

## **Phase I Environmental Site Assessment**

The Halmos College of Natural Sciences and Oceanography  
I.e. Oceanographic Campus  
8000 N Ocean Dr.  
Dania Beach, FL 33004

### **PREPARED FOR:**

Dr. Paul Baldauf  
Project Report I  
ENVS 3000

### **PREPARED BY:**

Morgan Gifford  
Annie Goyanes



**8000 N Ocean Dr, Dania Beach, Florida**

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## **Executive Summary**

The completion of a Phase I Environmental Site Assessment was requested for the property located at 8000 N Ocean Drive in Dania Beach, FL. The total area of the subject property sits on 10 acres of land and currently has approximately 6 acres of commercial building situated on it.

Information from historical land records, historic air photos, analysis of neighboring properties, and hydrogeological conditions were complemented with groundwater analysis, surface water analysis and reviews of regulatory agency records.

### On-site:

1. Florida consists primarily of limestone that rests upon a much older basement of igneous, metamorphic, and some sedimentary rock like sandstone and shale. This porous material will continue to create issues like saltwater pushing through into the drinking water supply as well as the flooding of rivers and canals from heavy rains.
2. The site consists of one parcel of land resting on approximately 10 acres in size. The main structure being the Center of Excellence for Coral Reef Ecosystem Research, as well as the Coral Reef Tank Research Area. While the remaining area includes faculty offices, classrooms, and research laboratories.
3. According to the USGS topographic map, the site perimeter remains at a minimum of -2 feet below sea level and a maximum of 17 feet above sea level. The topography appears to be sloping from the southeast which would demonstrate the direction of drainage creating runoff issues within the structure.
4. The subject site is located above the Biscayne aquifer which is at risk of saltwater intrusion according to recent developments. This allows for a direct relationship between groundwater contaminants and surface water. Potential sources of contaminants that are currently present include arsenic, manganese, radon, and uranium.

### Off-site:

1. According to maps provided by the U.S. Fish and Wildlife Service as well as visual inspection, determined that the site lies within the the category Estuarine and Marine Deepwater. However, marine wetlands are within close proximity to assist with water purification and locations for nurseries.
2. Twenty RCRA facilities were found within a 2 km radius of the Oceanographic Campus according to Figure 1. Although, these facilities are developed to protect and properly dispose of hazardous waste there are studies that show there is still potential for exposure to the surrounding environment.

3. According to EnviroMapper through the EPA, there are three Solid Waste Landfill Facilities within five miles to the west of the subject parcel of land at hand.

Based on review of the information discovered, it was determined that the property does not pose any significant environmental threat or liability. There should be a more in depth study of the contaminants and pollutants found directly within the site based off soil, groundwater and surface water analysis.

## **1: INTRODUCTION**

### **1.1 Summary of the Scenario**

The purpose of this task was to conduct an *environmental site assessment* of a parcel of real estate. This parcel of land involves the plans to sell the Oceanographic Campus.

The purpose of the *environmental site assessment* was to:

- evaluate the impact to the surface water, groundwater, and/or soils within the property boundaries as well as the local vicinity
- evaluate historical land usage to identify previous conditions that could impact the environmental condition of the site as well as in the future
- evaluate the potential on-site and off-site contamination; and,
- provide a professional opinion regarding the potential environmental impact at the site and list the recognized environmental impacts or conditions

Under the rules of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), Property owners are responsible for remediating contaminated property, whether or not they caused the problem. The reason for conducting this ESA is to conduct all inquiries based on the uses and prior ownerships of the site due to pending real estate agreement.

### **1.2 Regional Physiography**

South Florida's coastal waters lies between the Charlotte Harbor on the Gulf of Mexico and the St. Lucie River on the Atlantic Ocean. South Florida's ecosystem includes coastal waters that consist of estuaries, lagoons, bays, and coral reefs like: Ten Thousand Islands, Whitewater Bay, Florida Bay, Biscayne Bay, and the Florida Reef Tract. The highest altitude in this region is on

Lake Wales Ridge where the sand hills are from 70 to 300 feet above sea level. The Atlantic Coastal Ridge lies on the eastern coast and is a low ridge of sand over limestone that has an altitude from 10 to 50 feet above sea level (Kambly, Moreland, 2009).

