

Attachment C: Construction and Mitigation Monitoring

Manatee Heater and Horseshoe Crab Wall (Mod B)

Turbidity & Water Quality:

1. Turbidity must be controlled to prevent violations of water quality pursuant to Rule 62-302.530(69), Florida Administrative Code (F.A.C.). Turbidity shall not exceed 29 Nephelometric Turbidity Units (NTU) above natural background conditions. Also, turbidity of the effluent from the Dredge Material Management Area (DMMA) discharged back in to the Indian River Lagoon shall not exceed 29 NTU above natural background of the receiving surface waters.
2. A mixing zone for turbidity is granted with the following size and configuration constraints: The mixing zone shall extend no further than the floating turbidity barrier or not more than 150 meters from the cutterhead, return flow discharge, or other points of turbidity generation, whichever distance is less [Rule 62-4.244(5)(c), F.A.C.].
3. Measurements must be acquired in adherence to the Department's Standard Operating Procedure (SOP) for field turbidity (FT 1600), available at the website: <http://www.dep.state.fl.us/water/sas/sop/sops.htm>. More specifically, the instruments used to measure turbidity shall be fully calibrated within one month prior to commencement of the project, and at least once a month during the project. Calibration shall be verified each morning prior to use, and after each time the instrument is turned on, using a turbidity "standard" that is different from the one used during calibration. Calibration procedures shall be recorded in a permanent logbook. Copies must be submitted with the data.
4. Monitoring for turbidity shall be conducted for the duration of the project. Sampling will commence prior to, but no more than 24 hours before initiation of any dredging or filling activities.
5. A minimum of two sampling sites shall be established within the mixing zone as described in Specific Condition 2 above. The first site will be located at the mixing zone boundary (Compliance Sample (CS)); if required, the second site will be located 50 meters downstream from the CS; and, the third site shall be located 100 meters downstream from the CS. These sites shall be established on a transect extending down current from the turbidity source.

Samples shall be collected from surface and mid-depth and one foot above bottom. Mid-depth samples are sufficient in water that is less than five feet deep. Sampling will be restricted to the axis of the visible plume. Samples will be collected at the intersection of the mixing zone boundary and a line parallel with the water current and extending from the source of turbidity if a plume is not visible.

Background samples shall be collected at two sites at least 500 meters upstream. These samples will be collected at surface, mid-depth, and one-foot above bottom. The two background sites will be marked by temporary buoys and shall be maintained for the

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duration of the sampling program. These sites shall not be changed without specific written authorization by the Department.

Samples shall be collected with a Kemmerer, Van Dorn, or a similar sampler that is designed to collect in situ water samples. Samples shall be analyzed immediately after collection with a turbidimeter that produces results in Nephelometric Turbidity Units. The field sample results shall be accurately recorded to the precision capabilities (decimal place) of the instrument. Field turbidimeter results shall be rounded up to the next whole number (for example, 15.23 NTUs shall be recorded, however, the results shall be interpreted as 16 NTUs). If monitoring reveals turbidity levels greater than or equal to the turbidity limits contained in Specific Condition 1 above, the permittee shall cease all work pursuant to Specific Condition 9 below.

6. Turbidity monitoring reports shall be submitted to the Department at DEP_CD@dep.state.fl.us. each Monday following project commencement. Reports shall include the permittee name and permit number. When submitting this information to the Department, please include, at the top of each page or as a cover page to the submittal: "This information is being provided in partial fulfillment of the monitoring requirements in Permit No. 05-305821-009." Failure to submit reports in a timely manner constitutes a violation of the permit and may be grounds for revocation.
7. Monitoring data shall contain the following information:
 - a. Permit number;
 - b. Dates of sampling and analysis;
 - c. A statement describing the methods used in collection and analysis of the samples;
 - d. A map showing the sampling locations, along with the latitude and longitude of each location;
 - e. Copies of the Quality Assurance/Quality Control log; and
 - f. A statement by the individual responsible for implementation of the sampling program concerning the authenticity, precision, and accuracy of the data;
8. Monitoring reports shall also include the following information for each sample that is taken:
 - a. Time of day samples taken;
 - b. Depth of water body;
 - c. Depth of sample;
 - d. Tidal stage and direction of flow; and
 - e. Antecedent weather conditions, including wind direction and velocity.

The compliance locations specified in Specific Condition 5 above shall be considered the limits of the temporary mixing zone for turbidity allowed during construction.

