Environmental Assessment for Retail Warehouse at John F. Kennedy Space Center, Kennedy Space Center, Florida

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Prepared for:
National Aeronautics and Space Administration
John F. Kennedy Space Center
Environmental Program Office
Kennedy Space Center, Florida 32899

Prepared by:
Ivey's Construction, Inc.
4060 N. Courtenay Pkwy.
Merritt Island, Florida 32927

ENVIRONMENTAL ASSESSMENT
RETAIL WAREHOUSE
KENNEDY SPACE CENTER
JOHN F. KENNEDY SPACE CENTER, FLORIDA

Abstract

This Environmental Assessment (EA) evaluates the environmental effects of the Proposed Action of constructing a new retail warehouse building at the Kennedy Space Center Visitor Complex (KSCVC) on a site referred to as "Retail Warehouse East Property". The site is located east of the Kennedy Space Center Visitor Complex, south of State Road 405. Under the proposed action, the new retail warehouse will be located across the street and to the east of the current administration building and existing retail warehouse. In addition to the Proposed Action the No Action Alternative was also evaluated. Under the No Action Alternative, the retail warehouse would not be constructed. Potential impacts from the proposed action were evaluated and classified as either negligible or minor. The construction portion of the Proposed Action would result in negligible adverse impacts to utilities, noise, light emissions, threatened and endangered species, cultural resources, transportation, geology and soils, hazardous materials/hazardous waste, and environmental justice; minor impacts to vegetation, surface and groundwater quality, wildlife, wetlands, and flood plains; and minor beneficial impacts to socioeconomics. Further, implementation of the operational portion of the Proposed Action would result in negligible adverse impacts to transportation, vegetation, wildlife, threatened and endangered species, cultural resources, noise, and floodplains. Minor adverse impacts to light emissions, and utilities, and minor beneficial impacts to socioeconomics are expected with the operation of the Proposed Action. Mitigation is proposed for the Proposed Action to compensate for the minor impacts to wetlands. The No Action Alternative was not selected because it does not meet the purpose and need of the Proposed action.

LEAD AGENCY: National Aeronautics and Space Administration
John F. Kennedy Space Center
Environmental Program Office
Kennedy Space Center, FL 32899

POINT OF CONTACT: James Brooks
Environmental Planning Mail Code S1-E3
Kennedy Space Center, FL 32899
(321) 867-9081
james.t.brooks-1@nasa.gov

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List of Abbreviations and Acronyms

Abbreviation/Acronyms	Definition
ACI	Air Curtain Incineration
APE	Archaeological Area of Potential Effects
AST	Above Ground Storage Tank
BO	Biological Opinion
BFE	Base Flood Elevation
BMPs	Best Management Practices
CANA	Canaveral National Seashore
CCSFS	Cape Canaveral Space Force Station
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CRAS	Cultural Resource Assessment Survey
DNC	Delaware North Companies Parks and Resorts
EA	Environmental Assessment
ERP	Environmental Resource Permit
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Association
FLUCFCS	Florida Land Use, Cover and Forms Classification System
FPL	Florida Power & Light
FSHPO	Florida State Historic Preservation Office
GIS	Geographic Information System
ha	Hectare(s)
IRL	Indian River Lagoon
KSC	Kennedy Space Center
LC	Launch Complex
LEED	Leadership in Energy and Environmental Design
LPZ	Low-Probability Zone
MINWR	Merritt Island National Wildlife Refuge
MPZ	Moderate-Probability Zone
NASA	National Aeronautics and Space Administration
NAVD 88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act

Abbreviation/Acronyms	Definition
NFHL	National Flood Hazard Layer
NID	NASA Interim Directive
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPR	NASA Procedural Requirements
NPS	National Park Service
NRCS	Natural Resources Conservation Service
OFW	Outstanding Florida Waters
PA	Proposed Action
PEMB	Pre-engineered Metal Building
PVP	Public Visitor Program
REC	Record of Environmental Consideration
SAS	Surficial Aquifer System
SJRWMD	St. Johns River Water Management District
SMS	Stormwater Management System(s)
U.S.	United States
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VC	Visitor Complex
WWTP	Wastewater Treatment Plant
ZAP	Zone of Archaeological Potential

EXECUTIVE SUMMARY

This Environmental Assessment has been prepared to evaluate the potential environmental impacts associated with the construction and operation of a new retail warehouse at the Kennedy Space Center Visitor Complex (VC). The new facility will be located on a 3.15-acre portion of the 15.12-acre site referenced as the Retail Warehouse East Property located to the east of the current Administrative Building and existing Retail Warehouse. This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321, et seq.), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), Procedures for Implementing NEPA (14 CFR Part 1216 Subpart 1216.3), and National Aeronautics and Space Administration (NASA) policy and procedures ([NPR] 8580.1, Implementing the National Environmental Policy Act). Since NASA has considered a plan to construct the Retail Warehouse at the Kennedy Space Center Visitors Complex (KSC VC), this Environmental Assessment (EA) is necessary to support NASA's compliance with NEPA and related federal and state environmental regulations.

The VC is primarily an educational and historical experience that includes entertainment activities and restaurant options, including daily presentations from former astronauts. The VC, which is operated through a Concessions Agreement with NASA, features exhibits, displays, historic spacecraft, space memorabilia, IMAX theater, and supports tour buses that enter the KSC secured area, providing visitors with a personal experience of NASA KSC's facilities and capabilities for space exploration. Figure 1 presents the VC Site Location Map.

The purpose of the Proposed Action is to construct and operate a retail warehouse at the Retail Warehouse East Property that would include designing a new Pre-Engineered Metal Building (PEMB), with associated site improvements such as vehicle access driveways, parking lot areas, sidewalks, utility connections, and stormwater conveyance improvements to capture stormwater runoff from the new warehouse. The retail warehouse will provide Delaware North with a new facility to be used for receiving and distribution of retail merchandise for VC operations. The project construction start date is estimated to be February 2024 and a fully functional facility date of December 2024.

This EA evaluates the potential environmental impacts associated with the No Action (NA) Alternative and the Proposed Action (PA) which is the Preferred Alternative and include the following resource categories: biological resources (habitat and non-listed wildlife species), threatened and endangered wildlife species, cultural resources, noise, light emission, transportation, utilities, wetlands, floodplain, geology and soils, surface water quality, groundwater quality, hazardous materials/hazardous waste (includes solid waste and pollution prevention), socioeconomics, and environmental justice. Environmental impacts for the Proposed Action and No Action Alternatives will be classified as none, negligible, minor, or major (see Appendix A for definitions). Under the No Action Alternative, the retail warehouse would not be constructed. Apart from socioeconomics, the No Action Alternative would result in no impacts; minor adverse impacts to socioeconomics would be expected. However, the No Action Alternative is not being selected because it does not meet the purpose and need of the Proposed Action. As required by the NEPA, the No Action Alternative is carried forward for analysis in the EA for the purposes of analyzing the consequences of not undertaking the Proposed Action and establishing a comparative baseline.

Review of the initial digital map assessments was conducted to analyze the project site and surrounding areas to evaluate the construction and operational environmental impacts of the Proposed Action. The preliminary analysis indicates that the construction portion of the Proposed Action would result in negligible adverse impacts to utilities, noise, light emissions, threatened and endangered species, transportation, geology and soils, and hazardous materials/hazardous waste; minor impacts to vegetation, surface and groundwater quality, wildlife, wetlands, and flood plains; no impacts to cultural resources and environmental justice; and minor beneficial impacts to socioeconomics. Further, implementation of the operational portion of the Proposed Action would result in negligible adverse impacts or no impacts to transportation, vegetation, wildlife, threatened and endangered species, cultural resources, noise, and floodplains. Minor adverse impacts to light emissions, and utilities, and minor beneficial impacts to socioeconomics are expected because of the operation of the Proposed Action. Mitigation is proposed for the Proposed Action to compensate for the minor construction impacts to wetlands.

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

As a federal agency, the National Aeronautics and Space Administration (NASA) is required to consider environmental consequences resulting from its actions on any property within its boundaries. This requirement is based on regulatory mandates including the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321, et seq.), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), Procedures for Implementing NEPA (14 CFR Part 1216 Subpart 1216.3), and NASA policy and procedures ([NPR] 8580.1, Implementing the National Environmental Policy Act). Since NASA has considered a plan to construct the Retail Warehouse at the Kennedy Space Center Visitors Center (KSC VC), this Environmental Assessment (EA) is necessary to support NASA's compliance with NEPA and related federal and state environmental regulations.

Under the authority of the National Aeronautics and Space Act of 1958, the Government, represented by the Contracting Officer, entered into a Concessions Agreement with Delaware North Companies Parks and Resorts at KSC, Inc. (DNC). In this agreement, the Government provided DNC preferential rights to conduct revenue-producing Concession Activities associated with the KSC Public Visitor Program (PVP). The Concessioner understands that the Concession Activity is intended to serve a public interest by facilitating affordable visitation to NASA KSC and, in connection therewith, to disseminate information concerning NASA and specifically KSC's activities, which shall be accomplished with an equal or greater emphasis on the public interest as on making a profit.

The planning, approval, approaches, documentation, and associated processes are applicable to all projects funded through the Trust Accounts. The Concessioner understands the requirement to collaborate with the Contracting Officer in the identification, definition, and prioritization of projects on a recurring basis by compiling and submitting proposed projects for approval. NASA's action will be the Contracting Officers' approval of DNC's request to construct the new retail warehouse at the Kennedy Space Center Visitor Center.

As the landowner, NASA KSC is responsible for its real property assets and infrastructure in support of the Agency mission of human spaceflight and continued exploration of space. NASA is also responsible for managing other areas on KSC for space-related industry development and operations. KSC provides oversight for current commercial space and technology development- related uses and will be responsible for establishing and coordinating activities outlined in the Proposed Action. NASA is the lead agency for the Proposed Action and is responsible for ensuring overall compliance with applicable environmental statutes, including NEPA.

The VC is primarily an educational and historical experience that includes entertainment activities and restaurant options, including daily presentations from former astronauts. The VC features exhibit's, displays, historic spacecraft, space memorabilia, IMAX theater, and supports tour buses that enter the KSC secured area, providing visitors with a personal experience of NASA KSC's facilities and capabilities for space exploration.

The Proposed Action is in support of Delaware North Companies Parks and Resorts intent to execute a real property agreement with NASA in support of the construction of a Retail Warehouse for continued operations of the KSC VC. A new facility is currently needed to replace the current, ageing retail warehouse. The purpose of the Proposed Action is to construct and operate a retail warehouse at the Retail Warehouse East Property that would include designing a new Pre-Engineered Metal Building

(PEMB), with associated site improvements such as vehicle access driveways, parking lot areas, sidewalks, utility connections, and stormwater conveyance improvements to capture stormwater runoff from the new warehouse. The Retail Warehouse will provide Delaware North with a new facility to be used for receiving and distribution of retail merchandise for the KSC VC operations. The project construction start date is estimated to be February 2024 and a fully functional facility date of December 2024.

The Proposed Action will have beneficial operational impacts to the VC by isolating delivery vehicles to a designated point away from the administrative building and tour bus operations and increasing efficiency by having an isolated and dedicated facility. Current retail warehouse operations stage delivery vehicles and offloading operations along the roadway to the administrative parking lot and tour bus loading center. By constructing the new retail warehouse, the number of delivery vehicles into the area of park operations will be reduced, increasing the level of safety for both guests and employees. Additionally, the current retail warehouse is reaching the end of its useful life. Construction of a new warehouse facility will provide an upgraded facility constructed to the current building code and life safety guidelines.

1.1 Location

The Proposed Action is located on the northeast side of the Kennedy Space Center Visitor Center, Figures 1 and 2, Appendix B.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

Construction of a 22,500 square foot Retail Warehouse with associated parking, utilities, and stormwater management system in support of the continued operations of the KSC VC. The project site consists of 15.12 acres located directly east of the KSC VC. Within the 15.12-acre site a total of 10 acres will be cleared. Within the 10 acres of clearing, site improvements will be constructed within an area of 3.15 acres. Reference Appendix C for Site Plan and Appendix E for Clearing Plan.

2.2 Screening Factors

Selection/screening standards were developed to assist in determining reasonable alternatives and the basis for not evaluating some of them. The following selection standards were used to determine the feasibility of each alternative and to determine which of the alternatives would be the best fit to meet the needs of the project:

- Proximity to the KSC VC
- The site should avoid Traffic Impacts, onsite/offsite.
- Avoid/minimize impacts to wetlands, environmentally sensitive, and/or floodplain areas.
- Secure/safe for all team members and visiting public.

2.3 Alternatives Considered

The following alternatives considered:

- Renovate existing facility.
  - The existing facility was constructed in 1983 and is approaching the end of its useable life. The usable life for a new PEMB is approximately 25-50 years depending upon the environment. Usable life is the average amount of time in years that an item is estimated to function when installed new.
  - Existing building is experiencing corrosion and will require extensive repair to exterior wall panels.
  - Existing building is not up to current building code design standards. Renovation will require the building to be brought up to current building codes.
- Construct a new building.
  - New PEMB building structure costs are approximately $50/sf. (PEMB structure only)
  - Renovating a PEMB building structure costs approximately $115/sf. (PEMB structure only)

2.4 Alternatives Considered But Not Carried Forward to Detailed Analysis

The following alternatives considered but not carried forward to detailed analysis.

- Locate within an existing improved area or existing building.
  - There are no adjacent abandoned and/or underutilized facilities available.
  - There are no suitable areas available within existing improved areas for construction of a new facility without negatively affecting park operations and guest experience.
  - Delivery impacts to guest and visitor traffic from construction on existing improved area.
  - Delivery impacts to bus routes from construction on existing improved area.

- Existing buildings are at capacity.

2.5 Alternatives Carried Forward for Analysis

The following alternatives considered:

- Renovate existing facility.
  - The existing facility is approaching the end of its usable life.
  - Renovation would require extensive impacts to operations during construction as the existing facility would be unusable during renovation requiring temporary warehousing facilities.
  - Location is not ideal for efficient deliveries.
  - Location is not ideal for bus routes for guests and visitors.
  - Location is not ideal for access to the KSC VC Admin facility.
  - Renovation costs would exceed new PEMB structure cost.
- Construct new building at "Retail Warehouse East Property".
  - Expanded facility size for more efficient operations with covered offloading, dedicated truck routing, elevated loading dock, and increased storage capacity.
  - Will relocate certain retail operations away from guests, visitors, and administrative staff.
  - Will relocate warehousing operations away from bus operations.
  - New facility with increased functionality.

2.5.1 No Action Alternative

The No Action Alternative is not the preferred alternative because it does not meet the purpose and need of the Proposed Action.

2.5.2 Proposed Action (Preferred Alternative) – Construct Retail Warehouse

The Proposed Action has been identified as the Preferred Action alternative for the new retail warehouse. The location was selected considering environmental, cost, schedule, and construction and operational impacts. The Proposed Action was selected since it provided the best location for shipping and receiving delivery traffic, offered minimal environmental impacts, and was the most cost-effective location available. The proposed facility will be a 22,500 SF PEMB structure with associated site improvements such as vehicle access driveways, parking lot areas, sidewalks, utility connections, and stormwater conveyance improvements. Reference Appendix C for site plan.

The Proposed Action considers US Fish and Wildlife Service (USFWS) requirements for defensible space and controlled burns. A 100' buffer for defensible space is included within the current site plan. This space shall be maintained by DNC following completion of construction. Building HVAC systems are designed with controls that will allow for adjustment of outside air intake which can be reduced or closed in the event that prescribed burn operations inadvertently place smoke on the building.

The Proposed Action would require the following permits:

- Environmental Resource Permit (ERP) through SJWRMD

- A National Pollutant Discharge Elimination System Notice of Intent (NPDES NOI) through the Florida Department of Environmental Protection (FDEP) for stormwater discharges associated with construction.

3.0 Affected Environment

KSC encompasses nearly 140,000 acres on the east coast of Central Florida. It is bordered on the west by the Indian River Lagoon (IRL), on the south by the Merritt Island Barge Canal, on the north and northwest by Canaveral National Seashore (CANA) and Mosquito Lagoon, and on the east by the Atlantic Ocean and CCSFS. KSC is the primary launch and landing site for NASA's space mission operations. In addition to supporting the nation's space mission operations, KSC contains within its boundaries portions of the Merritt Island National Wildlife Refuge (MINWR) and the CANA, which are managed by the USFWS and the National Park Service (NPS) respectively. The relationship between space flight and environmental preservation is carefully managed to ensure both objectives are met with minimal conflict and impacts on one another.

The following section describes the existing environmental conditions and resources affected by the Proposed Action**.**

3.1 Facilities and Infrastructure

3.1.1 Transportation

KSC is served by 564 miles of roadways with 184 miles being paved and 380 miles unpaved (NASA 2020). Five Access roads feed into KSC; NASA Parkway West, Kennedy Parkway South, Kennedy Parkway North, Beach Road, and NASA Parkway East. NASA Parkway West is the primary access road for personnel, cargo, and tourists for both entering and leaving KSC. KSCVC is accessible for guests from Space Commerce Way. This is a four-lane road that originates in Titusville as SR 405 and crosses the IRL onto KSC. Once through the KSC Industrial Area the road reduces to two lanes and enters CCSFS once crossing the Banana River. The second access road onto KSC is Kennedy Parkway South which originates on north Merritt Island as SR 3. This is the main north-south roadway within KSC. The third access road is Beach Road which intersects Kennedy Parkway North from the west coming from Titusville. The fourth roadway is Kennedy Parkway North which extends south from Oak Hill to the north KSC entry gate. Access from the east is available along NASA Parkway East coming from CCSFS which is accessible from Phillips Parkway and Industry Road.

3.1.2 Wastewater Treatment

Sanitary sewer service on KSC is provided by a wastewater collection and transmission system at two locations within KSC that ultimately feed onto CCSFS. One system is located within the Industrial Area and the other within the Vehicle Assembly Building (VAB) Area. The VAB area system collects wastewater though gravity and force main systems that discharge into a regional lift station (4A) which pumps south to lift station 1AA. Lift Station 1AA serves as wastewater collection for the Industrial Area. Once wastewater is combined from both areas at Lift Station 1AA, the wastewater is further pumped through a force main across the Banana River to CCSFS to the regional wastewater treatment plant (WWTP). Some of the smaller and temporary outlying buildings on KSC are serviced by septic systems specific to those areas.

3.1.3 Power

Electricity at KSC is provided by Florida Power & Light Company (FPL). FPL provides 115 kilovolts (kV) to KSC which is distributed by on-center substations, the C-5 Substation, Mars Substation, and the Orsino Substation. The C-5 Substation serves the Launch Complex 39 Area (LC 39). Power to the Industrial Area is provided by the Orsino Substation. There are over 270 miles of underground and overhead service wires that distribute the power from the C-5 and Orsino Substations to facilities around KSC. Of the energy used on KSC, 80.2% is provided by electricity with the remainder being natural gas (NASA 2020). An additional substation near the C-5 Substation is under construction. Just outside of the KSC gate along Space Commerce Way a third substation is present that serves commercial aerospace customers along Space Commerce Way.

3.1.4 Communications

Communication systems within KSC provide a wide range of services including telephone service, satellite communication, weather transmission, range safety, and data transmission between facilities. Communication services are crucial for daily operations within KSC. There are three distribution and switching stations located on KSC at the Industrial Area (First Switch) and the LC 39 Area (Second and Third Switch).

3.1.5 Potable Water

Potable water to KSC is provided by City of Cocoa, which obtains water form artesian wells located within Orange County west of the St. Johns River as well as surface waters from Taylor Creek Reservoir (NASA 2020). Water service enters KSC through a 24" main along SR 3**.** Water usage on KSC consists of personal use, irrigation, firefighting, HVAC, construction, commercial uses, and launch operations including sound suppression, launch washdown and vehicle processing. Average daily demand is approximately .6 million gallons a day with maximum daily usage as high as 2.2 million gallons (NASA 2020). In order to maintain distribution and meet demand needs throughout KSC there are facility and launch area specific water storage and secondary pumping systems in place.

3.2 Air Quality

Ambient air quality at KSC is influenced by daily operations including traffic, launch operations, utilities fuel consumption, and refurbishment and maintenance operations. Prescribed fire management practices are followed on KSC which can also have an impact on air quality. KSC is within an area classified as "in attainment" with respect to the National Ambient Air- Quality Standards established by the U.S. Environmental Protection Agency (EPA) for all criteria pollutants (NASA, 2020).

3.3 Biological Resources

Covering approximately 140,000 acres, KSC remains approximately mostly undeveloped with

areas including wetlands, uplands, open water, and mosquito-control impoundments (NASA 2020). Undeveloped areas are managed by the USFWS. Some undeveloped areas include abandoned citrus groves. The extensive area that KSC covers makes it a vast ecosystem that offers a wide variety of habitat for plants and wildlife.

3.3.1 Habitats and Vegetation

Vegetation on KSC can generally be categorized into upland and wetland communities. A "ridge and swale" topography that includes bands of uplands and wetlands-oriented the northeast to southwest direction is found on KSC. Scrub and pine flatwoods are the common upland communities with freshwater marshes and wet prairies present between the upland bands. Large areas of mangroves and salt marsh are adjacent to the estuaries on KSC. In addition, several large areas on KSC were leased to citrus growers until those leases expired and were not renewed in the early-2000s**.**

Vegetation on the proposed retail warehouse can be generally categorized into Brazilian Pepper, wetlands, and surface waterways. These have been categorized according to the Florida Land Use, Cover and Forms Classification System (FLUCFCS). Reference Figures 3 and 4 for USGS Topo Map and FLUCFS Map and Appendix D – Topographic Survey.

3.3.2 Wildlife

KSC and the surrounding coastal areas provide habitat for 318 bird species, and MINWR is considered one of the top 10 birding destinations in the United States. Approximately 87 of these species are breeding residents, over 100 species have been documented to winter on KSC, and the remaining species are transients that regularly use KSC terrestrial and aquatic habitats for brief periods (NASA, 2020). Non-listed bird species that could use or be found in the vicinity of the Proposed Action project area include American robin (*Turdus migratorius*), Northern cardinal (*Cardinalis cardinalis*), Carolina wren (*Thryothorus ludovicianus*), Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), grey catbird (*Dumetella carolinensis*), red-shouldered hawk (*Buteo lineatus*), and other common avian species. Cattle egret (*Bubulcus ibis*), great white heron (*Ardea herodias occidentallis*), glossy ibis (*Eudocimus falcinellus*), great blue heron (*Ardea herodias*), American coot (*Fulica Americana*), and other common waterfowl occasionally forage in the existing upland cut ditches.

Twenty-nine species of mammals inhabit KSC lands and waters (NASA, 2020). Typical terrestrial species include the opossum (*Didelphis virginiana*), hispid cotton rat (*Sigmodon hispidus*), eastern cottontail rabbit (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), river otter (*Lutra canadensis*), and bobcat (*Felis rufus*). Due to the regional loss of large carnivores such as the Florida panther (*Puma concolor coryi*) and red wolf (*Canis rufus*), the bobcat, coyote (*Canis latrans*), and otter now hold the position of top mammalian predators on KSC.

Additionally, a proliferation of mid-level predators such as the raccoon and opossum has resulted from an imbalance of predator/prey ratios. Opportunistic species such as the cotton rat (*Sigmodon hispidus*) and eastern cottontail rabbit (*Sylvilagus floridanus*)

account for a large portion of the small mammal biomass. At least three species of bats have been documented occasionally using KSC facilities as roost sites and must be relocated and excluded from re-entry when conflicts with facility operations occur. Two mammal species common in the waters of the IRL are the Atlantic bottlenose dolphin (*Tursiops truncatus*) and the West Indian manatee (*Trichechus manatus).*

Within the site of the proposed action typical species that may utilize the area include wading birds, racoon, armadillo, feral pig, cottontail rabbit, cotton rat, and opossum. It was determined that the site is of low-quality habitat that provides opportunistic foraging habitat for wildlife that may be used from time to time while they are passing through to more suitable native habitat found offsite.