One of the main reasons that humans use this land surface are for fragmentation to advance development. Florida has been impacted by humans which can be seen through the earth's temperature rising, the change of global gas concentrations, ultraviolet rays increasingly penetrating the atmosphere, water pollution, increased invasive species, and less biodiversity (Whitney, Means, Rudloe, 2014).

### **1.3 Regional Geology**

Geologically, Florida rests on top of the Florida Platform, a plateau that lies mostly underwater, deep beneath present-day surface. The Florida Platform has a topographic relief of about 10,000 feet due to the sea level fluctuations that produce emergence and submergence of the land, thus constantly changing the shape of the land. The boundaries that define the Florida Platform were once active plate boundaries but currently the Florida Platform lies in a tectonically passive setting. Approximately 200 million years ago, Florida's igneous basement was flooded which then began the formation of carbonates. In present day, Florida consists primarily of limestone that rests upon a much older basement of igneous, metamorphic, and some sedimentary rock like sandstone and shale (Hine, 2013).

## **2: SITE DESCRIPTION**

### **2.1 Current Site Operations**

The assessed area referred to as the "site" is located at 8000 N Ocean Dr, Dania Beach FL 33004. The site consists of one parcel of land resting on approximately 10 acres in size. The south western portion is developed with the main structure, the Center of Excellence for Coral Reef Ecosystem Research, as well as the Coral Reef Tank Research Area. These two structures take up approximately 6 acres of the 10 totaling acres as shown in Figure 2. This portion of the land was completed in 2012. While the remaining area includes faculty offices, classrooms, and research laboratories including the Dr. Charles and Hamilton Forman building, the Mellon building, and the Alexander and Dorothy Shure building. All of which were completed prior to 2000. Associated parking lots and landscaped areas are located throughout the subject property.

### **2.2 Land Value**

According to the Broward County Property Appraiser, the site is identified as Parcel ID 5042 24 06 0010. The subject parcel of land at 8000 N Ocean Dr, Dania Beach FL 33004 remains

currently under the owner Nova Southeastern university Inc Facilities Management. This 10 acre parcel of real estate has a land value of \$27,930,530, a building value of \$15,029,640, and a total value of \$42,960,170 (BCPA Web Map, 2015).

### **2.3 Surface waters and Wetlands**

The site resides between the intracoastal, once referred to as Lake Mabel to the west, as well as the ocean to the east. As determined by the USGS topographic map, the site perimeter remains at a minimum of -2 feet below sea level and a maximum of 17 feet above sea level (USGS Topographic Map, 2018). The topography appears to be sloping from the southeast which would demonstrate the direction of drainage creating runoff issues within the structure. The elevation profile for the site can be viewed from Figure 3.

The subject site is located above the Biscayne aquifer which is at risk of saltwater intrusion according to recent developments. This saltwater intrusion began when the Everglades were drained to provide dry land for urban development and agriculture (Lodge, 2010). Surface waters primarily recharge shallow aquifers by entering from higher elevations. The groundwater then discharges into streams and other surface water bodies ("Natural Processes", 2016). Therefore there is a direct relationship between groundwater and surface water. Any pollutants within the aquifer would have direct influence on the health of the surrounding surface waters.

Wetlands are extremely important for the purification of the surrounding waters. Wetland plants for example, extract pollutant materials from water and deposit them into their own tissues (Whitney, 2014). The parcel of real estate has also been assessed for the presence of wetlands within the 2 km buffer surrounding the site. This was performed by adding the National Wetlands Inventory layer to the ArcGIS online map with the previously added boundary of the site for sale. Then using the analysis overlay tool, an additional layer was created illustrating the presence of wetlands within a 2 km radius of the site. This is shown in Figure 4 located in the appendix. It was determined from the map that the majority of area surrounding the site is Estuarine and Marine Deepwater. While it was also found, using the measure tool, that 1,167 feet north and 1,458 ft south there are Marine Wetlands present.

### **2.4 Soils**

The soil in the Dania county consists of nearly level, very poorly drained soils that is covered by water most of the year. The upper level of the soil is of black or dark reddish sapric material or muck. Below the muck, there is brown fine sand and light gray sandy marl that consists of 50% of limestone fragments. Limestone is found at the deepest depth of 18 inches. The organic material is twice as thick as the mineral material and is slightly acidic (Pendleton, Dollar, Law, McCollum, Belz, 1970).