9. If monitoring reveals turbidity levels greater than or equal to the turbidity limits contained in Specific Condition 1 above, the permittee shall take the following measures:

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- a. Immediately cease all work contributing to the water quality violation. Work which may contribute to the violation shall not resume until corrective measures have been taken and turbidity levels have returned to acceptable levels; and
- b. Stabilize exposed soils contributing to the violation. Modify work procedures responsible for the violation, install additional turbidity containment devices, repair non-functioning turbidity containment devices; and
- c. Increase monitoring frequency to every 2 hours until turbidity levels are within acceptable limits as specified in Specific Condition 1. Interim samples collected following the exceedance(s) shall be collected in the same manner and locations as the routine monitoring. Operations may not resume until the water quality standard for turbidity has returned to natural background conditions.
- d. The exceedance(s) shall be immediately reported to the Department, Central District Office (407)897-4100. The report shall include the description of the corrective actions being taken or proposed to be taken. The report shall be made to the Department as soon as normal business hours resume if exceedance(s) are noted after normal business hours, on holidays, or on weekends. A copy of the monitoring data sheets, which indicate violation(s), shall be forwarded immediately to the Department at DEP_CD@dep.state.fl.us.

Failure to report exceedance(s) or to follow correct procedures before resuming work shall constitute grounds for permit revocation and may subject the permittee to formal enforcement action.

Polymer Use:

10. The licensee is authorized to implement the polymer FLOPAM C-6207 at a dosing rate not exceeding 3 pounds per ton. The use of any additional polymers or flocculants will require toxicity testing for marine organisms and must be approved by the Department prior to application.

Mitigation Plan:

11. Mitigation to offset impacts associated with dredging include the restoration of a historic dredge hole in the Indian River, Class III Waters, to surrounding, natural elevations through the placement of 1,580 cubic yards of sediment. The mitigation shall comply with the mitigation and restoration plan in Attachment C-1.

Dredge Material Management Area (DMMA)

The dredging portion of the project consists of dredging muck and flocculent sediment from the eastern portion of the intake canal. The estimated quantity of material to be removed is 4,000 cubic yards. At the DMMA, there will be a polymer injection manifold in the discharge lines

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approximately 50 feet from the line termination. The discharge line will split and each pump system will fill two Geotubes. The Geotubes will receive the discharge water, fill and then bleed filtered water off into the containment area. The DMMA containment area will feature containment berms, an HDPE liner, the geotubes, and a sump area. The sump area will have a pump which will pump clean water back to the mixing zone.

12. The dredged material will be handled as described in the following documents and the specific conditions below:
 - a. The Ballard Marine Construction Dredge Plan Rev 3.1, dated 9/29/2016. It was an enclosure to the 11/28/2016 FPL submittal to Ms. Cindy Mulkey titled "Post-Certification Modification Request – Manatee Heater Area and Horseshoe Crab Wall." This letter was a request to modify the conditions of certification for the Cape Canaveral Energy Center.
 - b. The letter sent to Ms. Kim Eisele with the same title and date. This letter was a response to the Department's Request for Additional information, dated 6/20/2016.
 - c. The letter sent to Ms. Kim Eisele with the same title, but dated 1/27/2017. This letter was a response to the Department's Request for Additional information, dated 12/28/2016.
 - d. Engineering drawing package "Manatee Heating Area and \Horseshoe Crab Deterrent Wall," last revision dated 9/26/2016. Signed/sealed by Josh Schmitz, P.E., 9/30/2016.
13. Prior to dredging, sediment sampling and analysis will be conducted as described in Item 13 of the 11/28/2016 FPL submittal to Ms. Kim Eisele titled "Post-Certification Modification Request – Manatee Heater Area and Horseshoe Crab Wall." This letter was a response to the Department's Request for Additional information, dated 6/20/2016.
14. Once the material in the tubes has consolidated and dried out sufficiently, the tubes will be cut open and the material stock piled in one end of the containment area, the liner will be removed from one end and the dredge material will be moved to the now unlined area while the rest of the liner and tubes are removed.
15. Stock piles which could generate turbidity from run-off will always be in a containment area (either lined or unlined) until final grading takes place. Best management practices will be utilized to ensure there is no offsite erosion or sedimentation during construction.
16. Some of the stock piled dredge material can be used for the Seagrass Habitat Mitigation Plan to restore the topographic elevation of an historic dredge hole in the Indian River. Approximately 1,600 cubic yards (cy) of the expected 4,000 cy of dredged material may be used as fill within the hole.
17. Any dredged material not used to fill the 0.43-acre dredge hole/borrow pit must be tested before a decision is made about its subsequent use or disposal.
 - a. The dredge material in the geotubes must be tested for Polycyclic Aromatic Hydrocarbons (PAHs), Total Recoverable Petroleum Hydrocarbons (TRPH),

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Aluminum, Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, and Zinc.

