup target levels (CTLs) for commercial/industrial direct exposure

		Sample ID	NTD-01A	NTD-01B	NTD-02A	NTD-02B
		Sample Collection Date	10/24/2018 12:00	10/24/2018 12:00	10/24/2018 12:00	10/24/2018 12:00
Parameter	Reporting Units	62-777 Table II Soil Commercial/ Industrial				
Volatiles by 8260C						
Benzene	mg/kg	1.7	0.00097U	0.00084U	0.0014U	0.00087U
Ethylbenzene	mg/kg	9200	0.00088U	0.00077U	0.0013U	0.00079U
Methyl tert-butyl ether	mg/kg	24000	0.0015U	0.0013U	0.0022U	0.0013U
Toluene	mg/kg	60000	0.0015U	0.0013U	0.0022U	0.0013U
Xylenes, Total	mg/kg	700	0.0028U	0.0024U	0.0041U	0.0025U
Semivolatiles by 8270D LL						
1-Methylnaphthalene	mg/kg	1800	0.0036I	0.0026I	0.020	0.022
2-Methylnaphthalene	mg/kg	2100	0.0059I	0.0052I	0.016	0.039
Acenaphthene	mg/kg	20000	0.0063I	0.0059I	0.015	0.056
Acenaphthylene	mg/kg	20000	0.0057I	0.0077I	0.014	0.0092
Anthracene	mg/kg	300000	0.011	0.025	0.013	0.028
Benzo[a]anthracene	mg/kg	NA	0.016	0.027	0.017	0.040
Benzo[a]pyrene	mg/kg	0.7	0.022	0.052	0.013	0.036
Benzo[b]fluoranthene	mg/kg	NA	0.034	0.071	0.022	0.047
Benzo[g,h,i]perylene	mg/kg	52000	0.012	0.023	0.0099I	0.017
Benzo[k]fluoranthene	mg/kg	NA	0.014	0.027	0.0086I	0.020
Chrysene	mg/kg	NA	0.013	0.054	0.0084I	0.040
Dibenz(a,h)anthracene	mg/kg	NA	0.0029U	0.0025U	0.0039U	0.0026U
Fluoranthene	mg/kg	59000	0.033	0.021	0.057	0.12
Fluorene	mg/kg	33000	0.0076I	0.0084	0.014	0.053
Indeno[1,2,3-cd]pyrene	mg/kg	NA	0.013	0.023	0.012I	0.017
Naphthalene	mg/kg	300	0.015	0.011	0.050	0.057
Phenanthrene	mg/kg	36000	0.017	0.020	0.025	0.080
Pyrene	mg/kg	45000	0.033	0.022	0.068	0.14
GC Semivolatiles by FL-PRO						
Total Petroleum Hydrocarbons (C8-C40)	mg/kg	2700	48	46	110	90
Metals by 6020						
Aluminum	mg/kg	NA	2200	1400	8000	3300J3
Arsenic	mg/kg	12	0.89	0.57I	3.8	1.9
Barium	mg/kg	130000	3.5	2.7	11	6.7
Cadmium	mg/kg	1700	0.29U	0.25U	0.41U	0.25U
Chromium	mg/kg	470	4.7	3.7	16	7.7
Copper	mg/kg	88000	2.3	1.4	6.7	3.0
Iron	mg/kg	NA	2500	1700	9400	4500J3
Lead	mg/kg	1400	4.7	3.2	12	7.1
Nickel	mg/kg	35000	1.3	0.95	4.4	2.1
Selenium	mg/kg	11000	0.14I	0.14I	0.55I	0.23I
Silver	mg/kg	8200	0.027U	0.033I	0.085I	0.084I
Zinc	mg/kg	630000	12	5.8	33	14J3
Metals by 7471B						
Mercury	mg/kg	17	0.022	0.020	0.055	0.032