3.4 Threatened and Endangered Species

3.4.1 Listed Wildlife

Numerous federal and state laws deal directly with the conservation and preservation of flora and fauna in Florida. The primary objectives of these laws are to establish the listing and de-listing processes for endangered and threatened species, maintain data on current populations of species, identify and maintain critical habitat, and protect those species that have been identified as threatened or endangered. KSC and the adjacent CCSFS provide habitat for more threatened and endangered species than any other federal property in the continental United States (Breininger et al., 1994). Twenty-nine Florida or federally listed wildlife species regularly use the lands or waters of KSC (NASA, 2020). The tricolored bat (*Perimyotis subflavas)* is currently being proposed to become a listed species, (USFWS 2021 and USFWS 2022). Table 3.0 lists the known species to occur at KSC and their protected status.

Of the Florida or federally listed terrestrial wildlife species, only the eastern indigo snake (*Drymarchon couperi)*, gopher tortoise *(Gopherus polyphemus)*, and American alligator (*Alligator mississippiensis*) could potentially use the land or waters of the Proposed Action site. Wading birds, including little blue herons (*Egretta caerulea*), tricolored herons (*Egretta triolor*), Florida sandhill cranes (*Grus canadensis pratensis*), and wood storks (*Mycteria americana*), depend on freshwater marshes and shorelines for foraging and typically roost in forested wetland systems. It is possible that any or all of these birds use the on-site wetlands and surface waters from time to time on an opportunistic foraging basis. However, the preliminary survey did not indicate that any of the above listed protected wading bird species are using the property in a way that is significantly dependent upon on-site habitat. No nests of any of the listed species were observed on the Property, and no signs of these species were noted. The potential opportunistic usage should not trip a threshold to require compensatory mitigation for any of these species, nor should permits be required for these species. Table 3.1 includes the listed species that could occur within the habitats of the proposed action site.

Table 3.0 Wildlife Species Known to Occur on KSC that are State and/or Federally Protected

SCIENTIFIC NAME	COMMON NAME	LEVEL OF PROTECTION	
		STATE	FEDERAL
Amphibians and Reptiles			
Alligator mississippiensis	American alligator		T(S/A)
Caretta caretta	Loggerhead sea turtle		T
Chelonia mydas	Atlantic green turtle		T
Dermochelys coriacea	Leatherback sea turtle		E
Gopherus polyphemus	Gopher tortoise	T	C
Drymarchon couperi	Eastern indigo snake		T
Pituophis melanoleucus mugitus	Florida pine snake	T	
Lithobates capito	Gopher frog	I	
Birds			
Egretta caerulea	Little Blue Heron	T	
Egretta rufescens	Reddish Egret	T	
Egretta tricolor	Tricolored Heron	T	
Mycteria americana	Wood Stork		T
Platalea ajaja	Roseate Spoonbill	T	
Haliaeetus leucocephalus	Bald Eagle		P
Falco sparverius paulus	SE American Kestrel	T	
Laterallus jamaicensis	Black Rail		T
Grus canadensis pratensis	Florida Sandhill Crane	T	
Haematopus palliatus	American Oystercatcher	T	
Calidris canutus rufa	Rufa Red Knot		T
Sterna antillarum	Least Tern	T	
Rynchops niger	Black Skimmer	T	
Aphelocoma coerulescens	Florida Scrub-Jay		T
Pelecanus occidentalis	Brown Pelican	I	
Aramas guarauna	Limpkin	I	
Egretta thula	Snowy Egret	I	
Eudocimua albus	White Ibis	I	
Mammals			
Peromyscus polionotus niveiventris	Southeastern beach mouse		T
Podomys floridamus	Florida mouse	I	
Trichechus manatus	West Indian manatee		T
Perimyotis subflavas	Tricolored Bat		E (Proposed)
Key: T(S/A) = threatened because of similarity of appearance to another protected species; T = threatened; E = endangered; P = Bald and Golden Eagle Protection Act; I = Imperiled Species Management Plan; C = candidate for federal listing			

Table 3.1 State of Florida and Federally Listed Species that Could Occur within Habitats at the Proposed Action Site

Scientific Name	Common Name
Reptiles	
Alligator mississippiensis	American alligator
Drymarchon corais couperi	Eastern indigo snake
Birds	
Egretta caerulea	Little blue heron
Egretta rufescens	Reddish egret
Egretta tricolor	Tri-colored heron
Falco sparverius paulus	Southeastern American kestrel
Mycteria americana	Wood stork
Mammals	
Perimyotis subflavas	Tricolored Bat

3.4.2 Listed Plants

Thirty-nine plant species occurring on KSC are listed as threatened, endangered, or of special concern on federal or state lists. For some of these species, KSC populations appear to be important to their regional and global survival (NASA, 2020). These species are identified by agencies as being rare or restricted to sensitive habitats with many of them occurring in coastal dune areas that are not found in the Proposed Action site. There are no regulatory implications for the occurrences of listed plant species on the project site. Although a formal intensive vegetation survey was not completed, no listed plant species are expected to occur within the Proposed Action site due to the following:

- The Proposed Action site does not contain or is within several miles of coastal dune habitat.
- The Proposed Action site is not expected to have listed plant species because these areas were converted to and managed as citrus groves for over 50 years.
- The Proposed Action site is currently dominated by exotic invasive plant species.

3.5 Cultural Resources

Under the National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA) cultural resources and historic properties are considered a component of the human environment. These resources can include locations, landscapes, traditional use sites, or remnants of past or present human activity within an area. Remnants of these resources are referred to as historic properties, which are defined by NHPA as "any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on, the National Register, including artifacts records, and material remains". Section 106 of the NHPA requires that federal agencies identify and assess the effects of its actions on historic

buildings. As a federal agency NASA complies with Section 106 of the NHPA. NASA has executed a Programmatic Agreement among the NASA KSC, Advisory Council on Historic Preservation, and the Florida State Historic Preservation Officer (FSHPO) regarding management of historic properties at KSC. To reflect NASA's commitment to the protection of its cultural resources the Integrated Cultural Resource Management Plan (ICRMP) was developed. Under this program NASA manages cultural resources on all NASA KSC owned lands including NASA facilities and structures located on KSC and CCSFS (NASA 2020).

The Archaeological Area of Potential Effects (APE) for the Proposed Action consists of 15.12 wooded acres located within the Merritt Island National Wildlife Refuge in the northern portion of Brevard County, adjacent east of the KSC VC. The APE consists of the entire footprint of the projects proposed impacts. The terrain is relatively level with vegetation primarily consisting of Brazilian Pepper, wetland areas, and occasional oak trees. The site was considered for the Proposed Action based on its proximity to the VC, and potential development opportunity.

A Cultural Resource Assessment Survey was completed for the APE and concluded through review of historic background, pedestrian survey, and excavation of 10 shovel test probes that cultural material was not present. During review of the site two linear resources were identified. These were documented as Sites 8BR04572 and 8BR04573 and identified as drainage canal systems that were created on property to support agricultural usage. Both resources were documented as not meeting criteria for NRHP recommendation or inclusion. Neither resource exhibited distinctive designs or characteristics, are not associated with important events or influential people, and do not have the potential to yield important information. Overall, the Proposed action site does not contain any historic properties that will be affected by the project. On December 6, 2023, concurrence was received from FSHPO that no historic properties will be affected by this project.

3.6 Geology and Soils

KSC is in the east region of peninsular Florida, which gradually rose above a much larger feature called *the Florida Plateau*. Four distinct geologic units lie beneath KSC and are characteristic of the coastal area of East-Central Florida. In descending order, these are Pleistocene and Recent Age sands with inter-bedded shell layers, Upper Miocene and Pliocene silty or clayey sands, Central and Lower Miocene compacted clays and silts, and Eocene limestones (NASA, 2020).

The Natural Resources Conservation Service (NRCS) mapped two primary soil types within the project site, Bradenton Fine Sand, limestone substratum, and Wabasso Sand. See Figure 5 for NRCS Soils Map. Bradenton Fine Sand, limestone substratum soil type is a mixture of hydric and non-hydric soils. The Bradenton, non-hydric component makes up approximately 35 percent of the map unit. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during June, July, August, and September. The Bradenton, hydric component makes up 25 percent of the map unit. The natural drainage class is poorly drained. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during June, July, August, September, and October.

The Wabasso Sand component makes up 65 percent of the map unit. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during June, July, August, and September. Organic matter content in the surface horizon is about 3 percent. This soil does not meet hydric criteria.

Past development, agricultural activities, and other human activity within and adjacent to the property appear to have altered some of the characteristics possessed by the underlying soils. In general, the underlying soils appear to be less hydric than described above.

3.7 Noise

Noise generated at KSC originates from five primary sources: (1) launches, (2) aircraft movements, (3) industrial operations, (4) construction, and (5) traffic (NASA, 2020). Tables 3.2 and 3.3 present typical values for noise levels for activities occurring at construction sites and for activities conducted routinely at KSC. The effects of noise on wildlife have been studied at KSC during the launch of spacecraft (American Institute of Biological Sciences, 1982; NASA, 2014). These studies have shown that besides an initial startle response to launches, birds and other wildlife return to their normal activities soon after and appear to show no adverse effects.

Other studies conducted on wading bird colonies subjected to military overflights (500 feet of altitude) with noise levels up to 100 decibels (dBA) observed no productivity-limiting responses and only a short-term interruption of their daily routine (Dynamac, 2000). The Occupational Safety and Health Administration (OSHA) has established permissible noise exposure limits for humans, and 29 CFR Section 1910.95 states personnel exposed to an 8-hour time-weighted average of 85 dBA or greater must be issued hearing protection.

Table 3.2 Noise Levels (in Decibels A-Weighted) Measured on KSC, Florida (NASA 2020)

SOURCE	NOISE LEVEL (Peak)	DISTANCE FROM SOURCE*			
		50 feet (15.2 meters)	100 feet (30.5 meters)	200 feet (61 meters)	400 feet (122 meters)
Construction					
Heavy Trucks	95	84–89	78–83	72–77	66–71
Pickup Trucks	92	72	66	60	54
Dump Trucks	108	88	82	76	70
Concrete Mixer	105	85	79	73	67
Jackhammer	108	88	82	76	70
Scraper	93	80–89	74–82	68–77	60–71
Dozer	107	87–102	81–96	75–90	69–84
Paver	109	80–89	74–83	68–77	60–71
Generator	96	76	70	64	58
Shovel	111	91	85	79	73
Crane	104	75–88	69–82	63–76	55–70
Loader	104	73–86	67–80	61–74	55–68
Grader	108	88–91	82–85	76–79	70–73
Caterpillar	103	88	82	76	70
Shovel	110	91–107	85–101	79–95	73–95
Ditcher	104	99	93	87	81
Fork Lift	100	95	89	83	77
Vehicles					
Mack Truck	91	84	78	72	66
Bus	97	82	76	70	54
Compact Auto	90	75–80	69–74	63–68	57–62
Passenger Auto	85	69–76	63–70	57–64	51–68
Motorcycle	110	82	76	70	64

Table 3.3 Measured Noise on KSC (NASA 2020)

SOURCE	PEAK	REMARKS
Re-Entry Sonic Boom*		
Orbiter	-	101 N/m^2 maximum (2.1 psf)
SRB casing	-	96 to 144 N/m^2 (2 to 3 psf)
External tank	-	96 to 192 N/m^2 (2 to 4 psf)
Launch Noise	-	
Titan IIIC	94	21 Oct 1965 (9,388 meters)
Saturn I	89	Average of 3 (9,034 meters)
Saturn V	91	15 Apr 1969 (9,384 meters)
Atlas	96	Comstar (4,816 meters)
Space Shuttle*	90	1.4 dBA Down From Saturn V (9, 384 meters)
Aircraft		
F4 Jet	107	18 km From Ground Zero
F4 Jet	158	Calculated at Ground Zero
NASA Gulfstream	109	Takeoff (Marker 14)
NASA Gulfstream	100	Landing (Marker 14)
Industrial Activities		
Launch Complex 39A	78	Transformers
LETF	92	Hydraulic Charger Unit
Machine Shop	112	Base Support Building M6-486
Computer Room	88	VAB – Room 2K11
Snack Bar	60	CIF – Room 154
Laboratories	58	CIF – Rooms 139 and 282
Elevator	62	Central Instrumentation Facility
VAB High Bay	108	Welding, Cutting, etc.
VAB High Bay	116	Chipping
Hangar AE	77	Room 125 During Test
Headquarters office	75	Room 2637 and Printers
O and C Office	57	Room 2063
Mobile Launcher Platform	94	Main Pump Operating
Mobile Launcher Platform	100	Two Pumps Operating 5K Load
Industrial Area	66	15 meters From Traffic Light
Undisturbed Areas		
Seashore	69	Medium Waves (Nice Day)
Riverbank	48	Light Gusts (No Traffic)
150 m Tower	64	Light Gusts of Wind

3.8 Surface Waters

The surface waters in and surrounding KSC are best described as shallow estuarine lagoons and include portions of the IRL, Banana River, Mosquito Lagoon, and Banana Creek. The area of Mosquito Lagoon within the KSC boundary and the northernmost portion of the IRL north of the Jay Railway spur crossing are designated by the state as Class II, Shellfish Propagation and Harvesting. All other surface waters at KSC have been designated as Class III, Recreation and Fish and Wildlife Propagation. All surface waters adjacent to and within the MINWR have the distinction of being designated as Outstanding Florida Waters (OFW) as required by Florida Statutes for waters within National Wildlife Refuges. Surface water quality at KSC is generally good, with the best areas of water quality being adjacent to undeveloped areas of the lagoon such as Mosquito Lagoon and the northernmost portions of the IRL and Banana River. In recent years, several algal blooms have occurred within the IRL, resulting in the loss of an estimated 60 percent of seagrasses and causing large fish kills. The cause of these algal blooms is attributed to increased nutrient loads typically from runoff, inadequate stormwater treatment, and leaking septic tanks. SJRWMD and FDEP, along with other assisting agencies, have been monitoring seagrass cover and the overall health of the IRL since 1994. The data collected are used to assist in pinpointing point-source pollution and aging infrastructure issues as well as aid in developing more effective treatment and permitting solutions.

Surface waters at the Proposed Action site consist of approximately .6 acres of upland cut canals and ditches that were dug to drain wetlands and adjacent uplands for citrus production. These surface waters drain to the west via a large canal that flows under Space Commerce Way and eventually flow to a large canal on the north side of Ransom Road that discharges to the Indian River (Figure 6).

3.9 Ground Water

Three aquifer systems underlie KSC: the Surficial, Intermediate, and Floridan aquifer. The Surficial aquifer system (SAS) contains freshwater but is less extensive than the Floridan, the principal artesian aquifer in East-Central Florida. The Surficial and Floridan aquifers are separated by nearly impermeable confining units that contain three shallow aquifers referred to as the Intermediate aquifer system (NASA, 2020). Recharge to the SAS is primarily due to infiltration of precipitation. However, the quality of water in the aquifer beneath KSC is influenced by intrusion of saline and brackish surface waters from the Atlantic Ocean and surrounding lagoon systems. In addition, the SAS is subject to contamination from point sources and from general land use.

The groundwater quality in the Intermediate aquifer system varies from moderately brackish to brackish due to upward leakage from the highly mineralized and artesian Floridan aquifer system and, in some cases, from lateral intrusion from the Atlantic Ocean (NASA, 2020). The Floridan aquifer system at KSC contains highly mineralized water with high concentrations of chlorides due to connate seawater in the aquifer, lateral seawater intrusion due to inland pumping, and a lack of flushing due to distant freshwater recharge areas (NASA, 2020).

3.10 Floodplains

The topography in and around the Proposed Action site is relatively flat with on-site canals

being the lowest elevations and the crown of the adjacent roadway being the highest. Elevation ranges between approximately elevation 1.8 and 4.5 feet North American Vertical Datum of 1988 (NAVD 88), and on-site ditch bottoms are at approximately -1.0 feet NAVD 88. The majority of KSC lies within the 100-year floodplain. FEMA's National Flood Hazard Layer (NFHL) was reviewed at the FEMA web site and determined that the Proposed Action site is partially within Zone AE flood plain. AE zones are classified as areas subject to inundation by the 1 percent annual chance flood event where base flood elevations are shown. Figure 7 includes the floodplain map for the Proposed Action.

3.11 Socioeconomics

KSC is Brevard County's largest single employer and a major source of revenue for the local economy. KSC operations create a chain of economic effects throughout the region. Other large employers in the County are CCSFS, Patrick Space Force Base, the Brevard County School District, and Health First. The highest employment levels at KSC were recorded during the Apollo program, and KSC recorded a peak population of 25,895 employees in 1968 with an estimated 1 of 4 workers in Brevard County employed at KSC. Employment levels dropped precipitously following the Apollo program conclusion to a historic low in 1976 when 8,441 personnel were employed. Employment levels rose sharply in 1979 when KSC was designated as the launch and operations support center for the Space Shuttle program (NASA, 2007). In 2010, a 11.6-percent decrease in the contractor work force resulted from downsizing as the Space Shuttle Program came to an end. In 2022, KSC reported a total workforce of over 12,000 individuals including civil servants, NASA Pathway Interns, and on/off-site contractors, (NASA, 2022).

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Summary and Status of Impact

Impacts resulting from the alternatives were identified and then classified in one of the following pre-determined categories.

- None – No impact will occur or be noticeable.
- Negligible – The impact is barely perceptible or measurable, remains confined to a single location, and would not result in a sustained recovery time for the resource impacted.
- Minor – The impact is readily perceptible and measurable; however, the impact would be temporary, and the resource should recover in a relatively short period.
- Moderate – The impact is perceptible and measurable, and may not remain localized, impacting areas adjacent to the Proposed Action area; adverse impacts to a resource may require several years to recover.
- Major – An impact is predicted that meets the intensity/context significance criteria for the specified resource.

Impacts from construction and operation at the Proposed Action site varies from **negligible** to **minor adverse** depending on the environmental issues evaluated. Table 4.0 summarizes the results of the analyses showing the impacts on each media for each alternative.

Comparing the results of the assessment of environmental issues for the two alternatives, the Proposed Action has similar impacts on the environment as the No Action Alternative. No major environmental impacts are expected from the Proposed Action. Therefore, the Proposed Action is a viable alternative for this project.

This summary matrix can be used to review the overall impacts of implementation of this project for the proposed site. The following discussions provide details of the scope and type of impacts. This section is organized by alternative (Proposed Action versus No Action) so that cumulative impacts of the Proposed Action can be seen as a whole.

Table 4.0 Summary of Impacts

Issues		Proposed Action	No Action
Utilities	C	Negligible	None
	O	Minor Adverse	None
Noise	C	Negligible	None
	O	Negligible	None
Light Emissions	C	Negligible	None
	O	Minor Adverse	None
Threatened and Endangered Species	C	Negligible	None
	O	Negligible	None
Geology and Soils	C	Negligible	None
	O	None	None
Surface and Groundwater	C	Minor Adverse	None
	O	None	None
Hazardous Materials/Hazardous Waste	C	Negligible	None
	O	Negligible	None
Cultural Resources	C	Negligible	None
	O	Negligible	None
Transportation	C	Negligible	None
	O	Negligible	None
Environmental Justice	C	None	None
	O	None	None
Vegetation	C	Minor Adverse	None
	O	None	None
Wildlife	C	Minor Adverse	None
	O	Negligible	None
Wetlands	C	Minor Adverse	None
	O	None	None
Floodplains	C	Minor Adverse	None
	O	Negligible	None
Socioeconomics	C	Minor Beneficial	None
	O	Minor Beneficial	None

C = Construction

O = Operations

4.2 Proposed Action

4.2.1 Utilities

4.2.1.1 Construction

Construction of the Proposed Action is expected to have **negligible** impacts to utilities within KSC. Construction is a common activity on-center and utility usages such as water and electric would be unmeasurable against the overall daily use.

4.2.1.2 Operation

Utilities associated with the Proposed Action will have **minor adverse** impacts. The utility consumption would be measurable with a slightly larger facility but would be recoverable within a short period of time due to the use of newer and more efficient lighting, HVAC, plumbing, and electrical components.

4.2.2 Noise

4.2.2.1 Construction

Construction activities of the Proposed Action will have **negligible** impacts to noise. Construction is one of the 5 primary sources of noise on KSC. Construction noise at the Proposed Action site will be confined to the project site and be in line with daily noise levels typically encountered on KSC.

4.2.1.2 Operation

Operational activities of the Proposed Action will have **negligible** impacts to noise. The operations that will be performed are already occurring at the KSC VC. Relocating the operations to the new facility will have unmeasurable impacts to noise.

4.2.3 Light Emissions

4.2.3.1 Construction

Light emissions associated with construction of the Proposed Action will be **negligible.** Lighting will be confined to interior spaces of the project site and typically only used during daylight construction hours. Nighttime construction operations would involve limited task dependent light emissions that would not negatively impact surrounding areas.

4.2.3.2 Operation

Operational light emissions associated with the Proposed Action would be **minor adverse.** Additional light emissions would be perceptible at the proposed action site, but recoverable as environmentally friendly lighting is utilized as part of the KSC Lighting Operations Plan (KSC-PLN-1210, Rev. A) and USFWS BO for KSC. Additionally, the facility will be added to the VC Lighting Operations Manual.

4.2.4 Threatened and Endangered Species

4.2.4.1 Construction

Impacts to threatened and endangered species due to construction of the Proposed Action is **negligible.** No species have been identified as being significantly dependent upon the site's habitat. Existing habitat is dominated by invasive Brazilian Pepper which is low quality habitat for threatened and endangered species. However, existing habitats can possibly on occasion support listed species such as the Indigo Snake, Gopher Tortoise, and American Alligator due to their large home range. Although the site is of low-quality habitat for the tri-colored bat, their home range falls within this geographical region.

4.2.4.2 Operation

Operation impacts to threatened species will be **negligible** with the Proposed Action. No species have been identified as being dependent on the site and operational procedures would not impact any listed species. Impacts to sea turtle nesting due to light emissions will be negligible as the facility will adhere to KSC lighting standards.

4.2.5 Geology and Soils

4.2.5.1 Construction

Construction of the Proposed Action is expected to have **negligible** impacts on this resource category. Impacts will be confined to the project location without sustained recovery times with site grading improvements and construction of the stormwater management systems (SMS).

4.2.5.2 Operation

Operational activities for the proposed site would be **none.** Once construction is complete there are no operational activities that would impact or disrupt soil or geology.

4.2.6 Surface and Groundwater

4.2.6.1 Construction

Construction of the Proposed Action would have **minor adverse** effects on local surface water quality. These effects would be compensated for by constructing dry-retention and wet detention SMS, which would treat runoff from the new impervious surfaces of the parking area. During actual construction activities, impacts on surface waters would be minimized by ensuring that BMPs are initiated and maintained to control erosion and sedimentation. Dewatering activities may temporarily influence groundwater migration. NPDES Stormwater Permits and SJRWMD ERP will be obtained for construction.

4.2.6.2 Operation

Operation of the Proposed Action is expected to have **no impact** on surface water quality. Operations will not generate any surface water discharge. Rainwater runoff from the building site will be captured in wet detention areas.

4.2.7 Hazardous Materials/Hazardous Waste

4.2.7.1 Construction

Impacts of the Proposed Action to hazardous materials/hazardous waste will be **negligible.** Hazardous waste and material impacts are not expected as part of the construction and all waste will be disposed of properly in accordance with their manufacturer's label and KSC and KSC VC disposal guidelines.

4.2.7.2 Operation

Impacts of the Proposed Action during operations to hazardous materials/hazardous waste will be **negligible.** Hazardous waste and material impacts are not expected as part of operations. No hazardous waste or materials will be stored within or around the retail warehouse.

4.2.8 Cultural Resources

A cultural resource assessment has been conducted at the Proposed Action site and is included in Appendix D. Findings of no significant or potentially significant items have been discovered. Two linear resource canals were identified within the study but do not meet criteria for inclusion in the NRHP. As a result of the report, the findings for the site were negative for cultural material and no further archaeological investigation is recommended.

Buildings can become eligible for consideration as a historic property after reaching 50 years of age. There are currently five buildings located adjacent to the Proposed Action site that may be within view of the retail warehouse that contain buildings of this age class. A study was completed under a separate EA and found these buildings to be ineligible for NRHP, with SHPO concurrence received on 11.21.23.

4.2.8.1 Construction

Construction of the Proposed Action would have **negligible** impact on cultural resources.

4.2.8.2 Operation

Operation of the Proposed Action would have **negligible** impact on cultural resources.