### **2.5 Geology**

Holocene sediments are what make up the sediment near the present coastline. This sediment consists of quartz, carbonate sands and muds, and organics. Most of Florida's coastline is dominated by quartz-rich sand due to the massive deposition of siliciclastic sediment like quartz sand and phosphate that occurred about 20 million years ago (Hine, 2013). The Miami Limestone occurs from Palm Beach County and in the southernmost Keys and forms the Atlantic Coastal Ridge. The Miami Limestone are composed of two layers: the oolitic facies and the bryozoan facies. The oolite layer is mostly poorly indurated and are made up of grainstone pellets with some fossil contents. The bryozoan layer consists mostly of the bryozoan *Schizoporella floridana* as well as a mixture of ooids, pellets, mollusks, corals, and other bryozoans (Peutch, Roberts 2007).

## **2.6 Groundwater**

In most aquifers there are geologic and manmade sources of contaminants that are present like arsenic, manganese, radon, and uranium. How groundwater moves through an aquifer and the geochemical conditions within aquifers affect concentrations of contaminants in groundwater (DeSimone, McMahon, Rosen, 2015).

The groundwater from the Floridan aquifer has been withdrawn nearly 500 percent since 1950 because the aquifer acts a source of water for agriculture, source of springs that serve as recreational destinations which boosts the United States economy. The occurrence of nitrate at concentrations greater than the background concentration indicated that the Floridan aquifer and other aquifers are vulnerable to contamination due to human activity at the land surface (Berndt, Katz, Kingsbury, Crandall, 2014).

The Biscayne Aquifer underlies Miami-Dade county and southern Broward County and is the principle source of drinking water. The Biscayne Aquifer is prone to saltwater intrusion due to its low land-surface altitude and a low topographic gradient and being bordered by various sources of saltwater. The reduction in water levels from this drainage combined with droughts allowed the saltwater to flow inland seeping directly into the aquifer from canals (Prinos, 2014).

Based on the general location of the subject parcel of land, it can be concluded that there would be traces of contaminants in the land and surrounding waters because of the underlying aquifer. The local canals surrounding the subject land also act as transportation for effects of saltwater intrusion into the aquifer below. Although this piece of land is subject to contaminants and saltwater intrusion, it is unavoidable for many areas within the vicinity of Southern Florida.

## **3: REVIEW OF REGULATORY AGENCIES RECORDS AND DOCUMENTS**

### **3.1 Superfund: NPL and CERCLA Sites**

Chemform, INC. Pompano Beach, FL



The EPA, the Florida Department of Environmental Protection (FDEP), and other parties are currently working together to investigate the source of remaining groundwater contamination. The site contamination does not currently threaten people living and working at or near the site.

Flash Cleaners. Pompano Beach, FL

EPA placed this former dry cleaning facility on the NPL in 2008 because of contaminated soil and groundwater resulting from dry cleaning activities. The EPA and FDEP have investigated site conditions and taken steps to clean up the site in order to protect people and the environment from contamination. Site contamination does not threaten people living and working near the site.

Wingate Road Municipal Incinerator Dump. Fort Lauderdale, FL

EPA placed this former waste incineration facility on the NPL in 1989 due to contaminated oil, sediment and surface water resulting from waste disposal practices. The EPA, FEDP, the City of Fort Lauderdale, and other parties have investigated site conditions and taken steps to clean up the site in order to protect people and the environment from contamination. Site contamination does not threaten people living and working near the site.

### **3.2 RCRA Generators**

Additionally, the US EPA Resource Conservation and Recovery Act facilities were mapped through ArcGIS online to demonstrate vicinity of these facilities to the parcel of land being sold. A While, a 2 km buffer was set around the segment of land to show the number of Hazardous Waste Facilities within a 2 km radius. This is shown in Figure 1 below in the appendix. It was determined that twenty RCRA facilities are within a 2 km radius of the Oceanographic Center. Although, these facilities are developed to protect and properly dispose of solid and hazardous waste there are studies that show there is still potential for exposure to the surrounding environment. For example, air quality assessments can be performed to account for each toxic contaminant (Shen, 2003). However, it has been found that many hazardous waste disposal sites have not been properly assessed.

Two large quantity generator facilities have been identified among others within the 2 km radius of the site for sale. The RCRA generator with the closest vicinity to the site was determined to be MS Legend IMO #9224726 i.e. Carnival Legends located approximately 918 ft southwest of the campus based on Figure 1. The most recent Biennial Report indicates that the facility generates and ships 4 tons of waste a year. The types of waste processed and shipped include ignitable waste, mercury, silver, and nonhalogenated solvents including xylene, acetone, ethyl, acetate, methanol, among others (“EPA: RCRA Info”, 2017).