Analytical Laboratory Test Results

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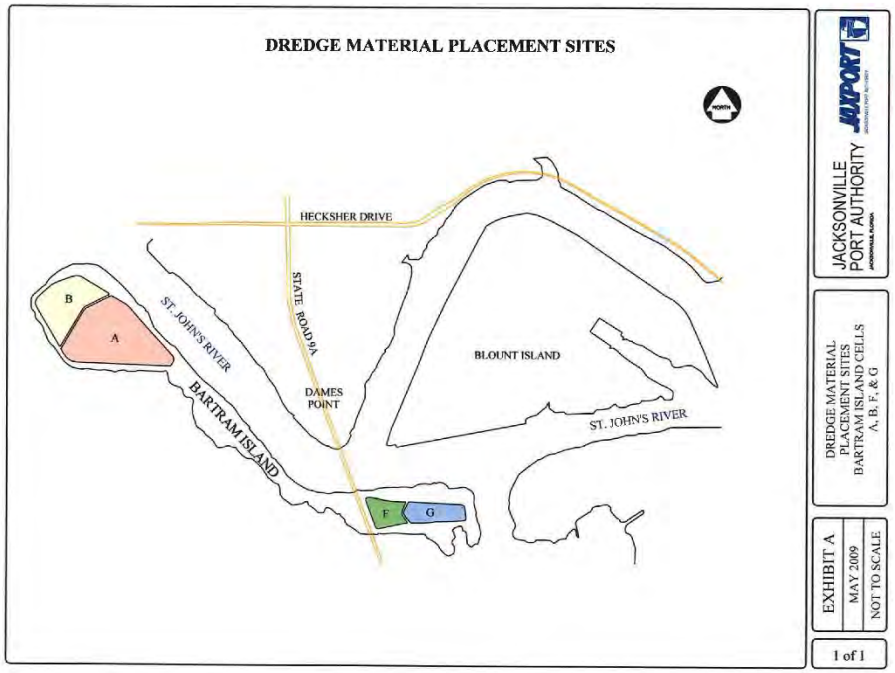
- The analytical results of modified elutriate samples indicated that the observed exceedances of CTLs for leachability based on marine surface water criteria were limited to aluminum, copper, iron, and lead

			Sample ID	Background Water	Elutriate - Sample
			Sampled By		
			Sample Collection Date	10/24/2018 13:00	11/02/2018 09:00
			Laboratory Order Number	400-161189-1	400-161189-3
Parameter	**Reporting Units**	**62-777 Table I Marine Surface Water**			
Volatiles by 8260C					
Benzene	ug/l	71.28		0.38U	0.38U
Ethylbenzene	ug/l	610		0.50U	0.50U
Methyl tert-butyl ether	ug/l	34000		0.74U	0.74U
Toluene	ug/l	480		0.41U	0.41U
Xylenes, Total	ug/l	370		1.6U	1.6U
Semivolatiles by 8270D LL					
1-Methylnaphthalene	ug/l	95		0.075U	0.085U
2-Methylnaphthalene	ug/l	30		0.061U	0.069U
Acenaphthene	ug/l	3		0.032U	0.037U
Acenaphthylene	ug/l	NA		0.046U	0.052U
Anthracene	ug/l	0.3		0.032U	0.037U
Benzo[a]anthracene	ug/l	NA		0.047U	0.053U
Benzo[a]pyrene	ug/l	NA		0.043U	0.048U
Benzo[b]fluoranthene	ug/l	NA		0.034U	0.039U
Benzo[g,h,i]perylene	ug/l	NA		0.13U	0.15U
Benzo[k]fluoranthene	ug/l	NA		0.10U	0.12U
Chrysene	ug/l	NA		0.075U	0.085U
Dibenz(a,h)anthracene	ug/l	NA		0.051U	0.058U
Fluoranthene	ug/l	0.3		0.069U	0.078U
Fluorene	ug/l	30		0.11U	0.13U
Indeno[1,2,3-cd]pyrene	ug/l	NA		0.044U	0.050U
Naphthalene	ug/l	26		0.095U	0.11U
Phenanthrene	ug/l	NA		0.036U	0.041U
Pyrene	ug/l	0.3		0.040U	0.046U
GC Semivolatiles by FL-PRO					
Total Petroleum Hydrocarbons (C8-C40)	mg/l	5		0.073U	0.34U
Metals by 6020					
Aluminum	ug/l	1500		770	10000
Arsenic	ug/l	50		4.3	9.2
Barium	ug/l	NA		13	51
Cadmium	ug/l	9.3		0.34U	0.34U
Chromium	ug/l	50		2.5	27
Copper	ug/l	2.9		2.1U	8.9
Iron	ug/l	300		840	13000
Lead	ug/l	8.5		0.94I	16
Nickel	ug/l	8.3		1.8U	6.6
Selenium	ug/l	71		0.71U	1.3
Silver	ug/l	0.4		0.11U	0.11U
Zinc	ug/l	86		6.5U	46
Metals by 7470A					
Mercury	ug/l	0.025		0.070U	0.070U
Wet Chemistry by 1664A					
HEM (Oil & Grease)	mg/l	NA		2.5I	22.5J3