4.2.9 Transportation

4.2.9.1 Construction

Construction of the Proposed Action is expected to have **negligible** impacts on transportation within KSC. Increases in construction traffic will occur during normal business hours and be unmeasurable against daily KSC traffic.

4.2.9.2 Operation

Operation of the Proposed Action is expected to have **negligible** impacts on transportation. There will be no increases in traffic as the existing retail warehousing operations will be relocated to the new facility. Traffic improvements around the admin office and bus loading areas are likely.

4.2.10 Environmental Justice

4.2.10.1 Construction

Construction of the Proposed Action would have **no impact** on environmental justice. Based on the location of KSC, no groups of low-income or minority populations have been identified within the surrounding areas. In addition, the distance of KSC from neighboring populations from the Proposed Action precludes any direct impacts from construction or operation of the new retail warehouse. Economic impacts are not expected to adversely affect any particular group. Temporary construction personnel would be drawn from the local workforce and provide a short-term economic benefit to the local area.

4.2.10.2 Operation

Operation of the Proposed Action would have **no impacts** on environmental justice. Based on the location of KSC, no groups of low-income or minority populations have been identified. In addition, the distance of KSC from neighboring populations from the Proposed Action precludes any direct impacts from construction or operation of the new retail warehouse. Economic impacts are not expected to adversely affect any particular group.

4.2.11 Vegetation

4.2.11.1 Construction

Construction activities at the proposed site would include removing existing vegetation which will have **minor adverse** impacts. The majority of the existing vegetation is invasive Brazilian Pepper. Removal of the vegetation will be noticeable, but the overall impacts will be minor. Total clearing within the 15.12-acre site will be approximately 10 acres as included in the clearing plan in Appendix E. Site improvements will be made to 3.15 acres of the total site. The 15.12 acres site is comprised of 12.94 acres of Brazilian Pepper, 1.56 acres of wetlands, and .6 acres of surface waters. Within the 3.15-acre portion of the site, 2.35 acres is Brazilian pepper, .73 acres is wetlands, and .07 acres is surface waterway. Reference Appendix E for clearing limits and project area. Refuse from land clearing will be disposed of according to KSC guidelines through haul off or burning through permitted air-curtain incineration (ACI).

4.2.11.2 Operation

Operational impacts to vegetation with the Proposed Action will be **none**.

4.2.12 Wildlife

4.2.12.1 Construction

Construction activities of the Proposed Action would have **minor adverse** impacts on wildlife due to the removal of habitat. On-site natural habitats are largely composed of low-quality disturbed wetlands and uplands that provide much lower-habitat quality than the vast acreage of natural vegetation communities found on KSC. Upland and wetland habitat within the project area is disturbed Brazilian pepper-dominated uplands and wetlands that provide little to no habitat value. Minimal impacts on wildlife are expected due to habitat loss and would not be significant to the species. Wide-ranging

species may be impacted by habitat removal and disruption of their previous movement patterns due to the proposed action, but likely disperse to the surrounding areas. A biological survey will be required prior to land clearing.

4.2.12.2 Operation

Operational impacts of the Proposed Action to wildlife will be **none**. Due to the low habitat quality of the site wildlife is not entirely dependent on the site.

4.2.13 Wetlands

4.2.13.1 Construction

Construction impacts with the Proposed Action to wetlands will be **minor adverse.** Impacts will be noticeable; however, wetlands will be mitigated to compensate for the disturbance. Wetland impact requiring mitigation for construction within the 3.15-acre portion of the site are expected to be .32 acres. Figure 4 and EX-1 indicate anticipated wetland areas. Anticipated mitigation credits for construction of the retail warehouse have been purchased through the NeoVerde Basin 21 Mitigation Bank.

4.2.13.2 Operation

The Proposed Action will have no impact to the wetlands.

4.2.14 Floodplains

4.2.14.1 Construction

Floodplain impacts during construction of the Proposed Action will be **Minor Adverse.** Figure 10 notes the wetland portion and ditch bottoms of the 15.12-acre site that fall within the 100-year floodplain map. Construction will impact the floodplain areas but improvements to grading and construction of SMS will be completed to improve stormwater management and containment. Pursuant to Executive Order 11988 and taking the information provided within this EA we find there is no practicable alternative to constructing the Proposed Action within Flood Zone AE. The Proposed Action takes practicable measures to minimize impacts to the 100-year floodplain and considers flooding hazards within the design incorporating appropriate measures to protect both the Proposed Action and the floodplain.

4.2.14.2 Operation

Operation impacts of the Proposed Action will be **negligible**. Onsite draining and containment will account for all stormwater runoff.

4.2.15 Socioeconomics

4.2.15.1 Construction

Construction personnel will be required during construction of the Proposed Action. These workers would be drawn from the local workforce with an expected positive impact on the local economy. Construction of the Proposed Action is expected to have **minor beneficial** impacts on socioeconomics and the workforce at KSC.

4.2.15.2 Operation

The number of employees at the VC or KSC is not expected to increase or decrease because of the Proposed Action, however the working and environmental conditions of the Proposed Action will result in **minor beneficial** impacts.

4.3 No Action Alternative

The No Action Alternative would have **no impacts** to utilities, noise, light emissions, threatened and endangered species, geology and soils, surface and groundwater, hazardous materials/hazardous waste, cultural resources, transportation, environmental justice, vegetation, wildlife, wetlands, floodplains, and socioeconomics.

5.0 CUMULATIVE IMPACTS

5.1 Definition of Cumulative Impacts

The approach taken in the analysis of cumulative impacts in this document follows the objectives of NEPA, CEQ regulations, and CEQ guidance. Cumulative impacts are defined in 40 CFR Section 1508.7 as follows:

> *The impact on the environment that results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

In addition, CEQ and EPA have published guidance addressing implementation of cumulative impact analyses – *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ, 2005) and *Consideration of Cumulative Impacts in EPA Review of NEPA Documents (*EPA, 1999). CEQ guidance entitled *Considering Cumulative Impacts Under NEPA* (1997) states that cumulative impact analyses should "…determine the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative impacts of other past, present, and future actions…identify significant cumulative impacts…[and]…focus on truly meaningful impacts."

Cumulative impacts are most likely to arise when a relationship or synergism exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or close to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Similarly, relatively concurrent actions would tend to offer a higher potential for cumulative impacts. To identify cumulative impacts, the analysis needs to address the following three fundamental questions:

1. Does a relationship exist such that impacts to affected resource areas by the proposed action might interact with the impacts to resources of past, present, or reasonably foreseeable actions?
2. If so, what would the combined impact be?
3. Are there any potential significant impacts not identified when the proposed action is considered alone?

5.2 Actions Affecting Resources of Concern

The overall geographic scope of analysis consists of KSC and developing 3.15 acres of the undeveloped 15.12-acre site. The timeframe for the analysis must include the past, present, and future. For most resource areas, the last 5 years at KSC mark the past temporal boundary for the cumulative effect's analysis. The future temporal boundary includes the life of the proposed action (i.e., 2023–2028) and other reasonably foreseeable actions within the overall timeframe. The temporal boundary for the present is defined by actions in detailed planning, under construction, or that have been recently initiated.

For this EA, the Proposed Action was found to result in negligible impacts or no impacts to the

following resource areas: noise, threatened and endangered species, geology and soils, hazardous materials/hazardous, cultural resources, transportation, and environmental justice. In addition, the Proposed Action was found to result in minor direct/indirect impacts to the following resource areas: wetlands, floodplains, and socioeconomics. Since the direct and/or indirect impacts to these resource areas are localized and temporary and the respective resources are expected to recover within a short period of time, another action would need to occur in the same localized area at the same time for cumulative impacts to be possible. Therefore, these resource areas are not carried forward in the cumulative impact's analysis.

Impacts to wetlands, utilities, light emissions, surface and groundwater, vegetation, wildlife, and floodplains are considered minor adverse. Therefore, these resources are carried forward for cumulative impacts analysis. Other past, present, and reasonably foreseeable actions that could influence the resource areas carried forward for further analysis are addressed in this section. This includes consideration of the other past and present actions and their locations, the extent of their direct and indirect effects, any likely future actions, and their relative contribution to cumulative impacts on the specific resource.

5.2.1 Past Actions

In accordance with CEQ's guidance, past actions are relevant and useful in analyzing whether or not the reasonably foreseeable effects of the Proposed Action may have a continuing, additive, and significant relationship to those effects. CEQ guidance emphasizes a focus on the current aggregate effects of past actions without delving into the historical details of individual past actions unless such information is necessary to describe the cumulative impact of all past actions combined. Table 5.0 lists past actions at KSC.

Table 5.0 Past Actions

Project	Description
Blue Origin Manufacturing Facility North Campus	Construct an approximate 140-acre rocket manufacturing facility in support of Blue Origins New Glenn program
Galaxy Way and Space Commerce Way Intersection Improvements	Provide a new dedicated visitor entrance to the KSC VC off Space Commerce Way and intersection improvements for public access and to accommodate transportation of Blue Origin New Glenn rocket from manufacturing facility to LC-36/11.
One Web – Manufacturing Facility at Exploration Park	Construct an approximate 9-acre satellite manufacturing facility to support various federal and private commercial aerospace missions.

5.2.2 Present and Reasonably Foreseeable Actions

Present actions include those actions that are undergoing detailed planning phases, under construction, or which have been recently initiated. Table 5.1 lists present and

reasonably foreseeable actions at KSC.

Table 5.1 Present and Reasonably Foreseeable Actions

Project	Description
Blue Origin Manufacturing South Campus	Construct an approximate 90-acre warehouse and manufacturing support facility for Blue Origin's New Glenn program.
Four-Lane Space Commerce Way	Add two additional lanes to accommodate expected growth in the area.
Shuttle Landing Facility (LLF)	Expansion and new construction of common-use infrastructure to support new horizontal launch and landing operations at the former SLF.
KSC VC Admin Building	Construct a new 15,000 SF administration building at the KSC VC. Project is in initial planning stages.
Next Big Thing (NBT)	Future project to construct a new attraction building south of the Atlantis Building. Project is in initial conceptual phase.
Space X Roberts Road North Expansion	Construction of a booster and fairing processing and storage facility and launch and landing control center.
FPL Saturn Substation	Construction electrical substation to support commercial customers.

5.3 Cumulative Impact Analysis or Resource Areas

The potential for cumulative impacts to wetlands, cultural resources, and floodplains was carried forward for cumulative impacts analysis.

5.3.1 Proposed Action

Impacts to wetlands, wetland vegetation, and surface and groundwater would be mitigated through use of BMPs to minimize erosion and sedimentation during construction activities. These practices include minimizing the length of time bare soil is exposed, along with timely reseeding and mulching. In addition, construction and maintenance of the SMS would further reduce the potential for erosion and sedimentation. Before conducting any construction activities, an NPDES and ERP would be obtained. Compensatory mitigation would be provided by the purchase of federal palustrine mitigation bank credits. Anticipated credits have been obtained from the NeoVerde Basin 21 Federal Mitigation Bank.

Impacts to utilities, light emissions, and wildlife are expected to recover over time. Utility consumption during operation of the new facility is expected to increase with the increase in building size, however, use of newer energy efficient fixtures would allow the resource to be recoverable over time. Light emissions would be perceptible but minor as environmentally friendly lighting is utilized as part of the KSC Lighting Operations Plan (KSC-PLN-1210, Rev. A) and USFWS BO for KSC. Additionally, the facility will be added to the VC Lighting Operations Manual. Wildlife impacts are expected as construction will disrupt current movement patterns and foraging

opportunities within the site. Wide ranging species that may inhabit the area from time to time are expected to disperse into adjacent areas.

A CRAS was completed for the Proposed Action site with negative findings regarding cultural material. Within the potential viewshed of the retail warehouse there are 5 buildings 50 years of age or older. These buildings have been reviewed and were found to be ineligible for inclusion in NRHP as historic properties as of 11.21.23. On December 6, 2023, concurrence was received from FSHPO that no historic properties will be affected by this project.

Pursuant to Executive Order 11988 and taking the information provided within this EA we find there is no practicable alternative to constructing the Proposed Action within Flood Zone AE. The Proposed Action takes practicable measures to minimize impacts to the 100-year floodplain and considers flooding hazards within the design incorporating appropriate measures to protect both the Proposed Action and the floodplain.

5.3.2 No Action Alternative

Under the No Action Alternative, wetlands, floodplains, and cultural resources would not be affected by construction or operation activities. Any existing activities or operations would occur in accordance with existing laws and permits. Therefore, the No Action Alternative would not have any additional cumulative impact on wetlands.

6.0 ENVIRONMENTAL JUSTICE

On February 11, 1994, the President of the United States signed Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The general purposes of the EO are to (1) focus the attention of federal agencies on the human health and environmental conditions in minority communities and low-income communities with the goal of achieving environmental justice; (2) foster non-discrimination in federal programs that substantially affect human health or the environment; and (3) give minority communities and low-income communities greater opportunities for public participation in, and access to public information on matters relating to human health and the environment.

The EO directs federal agencies, including NASA, to develop environmental justice strategies. Further, EO 12898 requires NASA, to the greatest extent practicable and permitted by law, to make the achievement of environmental justice part of NASA's mission by identifying and addressing, as appropriate, disproportionately high adverse human health or environmental effects on minority or low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

In accordance with EO 12898, NASA established an agency-wide strategy, which in addition to the requirements set forth in the EO, seeks to (1) minimize administrative burdens, (2) focus on public outreach and involvement, (3) encourage implementation plans tailored to the specific situation at each center, (4) make each center responsible for developing its own Environmental Justice Plan, and (5) consider normal operations and accidents. In turn, KSC has developed a plan to comply with the EO and NASA's agency-wide strategy (KSC, 2017). As part of that plan, the impacts on low-income and minority populations in the KSC area were addressed as part of this EA. The Proposed Action would be implemented within the boundaries of KSC.

The closest residential areas are approximately two miles south on Merritt Island and 7-1/2 miles west in Titusville. No groups of low-income or minority populations have been identified in either location. In addition, the distances of these areas from the Proposed Action preclude any direct impacts from construction or operation of the new retail warehouse. Economic impacts are not expected to adversely affect any particular group. Temporary construction personnel will be drawn from the local workforce and provide a short-term economic benefit to the local area.

7.0 PREPARERS, CONTRIBUTORS, AND CONTACTS

Table 7.0 List of Individuals Who Prepared This Document

Preparer	Affiliation	Professional Title	Contribution
Steve Sergis	Ivey's Construction, Inc.	Vice President	Purpose and Need, Description, Data and Text
Nick Caplanis	Ivey's Construction, Inc.	Project Manager	Affected Environment, Environmental Consequences, Cumulative Impacts, Data and Text
Taylor Mears	Ivey's Construction, Inc.	Project Engineer	Document Review
Andy Kirbach	Morgan & Associates	Professional Engineer - Civil	Biological Resources Data and Text
Lymari Merheb	Morgan & Associates	Professional Engineer	Biological Resources Data and Text
Jon Shepherd	Atlantic Environmental	Ecologist	Biological Resources Data and Text
James Brooks	NASA/KSC	KSC NEPA Coordinator	Document Review
Gina Parrish	Delaware North	Environmental Manager	Document Review
Leslie Winkler	Delaware North	Project Manager	Document Review

8.0 LITERATURE CITED

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Appendices:

APPENDIX A:

Appendix A: Levels of Environmental Impact Definitions

Changes to the natural and human environment that could result from the Proposed Action are evaluated relative to the existing environmental conditions. Four levels of impact may be identified:

None – No Impact will occur or be noticeable.

Negligible – The impact is barely perceptible or measurable, remains confined to a single location, and would not result in a sustained recovery time for the resource impacted.

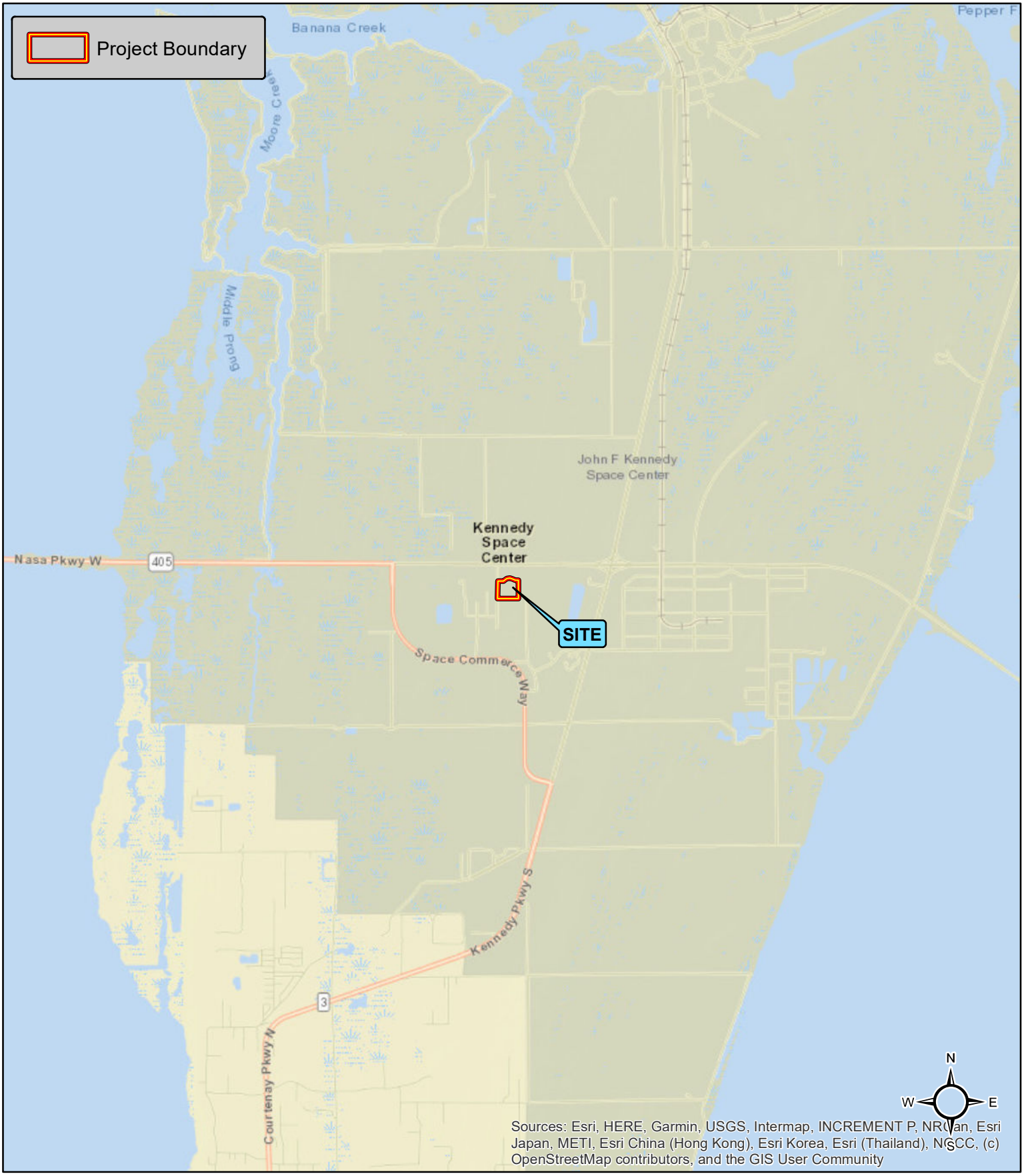
Minor – The impact is readily perceptible and measurable; however, the impact would be temporary, and the resource should recover in a relatively short period.

Moderate – The impact is perceptible and measurable, and may not remain localized, impacting areas adjacent to the Proposed Action area; adverse impacts to a resource may require several years to recover.

Major – An impact is predicted that meets the intensity/context significance criteria for the specified resource.

APPENDIX B:

Appendix B: Figures



Project: Retail Warehouse

Figure 1: Location Map

0 0.5 1 2 Miles

Brevard County, Florida

ATLANTIC ENVIRONMENTAL
ENVIRONMENTAL PERMITTING & MITIGATION

AE Proj #: 23152

Project: Retail Warehouse

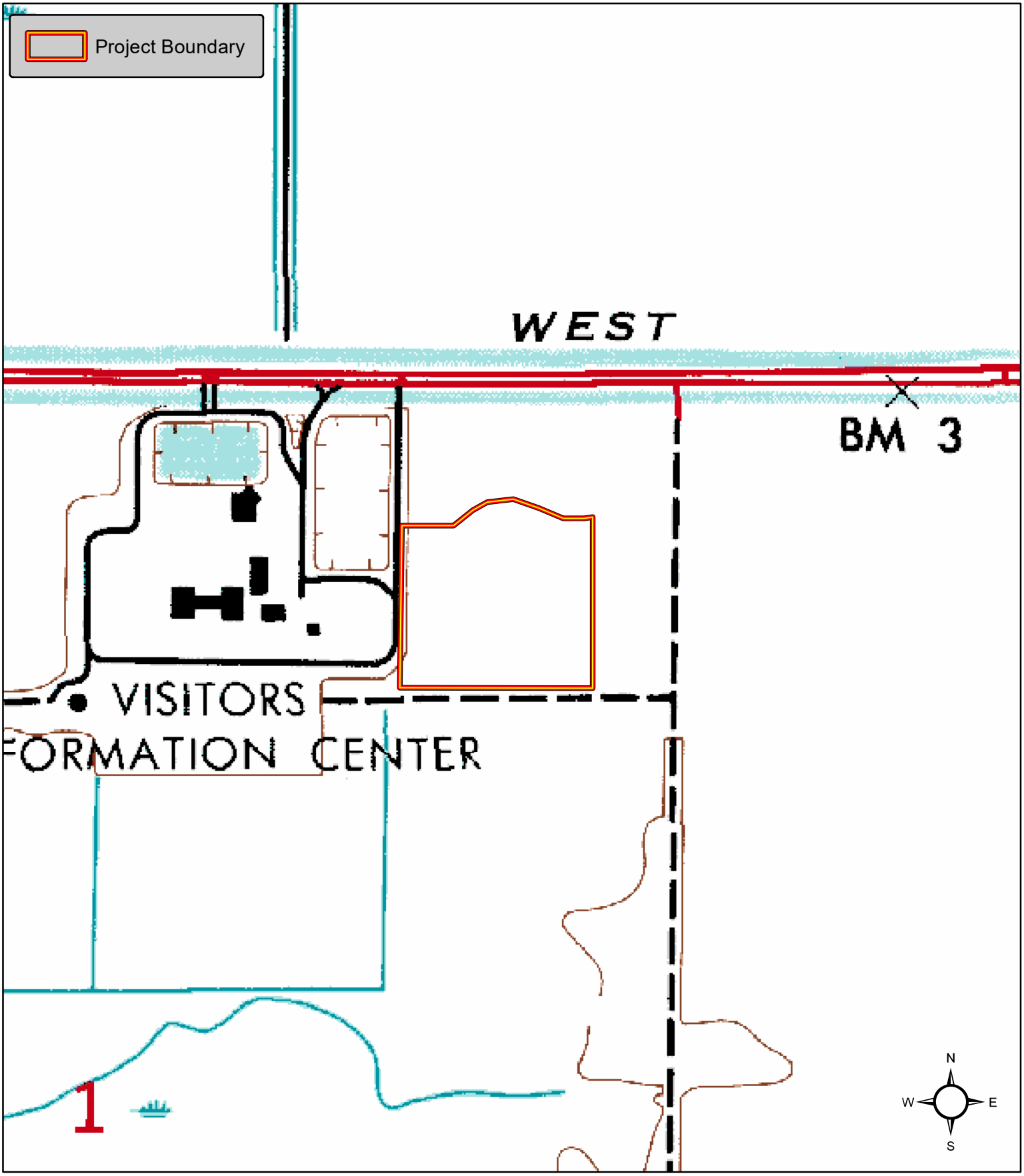
Figure 2: Aerial Map

0 100 200 400 Feet

2023 Aerial, Brevard County, Florida

ATLANTIC ENVIRONMENTAL
ENVIRONMENTAL PERMITTING & MITIGATION

AE Proj #: 23152



Project: Retail Warehouse

Figure 3: USGS Topo Map

0 250 500 1,000 Feet

Orsino Quadrangle, Brevard County, Florida

ATLANTIC ENVIRONMENTAL
ENVIRONMENTAL PERMITTING & MITIGATION

AE Proj #: 23152

Project: Retail Warehouse

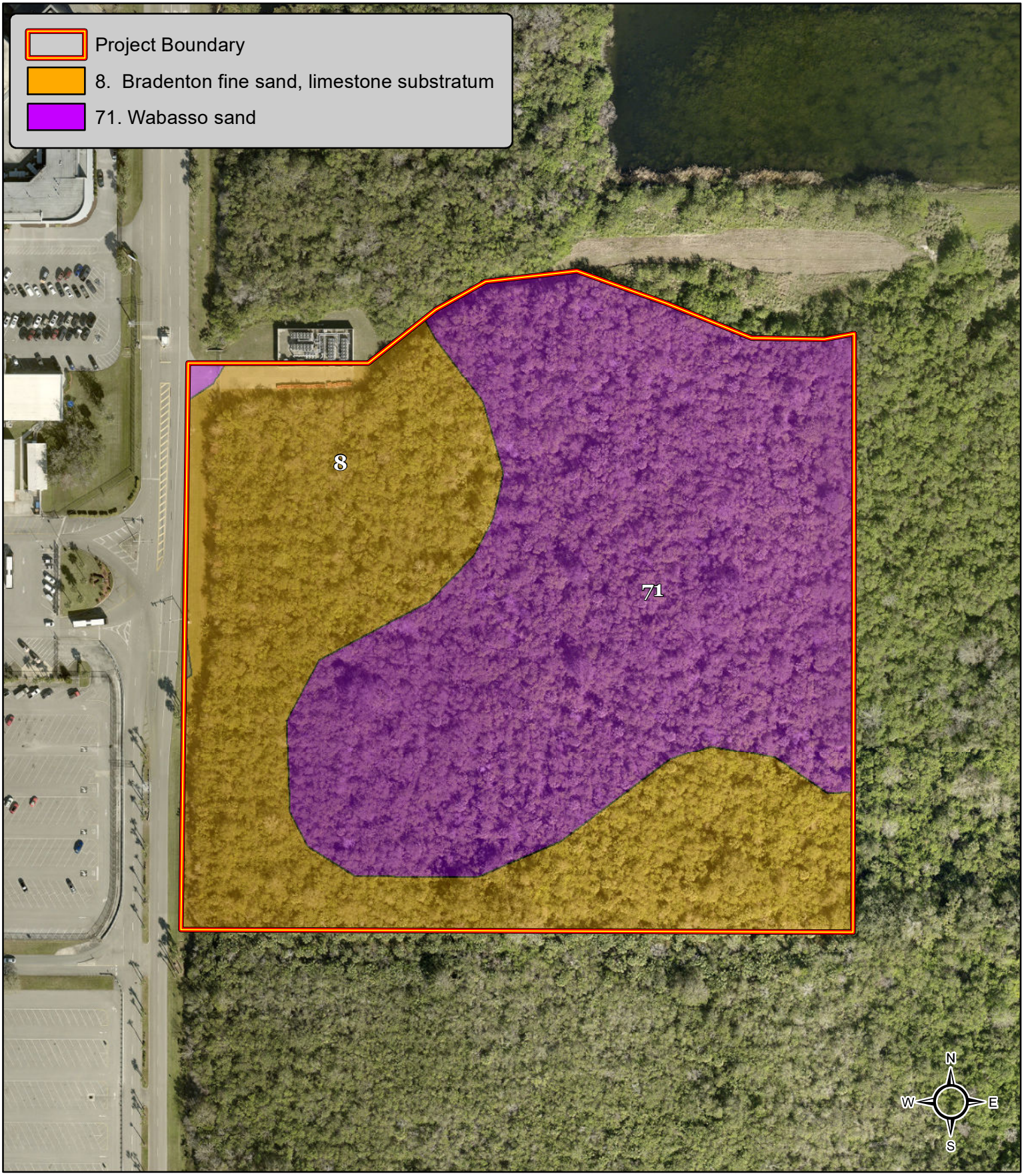
Figure 4: Land Use (FLUCFCS) Map

0 100 200 400 Feet

2023 Aerial, Brevard County, Florida

ATLANTIC ENVIRONMENTAL
ENVIRONMENTAL PERMITTING & MITIGATION

AE Proj #: 23152



Project: Retail Warehouse

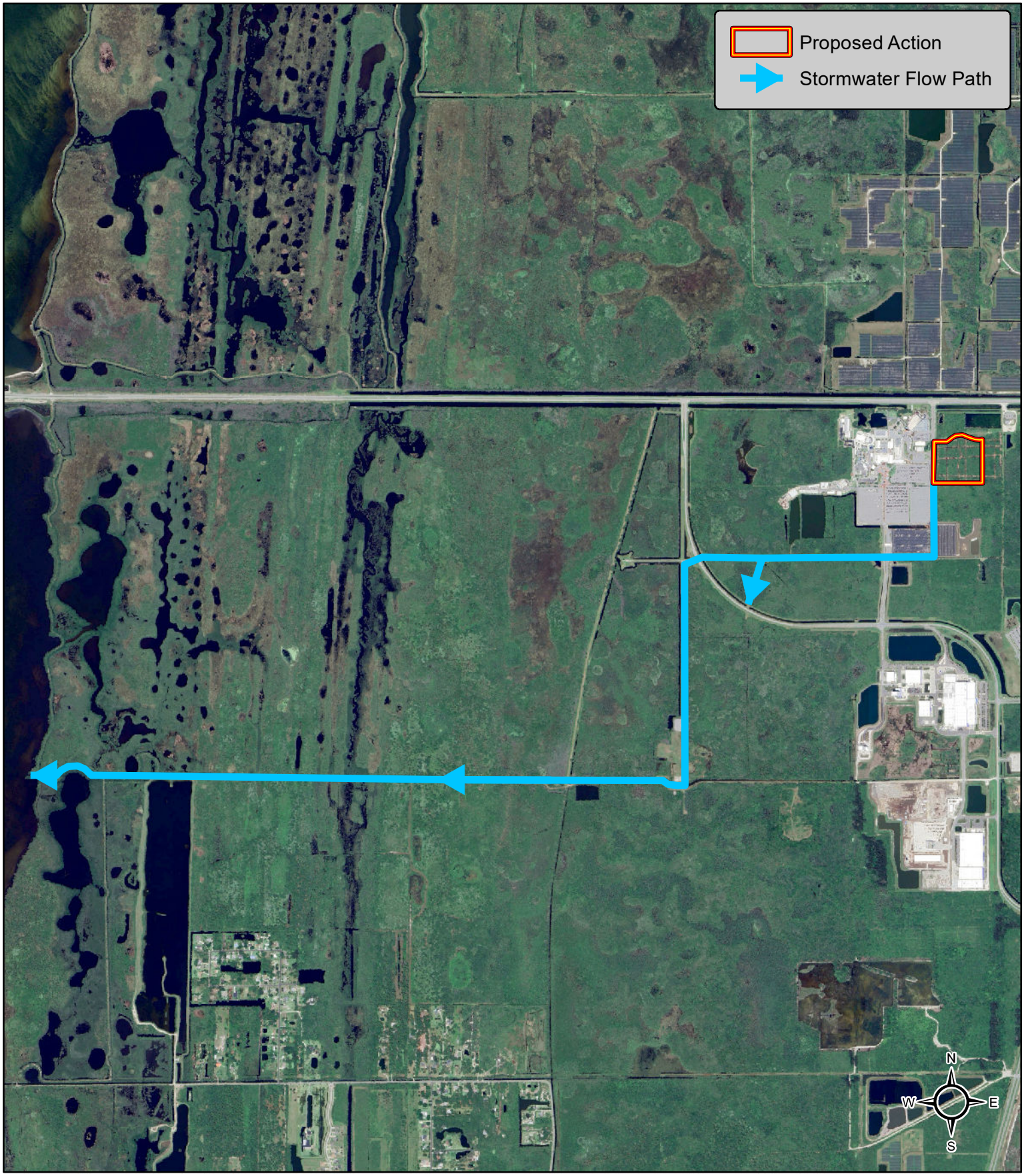
Figure 5: NRCS Soils Map

0 100 200 400 Feet

2023 Aerial, Brevard County, Florida

ATLANTIC ENVIRONMENTAL
ENVIRONMENTAL PERMITTING & MITIGATION

AE Proj #: 23152



Project: KSCVC Retail Warehouse

Figure 6: Stormwater Flow Path Map

0 0.25 0.5 1 Miles

2023 Aerial, Brevard County, Florida

ATLANTIC ENVIRONMENTAL
ENVIRONMENTAL PERMITTING & MITIGATION

AE Proj #: 23152

Project: KSCVC Retail Warehouse

Figure 7: 100-Year Floodplain Map

0 250 500 1,000 Feet

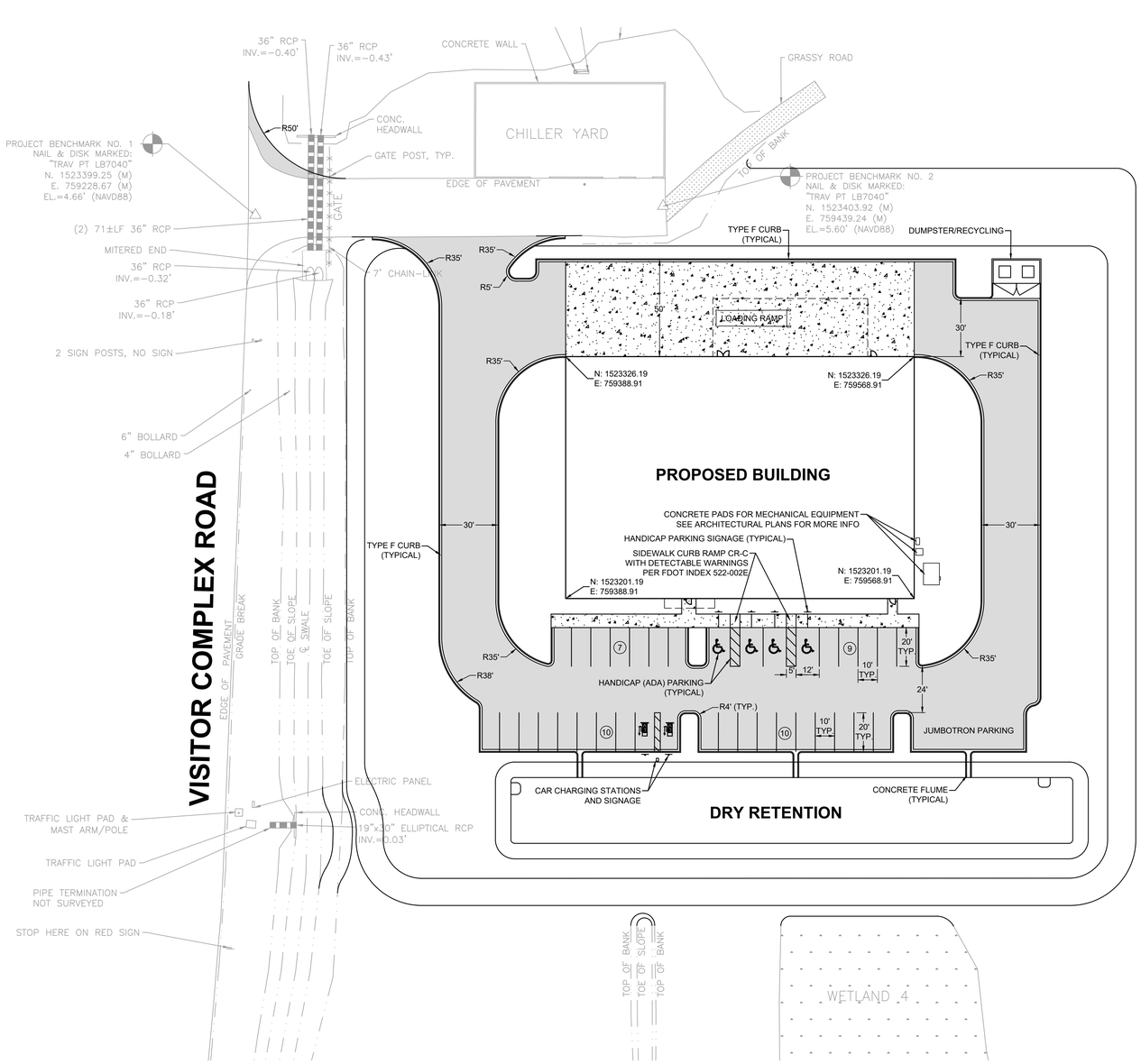
2023 Aerial, Brevard County, Florida

ATLANTIC ENVIRONMENTAL
ENVIRONMENTAL PERMITTING & MITIGATION

AE Proj #: 23152

APPENDIX C:

Appendix C: Site Plan



NORTH

0 30' 60'

GRAPHIC SCALE
SCALE: 1" = 30'
HALF SIZE: 1" = 60'

LEGEND

PROPOSED ASPHALT

PROPOSED CONCRETE

GENERAL STATEMENT

PROJECT CONSISTS OF CONSTRUCTION OF RETAIL WAREHOUSE BUILDING WITH SITE IMPROVEMENTS INCLUDING PAVING AND GRADING, STORMWATER MANAGEMENT SYSTEM, AND UTILITY CONNECTIONS.

PARKING:

36 SPACES TOTAL
INCLUDING:
- 4 SPACES FOR HANDICAP (ADA)
- 2 SPACES FOR EV

SYM.	ZONE	DESCRIPTION	DATE	APPROVED
		REVISIONS		

Delaware North | meD studio ARCHITECTURE | IVEY'S CONSTRUCTION, INC.

SIGNATURES		DATE
DRAWN	D. DAY	08/31/23
CHECKED	A. KIRBACH	08/31/23
SUBMITTED: FL LICENSE No.		08/31/23
DNC APPROVED:		08/31/23
APPROVED: NASA DM		08/31/23

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHN F. KENNEDY SPACE CENTER, NASA
KENNEDY SPACE CENTER, FLORIDA

CONSTRUCT ADMINISTRATIVE AND WAREHOUSE FACILTIES

RETAIL WAREHOUSE

SITE PLAN

FILE NO.	SIZE	DWG. NO.	REV
	F	79K40844	
PCN. NO. 99307		SHEET OF	

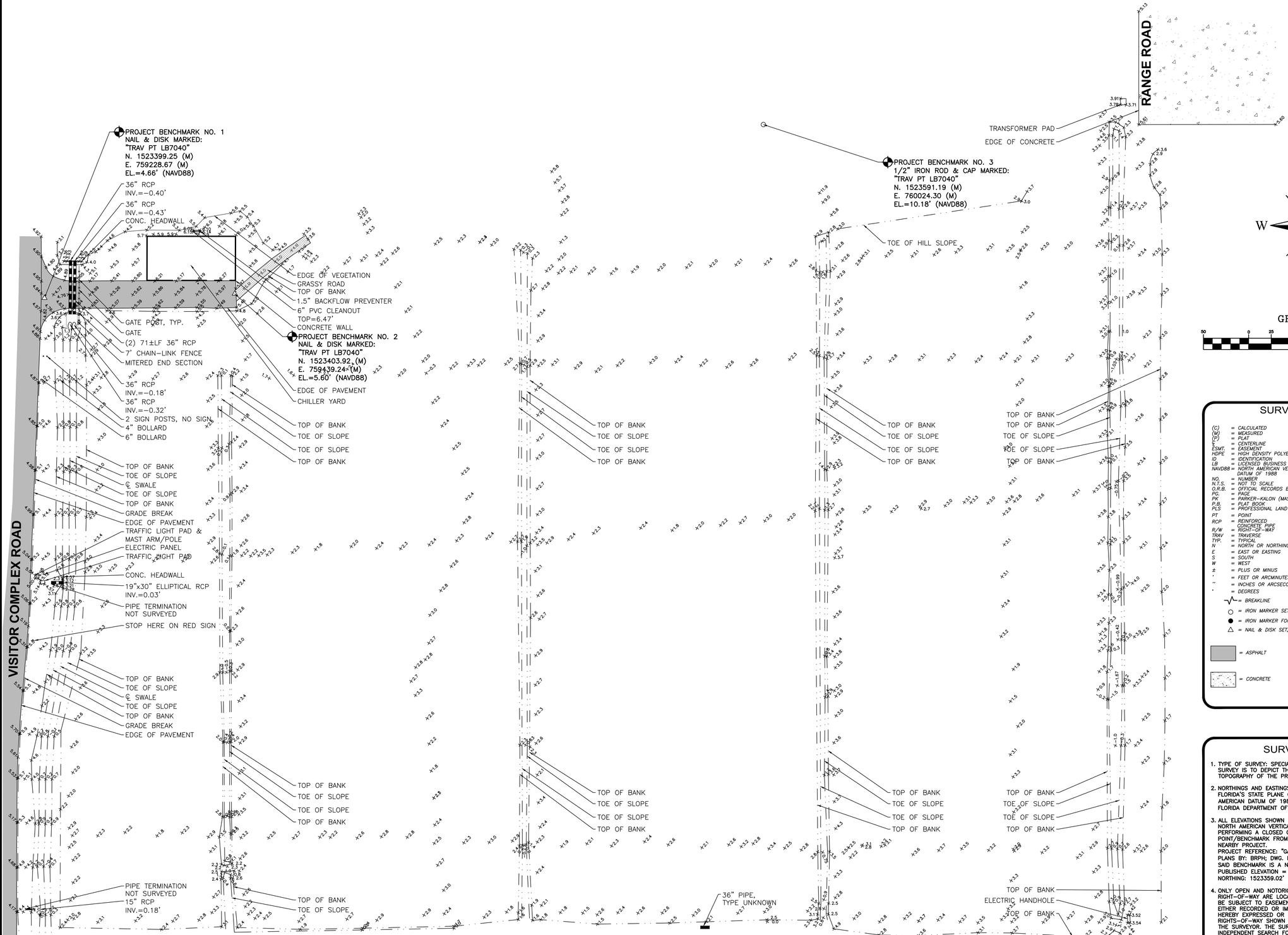
C-102

APPENDIX D:

Appendix D: Special Purpose Topographic Survey

SPECIAL PURPOSE SURVEY - COMMISSARY RETAIL BUILDING - KENNEDY SPACE CENTER

BREVARD COUNTY, FL



Revision	Drawn: J. HUSSEY	Checked: C. BOWERS
	4/14/2023	4/14/2023

N

W M&A E

S

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

SPECIAL PURPOSE SURVEY
COMMISSARYT RETAIL BUIDING
KENNEDY SPACE CENTER
BREVARD COUNTY, FLORIDA

SURVEYOR'S LEGEND

(C)	= CALCULATED	(E)	= ELECTRIC MANHOLE
(M)	= MEASURED	(S)	= SIGNALIZATION MANHOLE
(P)	= PLAT	(T)	= TELEPHONE MANHOLE
℄	= CENTERLINE	10	= BORE
ESMT.	= EASEMENT		
HDPE	= HIGH DENSITY POLYETHYLENE		= BENCHMARK
ID	= IDENTIFICATION		= WATER VALVE
LB	= LICENSED BUSINESS		= TRANSFORMER PAD
NAVD88	= NORTH AMERICAN VERTICAL DATUM OF 1988		= SIGN
NO.	= NUMBER		= BOLLARD
N.T.S.	= NOT TO SCALE		
O.R.B.	= OFFICIAL RECORDS BOOK		
PG.	= PAGE		
PK	= PARKER-KALON (MASONRY NAIL)		
P.B.	= PLAT BOOK		
PLS	= PROFESSIONAL LAND SURVEYOR		
PT	= POINT		
RCP	= REINFORCED CONCRETE PIPE		
R/W	= RIGHT-OF-WAY		
TRAV	= TRAVERSE		
TYP.	= TYPICAL		
N	= NORTH OR NORTHING		
E	= EAST OR EASTING		
S	= SOUTH		
W	= WEST		
±	= PLUS OR MINUS		
'	= FEET OR ARCMINUTES		
"	= INCHES OR ARCSECONDS		
.	= DEGREES		

= BREAKLINE
= IRON MARKER SET
= IRON MARKER FOUND
= NAIL & DISK SET, TYPE NOTED

= ASPHALT
= CONCRETE

SURVEYOR'S NOTES

1. TYPE OF SURVEY: SPECIAL PURPOSE SURVEY. THE PURPOSE OF THIS SURVEY IS TO DEPICT THE EXISTING CONDITIONS, IMPROVEMENTS, AND TOPOGRAPHY OF THE PROJECT AREA.
2. NORTHINGS AND EASTINGS SHOWN HEREON ARE REFERENCED TO FLORIDA'S STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), AND WERE DERIVED USING A FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT) NETWORK ROVER.
3. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED IN FEET TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, AND WERE DERIVED BY PERFORMING A CLOSED CONVENTIONAL LEVEL LOOP USING A CONTROL POINT/BENCHMARK FROM THE APPROVED CONSTRUCTION PLANS OF A NEARBY PROJECT.
   PROJECT REFERENCE: "GATEWAY TO SPACE, BUILDING M6-0307"
   PLANS BY: BRPH; DWG. NO.: 79K40590, DATED: 4/6/2020.
   SAID BENCHMARK IS A NAIL & DISK STAMPED: "PACKARD".
   PUBLISHED ELEVATION = 5.75' (NAVD88).
   NORTHING: 1523359.02' (PUBLISHED); EASTING: 757764.41' (PUBLISHED).
4. ONLY OPEN AND NOTORIOUS EVIDENCE OF EASEMENTS AND RIGHT-OF-WAY ARE LOCATED AND SHOWN HEREON. THIS PROPERTY MAY BE SUBJECT TO EASEMENTS, RESTRICTIONS, OR OTHER LIMITATIONS, EITHER RECORDED OR IMPLIED. NO OPINION OF TITLE OR OWNERSHIP IS HEREBY EXPRESSED OR IMPLIED BY THE SURVEYOR. EASEMENTS AND RIGHTS-OF-WAY SHOWN HEREON ONLY INCLUDE THOSE PROVIDED TO THE SURVEYOR. THE SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS OF RECORD, ENCUMBRANCES, RESTRICTIVE COVENANTS, OWNERSHIP TITLE EVIDENCE, OR ANY OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE SEARCH MAY DISCLOSE. THE SURVEYOR WAS NOT PROVIDED WITH A TITLE COMMITMENT.
5. SOME FEATURES SHOWN HEREON MAY BE EXAGGERATED FOR PICTORIAL PURPOSES. PUBLISHED DIMENSIONS WILL PRECEDE MAP SCALING.

MORGAN &Associates
Consulting Engineers, Inc.
Civil Engineers and Land Surveyors - E.B. # 7903 / L.B. #7040
504 North Harbor City Blvd. Melbourne, FL 32935
Phone (321) 751-6083 Fax (321) 751-6089

Project #: 2023-006
Drawing #: 2023-006 CENTRAL CONTROL RD.DWG
Scale:
Horiz. 1" = 50'
Vert. N/A
Sheet #:

SPECIAL PURPOSE
SHEET 1 OF 1

The Survey and this drawing have been prepared under my responsible charge to conform with applicable Standards of Practice as set forth by The Florida Board of Professional Surveyors and Mappers in Chapter 5J-17, Florida Administrative Code, pursuant to Section 472.027, Florida Statutes. This Certification is a statement of professional opinion based on the surveyor's knowledge, information and belief, which is based on the existing field evidence and documentary evidence as provided to the surveyor and is not an expressed or implied warranty or guaranty. This survey is not valid without original surveyor signature and seal.