Approximately 4,195 ft from the southwest corner of the property lies the Costa Magica IMO #9239795 RCRA facility. This facility, according to the Biennial Report, generates and ships 6.6 tons from the most recent update in 2007. The type of waste disposed of includes ignitable waste, silver, tetrachloroethylene along with other nonhalogenated solvents (“EPA: RCRA Info”, 2017).

Lastly, a conditionally exempt small quantity generator facility was determined 4,545 ft to the southwest of the site under the name FPL - Port Everglades Plant. The most recent Biennial Report states that 4.6 tons are generated and shipped every year (“EPA: RCRA Info”, 2017). This plant in particular has a smaller range of waste being collected, merely ignitable waste and reactive waste, compared to larger facilities.

### **3.3 State Landfills and Solid Waste Facilities**

Along with the assistance of the EnviroMapper through the Environmental Protection Agency, it was determined that there are three solid waste landfills within a five mile radius of the subject property at hand. These landfills are all located to the west of the site and are identified as SNYDER PARK TRANSFER STATION, WM RECYCLING SUN 3, and ENVIROCYCLE INC (‘EPA - EnviroMapper”, n.d). The three locations within a 5 mile proximity of the subject land can be viewed from Figure 5. The two facilities, WM RECYCLING SUN 3 and ENVIROCYCLE INC, are classified as Material Recovery Facilities (C & D). While the third facility, SNYDER PARK TRANSFER STATION, is classified as a transfer station focused on the disposal of household, construction and demolition waste.

## **4: SITE HISTORY**

With the assistance of an ArcGIS map layer created by the Everglades Project of the Soil Conservation Service was investigated to determine the change in soil composition from 1948 until present day. The layer was created by digitizing 1948 soil maps to understand water control for agricultural land. This can be used to understand the change in soil within the last 71 years. According to the 1948 soil maps, the OC Campus site was classified as wet rockland shown throughout Figure 8. A rockland hammock is classified as a rich hardwood forest where limestone is very near the surface while oftentimes exposed (Snyder, 1990). This type of community is often susceptible to fire and ground water reduction. Additionally, rockland hammock communities often have well drained organic soil covering the underlying limestone. The map also shows the wet marl and Calcareous soils to the east, south and south west of the site. Figure 7 demonstrates the presence of more trees and vegetation in 1955 then in present day. While Figure 6 shows the minimal construction that took place prior to 1955.

While closer to present day an additional map was analyzed through ArcGIS showing the Rock and Sediment Distribution as of 2018. The subject land falls within the region of medium fine

sand and silt compared to the surrounding area which was determined to be shell beds to the south and limestone to the southwest. This determination can be viewed using Figure 9.

## **5. SUMMARY OF RECOMMENDATIONS**

Based on the information provided as part of this *environmental site assessment*, the following conclusions and recommendations of the surrounding site have been made:

1. Analysis to conduct tests on the strength of the building on the current site.
2. Perform soil analysis of the surround vicinity local to the ocean, the intercoastal waterway and various locations within the 10 acre property to determine the quality of the soil as well as any contaminants at the surface.
3. Collect groundwater samples from locations throughout the property as well as existing well within a 2 km radius to determine the local water quality. A water quality analysis should then be performed to better understand the presence of high/low chloride concentration, heavy metals, or volatile compounds from surrounding hazardous waste facilities.

Based on review, it was determined that the property does not pose any significant environmental threat or liability. There should be a more in depth study of the contaminants and pollutants found directly within the site based off soil, groundwater and surface water analysis stated above.