- b. Once the material in a geotube has consolidated and dried out sufficiently and the 200-foot long tube cut open, a discrete sample shall be taken from the approximate volume center at the 50-foot, 100-foot, and 150-foot location along the tube.
 - c. The analytical results shall be compared to the Soil Cleanup Target Levels for Residential Direct Exposure (Residential SCTLs). These are in Table II of Chapter 62-777, F.A.C.
 - i. All PAH-type chemical concentrations will be used to calculate a “total benzo(a)pyrene equivalents” value. This value will be compared to the benzo(a)pyrene SCTL.
 - ii. If all the results are less than the Residential SCTLs, no further testing is required. The dredged material can be used at that location.
 - iii. If any results exceed the Residential SCTLs, you must schedule a meeting with the Department to discuss them and determine the next actions. The following are possible actions:
 - (1) More sampling might be required.
 - (2) If the results are higher than the Residential SCTLs but less than the industrial/commercial SCTLs, FPL and FDEP need to discuss what actions could allow for the dredged material to remain on site.
 - (3) If the results are higher than the industrial/commercial SCTLs, the dredged material may have to be removed from the site and disposed in a Class I landfill.
18. The organization collecting samples at this site must use the Field and Laboratory Standard Operating Procedures (DEP-SOP-001/01) referenced in Chapter 62-160, F.A.C. The material in the geotubes should be sampled in accordance with FT 3000. The laboratory designated to conduct the chemical analyses must be certified by the Florida Department of Health Environmental Laboratory Certification Program (DoH ELCP). This Certification must be for the test method and analyte(s) that are reported.
19. No impermeable surfaces are allowed to remain at the DMMA after completion of the work. The geo-tubes, liner material used in the DMMA, and other non-soil components of the DMMA will be recovered or disposed of in a landfill.
20. After final grading and removal of all parts of the DMMA, the silt fencing placed around the DMMA before construction must remain until the vegetation has been re-established. Best management practices will be utilized to ensure there is no offsite erosion or sedimentation during or after construction.
21. The outfall from the DMMA will be removed after final grading of the site has restored the original configuration. The outfall from the DMMA must remain as the last item to be removed allowing for its monitoring and operation until it is no longer needed.

FLORIDA POWER & LIGHT
CCEC MANATEE HEATER AREA MITIGATION PLAN
BREVARD COUNTY, FLORIDA

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Appendix B. UMAM Evaluation Matrix

Acronyms and Abbreviations

CCEC	Cape Canaveral Energy Center
cy	cubic yard
DGPS	Differential Global Positioning System
FDEP	Florida Department of Environmental Protection
FLUCCS	Florida Land Use and Cover Classification System
FPL	Florida Power & Light
fsw	feet of seawater
ft.	foot/feet
ft ²	square feet
FWC	Florida Fish and Wildlife Conservation Commission
FWS	U.S. Fish & Wildlife Service
in.	inch/inches
kg	kilogram
m	meter
m ²	square meters
NAVD	North American Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NTU	nephelometric turbidity unit
Project	Cape Canaveral Energy Center Project
SAV	Submerged Aquatic Vegetation
WGS84	World Geodetic System 1984

1. INTRODUCTION

Florida Power & Light Company (FPL) has operated the Cape Canaveral Energy Center (CCEC) (formerly the Cape Canaveral Plant) since the 1960's. In 2014, the Plant was converted to Cape Canaveral Next Generation Clean Energy Center, located in Brevard County, FL. The CCEC is certified and licensed by the Florida Department of Environmental Protection's Siting Coordination Office and includes all regulatory activities which are applicable under state, regional, and local agencies. The CCEC is regulated under the Power Plant Siting Act (PPSA), the Transmission Line Siting Act (TLSA), and the Natural Gas Transmission Pipeline Siting Act (NGPSA). FPL's CCEC Site Certification also includes a Manatee Protection Plan (August 8, 2000) developed in compliance with the CCEC DEP Permit No. FL 0001473, the facilities State Industrial Wastewater Permit.

On November 28, 2016 FPL submitted a petition for modification to the CCEC Site Certification including relocation of the manatee heater enclosure and associated dredging, construction of a Dredged Material Management Area (DMMA), and installation of a new horseshoe crab deterrent wall. Unavoidable impacts to the benthic habitat of the Indian River Lagoon will result from the installation of the manatee heater enclosure.