CHRISTOPHER S. BOWERS, FL
PROFESSIONAL SURVEYOR &
MAPPER #5990
4/14/2023
SURVEY DATE

APPENDIX E:

Appendix E: EX-1 Clearing Plan

NORTH

0 40' 80'

GRAPHIC SCALE
SCALE: 1" = 40'
HALF SIZE: 1" = 80'

PROJECT AREA
CLEARING LIMITS
SILT FENCE (TYPICAL)
DNC RETAIL PROJECT LIMITS
25' BUFFER (TYPICAL)

PROJECT BENCHMARK NO. 1
NAIL & DISK MARKED:
"TRAV PT LB7040"
N. 1523399.25 (M)
E. 759228.67 (M)
EL.=4.66' (NAVD88)

PROJECT BENCHMARK NO. 2
NAIL & DISK MARKED:
"TRAV PT LB7040"
N. 1523403.92 (M)
E. 759439.24 (M)
EL.=5.60' (NAVD88)

PROJECT BENCHMARK NO. 3
1/2" IRON ROD & CAP MARKED:
"TRAV PT LB7040"
N. 1523591.19 (M)
E. 760024.30 (M)
EL.=10.18' (NAVD88)

CHILLER YARD
EDGE OF VEGETATION
1.5" BACKFLOW PREVENTER
6" PVC CLEANOUT TOP=6.47'
CONCRETE WALL
36" RCP INV.=-0.40'
36" RCP INV.=-0.43'
CONC. HEADWALL
GATE POST, TYP.
EDGE OF PAVEMENT
GRASSY ROAD
7' CHAIN-LINK GATE
(2) 71±LF 36" RCP
MITERED END
36" RCP INV.=-0.32'
36" RCP INV.=-0.18'
2 SIGN POSTS, NO SIGN
6" BOLLARD
4" BOLLARD

VISITOR COMPLEX ROAD
EDGE OF PAVEMENT
GRADE BREAK
TOP OF BANK
TOE OF SLOPE
SWALE
TOP OF BANK

WETLAND 1
0.264 AC.
WETLAND 2
0.324 AC.
WETLAND 3
0.321 AC.
WETLAND 4
0.326 AC.
WETLAND 5
0.333 AC.

SURFACE WATER IMPACT
3,090 SF
SURFACE WATER IMPACT
4,566 SF
SURFACE WATER IMPACT
3,804 SF
SURFACE WATER IMPACT
9,931 SF
SURFACE WATER IMPACT
4,866 SF

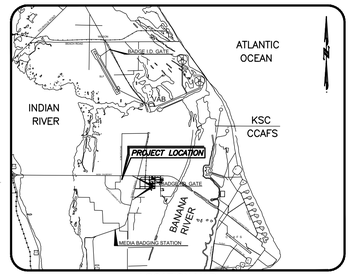
CLEARING LIMITS
436,631 SF = 10.02 AC.

PROJECT AREA
658,502 SF = 15.12 AC.

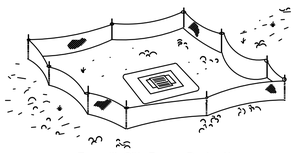
SILT FENCE
±50' FROM WETLAND
(TYPICAL)

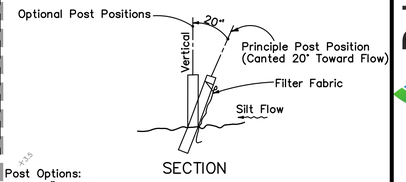
NOTE:
WETLAND INFORMATION PROVIDED BY
ATLANTIC ENVIRONMENTAL OF FLORIDA

ELECTRIC PANEL
CONC. HEADWALL
19"x30" ELLIPTICAL RCP
INV.=0.03'
TRAFFIC LIGHT PAD & MAST ARM/POLE
TRAFFIC LIGHT PAD
PIPE TERMINATION NOT SURVEYED
STOP HERE ON RED SIGN
PIPE TERMINATION NOT SURVEYED
15" RCP INV.=0.18'
DITCH
36" PIPE, TYPE UNKNOWN

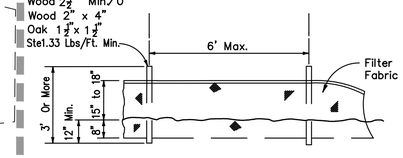


LOCATION MAP


Type III Silt Fence Protection
Around Ditch Bottom Inlets.
Do not deploy in a manner that silt fences will act as a dam across permanent flowing watercourses. Silt fences are to be used at upland locations and turbidity barriers used at permanent bodies of water.

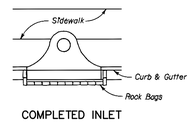


SECTION

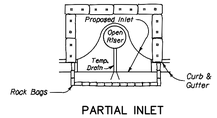


ELEVATION

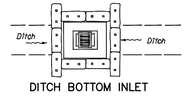
TYPE III SILT FENCE DETAIL



COMPLETED INLET



PARTIAL INLET



DITCH BOTTOM INLET

PROTECTION AROUND INLETS OR SIMILAR STRUCTURES

Revision	Date:	Designed:	AK
	09/06/2023	Drawn:	DD
	09/06/2023	Checked:	AK
	09/06/2023		

Delaware North

KSC RETAIL BUILDING

CLEARING PLAN

MORGAN & Associates
Consulting Engineers, Inc.
Civil Engineers and Land Surveyors - E.B. # 7960 / L.B. #7940
504 North Harbor City Blvd., Melbourne, FL 32935
Phone (321) 751-6080 / Fax (321) 751-6089

Project #: 2023-023
Drawing #: CIVIL-RETAIL
Scale:
Horiz. 1" = 30'
Vert. N/A
Sheet #:
EX-1
Sheet 1 of 1

This item has been digitally signed and sealed by Andreas H. Kirbach, PE on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and signature must be verified on any electronic copies.

Andreas H. Kirbach P.E.
FL. Reg. #49431

APPENDIX F:

Appendix D: KSC Record of Environmental Consideration (REC)

Avoid Verbal Orders

TO: DNPS/Gina Parrish **DATE: 06/01/2023**

FROM: SI-E3/Environmental Management Branch

SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 12309**

1. PROJECT INFORMATION

Project Title: Retail Warehouse

Project Lead: Leslie Winkler, DNPS, 410-493-8165 **Project No.:** 99307_RW

Project Description:

Delaware North Visitor Center is constructing a new Retail Warehouse. The retail warehouse will be utilized for delivery and distribution of retail inventory to include retail employee work space and a mail order packing room. Funding for preliminary environmental work has been awarded and Morgan and Associates will develop the Environmental Assessment (EA). Delaware North would like to schedule the EA kick-off meeting in the timeframe of June 2023. Construction is schedule to begin in the January 2024 and completed by January 2025. Note:construction of the administration building will be outlined in a separate checklist and submitted at a later date.

EPB Reviewer: LPH **Facility No.:** Retail Warehouse

2. NEPA DETERMINATIONS

- ☐ **a. Categorical Exclusions per 14 CFR Part 1216.304(d)**
- ☑ **b. Environmental Assessment (EA) Required**
- ☐ **c. Environmental Impact Statement (EIS) Required**
- ☐ **d. Existing FONSI or ROD**
- ☐ **e. Centerwide EIS**
- ☐ **f. AF Project on KSC/813**
- ☐ **g. NASA Project on CCAFS/813**

3. ENVIRONMENTAL REQUIREMENTS

a. Non-Permit Requirements	☑ **YES**	☐ **NO**
b. Permit Requirements	☑ **YES**	☐ **NO**

2.b.1. ENVIRONMENTAL ASSESSMENT (EA): This project cannot be categorically excluded (CATEX) from further NEPA review based on information provided with the Environmental Checklist. The project proponent must develop an Environmental Assessment (EA) for construction of the new retail warehouse at KSC, in accordance with KDP-P-1726. For additional information, please contact Don Dankert of the NASA Environmental Management Branch (SI-E3, 861-1196).

3.a.1. SOLID WASTE MANAGEMENT UNIT (SWMU): The Retail Warehouse project boundary overlaps SWMU #116 Fire Station #1 being investigated by Remediation Project Manager (RPM) Deda Johansen (SI-E2, 867-5352), and SWMU #118 KARS Park II which is now a part of SWMU #116. A SWMU designation means a site has had historical operations with the potential to impact the environment. This area has land use controls to prevent contact with or discharge of potentially contaminated groundwater. Prior to any dewatering activity, coordinate with the RPM for guidance on management of dewatering effluent and submittal of dewatering plan.
All workers involved in subsurface/dewatering work must be notified (HAZCOM) of the potential for contamination present and it is recommended that an Industrial Hygienist be consulted for determination of required personal protective equipment (PPE).

3.a.2. HAZARDOUS/NON-HAZARDOUS WASTE: All hazardous and non-hazardous wastes generated on KSC must be managed, controlled and disposed of per the KSC Waste Management requirements outlined in KNPR 8500.1. The onsite hazardous waste site environmental coordinator/point of contact shall have formal RCRA training and provide proof of training as identified in 40 CFR 262.17 and subpart M. Please contact NASA Environmental Assurance Branch at 861-0863 if assistance is required.

A Process Waste Questionnaire (PWQ), KSC Form 26-551 along with any supporting documentation (SDS, product formulation, lab analyses) must be submitted to the NEMCON Waste Management Office for each waste stream

generated. That office will then generate a Technical Response Package (TRP) which will give direction on proper handling, storage, and disposal of the waste stream. Please contact NEMCON Waste Management Services at 867-8642 for assistance.

3.a.3. HAZARDOUS AND CONTROLLED WASTE (PAINT): This project will involve the application of paint coatings. All practical precautions must be taken to eliminate the possibility of a release of material or waste (primers/paints) into the environment from the paint surface preparation and painting operation. Paint chips, rust, debris, blast media, wastewater, etc. generated during preparation of surfaces will be contained and disposed of according to waste management guidelines given in Item 3.a.2. Please contact NEMCON Waste Management Services at 867-8642 for assistance. There are special handling and waste management requirements for inorganic zinc (IOZ) coatings. When placed in a sealed container, IOZ paint can produce hydrogen and other gases from chemical reactions that occur during the curing process. The gas production builds pressure in the container and can cause the container to bulge and/or rupture thus creating a safety hazard. To meet environmental requirements and mitigate safety concerns, users of IOZ paint must physically separate IOZ paint related waste streams from other waste streams at the job site and manage their IOZ paint related waste streams according to the three categories below:

1) Leftover or unusable IOZ paint

Leftover or unusable IOZ paint must be stored in the original product containers supplied by the manufacturer with a loosely secured lid. Original product containers must then be placed into a larger closed drum or container that meets hazardous waste storage requirements and prevents any possible release to the environment. The larger closed drum or container must have a 5 psi pressure relief vent to avoid potential safety hazards. Cleaning solvents may NOT be placed into these containers.

2) Spent cleaning solvents

Waste cleaning solvent containers must have 5 psi pressure relief vents to avoid potential safety hazards

3) Solids from IOZ paint mixing and painting operations

Includes rags, brushes, rollers, empty cans, empty buckets, liners, stirring sticks, personal protective equipment, masking paper/tape, and any other waste materials that have contacted IOZ paint - Solid waste containers must have 5 psi pressure relief vents to avoid potential safety hazards - Empty paint cans and buckets can be disposed as unregulated waste provided that all paint is wiped out of them. The spent rags/wipes used to wipe paint out of the cans or buckets shall be managed as waste under this category. Contractors are responsible for contacting the KSC Waste Management Office (867-8642) to arrange pickups of leftover/unusable paints, and to remove solvent or regulated paint waste when the containers are full. Contact Al Gibson (SI-E2, 861-0863) if you have any questions.

3.a.4. PAINT DISTURBANCE/REMOVAL: This project may involve disturbance/removal of paint coatings. Unless known to be non-hazardous, the coatings must be sampled and analyzed for the 8 RCRA hazardous metals (Ag, As, Ba, Cd, Cr, Hg, Pb, and Se) and PCBs. If the coatings contain heavy metals or PCBs, OSHA standards must be followed. It is recommended that the control zone and personal protective equipment requirements established in the lead standard be complied with to prevent exposure to workers and adjacent unprotected areas. The sampling analysis will dictate the level of PPE required and the handling/disposal requirements. Contact your company's Safety and Health Office or NEMCON Industrial Hygiene (IH) for recommendations on personal protective equipment (PPE). IH can be contacted at 867-2400 or at KSC-DL-EnvHealth/(KSC-DL-EnvHealth@mail.nasa.gov). Paint chips, rust, debris, blast media, etc. generated during preparation of metal, fiberglass, or concrete surfaces and/or deconstruction will be contained and disposed of according to waste management guidelines given above in Item 3.a.2.

Recycling of painted materials: Painted non oil-filled electrical equipment and other painted materials may go to the KSC Reutilization, Recycling, and Marketing Facility (RRMF) or taken off KSC for salvage by a contractor if PCBs are less than 50 ppm. Oil-filled and grease or oil-contacted equipment with PCB concentrations less than 50 ppm in the oil and in the paint on the equipment may go to the contractor or the RRMF for reuse. There is no requirement for TCLP analysis on items to be reused.

Avoid Verbal Orders

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FROM: SI-E3/Environmental Management Branch

SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 12309**

Disposal of painted materials: Painted construction and demolition waste items will be accepted at the KSC Class III Landfill without PCB or TCLP analysis. Construction and demolition debris that has not been tested for PCBs or has been found to contain PCBs greater than 50 ppm will be accepted at the KSC landfill but must be managed according to PCB bulk product waste storage regulations until disposal in the landfill. This includes covering the materials and storing them on an impermeable surface for protection against precipitation, and prevention of soil contamination. Oil-filled and grease or oil contacted equipment with PCB concentrations greater than or equal to 50 ppm in the oil or in the paint on the equipment must be managed as regulated PCB waste. Welding/torch cutting: Organizations shall not directly torch cut or use heat on any materials that contain PCBs as burning of PCBs can create toxic byproducts (such as dioxins). Paint samples shall be collected and analyzed for PCBs prior to using heat or torch cutting of materials that could potentially contain PCBs. Heating or torch cutting of materials with PCBs is a regulatory violation and is prohibited without a permit issued by the EPA. See KNPR 8500.1 for details.

3.a.5. STORAGE TANK INSTALLATION: Depending on the commodity stored and the size of the fuel storage tanks (typically greater than 550 gallons) the proposed tank may be required to be registered with the State of Florida in accordance with the requirements of Florida Administrative Codes 62-761 and 62-762. Commodity dependent, the Florida Department of Environmental Protection (FDEP) has contracted the responsibility to ensure registered storage tank compliance in Brevard County to Brevard County Natural Resource Management Department (BCNRMD). The installation of all regulated storage tanks (including those associated with generators) must be coordinated with the BCNRMD through the NASA Environmental Assurance Branch Permitting and Compliance group. Notification must be made at least 45 days prior to the start of any work to allow time for the 30 day notification to the regulatory agency and scheduling of any agency requested site surveys. Per F.A.C. 62-761 (Underground Storage Tanks) or 62-762 (Aboveground Storage Tanks), a completed tank registration form is required to be submitted to the BCNRMO no later than 30 days after regulated substances are put into any storage tank system. The registration package should be submitted to SI-E2 prior to final inspection before tank is placed into service, for processing and notification to regulatory agencies. Coordination with Jeff Bobersky (SI-E2, 861-6035) is required at the planning stages.

3.a.6. SPILL PREVENTION, CONTROL, AND COUNTERMEASURES (SPCC) PLAN: The Kennedy Space Center SPCC Plan documents the procedures for the prevention, response, control, and reporting of spills of oil at KSC. This plan serves as a guide for KSC personnel and organizations to ensure that all measures are taken to prevent and contain spills and leaks of oil in accordance with all applicable state and federal regulations. An SPCC Site Specific Plan may need to be developed if a new tank is installed. Oil storage includes all containers (including assets prior to turnover to the government) with the exception of motive power containers, which are equal to or greater than 55 gallons. Petroleum tanks associated with generators and having a capacity greater than or equal to 55 gallons must also meet SPCC regulatory requirements. The plan must be reviewed and signed/sealed by a P.E. For additional clarification of the SPCC rules, contact Jeff Bobersky (SI-E2, 861-6035).

3.a.7. PROTECTED SPECIES: This project has the potential to affect protected and/or threatened and endangered species; which may include the Eastern indigo snake and gopher tortoise. Measures must be taken to minimize impacts to their habitat. A biological survey will be required to identify potential impacts prior to disturbances. Please contact Russ Lowers (NEM-022, 321-759-6022), 14 days prior to beginning work to schedule a biological survey.

3.a.8. EXTERIOR LIGHTING: The installation/modification and use of any lighting that is visible from the exterior of a facility or structure must be in compliance with the requirements in the KSC Lighting Operations Plan (KSC-PLN-1210, Rev. A) and requirements of the US Fish and Wildlife Service Biological Opinion for KSC regarding dark skies and artificial lighting. Submit the manufacturers cut sheet data and spectral power distribution graphs for the actual lighting to be installed for review by the NASA Environmental Management Branch (EMB). Safety and hazardous operations can apply for a waiver to allow for use of non-compliant lighting; however, justification must be provided to the EMB. Development of a lighting operations manual (LOM) that meets these criteria is required for all new structures or facilities. Please contact Jeff Collins (SI-E3, 861-6554) for additional information, and for guidance on development of a LOM or for a copy of the referenced documents.
Note: The LOM for the KSC Visitor Complex must be updated to include the proposed Retail Warehouse.

3.a.9. EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPs): Precautions must be made to eliminate or reduce to the greatest extent possible any discharge of sediments outside established project boundaries. This can be accomplished by initiating proactive erosion control BMPs. Installation and maintenance of appropriate erosion/sediment control devices (such as wattles, turbidity screens, silt fences, inlet protectors, floating turbidity booms, etc.) must be completed prior to initial land disturbance where the possibility of sediment discharge could impact surrounding stormwater conveyances and other surface waters. The BMPs must be maintained so they remain functional until such time that the newly exposed soils are stabilized with sod or natural vegetation.

3.a.10. CONCRETE WASHOUT: Water used to rinse out concrete trucks and other equipment used for concrete work must not be allowed to discharge to surface waters. Concrete washout water shall be diverted to a settling pond where suspended material will settle out and the water can percolate into the ground. Contact Doug Durham (SI-E2, 867-8429) with any question on this requirement. Remove and dispose of hardened concrete waste consistent with your handling of other construction wastes. After drying/settling, the residue may be disposed of at the Diverted Aggregate Reclamation and Collection Yard (DARCY); and the ground restored. Clean, unstained, unpainted concrete residue is accepted at the DARCY without any sampling and analysis. Contact Zach Hall (SI-E2, 867-5178) with any questions on this requirement.

3.a.11. RECYCLING: The contractor must make every practical effort to reclaim and segregate materials that have the ability to be recycled. All reclaimed concrete (see Item 3.a.12) must be segregated from other wastes and transported to the KSC Landfill (L7-0071) on Schwartz Road. All reclaimed scrap metal, not being recycled by contractor outside of KSC, must be transported to the Reutilization, Recycling and Marketing Facility (RRMF) with a KSC Form 7-49. Please turn these items and the KSC Form 7-49 in to RRMF personnel to ensure the proper disposition of the materials prior to leaving the recycling area. For any other information regarding materials that can be recycled or other general information regarding recycling policies at KSC, please contact the Environmental Management Branch Jonathan Haling, SI-E3, 867-8414).

3.a.12. CONCRETE RECYCLING/DISPOSAL: Clean, unstained, unpainted concrete is accepted at the Diverted Aggregate Reclamation and Collection Yard (DARCY) without any sampling and analysis. Painted concrete must have PCB and Total Metals analyses (limited to Pb, Cd, and Cr) performed to determine whether it will be accepted at the DARCY for reuse. The results of the analysis must show metal concentrations below the residential cleanup level (Pb = 400 ppm, Cd = 82 ppm, Cr = 210 ppm) and PCB levels below 0.5 ppm. If no testing is done or if PCB and/or Total Metals concentrations are above residential cleanup levels, coated concrete goes to the landfill as construction/demolition debris. When feasible, painted concrete should be segregated from unpainted concrete for placement in the DARCY. No oil-stained concrete will be accepted at the DARCY. Due to the potential for PCB contamination, all removed concrete associated with oil-containing electrical equipment must be disposed through the KSC Waste Management Office as regulated PCB waste. To coordinate or for more information, contact Zach Hall (SI-E2, 867-5178).

3.a.13. GREEN PURCHASING/SUSTAINABLE ACQUISITION: Federal agencies and their contractors are required to purchase products made from recycled or recovered materials and other environmentally preferable products whenever possible. The Green Compilation Tool found at https://sftool.gov/greenprocurement provides information and useful links and tools to identify applicable green/sustainable acquisition requirements for products and services (Ref. FAR subpart 23.1 and NPR 8530.1). A Request for Waiver Form (KSC 28-825 NS) must be submitted when a product or service meets the green/sustainable requirements but is not procured. Please contact Jonathan Haling (SI-E3, 867-8414) with any questions on this requirement.

Avoid Verbal Orders

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FROM: SI-E3/Environmental Management Branch

SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 12309**

3.a.14 ARCHAEOLOGICAL: Work may not proceed at this time. A cultural resources assessment survey (CRAS) following Florida's Archaeological and Historical Report Standards and Guidelines (myflorida.com) must be conducted in undeveloped areas. Further, NASA must satisfy the requirements of 36 CFR Part 800 (Protection of Historic Properties), KCA 4185 (Programmatic Agreement for Management of Historic Properties at KSC), and/or other relevant cultural resource laws and regulations. Section 106 consultation must be concluded by NASA, and any mitigation of adverse effects must be complete, prior to the start of construction activities. Please coordinate with Katherine Zeringue (SI-E3) at 867-8454.

3.b.1. EXCAVATION PERMIT: A KSC Excavation Permit will be required for any digging proposed by this project. Please contact the Utility Locate/Excavation Permit Request Customer Helpline at 867-2406 or go to website at http://epr.ksc.nasa.gov/Home/ for an underground utility scan and dig permit. NOTE: If a trench or pit is to be left open all day or overnight, the trench/pit must be checked for trapped animals at the beginning and end of each work shift. If an animal is observed trapped, contact Russ Lowers (NEM-022, 321-759-6022) or the Duty Office (861-5050, email KSC-BOSS-DutyOffice@mail.nasa.gov) to arrange removal/release. Do not handle the animal(s). If any archaeological material (e.g., artifacts and/or cultural features or human remains) is found, work must stop immediately, and the discovery reported to the KSC Cultural Resources Manager (CRM). For questions or to report a discovery, contact Katherine Zeringue (SI-E3) at 867-8454.

3.b.2. ENVIRONMENTAL RESOURCE PERMIT (ERP) -STORMWATER: An ERP stormwater permit will be required for changes (increase or decrease) in ground cover, stormwater flow patterns, or impervious area. Application forms with supporting material including maps and engineering drawings must be submitted to the Environmental Assurance Branch (Doug Durham,SI-E2, 867-8429) by the 90% Design Review phase for review and NASA signatures. An electronic version in PDF format should also be provided. It is the responsibility of the project proponent to submit the application to the regulatory agencies and pay the application fee. No work can be performed until the permit process is completed. Please contact Doug Durham for more information.

3.b.3. ENVIRONMENTAL RESOURCE PERMIT (ERP), FDEP or ACOE Permit: Wetland permits from the St. Johns River Water Management District (SJRWMD), Florida Department of Environmental Protection (FDEP) or US Army Corp of Engineers (ACOE) may be required for the proposed development of the proposed Retail Warehouse location. The project proponent shall prepare all permit applications and pay any application fees. Application forms with supporting material such as maps and engineering drawings must be submitted to the EMB (Jeff Collins, SI-E3, 861-6554) for review and NASA signature. An electronic version in PDF format should also be provided.??No work can be performed until the permit process is completed.

3.b.4. FDEP NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) CONSTRUCTION ACTIVITY PERMIT: This project may require an NPDES Phase II construction permit. If 1 acre or more of land will be disturbed, a NPDES Construction Activity Permit from the Florida Department of Environmental Protection (FDEP) is required under F.A.C. 62-621.300(4), Notice of Intent to Use Generic Permit for Stormwater Discharge from Large (If over 5 Acres) and Small (1 Acre To 5 Acres) Construction Activities http://www.dep.state.fl.us/water/stormwater/npdes/forms/cgp_noi.pdf. This includes construction activity which will disturb less than one acre of land area that is part of a larger common plan of development that will ultimately disturb equal to or greater than one acre of land. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site. A condition of this permit is to provide a Stormwater Pollution Prevention Plan (SWPPP) detailing erosion and turbidity controls for the site. Information on completing the permit application and development of the SWPPP can be obtained by contacting Doug Durham (SI-E2, 867-8429).