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## **7. APPENDIX**

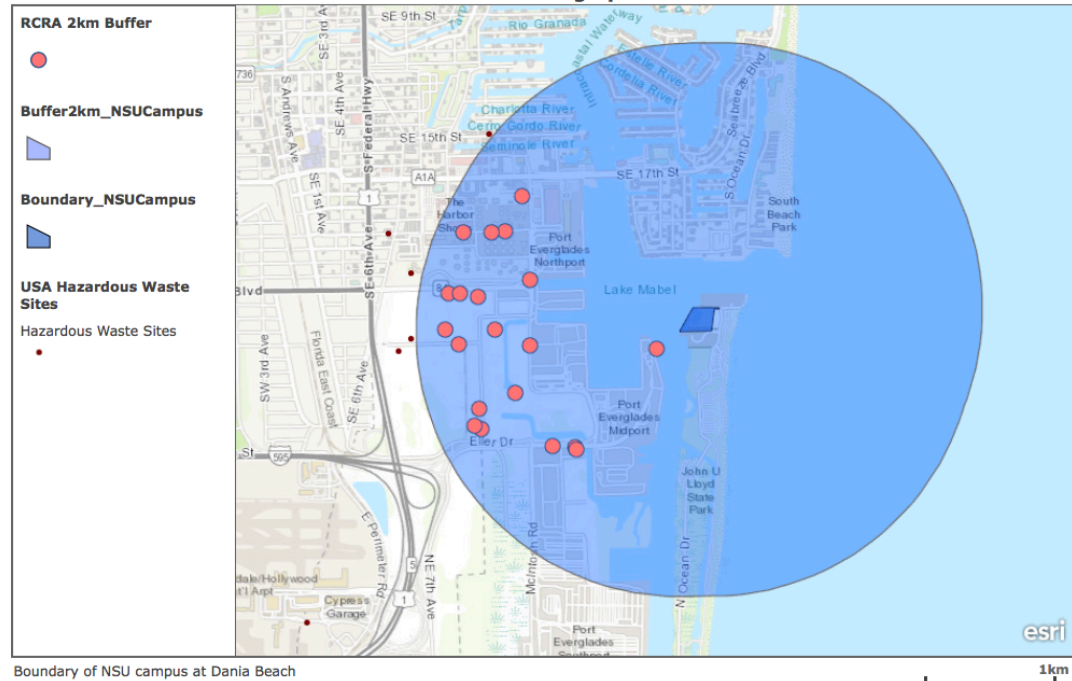
**Phase I Environmental Site Assessment of NSU Oceanographic Center.**

Figure 1. US EPA Resource Conservation and Recovery Act (RCRA) facilities within 2 km of the project area, i.e. Hazardous Waste Sites



Figure 2. Phase I landscape elements at NSU Oceanographic Center.

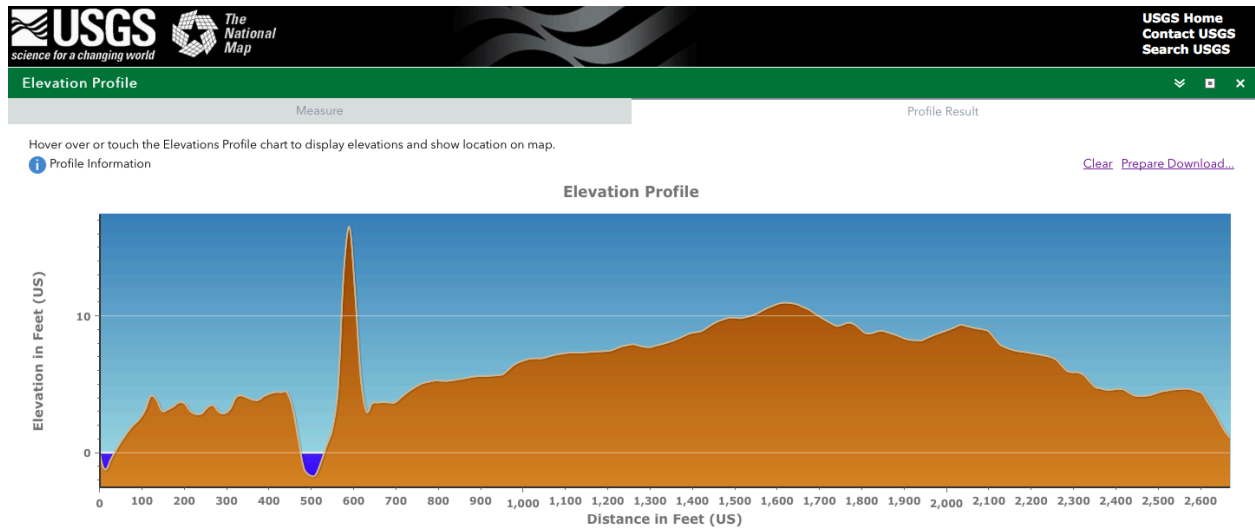


Figure 3. USGS Topographic Map of Elevation Profile of 8000 N Ocean Drive Hollywood, FL 33304.