Tetra Tech, Inc., (Tetra Tech) was contracted by FPL to prepare a mitigation plan to offset impacts from dredging activities related to the required Interim Warm Water Refuge Heating System required under FDEP's Site Certification (PA08-53A) issued on December 28, 2011 and subject to the petition for modification submitted on November 28, 2016. The proposed mitigation entails restoring topographic elevation of a 0.43-acre dredge hole/borrow pit approximately

1.1 Purpose and Need

The FDEP's Site Certification (PA08-53A) issued on December 28, 2011 requires that an Interim Warm-Water Refuge Heating System be installed in order to prevent an increased risk of manatee cold stress death during the CCEC conversion construction period. The interim warm water refuge is the area located within the current Cape Canaveral plant intake canal beginning at the western most extent of the canal and including all waters within the canal between the peninsula and the southern shoreline up to the southern shorelines' easternmost point. The interim heating system has been designed such that the system will provide a water temperature at or above 68°F within the identified warm-water refuge when ambient water temperatures are below 65°F. The interim heating system at the CCEC site shall be installed and operational by November 15, 2017 which is the start of manatee season.

1.2 Project Description

FPL proposes to dredge two areas east of the existing CCEC property in order to relocate the manatee heating area required by the site certification. Additionally, FPL will be installing a Dredge Disposal Management Area (on adjacent uplands), a sheetpile wall, piping, and a maintenance dock for access. The project impact area is identified as a warm water aggregation area for manatees. All work will be performed in accordance with the standard manatee conditions for in-water work. Turbidity curtains will be installed to protect water quality.

1.3 Avoidance and Minimization

FPL has made every effort to avoid and minimize impacts to benthic habitat and water quality. Best management practices have been incorporated into the Project design in order to protect water quality during in-water work. Additionally the DMMA has been designed to ensure dredge effluent has sufficient settling time to reduce suspended material and the potential for turbid water to be discharged back into the Indian River Lagoon.



Figure 1-1. Project Vicinity Map

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2. IMPACTS ANALYSIS

Unavoidable permanent impacts to benthic habitat are anticipated as a result of the installation of the Interim Warm-Water Refuge Heating System. Avoidance and minimization of impacts was the basis for project planning and design. A description of the anticipated impacts to natural resource follows.

Approximately 0.61 acres of permanent impacts to habitat are expected from the proposed project. The impacts will occur within the intake canal and the Indian River Lagoon immediately east of the CCEC.

A Unified Mitigation Assessment Methodology (UMAM) evaluation was performed as a basis for the proposed mitigation plan. The UMAM analysis resulted in a functional loss score of 0.061 for the impact area. The project proposes to permanently impact 0.61 acres of seagrass habitat; therefore, using the UMAM analysis 0.44 acres of seagrass habitat mitigation should be required to offset the proposed impacts. The UMAM evaluation matrix is provided in Appendix B.



Figure 2-1. Dredge Impact Area

3. BATHYMETRIC SURVEY & BIOLOGICAL EVALUATION

A bathymetric survey and biological evaluation were conducted on February 16, 2017 at potential mitigation sites to document physical attributes, ecological communities, identify potential environmental concerns during implementation, and make specific recommendations concerning construction activities associated with the restoration actions. The survey identified access routes and environmental precautions. Data gathered during the site visit provided the basis for development of the restoration prescription and design criteria.

3.1 Methods

Bathymetric Survey

The bathymetric survey was conducted to evaluate the physical dimensions (i.e., planar area and volume) of the mitigation area (dredge hole). The survey provides data that is used to quantify the volume of material needed to topographically restore the hole, raising the grade to match that of the surrounding area.

The dredge hole was delineated and bathymetrically surveyed using a Trimble® DGPS unit, a Furuno® P66 single beam echosounder (SBE), and Hypack® marine surveying, positioning, and navigation software. Data was collected in WGS84 (World Geodetic System 1984), North American Datum of 1983 (NAD 83), Universal Transverse Mercator (UTM), Zone 17N, Meters at a rate of one data point per second. The Trimble® DGPS receives differential corrections from U.S. Coast Guard Continuously Operating Reference Stations and provides sub-meter horizontal accuracy.

Data were processed with Hypack® Single Beam Editor and subsequently exported in a .xyz format. The raw XYZ data was imported into ArcGIS® (ArcMap™ 9.3) where data layers were created and analyzed. A georeferenced map of the dredge hole was produced, and the planar area and volume of the hole was calculated using Xtools Pro (independent ArcGIS extension [source: Data East, LLC.]) and the 3D Analyst extension in ArcMap™, respectively.

Biological Evaluation

Two Tetra Tech biologists with experience in benthic habitat assessments performed a biological evaluation of the mitigation site and surrounding areas. The evaluation included reconnaissance of the dredge hole extents and the immediately surrounding area.

3.2 Findings

Bathymetric Survey

Depths within the survey area range from 1 ft. to 8.5 ft. The mitigation boundary was selected based on topographically restoring the dredge hole to the surrounding natural grade. The proposed upper limit of fill is set to the 4.5 feet of seawater (fsw) with a total planar area of approximately 0.43 acres. The calculated volume below the 4.5-ft contour is approximately 1,250 CY. Figure 3-1 presents the results of the survey graphically.