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FROM: SI-E3/Environmental Management Branch

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3.b.5. DEWATERING: Construction dewatering is exempted from permitting under conditions of Rule 40C-2.051 (7) providing the conditions of exemption are met including: limiting withdrawal methods, limiting withdrawal to less than 300,000 gpd and limiting withdrawal to 30 days. Additional limitations are placed on discharge of produced water to prevent harm to the environment. If conditions of the exemption cannot be met, a construction dewatering general permit is required from SJRWMD using Form 40C-2.900(12). No dewatering may begin until 10 days after submittal of the complete form.If the dewatering activity does not qualify for a general permit by rule under Rule 40C-2.042(9), F.A.C., you must complete and submit a SJRWMD application for an individual Consumptive Use Permit pursuant to Rule 40C-2.041, F.A.C. Approval of the application must be obtained before starting the dewatering activity. If produced water discharge will reach surface waters, an FDEP permit may be required under Rule 62-621.300-2. Contact Doug Durham (SI-E2, 867-8429) with questions related to these requirements.

Note: See Item 3.a.1 for requirements when dewatering in SWMU #116/#118.

3.b.6. WATER RESOURCE PERMITTING (Domestic Wastewater): The proposed project may require a permit for the alteration or installation of utilities for transport of domestic wastewater. Please submit data and drawings required for permit determination to the NASA Permitting and Compliance Group. Additionally, any work done will be per standards and criteria set forth in the permit requirements, and not jeopardize the health and safety of personnel due to effects of the construction/modification on the KSC wastewater system. The organization responsible fore work will ensure that best engineering practices, codes, specifications and standards are followed. Contact Doug Durham (SI-E2, 867-8429) for permit requirement determination and if further assistance is required.

3.b.7. WATER RESOURCE PERMITTING (Potable Water): The proposed project may require a permit for the alteration or installation of utilities for transport of potable or FIREX water. Please submit data and drawings required for permit determination to the NASA Permitting and Compliance Group. Additionally, any work done will be per standards and criteria set forth in the permit requirements, and not jeopardize the health and safety of personnel due to effects of the construction/modification on the KSC potable water system (i.e. disinfection and verification prior to use). The organization responsible for the work will ensure that best engineering practices, codes, specifications, and standards are followed. Pressure and leak tests as well as disinfection are also required. Contact Doug Durham (SI-E2, 867-8429) for permit requirement determination and if further assistance is required.

3.b.8. TRANSFORMERS/GENERATORS: The temporary operation of portable generators during construction is allowed and is not considered a stationary source of air emissions. New generators proposed for permanent use at the facility, and associated air emissions must be reviewed for determination of construction permit and RICE (Reciprocating Internal Combustion Engine) NESHAP (National Emission Standards for Hazardous Air Pollutants) requirements. If a new transformer or generator with a maximum capacity of fuel/oil equal to or greater than 55 gallons is to be installed, it is also subject to SPCC rules. Please contact Zach Hall (SI-E2, 867-5178) for more information.

3.b.9. AIR CONDITIONER CONDENSATE (including retrofits): Condensate may not be discharged to the stormwater system. The air conditioner condensate must be discharged to sanitary sewer, or above grade, but not below grade. If below grade, this discharge may be considered an Industrial Wastewater/Underground Injection Control (UIC) discharge and may require FDEP permit. Contact Doug Durham (SI-E2, 867-8429) for additional information on this requirement.

3.b.10. RADIATION: Use of ionizing and non-ionization radiation sources must comply with KNPR 1860.1 and 1860.2 requirements. Controlled ionization sources include but are not limited to moisture density gauges, X-ray machines, and radioactive materials used by industrial radiographers for non-destructive evaluations of structural components such as pipes or welds. controlled non-ionizing radiation devices include but are not limited to Class 3R, Class 3B and Class 4 lasers, RF devices or systems operating at frequencies between 3kHz and 300GHz, and UV sources with and accessible effective irradiance greater than 0.1 mW/cm^2. Requests for use of radiation sources must be submitted to the NEMCON Health Physics Office for evaluation. Contact Health Physics (NEM-022, 867-2400) with any questions.

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FROM: SI-E3/Environmental Management Branch

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3.b.11. ON-SITE BURNING OF CLEARED VEGETATIVE MATERIAL (Only Approved Method Is Air Curtain Burn): Every effort must be made to deliver land-clearing debris to the appropriate disposal area. Combustible vegetative material may be burned within the confines of KSC after obtaining a Burn Permit issued by the KSC Fire Inspector. Burning shall be in accordance with conditions required in the burn permit, as well as all requirements for conducting an air curtain burn. As such, contractors that clear and burn or solely burn vegetative material must accomplish the following:

As a standard from the Tri-Agency Prescribed Burn agreement, no burns will be conducted:

18 hours prior to a Static Test Fire, Wet Dress Rehearsal, or similar major milestone supporting any of our launching mission partners

24 Hours prior to a launch on Kennedy Space Center or CCAFS

Notify KSC Spaceport Integration (Bill Heidtman [Desk (321) 861-9339 / Cell (321) 591-1761] or Greg Gaddis [Desk (321) 861-9556) / Cell (321) 607-2595] three business-days ahead of planned burn for a review of possible operational impacts.

After the site is prepared for burning, notify Tom Penn (US Fish and Wildlife Service, (321) 861-2288, tom_penn@fws.gov of the proposed air curtain burning.

Contact the Florida State Division of Forestry Cocoa Field Office ((321) 690-6465) to notify them of the planned burning of land clearing debris and schedule an inspection to ensure the setbacks, piles, and equipment are set up properly. The Cocoa Office will send inspection paperwork to the Division of Forestry Orlando District Field Unit who will issue a valid burn control number.

Call the Orlando Unit (407-888-8767) every day before burning to receive a Burn Authorization Number.

Call the KSC Duty Office at (321) 861-5050 for a Burn Permit a minimum of 48 hours prior to the burn and daily prior to ignition of burns to ensure there are no spaceport operations planned that require burn constraints. The KSC Fire Inspector will schedule an onsite visit for the day you get the Burn Authorization Number.

No other environmental issues were identified based upon the information provided in the KSC Environmental Checklist. This Record of Environmental Consideration (REC) does not relinquish the project lead from obtaining and complying with any other internal NASA permits or directives necessary to ensure all organizations potentially impacted by this project are notified and concur with the proposed project.

Due to potential changes in regulations, permit requirements and environmental conditions, statements in this REC are valid for 6 months, and subject to review after this period. It is the responsibility of the project lead to submit current project information for a REC update prior to project commencement if REC is older than 6 months; and also to notify the Environmental Management Branch (SI-E3) if the scope of the project changes at any time after the REC is issued.

Avoid Verbal Orders

TO: DNPS/Gina Parrish **DATE: 06/01/2023**

FROM: SI-E3/Environmental Management Branch

SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 12309**

G. Parrish/DNPS

cc:

L. Winkler/DNPS
D. Durham/SI-E2
J. Bobersky/SI-E2
D. Johansen/SI-E2
J. Collins/SI-E3
R. Lowers/NEM-022
K. West/NEM-022
T. Timm/NEM-022
E. Beilewech/NEM-022
K. Zeringue/SI-E3

4. Upon evaluation of the subject project, the above determinations have been made and identified. Contact the Environmental Management Branch (SI-E3) at 861-1196 for re-evaluation should there be any modifications to the scope of work.

06/01/2023 08:31

James Brooks **Date**

Appendix G:

Appendix G: Phase 1 Cultural Resource Assessment Survey of the DNC Retail Warehouse Pre-Con Site with Finding of No Historic Properties Affected FSHPO Concurrence

National Aeronautics and Space Administration

John F. Kennedy Space Center
Kennedy Space Center, FL 32899

October 31, 2023

Reply to Attn of: SI-E3

Florida Division of Historical Resources
& State Historic Preservation Officer
Attn: Scott Edwards
500 S. Bronough Street
R. A. Gray Building
Tallahassee, Florida 32399-0250

Subject: **Construction of KSC Visitor Center Warehouse**
Finding: No Historic Properties Affected

Dear Mr. Edwards:

Delaware North Companies Parks and Resorts operates the Kennedy Space Center (KSC) Visitor Complex on behalf of the National Aeronautics and Space Administration (NASA) and intends to build a new warehouse in a currently undeveloped area. Because these properties are owned by KSC, this project qualifies as a Federal Undertaking subject to review under Section 106 of the National Historic Preservation Act of 1966 and its implementing regulations (36 CFR 800).

In August 2023, LG^2 Environmental Solutions, Inc. completed the enclosed Phase I Cultural Resources Assessment Survey of the project area. No archaeological resources were identified. Two linear resources, which are linear drainage canal systems associated with former orange groves, were recorded and determined to be ineligible for the National Register of Historic Places. NASA KSC has determined that no historic properties are present, therefore **No Historic Properties Will be Affected** by this Undertaking.

Consulting Parties are being copied on this correspondence and may provide comment to NASA by November 30, 2023.

NASA KSC requests your concurrence with this determination. If you have any questions or require further assistance, please contact me at 321-867-8454.

Sincerely,

Katherine Zeringue
Digitally signed by Katherine Zeringue
Date: 2023.10.31 14:51:56 -04'00'

Katherine Zeringue
Cultural Resources Manager

Enclosure:
Phase I Cultural Resources Assessment Survey of the DNC Retail Warehouse Pre-Con Site

cc:
HQS FPO/R. Klein
KSC/SI-E3/D. Dankert
KSC/SI-E3/L. Phillips
KSC/AD/D. Thorpe
KSD/AD/J. Krouchick
KSC/CC/A. Vinson
KSC/SI-C2/R. Griffin

Consulting Parties:
FWS/T. Penn
NPS/K. Kneifl
CCSFS/MS-9125/T. Penders
Apollo One Memorial Foundation, Inc.
Brevard County Historical Commission
Cape Canaveral Space Force Museum
Florida Public Archaeological Network – East Central Region
Historical Society of North Brevard
Indian River Anthropological Association
North Brevard Heritage Foundation
South Brevard Historical Society

FLORIDA DEPARTMENT of STATE

RON DESANTIS
Governor

CORD BYRD
Secretary of State

National Aeronautics and Space Administration
John F. Kennedy Space Center
Kennedy Space Center, FL 32899

December 6, 2023

RE: DHR Project File No.: 2023-6603 Received by DHR: October 31, 2023
Phase I Cultural Resources Assessment Survey of the DNC Retail Warehouse Pre-Con Site, Brevard County, Florida

To Whom It May Concern:

Our office reviewed the referenced project in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and its implementing regulations in *36 CFR Part 800: Protection of Historic Properties*, as well as Chapters 267.061 and 373.414, *Florida Statutes*, and implementing state regulations for possible effects on historic properties listed, or eligible for listing, in the *National Register of Historic Places*. The project is subject to compliance with requirements for a National Aeronautics and Space Administration (NASA) undertaking.

In August 2023, LG^2 Environmental Solutions, Inc. (LG2) conducted the above referenced Phase I cultural resource assessment survey (CRAS) as due diligence on behalf of Delaware North (DNC) Parks and Resorts at KSC, Inc. and Ivey's Construction. LG2 excavated the approximately 15-acre parcel with 10 shovel tests dug throughout the project area in Brevard County. As a result of the survey, no archaeological sites were identified, but two historical resources were newly recorded. These resources include 8BR4572 (DNC West Canal) and 8BR4573 (DNC East Canal), both c. 1940s earthen drainage canals recommended ineligible for listing on the NRHP by LG2. Based on these results, it is the opinion of LG2 that the proposed project will not affect any known historic properties.

Based on the information provided, our office concurs with the presented survey results and recommendations and finds that the proposed project will have no effect on historic properties listed, or eligible for listing, in the NRHP, or otherwise of historical, archaeological, or architectural value within the surveyed APE. Further, we find the submitted report complete and sufficient in accordance with Chapter 1A-46, *Florida Administrative Code*.

If you have any questions, please contact Ethan Putman, Historic Preservationist, by email at *Ethan.Putman@dos.myflorida.com*.

Sincerely,

Kelly L Chase
For

Alissa Slade Lotane
Director, Division of Historical Resources
& State Historic Preservation Officer

Phase I Cultural Resources Assessment Survey of the DNC Retail Warehouse Pre-Con Site
Brevard County, Florida

LG2 Project Number
312023004-026

Prepared for:
Kennedy Space Center

On Behalf of:
Delaware North (DNC) Parks and Resorts at KSC, Inc.
State Road 405
Kennedy Space Center, FL 32899

And

Ivey's Construction
4060 N. Courtenay Parkway
Merritt Island, FL 32953

Prepared by:

LG^2 Environmental Solutions, Inc.
10475 Fortune Parkway, Suite 201
Jacksonville, Florida 32256
(904) 363-1686
www.lg2es.com

October 2023

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Merritt Island, FL 32953

Frank Keel, MA, RPA
Principal Investigator

Elizabeth Zieschang, MSc, RPA
Archaeologist / Author

Wendy Puckett
Archaeologist / Co-Author

Sierra DeVanie
Archaeologist / Co-Author

October 2023

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ACKNOWLEDGEMENTS

The successful completion of this study was made possible with the hard work and input of many individuals. LG2 would especially like to thank Ivey's Construction, specifically Steve Sergis, Sam Martinez, and Nick Caplanis. Special thanks also to Katherine Zeringue, NASA Cultural Resources Manager at Kennedy Space Center, for her review of this document. LG2 would like to thank Oneida Nation of Wisconsin, owners of LG2, for their support, and as well as in-house personnel including Frank Keel, Elizabeth Zieschang, Wendy Puckett, Sierra DeVanie and Megan Bebee (GIS Specialist) for their assistance with this report.

EXECUTIVE SUMMARY

This report presents the results of a Cultural Resources Assessment Survey (CRAS) conducted in support of the proposed DNC Retail Warehouse Pre-Construction Site Assessment at Kennedy Space Center in Brevard County, Florida. The survey was conducted by LG^2 Environmental Solutions, Inc. (LG2) on behalf of Ivey's Construction, Inc and Delaware North (DNC) to assist Kennedy Space Center in meeting its regulatory obligations under Section 106 of the National Historic Preservation Act (NHPA), as amended. All work was conducted in accordance with the NHPA and in compliance with the Archaeological Resources Protection Act and met or exceeded standards detailed in *Archaeological and Historic Preservation; Secretary of the Interior's Standards and* Guidelines 48FR, Part 44716-42, Vol. 48, No. 190, September 29, 1983 and guidelines developed by the Florida State Historic Preservation Office.

The Archaeological Area of Potential Effects (APE) is located on the *Orsino, Florida* 7.5-minute USGS quadrangle. It is situated within the Merritt Island National Wildlife Refuge in the northern portion of Brevard County.

The CRAS was conducted August 2nd, 2023 and consisted of historic background research, pedestrian survey, and excavation of 10 shovel tests probes (STPs), all of which were negative for cultural material. No further archaeological investigation is suggested for this area.

Two linear resources were recorded during this survey, 8BR4572 and 8BR4573. Both are drainage canal systems and both are recommended ineligible for the *National Register*, no further research is recommended.

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LIST OF ACRONYMS

Abbreviation	Description
APE	Area of Potential Effects
ARPA	Archaeological Resource Protection Act
CMBS	Centimeters Below Surface
CRAS	Cultural Resource Assessment Survey
CRM	Cultural Resource Management/Manager
EA	Environmental Assessment
FMSF	Florida Master Site File
FWS	U.S. Fish and Wildlife Service
GIS	Geographic Information System
GPS	Global Positioning System
ICRMP	Integrated Cultural Resource Management Plan
IRL	Indian River Lagoon
KSC	Kennedy Space Center
LG2	LG2 Environmental Solutions, Inc.
LC	Launch Complex
MINWR	Merritt Island National Wildlife Refuge
NAD 27	North American Datum 1927
NAD 83	North American Datum 1983
NASA	National Aeronautics and Space Administration
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
SHPO	State Historic Preservation Office
SOP	Standard Operating Procedures
SOW	Scope of Work
SF	Space Florida
STP	Shovel Test Probe
USAF	United States Air Force
UTM	Universal Transverse Mercator

1.0 INTRODUCTION

1.1 Project Description

In August 2023, LG2 Environmental Solutions, Inc. (LG2) conducted a Phase I Cultural Resource Assessment survey (CRAS) in support of the proposed Delaware National Company (DNC) Retail Warehouse Pre-Construction Site Assessment at Kennedy Space Center (KSC) on Merritt Island in Brevard County, Florida. The project area is wholly contained on the *Orsino, Florida* 7.5-minute quadrangle (USGS 1976) (**Figure 1.1**). It was conducted on behalf of DNC and Ivey's Construction to assist KSC in meeting its regulatory obligations under Section 106 of the National Historic Preservation Act (NHPA), as amended. Proposed project activities include the construction of a retail warehouse next to the Kennedy Space Center to support development and commercial facilities.

All work was conducted to comply with Section 106 of NHPA, as amended, and its associated regulations, 36 CFR Part 800; Section 267.12, Florida Statues; and Chapter 1A-46 of the Florida Administrative Code. All work was conducted in accordance with the Florida Division of Historical Resources' *Module Three Guidelines for Use by Historic Preservation Professional* and the Florida Division of Historical Resources' Performance Standards. All investigations were performed by professional archaeologists meeting the qualifications established in the Secretary of Interior's Standards and Guidelines.

1.2 Area of Potential Effects

The Area of Potential Effects (APE) for this investigation consists of the proposed construction area of the Retail Warehouse Space for the KSC Visitor Complex, an approximately 15-acre (ac) parcel (**Figure 1.1**). The project APE consists of the entire footprint of the Project's proposed impacts. The APE is relatively level with elevations ranging from 8 to 14 meters (m) above mean sea level (amsl). Vegetation in the APE primarily consists of Brazilian Pepper and Saw Palmetto with occasional oak trees. The area contains many areas of standing water and swamp.

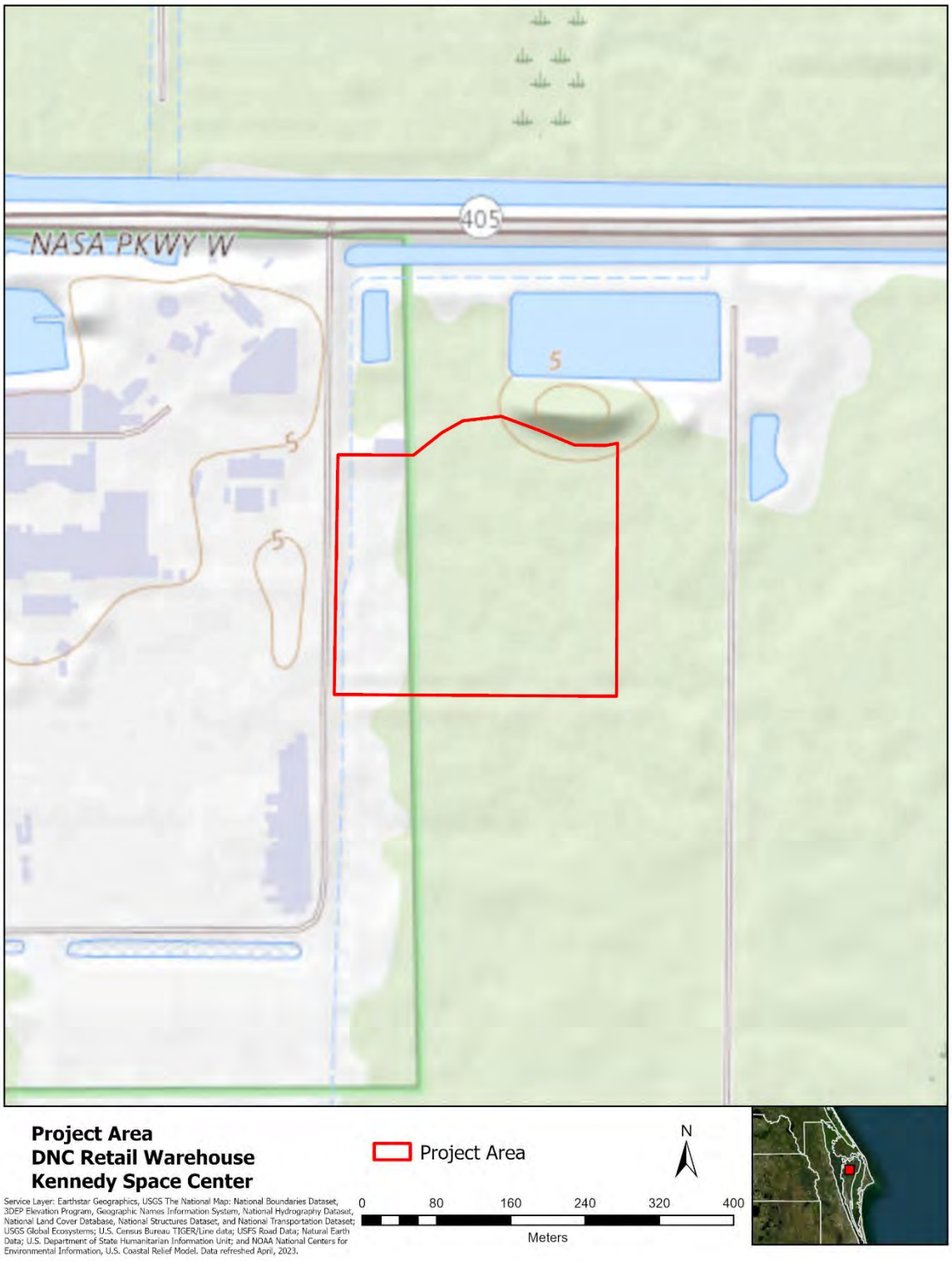

Figure 1.1 Project Area Shown on the *Orsino, Florida* 7.5-Minute Quadrangle (USGS 2021).

2.0 ENVIRONMENTAL CONTEXT

2.1 Physiographic Setting

Kennedy Space Center (KSC) Visitor Complex is located on Merritt Island in Brevard County, Florida. Merritt Island is located within the Southern Coastal Plain region of the Atlantic Coastal Plain physiographic province, as is all of Florida. This portion of Florida is within the Eastern Florida Flatwoods ecoregion, described as nearly level and poorly drained with numerous ponds, lakes, swamps, and sloughs (Huckle et al. 1974; Griffith et al. 1994; Scott 2001; Scott et al. 2001). The physiographic setting of the project area suggests a low probability of encountering cultural resources within the APE.

2.2 Hydrology

The KSC is located within the Indian River Lagoon (IRL) watershed. The IRL watershed stretches 251 kilometers (km) from Ponce Inlet in Volusia County to Jupiter Inlet in Martin County and is comprised of the Mosquito Lagoon, the Banana River, and the Indian River (SJRWMD 2016). The IRL watershed is an estuary that receives salt water from the Atlantic Ocean through inlets and fresh water from direct precipitation, groundwater seepage, surface water runoff, and discharges from tributary streams and canals (Penders 2012a). The ridge and swale topography of the barrier island also creates a reservoir for fresh water that could have been easily obtainable by previous occupants of the island (Cantley et al. 1994). In addition to the Banana River, which borders Merritt Island to the east, other surficial water resources include impoundments, drainage canals, borrow pits, freshwater wetlands, mangrove wetlands, and salt marsh wetlands (Penders 2012b).

2.3 Generalized Topography

The following is adapted from the KSC 2015 Environmental Resource Document, Revision F (KSC 2015:144-145). Merritt Island, as well as Cape Canaveral, form a barrier island complex of Pleistocene and recent age. Topography is characterized by a series of ridges and swales created from relict dunes, which were deposited as the barrier islands were formed. The western side of Merritt Island "has been reduced to a nearly level plain" (KSC 2015:145). Elevations on Merritt Island range from sea level to approximately 3 m. The island is comprised of saline and freshwater marshes, flatwoods, and scrub. Within the APE, the land cover is characterized as Citrus to Brazilian Pepper (KSC 2015:150).

2.4 Climate

The following is adapted from the KSC 2015 Environmental Resource Document, Revision F (KSC 2015). The climate at KSC is classified as subtropical with short, mild winters and hot, humid summers and no recognizable spring or fall seasons. Summer weather begins in April and is prevalent for approximately nine months of the year. Average temperatures in this part of the year are in the 70s Fahrenheit (F) and temperatures usually rise into the 80s and 90s F during the day. Days are mostly sunny; however, afternoon thunderstorms are common. Although cool days can occur in November, winter weather begins in January and extends through March. Winter weather is marked by windy days and temperatures in the 40s F at night and the 70s during the day. May through October weather is characterized by southeast winds, traveling clockwise around the Bermuda High. These winds bring

"moisture and warm air, which help produce almost daily thundershowers creating a wet season" (KSC 2015:46). The dry season occurs between November and April and is characterized by cold continental air masses which cause uniformly distributed light rain, as opposed to the localized heavy thunderstorms of the wet season (KSC 2015).