Dredging & Disposal Permitting Efforts

- USACE Dredging Permit
  - NWP #35 issued Sep 20, 2018
  - Expires March 18, 2022
- FDEP Dredging Permit
  - ERP application submitted Jan 2019
  - RAI on submerged lease land survey/modification
  - Response to RAI submitted Feb 2019
  - Permit issued May 23, 2019
- JAXPORT Disposal Agreement
  - User Dredge Agreement Negotiations



Future Dredging Activities / Conclusions

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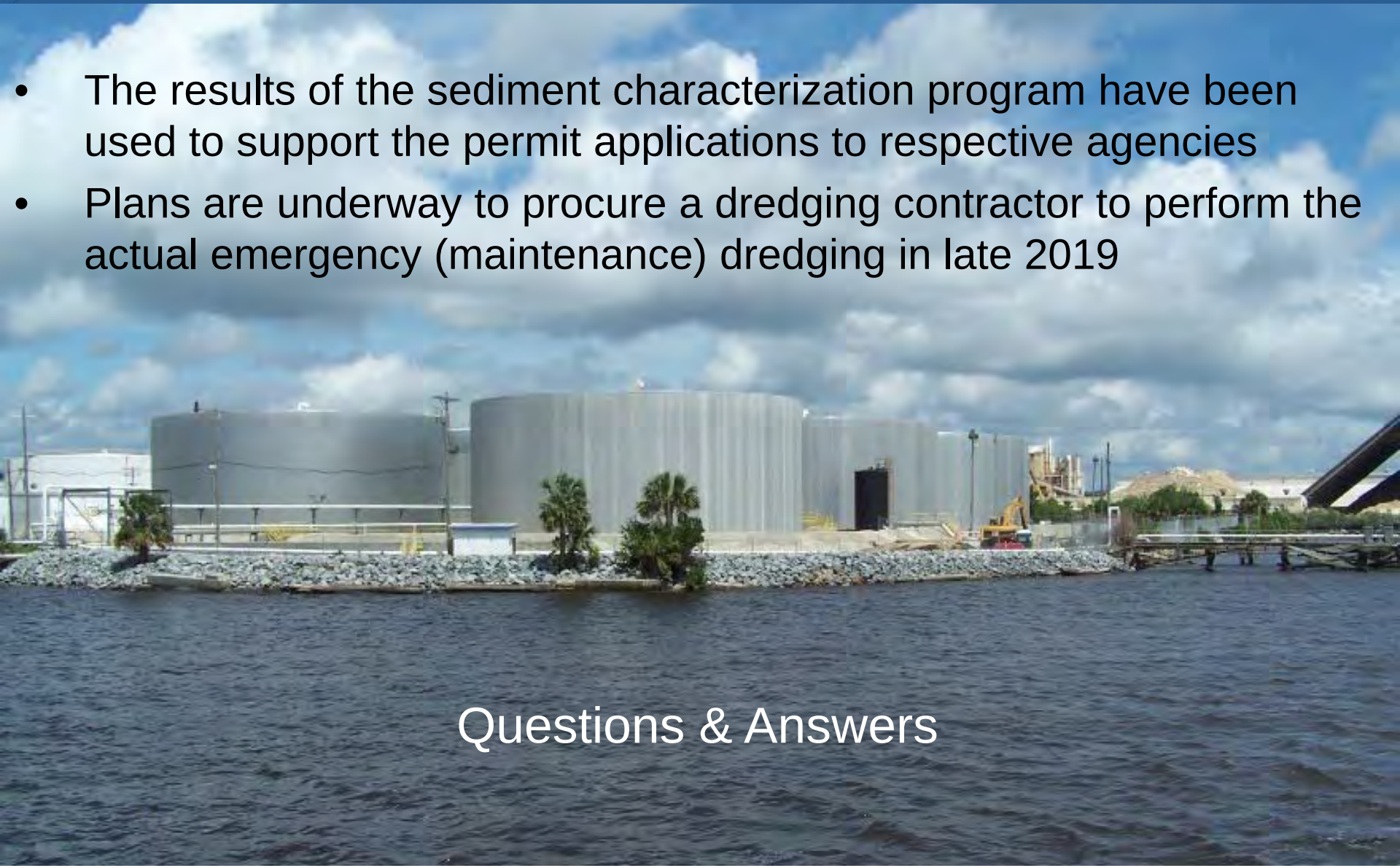
- The results of the sediment characterization program have been used to support the permit applications to respective agencies
- Plans are underway to procure a dredging contractor to perform the actual emergency (maintenance) dredging in late 2019



Questions & Answers