Biological Evaluation

With the exception of the downward slope of the dredge hole, the bottom topography is relatively flat. Sediments outside of the hole can be characterized as fine grained sand with organic material. Sediments within the dredge hole were similar to those outside of the dredge hole, however, have a higher fraction of organics.

No submerged aquatic vegetation (SAV) or epibenthic cover was documented within or in the vicinity of the dredge hole. Similarly, no marine fauna were observed utilizing the area. Two avian species, the brown pelican (*Pelecanus occidentalis*) and greater scaup (*Aythya marila*) were observed feeding in the surrounding area. Photographic documentation was not feasible as underwater visibility was 1-ft. or less at the time of the survey.

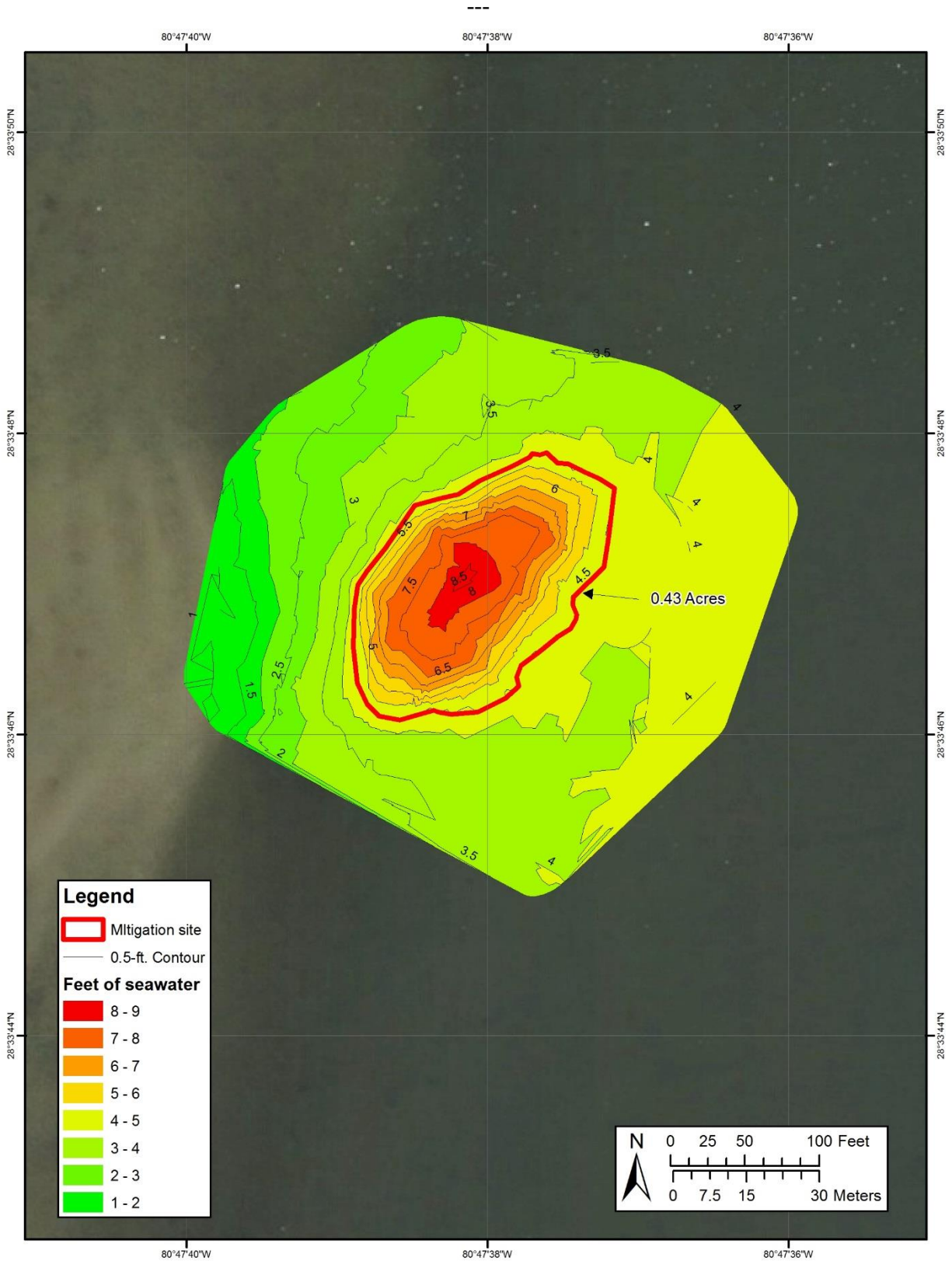


Figure 3-1. Proposed mitigation area

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3.3 Protected Species

The Florida Fish and Wildlife Conservation Commission (FWC) publication Florida's Endangered and Threatened Species (Updated January 2016) was used to determine the status of listed species with the potential to utilize the proposed Project site. No listed species were observed during the February 16 site visit; however, based on geographic range, several listed species have the potential to utilize the CCEC area (Table 2-3).