2.5 Soils

Three soil types have been identified within the APE (**Table 2.1 and Figure 2.1**). The majority of the area (9.04 ac.) contains Wabasso-Brynwood-Cypress Lake-Pineda, 0 to 2 percent slopes. This soil is found on flats and marine terraces and is described as poorly drained. Bradenton fine sand, limestone substratum, is found in 6.82 ac. of the western and southern edges of the APE. This soil is found on flats and marine terraces and described as poorly drained. A small section along the western edge of the APE, approximately 0.01 ac, contains Anclote sand, frequently ponded, 0 to 1 percent slope, described as very poorly drained and found on depressions and marine terraces.

Table 2.1 Soils within Project Area

NRCS Code	Name	Drainage	AOI Acres
71	Wabasso-Brynwood-Cypress Lake-Pineda	Poorly drained	9.04
8	Bradenton fine sand, limestone substratum	Poorly drained	6.82
2	Anclote sand, frequently ponded, 0 to 1 percent slope	Very Poorly Drained	0.01

Soils in Lease Area
Exploration Park North Extension
Kennedy Space Center

Soils in Lease Area

N

0 50 100 150 200

Meters

Service Layer: State of Florida, Maxar

Soil Name	MUSYM	Area in Acres
Anclote sand, frequently ponded, 0 to 1 percent slopes	2	0.01
Bradenton fine sand, limestone substratum	8	6.82
Wabasso sand, 0 to 2 percent slopes	71	9.04

Figure 2.1 Soil Types Mapped within the DNC Retail Warehouse Space Project APE.

2.6 Vegetation

KSC is wholly contained within the Merritt Island National Wildlife Refuge (MINWR). The APE is situated in the southwestern portion of the refuge. Portions of the APE were once citrus farms and the vegetation throughout suggests prior clearing episodes. The APE is surrounded by development associated with KSC. Areas with established water control measures, such as drainage ditches, were used for citrus, truck crops, and rangeland. Natural vegetation incudes slash pine, cabbage palm, live oak, saw palmetto, laurel oak, wax myrtle, chalky bluestem, creeping bluestem, indiangrass, little bluestem, pineland threeawn, southern bayberry, sweetbay magnolia, water oak, sweetgum, and panicums. Vegetation within areas of very poorly drained soils may also include cabbage palmettos, maples, gums with an undergrowth of vines, pineland shrubs, and ferns. Blue flags, rushes, sedges, and lilies are commonly found in depressions.

2.7 Faunal Resources

Numerous species of mammals, birds, and reptiles are found within the MINWR. Mammals living within the refuge include armadillos, bobcats, manatees, river otters, white tailed deer, rabbits, squirrels, raccoons, and opossum. Birds observed within the refuge include birds of prey such as the osprey, red-shouldered hawk, bald eagle, and American kestrel; shorebirds such as the killdeer, lesser yellowlegs, Wilson's snipe, and ring-billed gull; migratory birds such as the blue jay, barn swallow, tufted titmouse, Carolina wren, American robin, and pine warbler; and wading birds and waterfowl such as blue heron, white ibis, great egret, great blue heron, and many species of ducks. Reptiles include the American alligator, lizards such as anoles and skinks, over 40 species of snakes, and numerous turtle species such as Peninsula cooter, chicken turtle, snapping turtle, striped mud turtle, stinkpot, and gopher tortoise. Endangered species within the MINWR include the eastern indigo snake, the Florida scrub-jay, the gopher tortoise, the southeastern beach mouse, the West Indian manatee, and the wood stork (FWS 2020).

3.0 CULTURAL CONTEXT

The Cape Canaveral area has a long record of human occupation, and this is reflected by the presence of numerous prehistoric and historic sites that are part of the area's rich archaeological heritage. Human occupation throughout the Cape Canaveral area spans from the first Native Americans of the Orange Period over 3,000 years ago, the colonizing Spanish, the failed attempts of the colonizing French and their associated survivor camps, and the development of the US Space Program and US Air Force Space Wing during the Cold War, through to the present day.

3.1 Prehistoric Chronology

3.1.1 Paleoindian and Early Archaic (14,000 BP – 8,000 BP)

Florida has a rich Paleoindian history extending continuously from the late Pleistocene epoch into the early Holocene epoch (**Figure 3.1**). At early archaeological sites and isolated finds in Florida, there are diagnostic artifacts dating to the late Pleistocene, including the Clovis fluted points and later lanceolate types. Tools of this period were constructed from a variety of natural resources. These tools were made from carefully chipped-stone into bifacial and unifacial tools (Purdy 1981), from ivory into foreshafts (Hemmings 2004), from bone into double-pointed points (Waller 1976), and from wood and other organic materials. However, the Florida Paleoindian occupation lacks good radiocarbon dates.

The projectile point sequence: Clovis to Suwannee/Simpson to Bolen notched points have a bracketed age between 11,000 BP and 10,000 BP (with Clovis being oldest). Stylistically, Clovis and Suwannee/Simpson points are lanceolates (attached to a spear) although Clovis are fluted and Suwannee/Simpsons are not. At the end of the Paleoindian period, smaller notched points, including the Bolen and Greenbrier, replaced lanceolates (Austin 2006; Powell 1990). While Clovis remains as the earliest stylistically secure projectile point, "Pre-Clovis" occupation has been proposed for years at multiple sites in Florida, including Little Salt Spring (Clausen et al. 1979) and Page-Ladson (Dunbar and Hemmings 2004) as well as other sites in the Aucilla River in the Big Bend area (Dunbar 2006, 2007; Hemmings 2004).

There have been several studies in recent years examining genetic samples of modern Native Americans and ancient human skeletons indicating the occupation of the Americas occurred at least 1,500 years prior to the Clovis complex which has been confidently dated to ~13,000 calendar years before present (cal yr BP) (Halligan et al. 2016). However, until now, this interpretation had lacked actual archaeological evidence. The archaeological evidence of pre-Clovis occupation between 14,000 and 15,000 cal yr BP is very limited due to a number of factors but, as researchers have been saying for years, the two most important factors are the recognition and visibility of these sites. It is theorized that most of these sites are located in submerged areas, what underwater archaeologists refer to as drowned terrestrial sites. Recently, one suspected pre-Clovis site was revisited.

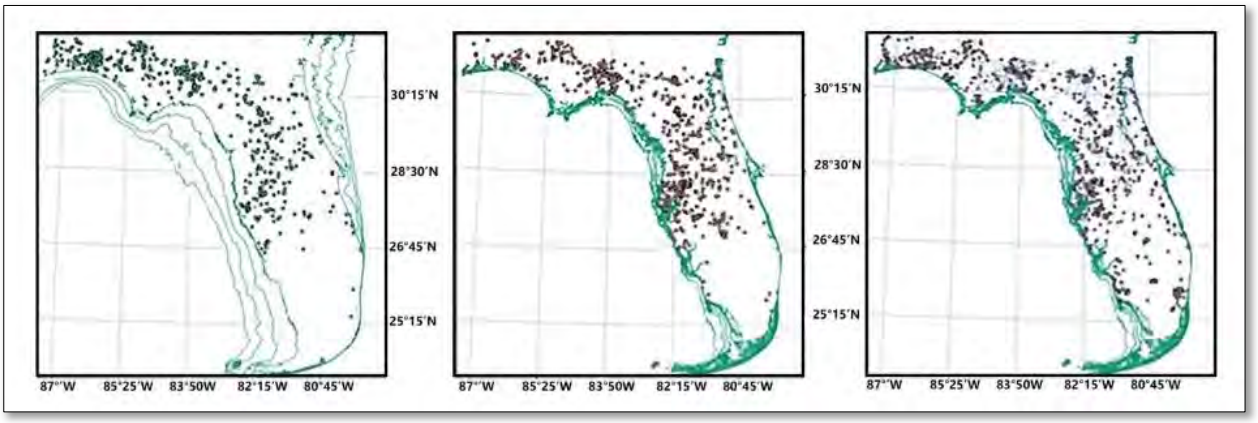

Figure 3.1 Culture Type Designations Queried from the FMSF: Paleoindian and Early Archaic Sites; Sites with Middle Archaic Designations; and Late Archaic with Middle Archaic Sites (Lydecker et al. 2011).

The Page-Ladson site located in the Aucilla River in Florida's Big Bend region has yielded remarkable findings. Archaeologists from several universities, governmental, and non-governmental organizations have worked together, led by researchers from Florida State University and Texas A&M University, to conduct new excavations at this unique site. This site is located under 9 m of water within a mid-channel sinkhole along a segment of the Aucilla River, about 11 km inland from the Gulf of Mexico. While this site has been suspected to contain a pre-Clovis component since the discovery and recovery of a Mastodon tusk that showed signs of butchering, no direct archaeological evidence had been found (Dunbar and Hemmings 2004). Recent publications have revealed the recovery of a biface knife in direct association with mastodon bones showing signs of blade marks from butchering (Halligan et al. 2016).

> "The findings prove that hunter-gatherers, butchered or scavenged a mastodon carcass at the sinkhole's edge next to a small pond at 14,500 cal yr BP. The record of human habitation of the Americas between ~14,000 and 15,000 cal yr BP is sparse but real. The rarity of these early sites along the Gulf Coastal Plan of North America is largely due to two factors: sediment preservation, and burial and submergence during the late Pleistocene transgression" (Halligan et al. 2016).

Both Little Salt Spring (8SO18) and Warm Mineral Springs (8SO19) are also unique submerged terrestrial sites located in Sarasota County. These two sites are spring-fed cenotes or sinkholes with anoxic subsurface environments located within 4.8 km of each other. The anoxic environment results in some of the best-preserved artifacts and ecofacts known in the southeast (Wentz and Gifford 2007). Both sites also have suspected pre-Clovis occupations. One such artifact recovered from Little Salt Spring is a fire-hardened wooden stake, which was recovered in the late 1970s by Charles Clausen from the 27 m ledge. This stake was found in situ with an extinct giant ground tortoise in direct association with charcoal of a campfire, which could be radiocarbon dated. Archaeologists have also uncovered artifacts and tools never before seen due to the anoxic environment of the spring. One of the oldest artifacts from Little Salt Spring was recovered during excavations within the basin of the spring in 2004. A worked portion of a deer antler was recovered one meter below the sediment-water interface. Radiocarbon dating of an ecofact directly associated with the object was determined to be Cal BP date of 10,560 to

10,253 (2 sigma; Claib Rev.6) (Gifford and Koski 2011). Investigations of these two sites have only scratched the surface. To date, only about five percent of Little Salt Spring has been excavated.

The transition from lanceolates to smaller notched points represents the end of the Paleoindian period (Austin 2006; Bullen 1975; Powell 1990), while lithic reduction strategies and contiguity from 10,000 BP to 9,000 BP represents a continuation of Paleoindian occupation of Florida (Lydecker et al. 2011:12). Early Archaic tool assemblages associated with Bolen points are well constrained stratigraphically and chronologically (10,000 BP to 9,000 BP) (Faught et al. 2003). However, unlike Clovis and Suwannee/Simpson lanceolates (Dunbar 1991; Thulman 2007), their spatial distributions have not been reconstructed for Florida. Numerous sites show at least semi-permanent occupation during this period (Faught et al. 2003) while other special activity sites and campsites in the Central Florida Highlands were used seasonally or to utilize a specific resource (Milanich 1994; Milanich and Fairbanks 1980).

Windover Pond is an Early Archaic mortuary pond located in Brevard County, Florida. The site has produced a large variety of organic materials including 7,000-year-old human tissue, bone, antler, wood, and fabric made of saw palmetto and sable palm preserved in a peat bog. There is evidence that their dead were buried underneath the peat deposits. The site has provided "unprecedented and dramatic" information about Early Archaic people in Florida (Milanich 1994).

3.1.2 Middle Archaic (8,000 BP – 5,000 BP)

In Florida, the Middle Archaic witnessed increased population growth and reliance on marine resources. Sites were expanded into the St. John’s River area, along the Atlantic coastal strand, and along the southwest Florida coast into south Florida (Milanich 1995:20).

During the Middle Archaic, Florida’s eastern lakes were settled for the first time and biface points were made with a stem for hafting rather than notching. Many archaic tools appear less carefully crafted and are expedient rather than consistent. New mortuary practices including the preservation of the skeleton in different positions were introduced, and populations grew much like those found at the Windover Pond site (Doran 2002). It was during this time span that the second occupation of Little Salt Spring appears in the evidence uncovered by researchers from the University of Miami. It is estimated somewhere between 100 and 1000 submerged burials are present at Little Salt Spring. While evidence of this burial practice has been seen elsewhere in the world, in North America these archaic mortuary ponds are unique to Florida. It is possible that there are sites of a similar nature to Warm Mineral Springs, Little Salt Spring, and Windover Pond preserved on the submerged paleo-landscape offshore.

Maritime adaptations become increasingly apparent from 7,000 BP. Shellfish resources first appear in the archaeological record during the Middle Archaic. Extensive shell middens along the coast and canal systems connecting mangrove swamps were constructed by humans utilizing the coastal zone. Middle Archaic sites, specifically shell middens, are plentiful and are found in a variety of locations in Florida (Milanich 1994). In at least three sites at Big Bend in Apalachee Bay, the shell middens continue offshore along relic river channels (Faught 1988, 2004).

Ground and pounded shell and limestone were increasingly used as raw materials to make tools during the Middle Archaic. In present-day Florida, evidence of lithic technology is meager during this period and pottery is absent from the record. On the other hand, excavations at the San Marco Island site found wood and plant fibers used for cordage and decorative items. The excellent preservation of these finds is due to the unusual anoxic environment in wetland muck. Wood was certainly made into many items of daily use and has been previously found in submerged settings (Lydecker et al. 2011).

Excavated artifacts made from limestone include plummets, grooved pebbles, net sinkers, and hammer stones. Large shellfish, including whelks and conchs (*Busycon*, *Strombus* and *Pleuroploca*) were modified/manufactured to make picks, adzes, celts, chisels, awles, gouges, knives, scrapers, cups, saucers, dippers, and spoons while smaller shellfish are thought to have been used to make net weights, sinkers, and decorative beads (Kozuch 1992).

3.1.3 Late Archaic (5,000 BP – 3,000 BP)

The Late Archaic Period is characterized by greater cultural complexity after 5,000 BP (Milanich 1994). Extensive shell middens dating to the Late Archaic are found along the coast and inland waterways of Florida.

In the Late Archaic Period, middle Archaic assemblages, including the expedient chipped-stone assemblage, continued (Hemmings and Kohler 1974), while new technologies were introduced to the region. The earliest ceramics tempered with plant fibers appear about 4,050 BP (2000 BC). Varying by location in Florida, these ceramics are referred to as Mount Taylor, Norwood, or Orange. The Late Archaic also sees the use of steatite cooking vessels (Milanich 1994; Powell 1990; Sassaman 2003) and shell middens made into circular features known as “shell rings” (Russo 2004).

While appearing first in Middle Archaic assemblages, socketed base points such as Culbreath and Levy are also consistent with Late Archaic settings. Hemmings and Kohler (1974) report these chipped stone assemblages as extensions of the expedient Middle Archaic tool kit. Late Archaic sites indicate that humans were hunting, fishing, processing food, manufacturing marine shell tools, building fires, and living along the developing Everglades tree island landscape more than 5,000 years ago. Several Late Archaic sites overlay pre-existing layers of organic soil, sediment, faunal remains, and cultural material, suggesting an earlier occupation during the Middle Archaic (Schwadron 2010).

Coastal occupation during the Late Archaic is more extensive than previous periods. Features including fish weirs, canals, platforms, ponds, and sluices appear in the archaeological landscape for the first time (Schwadron 2010).

The transition from the Archaic to the Woodland period in Florida is marked by increasing regionalization and the development of specific ceramic styles and variations. To understand these different traditions, Florida has been divided into nine cultural regions by Milanich (1994). Brevard County is located within the East and Central region, in which is further separated into the Indian River Culture Area. This is a region that is centered on the Indian River and stretched from the northern boundary of Brevard County south to St. Lucie Inlet, a distance of some 190 km. From east to west, it extended from the Atlantic seaboard to the upper St. Johns River basin, an average distance of about 50 km (45 SW 2020).

3.1.3.1 Mt. Taylor Period (6,000/5,000 – 4,000 BP)

At the end of the Late Archaic, Milanich (1994) uses the Mt. Taylor Period to differentiate and define the beginnings of identifiable regionalism in east central Florida. In the Indian River Culture Area, the end of the Late Archaic period has been associated with the Mt. Taylor regionalism (Table 3.1). It is heralded by the emergence of steatite vessels and ground stone implements. The presence of these artifacts in this region indicates that a long-distance trading network was established during this time. Mt. Taylor is the final preceramic culture in Central Florida and dates to the Middle and Late Archaic though the exact date is subject to debate (45 SW 2020). The subsistence strategies for people during this time are more closely related to that of the Late Archaic, indicating that it is more closely related to the latter phase, rather than the Middle Archaic (Cantley et al. 1994). Fish was the main food source, along with mammals, reptiles, birds, and amphibians (45 SW 2020).

This period is also identified with the rise of monumental architecture. Previously, it was assumed that shell mounds along the St. Johns River could only have been constructed during the post-Archaic periods and were associated with later cultures which used ceramics. However, recent research at shell mounds have identified purposely constructed shell mounds (some containing burials) that are older than 2,000 BP (45 SW 2020).

Sites representative of the Mt. Taylor Period include the Mt. Taylor Site (8VO19), Max Hoeck Site (8BR205), and Tick Island (8VO24). The Mt. Taylor and Tick Island Sites indicate that these people used charnel houses for preparation and storage of their dead until mass burial plots could be constructed within shell middens (Cantley et al. 1994).

3.1.4 Orange Period (4,000 – 2,500 BP)

The introduction of clay pottery vessels emerges during the end of the Late Archaic Period during the Orange Period (45 SW 2020). This is the first pottery type to emerge in Central Florida and is typified by fiber-tempered pottery (Cantley et al. 1994). There is little evidence of subsistence pattern differences, therefore the period is defined by the changes in pottery technology, decoration, and manufacturing methods. Although the patterns did not change, there was an increase in the use of shallow dwelling fish, snails, and mussels from freshwater marshes (45 SW 2020).

The Orange Period is split into five different phases based upon pottery styles (Orange Period I-V) (Table 3.2). Orange Period I ceramics are characterized by plain, hand-molded, thin-walled, rectangular containers with occasional lug-like appendages. Orange Period II ceramics are very similar to the previous period in the exception that in addition to plain wares, they also began to exhibit exterior decorations, including incised, concentric, vertical diamonds with horizontal lines and spirals with background punctations. Orange Period III ceramics are distinguished by large, straight-sided and round-mouthed vessels with flat bottoms. The thickness varied, but the lips were always simple rounded or flattened. Exterior decorations are similar to the Orange Period II ceramics, with incised straight lines, some parallel and slanting, with occasional punctations or ticks. Orange Period IV ceramics had simple incised motifs, with sand and fiber tempers, constructed with hand molding (Cantley et al. 1994) and the first instances of coiling (45 SW 2020). Orange Period V (which is referred to as the Transitional Period to some researchers) ceramics exhibited both hand molded and coiled manufacturing methods with incised,

pinched, and triangular punctated surface decorations. Sand and fiber ware was used as the tempering agents, like the ceramics of the previous Orange Periods. St. Johns chalky pottery is also associated with this phase, as well as Malabar I ware types (Cantley et al. 1994; 45 SW 2020).

Table 3.1 Prehistoric Culture Periods of the Indian River Culture Area (45 SW 2020)

Date BC/AD	Cultural Period	Cultural Traits	Diagnostic Artifacts
12,000-8,000 BC	Paleoindian	Small bands of migratory hunters and gatherers.	Fluted points: Clovis, Folsom, Dalton, Suwannee, and Simpson projectile points
8,000-2,000 BC 8,000 5,000 3,000	Archaic Early Archaic Middle Archaic Late Archaic Mount Taylor	Small groups of migratory hunters and gatherers living within smaller territories. Burials in ponds. Some evidence of aquatic resources exploitation early. Beginning of middens by Middle Archaic. Steatite vessels appear by Mt. Taylor. Regionalism begins.	Archaic stemmed points, steatite vessels
2,000-500 BC	Orange	First appearance of ceramics. Increased sedentism. Exploiting aquatic resources. Middens becoming commonplace.	Fiber-tempered pottery. Increased use of design motifs over time. Appearance of sand and mixed sand and fiber tempering late. Stemmed projectile points
500 BC-AD 900	Malabar I	Conditions similar to present. Continuation of hunter/gatherer/fisher subsistence. Villages with smaller special use camps. Burial mounds.	St. Johns Plan, Sand-Tempered Plan, Glades Plain, Sandy St. Johns, Dunns Creek Red (late)
AD 900-1565	Malabar II	First appearance of check-stamped ceramics. Large populations. Appearance of non-local objects. European artifacts 1513+. Wreck salvaging.	Stamped ceramics, Exotics (galena, copper, quartz crystals, etc.), European goods

Table 3.2 Orange Period Chronology (45 SW 2020)

Date BC	Cultural Period	Ceramic Attributes
2000-1650	Orange I	Hand-molded, flat-based rectangular shaped containers. They were undecorated with then walls and the rim treatment was simple rounded lips.
1650-1450	Orange II	First use of decorations on ceramics. The decorations include concentric vertical diamonds with horizontal lines and some use of incised spirals and punctuations. Vessel forms were similar to Orange I.
1450-1250	Orange III	Large straight wall, rounded vessels with smooth surfaces and flat bottoms. Fewer rectangular vessels are found. Decorations on the ceramics are incised straight lines and some punctuation.
1250-1000	Orange IV	Coiling first appears as a method of manufacturing ceramics. It also signified the end of hand molding. By the end of this period tempering begins to be a mix of sand and fibers (also known as semi-fiber tempered). Decorations on pots are simple incised motifs.
1000-500	Orange V	The end of the semi-fiber tempered ceramics and the appearance of chalky ware, which is typical of the Malabar Period. Also decorations and shapes of vessels are similar to Malabar Period wares.

3.1.5 Malabar Period (2,500 BP – 450 BP)

From the Orange Period, the Malabar Period evolved, which existed up until the arrival of the Spanish. Many researchers believe that several factors separate it from the St. Johns Culture Area to the north (45 SW 2020, Buchner et al. 2008, Cantley et al. 1994). The cultivation of corn is absent and there were differences in linguistics, social activities, and religious customs (Buchner et al. 2008). The period is marked by an increase of sand-tempered pottery, although spiculate-tempered pottery (St. Johns) was still dominant from Orange Period V.

The prevalence of sand-tempered Glades pottery in the southern portion of the region and St. Johns ceramics in the northern portion indicate that the Indian River Culture Area was a transitional zone (45 SW 2020). Rouse (1951) was the first to describe the pre-Columbian cultures of the transitional Indian River area (Figure 3.2). This Malabar I period is coeval to the St. Johns I period. Malabar II, which is characterized by the appearance of St. Johns Check Stamped pottery, is temporally equivalent with St. Johns II (Penders 2012c).

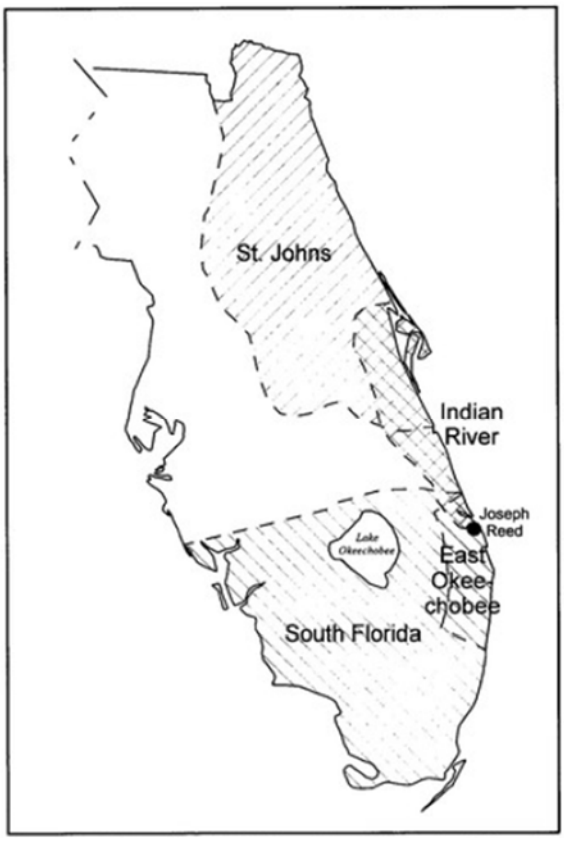

Figure 3.2 East and South Florida Culture Regions (St. Johns after Milanich 1994, Indian River after Rouse 1951, East Okeechobee after Carr and Beriault 1984, South Florida after Widmer) (Russo & Heide 2002:76).