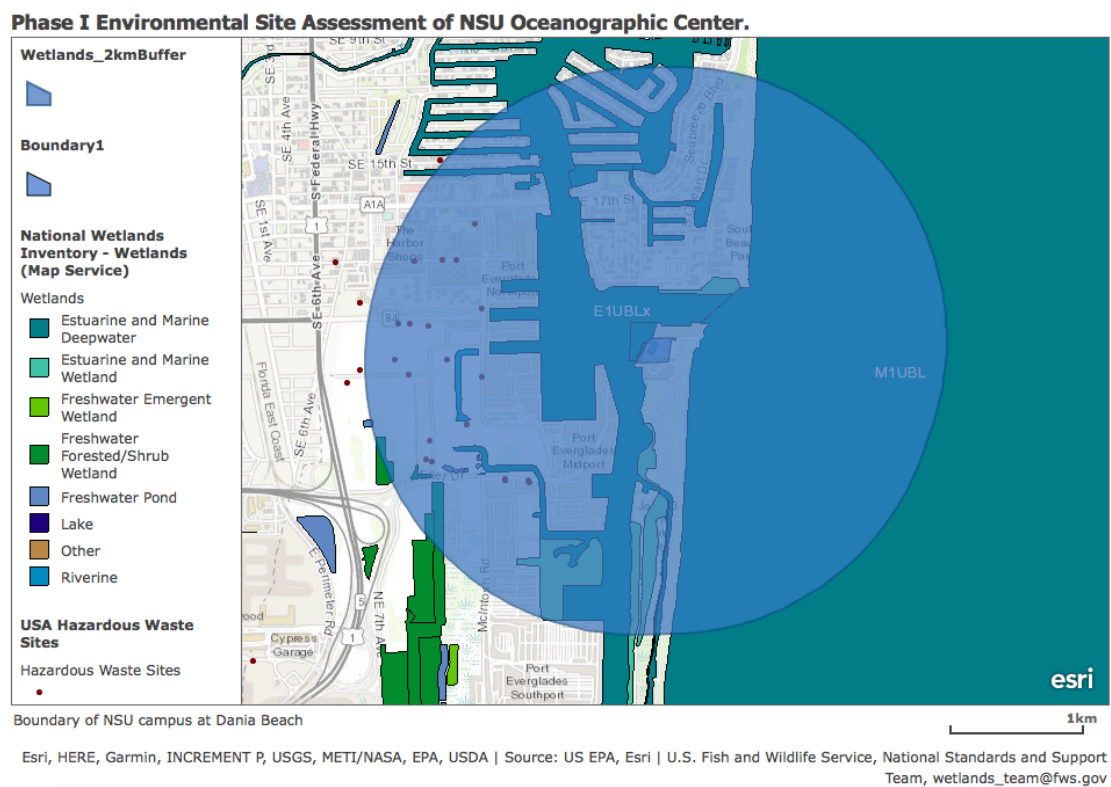


Figure 4. National Wetlands Inventory.