There are seven aquatic species known to occur within marine habitats adjacent to the CCEC that are protected under the Endangered Species Act or are candidates for listing. These are the small-toothed sawfish (*Pristis pectinata*), five species of sea turtle, and the Florida manatee (*Trichechus manatus*). Additionally, two avian species are known to occur in the CCEC vicinity. Table 2-1 includes the list of protected species that have been known to utilize the CCEC area. Although these species were not documented during the survey, brief discussions of potentially occurring protected species are provided below.

Small-toothed sawfish (Pristis pectinata)

The small-toothed sawfish is a state and federally endangered species that inhabits inshore bars, seagrass beds, and mangrove areas. Due to its preference for these habitat types, the small-toothed sawfish could potentially utilize the CCEC canal and mitigation area; however it is unlikely in the canal due to the poor habitat quality of the turning basin.

Florida manatee (Trichechus manatus)

The manatee is a state and federally endangered species that frequents warm water estuarine habitats including rivers, marshes, bays, and sounds in Florida. They use warm water refuges in the cooler months, including freshwater springs and heated effluent from power plants. Manatees are federal- and state-listed as endangered, and their critical habitat includes marine waters adjacent to the CCEC and associated canal. Manatees have been observed in the barge turning basin and nearby state canals.

Sea turtles

Sea turtles (4 species with protection status of Endangered or Threatened) are found in marine habitats such as seagrass meadows, rock ledges, oyster bars, and coral reefs. Marine habitats in the vicinity of the CCEC provide suitable habitat for sea turtles, and the shoreline adjacent to the canal and proposed mitigation area provide the beach habitat preferred by sea turtles for nesting.

Brown pelican

The brown pelican is a state species of special concern that thrives near coasts and on islands. Brown pelicans rely in part on the actions of marine predators such as large fish, sharks and dolphins to force schools of fish to the surface where the pelicans can catch them. Pelicans will breed only in areas with enough food to support the breeding colony. Roosting and resting sites where brown pelicans can dry their feathers and rest without disturbance are also important. (USFWS 2016). This is the only listed species to be observed during the February 16, 2017 survey.

Black skimmer

The black skimmer is a state species of special concern that inhabits areas along the coasts of Florida including estuaries, beaches, and sandbars. The black skimmer's diet primarily consists of fish. They build nests along beaches, sandbars, and islands developed by dredged-up material. (FWC 2017). Disturbance of this species is not likely during project implementation as no land-based activities are expected to occur along the beach.

Table 2-1. Federally Listed and Florida-State Listed Species Potentially Existing near CCEC				
Common Name	Scientific Name	Federal Status ^(a)	State Status ^(a)	Observed during survey
Fish				
Small-toothed sawfish	<i>Pristis pectinata</i>	E	—	N
Common snook	<i>Centropomus undecimalis</i>	—	S	N
Mammals				
Florida manatee	<i>Trichechus latirostris</i>	E	E	N
Birds				
Brown pelican	<i>Pelecanus occidentalis</i>		S	Y
Black skimmer	<i>Rynchops niger</i>		S	N
Reptiles				
Green sea turtle	<i>Chelonia mydas</i>	E	E	N
Hawksbill sea turtle	<i>Erytmochelys imbricata</i>	E	E	N
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E	E	N
Kemp's ridley sea turtle	<i>Lepidochelys kemp</i>	E	E	N
Loggerhead sea turtle	<i>Caretta caretta</i>	T	T	N
(a) E = Endangered; T = Threatened; T(S/A) = Threatened due to similarity of appearance; C = Candidate for federal listing; S = Florida species of special concern; SOC = NOAA species of concern; — = No listing				

4. RESTORATION PLAN

This section describes the methods and techniques planned for restoration implementation of the dredge hole/borrow pit. The proposed restoration action involves topographically restoring the dredge hole to an elevation of 4.5 fsw. Restoration will consist of a combination of specific activities that include material staging, sediment placement, and grading. The approach to restoration activities is presented below.

4.1 Topographic Restoration

Topographic restoration will be achieved by placing approximately 1,580 (**1,216** cubic yards (cy) and 365 cy for compaction and loss) of loose (raw) sediment fill within the hole. The fill volume was calculated using topographic survey data collected as described in Section 2.1, above. The volume includes an additional 30% of material to account for inadvertent loss due to compaction, material handling, loss of fines, etc. The 30% factor is an estimate based on past experience with similar projects.

The dredge hole was evaluated to determine the work zone, vessel access corridor, the appropriate methods for delivery and transfer of fill material, placement of the fill material, and turbidity containment. Figure 3-1 illustrates the fill area planned. The proposed approach and methods for topographic restoration are described below.

4.1.1 *Fill Procurement, Transport, and Staging*

Sediment fill will be obtained from a local quarry. A single carbonate material with a grain size distribution dominated by fine sands with low fractions of medium and coarse sands will be used. Fill material will be delivered via truck directly to the staging area. A Fill material will be stored on site and transferred onto the placement barge from the project staging area. Fill material will be staged in a contained environment to avoid loss of material to adjacent aquatic resources. The staging area will be returned to pre-project conditions following project completion, with final cleanup notification provided to the FPL representative.

4.1.2 *Placement barge mobilization*

A barge (placement barge) with an on-board long reach excavator will be mobilized to the site for placement of the material within the fill area. The placement barge will remain at the fill area until fill activities have been completed. Access routes were identified to accommodate the maximum draft (4 ft.) of the tug and barges. Access routes will keep the tug and barge in water depths greater than 5 fsw at all times.

4.1.3 *Turbidity containment*

Prior to mobilization of the placement barge to the dredge hole, a turbidity containment system will be installed. The placement barge will remain spudded down immediately adjacent to the turbidity containment throughout the fill operations. At no time will the turbidity containment be breached during the fill operations.

Turbidity curtains will be placed around the perimeter of the dredge hole to minimize potential siltation and turbidity of the adjacent benthic communities. Turbidity curtains will be placed such that the bottom edge of the material is in contact with the river bottom. Turbidity curtains will be anchored securely for use in high current/dynamic conditions. Piles (12- in. diameter or greater) will be used around the perimeter of the hole to secure the turbidity curtain. Sand screws may be used to supplement the installation as needed. All possible turbidity leak points (seams, bottom of curtain, etc.) will be secured and monitored during filling operations. Turbidity curtains will be furnished with excess material (flaps) at each end so they may be rolled together to seal the seam created by securing two sections together. Additionally, curtains will have a 3-ft. barrier above the water line to inhibit manatees from entering the fill zone. The turbidity curtains will be highly visible and manufactured from entanglement-free material that is safe to use in the presence of marine mammals, sea turtles, and other marine fauna. Curtains will be removed once turbidity within the hole reaches an acceptable level.

4.1.4 ***Sediment Placement***

Sediment placement operations will commence following turbidity curtain installation. Loose fill will be transferred using a long-reach excavator and conveyor system (if necessary due to restricting water depths) from the staging area to a material placement barge (see Photo 4-1). The use of a conveyor system provides a low-to no-impact fill material transfer route through mangroves, coastal vegetation, and shallow water habitats. All sections of the conveyor system that cross sensitive habitat will be covered from above and below to limit wind loss and catch material that may drop from the conveyor system. The covers are generally constructed of half sectioned corrugated style pipe installed above and below the conveyor belt.



Photo 4-1. Fill conveyor loading placement barge

Sediment fill will be transferred from the staging area directly to a transport barge for delivery to fill site. A fender system or piles will be installed water-ward of the conveyor system for the placement barge to secure itself to during the fill transfer. Having a secure fender system will minimize the potential for impacts from the placement barge to the shoreline during transfer of fill material. Once the full capacity of fill material has been transferred, the transport barge equipped with GPS and Hypack positioning software will deliver the fill material to the placement barge.

4.1.5 Bathymetric survey and grading

The dredge hole will be bathymetrically surveyed on a regular basis in order to monitor fill progress. Surveys will provide data on placement efficiency (fill material delivered versus placed), evenness, and progress. A location index map (grid pattern over the fill area) will provide the basis for progress monitoring. Figure 4-1 provides an example of a location index map from a similar topographic restoration project.

Grading will be conducted following placement activities. A large steel I-beam will towed by a tug throughout the fill area. The tug operator using Hypack software will have a real-time view of position over the latest bathymetric survey. This will allow for focused grading based on the current conditions. The operator will drag the bar over high areas of fill towards adjacent low areas in an attempt to level the seafloor.