## Solid Waste Landfill Facilities

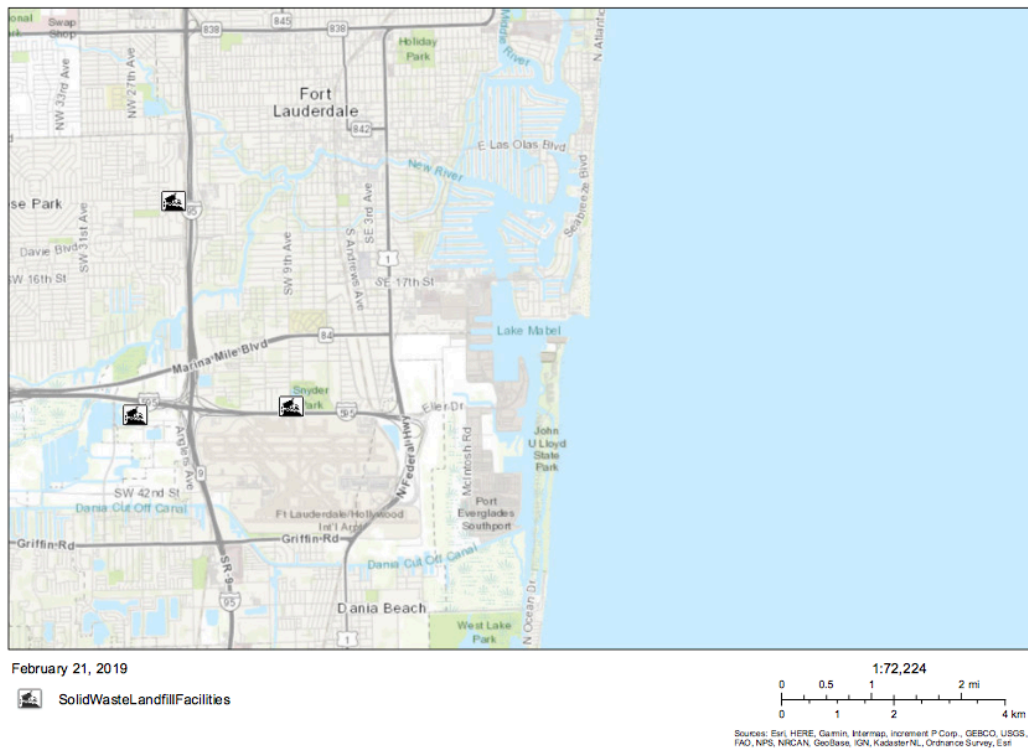


Figure 5. Solid Waste Landfill Facilities.

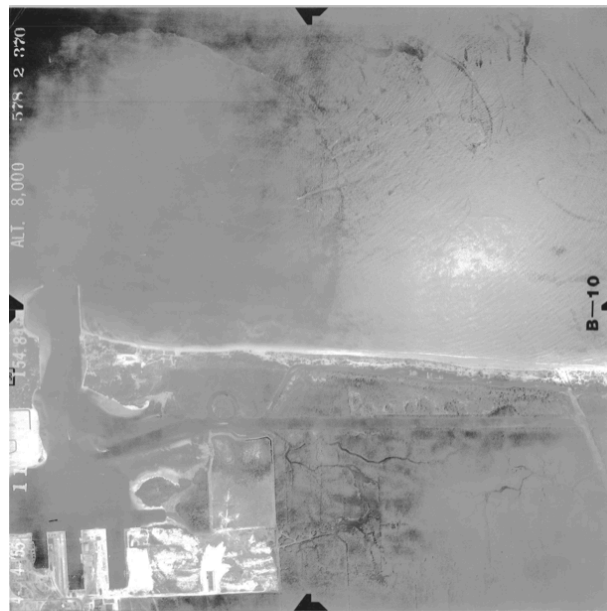
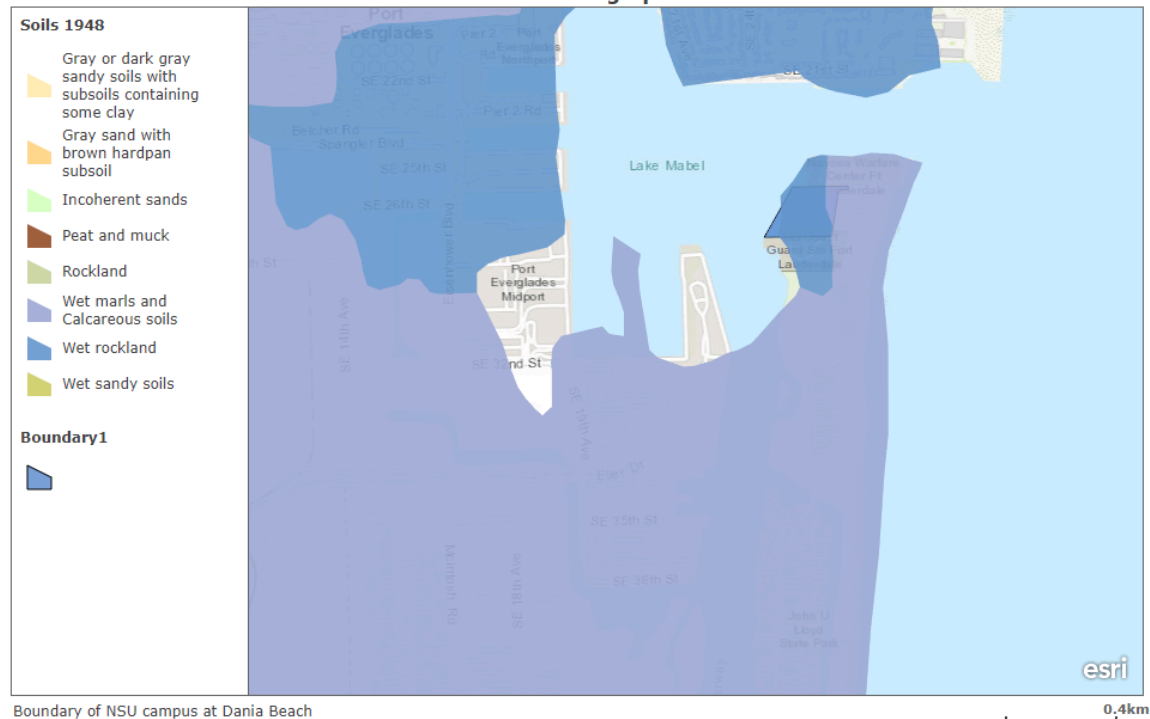