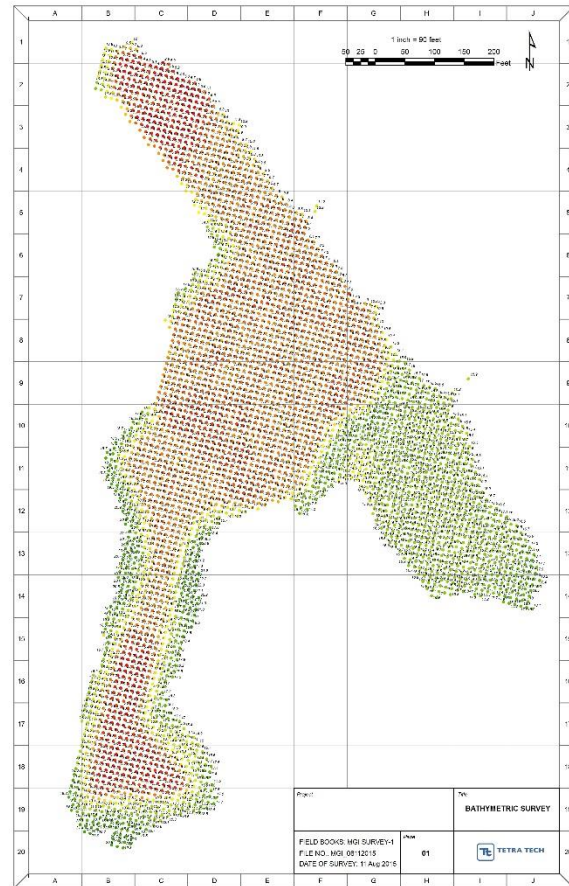


Figure 4-1. Bathymetric survey projected over location index map

4.2 Threatened and Endangered Species Signage

All staff involved with filling operations will be instructed and trained as per Florida Fish and Wildlife Conservation Commission (FWC) Standard Manatee Conditions for In-Water Work as well as the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA-NMFS) Marine Sea Turtle and Smalltooth Sawfish Construction Conditions. Idle speed/manatee protection signage will be maintained on board during all restoration activities. One sign which reads Caution: Boaters shall be posted in a location where it is prominently visible to all staff. A second sign measuring at least 8.5 by 11-in. explaining the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations (Figure 3-3) will be posted in a location prominently visible to all personnel engaged in water-related activities (www.myfwc.com). Signage will be maintained at both the location of the materials barge and the restoration site. A biologist will be on site at all times during restoration implementation to monitor for the presence of Threatened and Endangered Species. If any Threatened and Endangered Species comes within 50 feet of the work zone, filling operations will cease until the protected species has left the work zone on its own accord.



Figure 3-3. FWC manatee signage

4.3 Water Quality Monitoring

Using a portable turbidimeter (Hach 2100Q), turbidity measurements will be collected at 6-hour intervals from upstream, downstream, and within the work area. Samples will be collected outside the turbidity containment from no further than 50 ft. from the point of discharge within the densest portion of any visible plume. If the turbidity exceeds the state water quality standards (DEP 62-302.530) for an Outstanding Florida Water (zero NTU's above background) then backfill operations will cease until water quality standards are returned to background levels. If water quality standards are exceeded more than twice a day, the backfill operations will be stopped and then evaluated for implementation of mitigation measures.

4.4 Post-Construction Survey

A post-construction survey will be performed immediately after mitigation actions have been completed (e.g., fill placement) and it is safe for scientific divers to enter the area. The post-mitigation survey will evaluate the mitigation area to identify any incidental or unanticipated impacts from construction. Post construction activities will include the following:

- Towed divers equipped to document the post-construction conditions of the benthic habitat
- Bathymetric survey
- Post Construction photo-documentation

5. SUMMARY

Currently the dredge hole has no epibenthic floral or faunal coverage. The vertically cut banks along with poor water quality (high turbidity) currently provides suboptimal marine habitat. Filling of the hole is expected to improve benthic habitat both within the dredge hole and adjacent areas. The overall intent of the Project is to increase seagrass habitat within and in the vicinity of the dredge hole by backfilling the hole to a minimum depth 4.5 fsw. Additionally, indirect benefits to marine habitats are expected as a result of the overall improvements to water quality.

Based on the site survey, direct impacts to benthic resources are not expected as a result of the mitigation project. Indirect impacts such as shading, sedimentation, turbidity, and mechanical injury are expected to be negligible. The use of specialized turbidity containment and equipment and the methods specified herein will avoid and minimize both direct and indirect impacts to both sessile and motile biota. All standard construction conditions for manatees and smalltooth sawfish will be abided by during construction to avoid any potential affects. Additionally, biologists will be on-site during all construction to observe any protected species within the project vicinity and advise any additional measures needed to avoid harm or harassment to protected species.

6. REFERENCES

- US Fish and Wildlife Service. <http://www.fws.gov/oregonfwo/Species/Data/BrownPelican/>. Accessed May 25, 2016.
- Florida Fish and Wildlife Conservation Commission. <http://myfwc.com/wildlifehabitats/imperiled/profiles/birds/least-tern/>. Accessed May 25, 2016.
- United States Nuclear Regulatory Commission. <http://www.nrc.gov/docs/ML1036/ML103630163.pdf>. Accessed May 25, 2016.