Figure 6. The Oceanographic Campus 1955.



Figure 7. The Oceanographic Campus 1995.

## Phase I Environmental Site Assessment of NSU Oceanographic Center.



Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA | Source: US EPA, Esri | U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands\_team@fws.gov | SFWMD, Geospatial Services: Geospatial Services is a unit within the South Florida Water Management District's Information Technology Bureau (ITB). Geospatial Services manages and maintains enterprise geospatial services, products, and data and is governed by the ITB's Policies and Procedures. The Agricultural Experimental Station of the University of Florida and the Soil Conservation Service of the U.S. Department of Agriculture should be acknowledged as the data source in products derived from this dataset.



# **Phase I Environmental Site Assessment of NSU Oceanographic Center.**

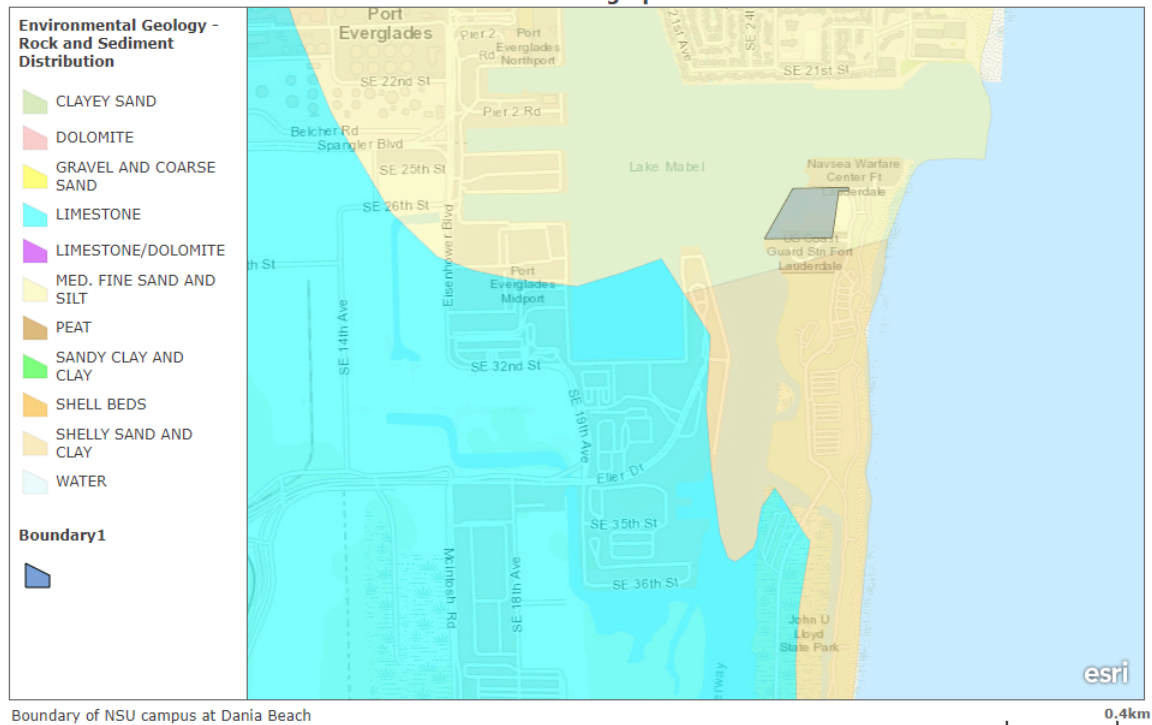


Figure 9. Rock and Sediment Distribution 2018.