A significant amount of undecorated pottery tempered with quartz sand also appears in the Indian River region. Indian River-region ceramic samples have shown that both the St. Johns and quartz-tempered pottery are made from local clay sources, suggesting that one group made both wares (Milanich 1994).

The Malabar Period is divided into two sub-periods or phases, Malabar I and Malabar II, which are further divided into Ib and IIb respectively (Table 3.3). In the past, the Malabar Period has been seen as temporally equivalent with St. Johns but recently the chronology has been further differentiated by research in the region (45 SW 2020).

3.1.5.1 Malabar I (2,500 BP-1,500 BP)

Malabar I is mainly defined by the presence of chalky, sponge spicule ceramics. Some fiber-tempered wares are present during this phase but is likely transitional from the prior period. The decorative motifs are linear and continue through Malabar II. Climate change from the Roman Warm Period, may have caused an occupancy shift to the Indian River Lagoon area and on the coastal barrier islands (45 SW 2020).

There appears to be some influence from the Weeden Island and Yent complexes, but the degree of influence seems to be minor. Exotic goods resulting from trades with other cultures is rare and comprise of a very small percentage of the archaeological record (45 SW 2020).

Malabar Ib is noted more by the brief presence of Dunns Creek Red ceramics rather than any other cultural identifier. During this short time span (1,500-1,100 BP) the ceramic appeared and disappeared. It is unclear what caused the short-lived pottery, but it is suggested that it may have to do with the climate shift to cooler and drier environments during the Vandal Minimum Period (45 SW 2020).

Table 3.3 Malabar Period Chronology (45 SW 2020)

Date BC/AD	Climatic Period**	Malabar Subperiod	Cultural Traits	Diagnostic Artifacts
500 BC-AD 900	Roman Warm Period (ca. 350 BC-AD500)	Malabar Ia	Conditions similar to present. Continuation of hunter/ gatherer/ fisher subsistence. Villages with smaller special use camps. Burial mounds.	St. Johns Plan, Sand-Tempered Plan, Glades Plain, Sandy St. Johns
AD500-900	Vandal Minimum Period (ca. AD 500-850)	Malabar Ib		Dunns Creek Red
AD900-1050	Medieval Warm Period (ca. AD850-1200)	Malabar IIa	Though check-stamped sherds appear as early as AD750, recent dates suggest a correlation between their widespread use and the start of the Mississippian Period. Large populations. Some non-local artifacts or local copies.	Check-stamped ceramics. Very few exotics (galena, copper, quartz crystals, etc.),
AD1050-1513	Little Ice Age (ca. AD 1200-1850)		European artifacts 1513+. Wreck salvaging. Populations were declining due to introduced diseases. Burial customs declined, and burials were placed in old existing mounds.	Some exotics of Native American origin early. European goods late.
AD 1513-1565		Malabar IIb		

*This revised chronology is based on Penders et al. 2009; Penders 2012a.
**The climate periods are from Marquardt and Walker 2012.

3.1.5.2 Malabar II (1,100 BP-450 BP)

Malabar II is indicated by a population growth and an increase in mounds and villages during the earlier portion of the Period. The phase is also hallmarked by the presence of check-stamped ceramics, which appeared in the St. Johns region in AD 750, but did not appear in the Indian River Culture area until 900 AD. This corresponds to the dawning of the Mississippian period and the Medieval Warm Period (45 SW 2020). In many nearby regions, this warmer weather resulted in the further cultivation of corn, but that did not seem to be the case in the IRCA. Instead, there was an increase in the consumption of shallow water fish within freshwater wetlands, which suggests a population increase.

Malabar IIb is largely distinguished archaeologically by the appearance of European goods, acquired either via trade or salvage of shipwrecks. The cooler and drier climate of the Little Ice Age during this time did not seem to have much of an effect on subsidence strategies. By the end of Malabar II, populations were decreasing, possibly due to the introduction of new diseases by the Spanish. By becoming proficient wreckers, the acquisition of European goods changed the socio-political network of the region. It could be speculated that the new trade network

established by European goods was farther reaching than those established in the Mississippian Period (45 SW 2020).

3.2 Historic Chronology

3.2.1 Contact Period (CA. 1500 -1565)

The Florida peninsula first appeared in cartography in 1502 on the Cantio map and in 1507 on the Waldseemuller map (Lydecker et al. 2011:19) (**Figure 3.3).** While it is unknown when Europeans first made contact with Florida's native tribes, Juan Ponce de León made the first "authorized discovery" of Florida in 1513 (Griffin 1983:18; Turner 2013). Before that documented voyage, it is virtually certain that Spaniards were using Florida as a staging ground to capture slaves and possibly provision their ships, as had been practiced extensively in the Bahamas for some time. The exact location of Juan Ponce de León's initial landfall remains unknown but judging from the latitude recorded in his log the prior day it would have been somewhere close to present-day Ponte Vedra, north of St. Augustine. He claimed the "island" for Spain and named it La Florida, because it was the season of Pascua Florida ("Flowery Easter") and because much of the vegetation was in bloom. He then explored south along the coast, around the Florida Keys and north up the west coast of the peninsula, before returning to Puerto Rico.

It is likely that Ponce de León, like other conquistadors in the Americas, was looking primarily for gold, Indians to enslave, and land to govern under the Spanish crown. Accounts of the Ponce de Leon voyage describe interactions with the Ais Indians, the tribe occupying the Central East Coast of Florida at the time (Rouse 1951). Ponce de Leon attempted to land at the St. Lucie Inlet where he encountered the Surruque Ais (Davidson 2001). After Juan Ponce de León's journey, a series of increasingly ambitious Spanish expeditions led by Pánfilo de Narváez (1528), Vazquez de Allyon (1526), Hernando de Soto (1539-1540), and finally Tristán de Luna (1559) explored Florida and parts of the southeastern United States (Meide et. al 2010:19).

Figure 3.3 The New World as it first appeared on the Waldseemuller Map in 1507 (Lydecker et al. 2011).

3.2.2 First Spanish Period (CA. 1565-1763)

By the mid-sixteenth century, Spain emerged as a leading power with its foundation being in trade and plunder from the Americas. The neighboring country of France noticed this rapid rise and sought a thriving empire of its own by setting sail to this new land. On May 1, 1562, an expedition of French protestant Huguenots under Jean Ribault's command found and explored a large deepwater river in northeast Florida. Two years later, the French successfully established Fort Caroline on the River May, in north Florida, with three hundred settlers under the command of René Goulaine de Laudonnière, establishing a large French presence in Florida (Bennett 2001:19-20; de Bry and Meide 2014).

By this time King Philip of Spain had already felt an acute need to establish a coastal stronghold in the territory he claimed as *La Florida*. This time Spanish forces would attempt to settle the Atlantic rather than the Gulf coast of Florida. A military outpost on the Florida coast could suppress piracy along Spain's Gulf Stream shipping routes while at the same time serve as a base for staging rescue and salvage operations for the increasing number of ships cast away on Florida's dangerous shoals. Don Pedro Menéndez de Avilés was charged with the task of establishing a Spanish foothold on Florida's Atlantic coast, and completely eradicating the French enterprise (Lyon 1976). Menéndez' fleet arrived almost simultaneously with a French re-supply ship led by Ribault, setting the stage for a rapid and bloody encounter between the two colonial powers. Ribault's fleet aimed to strike first but was ravaged by a hurricane which wrecked his ships to the south towards Canaveral. The survivors were put to the sword by Menéndez, who by this time had sacked Fort Caroline and ensured the survival of what would be the first Spanish settlement attempt in the U.S. to persist to this day, St. Augustine (Lyon 1976; Gannon 1983; de Bry and Meide 2014).

After the founding of St. Augustine, Menéndez also explored the west coast of the Florida peninsula, guided by Hernando de Escalante Fontaneda. Fontaneda had, at the age of 13 in 1549, survived a shipwreck on the southwestern coast of Florida. A concerted effort to document the Canaveral area and the Ais groups living there came in 1605, when Spanish soldier Alvaro Mexia traveled through the region with the goal of making allies with the native groups against the Dutch, French, and English (Dubcofsky 2011:34).

During the 1600s and 1700s, the Spanish, French and English continued to fight over territory and religion in Florida. The English, established in South Carolina by 1670 and thereafter in Georgia, attempted to push southward while the French moved eastward along the Gulf Coast from the Mississippi River valley. The Spanish would strengthen their hold in the Gulf with the founding of Pensacola and its fortifications beginning in 1698 but it remained tenuous, as evidenced by the inability of Spain to defend the Apalache mission system which was abandoned when attacked by Governor Moore from South Carolina in 1704 (Hann 1988:264-317). Forts and missions were established throughout La Florida extending in all directions with St. Augustine being the epicenter. (Hann 1988:326-327). However, the Ais's territory near Canaveral is conspicuously void of both forts and missions. The Ais Indians maintained control of the Cape Canaveral area throughout the First Spanish Period, their populations fluctuating throughout the decades.

At the close of the Seven Years War in 1763, in accordance with the Treaty of Paris, Spain ceded her Florida territory to the British and withdrew her garrisons from these remaining outposts along the Gulf of Mexico (Florida Department of State 2020a).

3.2.3 British Period (CA. 1763-1783)

Between 1754 and 1763, war ensued between the major powers of Europe, with the New World colonies of those powers serving as the predominant theaters for the war. The Seven Years' War, also called the French and Indian War in North America, concluded with Great Britain defeating the allied French and Spanish. Peace was signed with the 1763 Treaty of Paris, in which Great Britain gained control of significant land in the New World, including Florida. This transfer of power heralded a shift in the population of Florida, with many Spanish and allied native residents departing and being replaced by British colonists. Britain divided her new territory into two colonies, West Florida with its capital at Pensacola, and East Florida with its capital at St. Augustine (Schafer 2001).

Initially, the British viewed the Floridas as backwater colonies neither self-sufficient nor export-producing. Dismissive of Spanish colonial management, British authorities set out to transform their new possessions into profitable colonies. As successful as this effort was in the regions around St. Augustine and Pensacola, the British made little economic impact at the southern end of the peninsula.

During this time, the Creek Indian tribes of the Carolinas, Georgia and Alabama began to migrate to the Florida peninsula filling the void left when the Spanish were evacuated from Florida to Cuba. The departing Spanish had taken with them most of the original tribes native to La Florida. There is little information in the historical record from those who remained after the Spanish succession. The Creek peoples in Florida would eventually become known as Seminoles and Miccosukee.

The British would make notable efforts to map the region, and one result of this was the Anglicization of place names in the area. One government surveyor, Bernard Romans, conducted extensive surveys of the central and western areas of the peninsula between 1769 and 1772, producing detailed maps (Romans 1999[1775]:88, 338) (**Figure 3.4**).

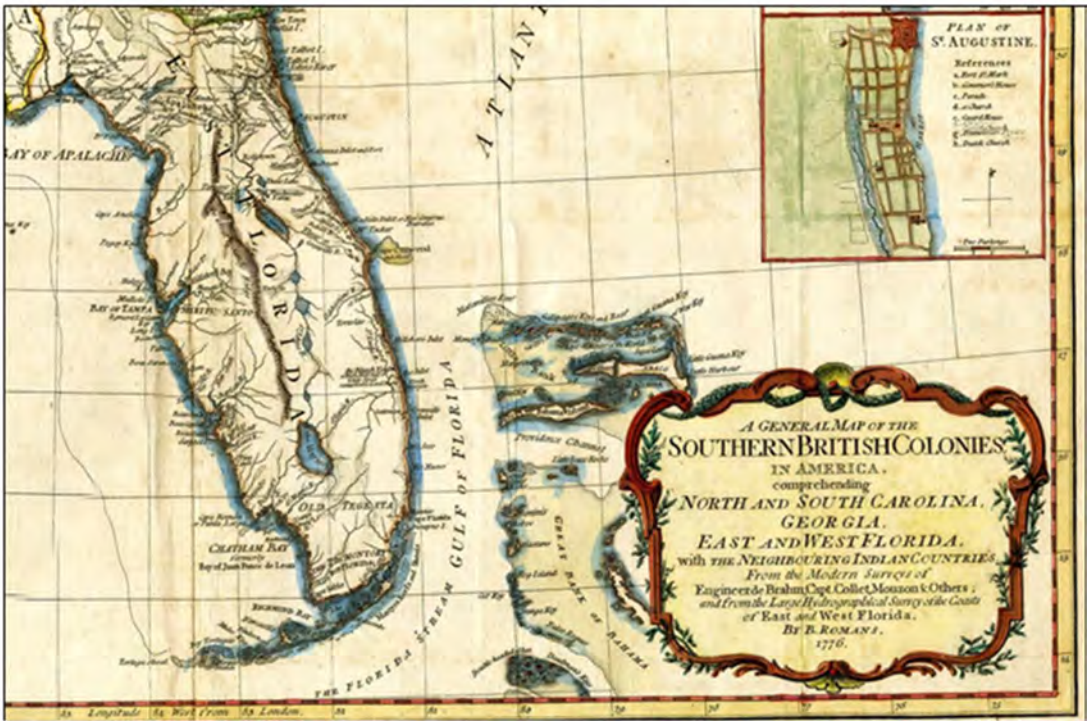

Figure 3.4 Bernard Romans' General Map of the Southern British Colonies (1776) (Note the peninsula labeled as Cape Canaveral on the eastern coast).

British rulers promoted population growth in East Florida with large land grants. The largest British plantation to the project area was granted to Dr. Andrew Turnbull, a Scottish physician. Dr. Turnbull, with a grant of 60,000 acres and over 1,200 colonists from the Mediterranean region, attempted to establish an agricultural colony in 1768 at New Smyrna, at the north end of the Indian River above Cape Canaveral. The colony produced indigo, sugarcane, hemp and rum, but was ultimately unsustainable. Fleeing disease, overwork, and a lack of food, the roughly 600 remaining colonists abandoned New Smyrna for St. Augustine by 1777 (Tebeau 1971).

Realizing that citizens from the British Isles might have difficulty with the heat and humidity in Florida, Turnbull resolved to use Greeks, who were accustomed to such conditions and knew how to cultivate olives, cotton, madder, and tobacco, as settlers. He had experience with the Greeks as his wife was Greek. He received large grants of land near the Ponce de Leon Inlet (near present day Daytona). His plans called for 500 Greek settlers to cultivate crops that would thrive in the Florida climate. He called his colony New Smyrna after the birthplace of his wife.

Turnbull recruited 1,403 colonists from the Mediterranean region, which included Greeks, Italians, and Minorcans to establish an agricultural town in New Smyrna, at the north end of the Indian River above Cape Canaveral. The group ran into problems almost immediately. A ship carrying supplies wrecked before it reached the colony. A total of 148 settlers died during the voyage from Minorca to New Smyrna. When the colonists finally reached their destination, they were met by mangrove swamps. The land had not been cleared, and food was inaccessible. The swamps had to be cleared and shelters built for the colonists. Although there was an abundance of food in the area the colonists were not allowed the time to gather, hunt, or fish. These conditions led to a minor revolt by about 300

colonists. They rioted, seized a ship, and sailed south. A British frigate captured the escapees and brought them to St. Augustine. Two of the rebels were executed and the rest were returned to New Smyrna. Life at the colony continued to be difficult. The work was hard, food continued to be scarce, and malaria was rampant. In the first year of its existence an additional 450 colonists died (Tebeau 1971).

The colonists who were deemed not to be working to their capacity were beaten, confined in stocks, or chained to heavy iron balls. Some were chained to logs in the fields to continue their work. Turnbull used his overseers to enforce his judgements, and often they exceeded their master in severity. Despite this, New Smyrna was the most profitable indigo plantation in North America.

All the colonists had signed letters of indenture with Turnbull. They would work for a set number of years. At the end of that time, they would be released from the indenture and Turnbull would give them a small plot of land of their own. The more skilled such as blacksmiths and carpenters had shorter terms of indenture. As the terms of indenture ended for the more skilled of the colonists, they approached Turnbull for their discharge and land. Invariably they were imprisoned and forced to sign new indentures. Eventually the colonists were afraid to ask for their discharge.

In 1777, a group of Englishmen from St. Augustine came to New Smyrna to examine the colony. A young boy overheard these gentlemen say that if the colonists knew their rights, they would not suffer the slavery in which they found themselves. The boy told his mother, who discussed the matter with other colonists. They decided to see what they could do. On March 25, 1777 three of the men got permission to go to the coast to hunt for turtles. They were granted permission and went to the coast, but they turned north and went to St. Augustine where they sought an audience with Governor Tonyn asking for justice as their terms of indenture had expired. Governor Tonyn promised to protect their rights. Several factors came into play; the conditions at New Smyrna, the need for men to protect Florida because of the outbreak of the American Revolution, and antagonism between Tonyn and Turnbull, led Governor Tonyn to liberate the New Smyrna colonists. During May and June of 1777 most of the colonists migrated to St. Augustine and by July 17, 1777 Turnbull's attorneys had set all the colonists free. In its ten years of existence 964 colonists died at New Smyrna (Ancestry n.d.).

A map surveyed by William de Brahm and drawn by John and Samuel Lewis depicts several smaller land grants between the project area and New Smyrna. These grants of between 10,000 and 20,000 ac, were likely given to the grantees but never occupied. The grantees include Thomas Bradshaw, with 10,000 ac on the west bank of the Indian River, and Samuel Barrington, Captain John Jervis, William Henry Ricketts, and Colonel William Faucitt, each with 20,000 acres (Lewis and Lewis 1769). Bradshaw’s grant was the closest to the project area, at a distance of 26.3 km.

Further north, in the vicinity of the present Haulover Canal, two grantees developed their grants into plantations. Robert Bissett received a 300-ac grant in 1768, which he named Mount Plenty. The grant wasn’t settled until 1777 and was only inhabited and worked for two years before it was raided by a “Spanish privateer” and abandoned shortly after. The plantation was reported to include a dwelling, a storehouse, a kitchen building, a hen house, and a stable. Bissett also claimed to have enough houses to accommodate 70 slaves. “He claimed to have built three sets

of indigo vats and cleared 143 acres" (Parker 2008:30). Bisset's claims made to the British government in hopes to receive compensation for losses suffered by virtue of evacuating the Floridas when Great Britain agreed to cede the Floridas back to Spain at the end of the American Revolution (Siebert 1929).

The second grantee of note in this area was William Elliot. Elliot's plantation was located "a few miles south of the Bissett grant" (Parker 2008:30) and was developed into the first sugar plantation in British Florida. It was, at the time, the "southernmost plantation along the Atlantic coast during the British occupation of Florida" (Parker 2008:30). Elliot hired John Ross, a native of Scotland to travel to Florida and "select and settle tracts of land in Florida." Ross selected a tract on the Halifax River approximately 85 miles south of St. Augustine. The land was called Stobs in honor of the Elliot family land in Great Britain. Elliot also ordered Ross to "purchase enslaved Africans in Georgia for his labor force" (Parker 2008:31). The slaves were to begin by constructing their lodging prior to clearing the land for "provision crops and indigo" (Parker 2008:31). These tasks were completed by the end of 1768. "Five years later, the Kings Road would be completed between St. Augustine and its southern terminus: Stobbs Farm" (Parker 2008:31). Following limited success with indigo, Ross began draining the wetlands at the plantation for the creation of sugar fields, and possibly rice fields. He also created a canal network to irrigate the indigo fields. In 1771, Ross constructed "'a complete sugar works: one large mill house, one boiling and curing house and twenty-eight Negro houses'" on a previously undeveloped 1,200 ac tract that abutted the western edge of Stobbs and extended to the marshes of the Indian River (Parker 2008:31). This would become the first sugar works in East Florida and the oldest standing sugar processing facility. The plantation was moderately successful throughout the 1770s and produced both sugar and rum for export back to England. As with Bissett's plantation, production ended with the raid of the "Spanish privateer in November 1779 (Parker 2008:31).

Ruins of the plantation, located just beyond the boundary of the Merritt Island National Wildlife Refuge, have been recorded as site 8Vo160. Excavations conducted in 2008 also recorded the Elliot Plantation Complex (8VO9407), a multi-component archaeological site that includes nine separate sites consisting of the remains of the sugar mill (8VO160, Ross Hammock Midden (8VO130), Ross Hammock Indian Mounds (8Vo131), a salt evaporating plant (8VO213), sugar factory village (8VO9403), sugar factory canals (8VO9404), Ross Hammock canals (8VO9405), and Plantation Road (8VO9406). Three of the sites (8VO130, 131, and 213) are contained in a multiple National Register listing (8VO2569).

East Florida played a very small role in the American Revolution with the colony still so dependent on oversight and supplies from Great Britain. The last naval battle of the war took place off the coast of Cape Canaveral more than one month following the official end to the conflict.

3.2.4 Second Spanish Period (CA. 1783-1821)

The 1783 Treaty of Paris marked the end of the Revolutionary War and the beginning of the Second Spanish Period in Florida history, with the colony serving as a reward for Spanish efforts in aid of the United States. British loyalists, many of whom recently moved to Florida to escape revolution fervor in other British colonies, now had to leave again. The Spanish government attempted to populate their recovered territory the same way the English had, through land grants, but they could not keep up with the influx of American settlers moving south. During this

period, Spanish leadership had some difficulty unifying and exercising control over the diverse groups then living in Florida: Spanish moving back in from other parts of the empire, Americans, Minorcans remaining from the British period, free blacks, and Seminole and Creek Indians, many of whom preferred the trading relationships they had developed with the British (Tebeau 1971).

The new Spanish governor in St. Augustine, Vicente Manuel de Zéspedes y Velasco, wrote that in 1785 Florida "was a province that has just died for England and is in the process of being reborn for Spain" (Lockey and Caughey 1949:728). After overseeing the evacuation of British subjects over an 18-month period (those who decided to leave and forfeit their property rather than stay and swear loyalty to Spain), Zéspedes' priority was to make Florida a secure, stable, and prosperous settlement. Florida was once again under Spanish control. However, Spain chose to keep the English divisions of the territory in place, leaving the state split into East and West provinces (Tanner 1989; Cusick 2000:173).

In many ways, the Florida colonies were once again a series of military outposts on the fringe of Spain's New World Empire. Numerous late 18th-century accounts make note of the military and backwater nature of East Florida's provincial capital, typified by this 1785 description: "All are either in service of the garrison, or live on a small liquor trade or other mercantile business of little consequence" (Lockey and Caughey 1949:481). This early characterization was no doubt to some degree the result of the massive population loss that occurred when the multitude of British subjects left the Floridas for the Bahamas or other British colonies (Poitrineau 1988).

To counter this population and economic loss, the Spanish government enacted a series of policies designed to encourage immigration and settlement of uninhabited areas. Tax exemptions, land grants, and subsidies were used to entice Catholic immigrants, and non-Catholics were for the first time allowed to own land. Many *Floridanos* (persons born in Florida under the first Spanish regime) returned from Cuba to either set up new plantation or acquire lands previously held by the British (Landers 2000a:121). Some new immigrants including the wealthy *Floridano* Francisco Xavier Sánchez, maintained large ranches with herds of cattle (Landers 2000b; Parker 2000). Other settlers who arrived as indentured servants were upwardly integrated into the new Spanish society, most notably St. Augustine's substantial Minorcan community, who became landowners by investing in farming, fishing, business, and maritime commerce (Griffin 1991; Cusick 1993).

While the slave-based plantation economy was now firmly entrenched in Florida, Spanish authorities until 1790 continued to honor the 17th-century amnesty for runaways from adjacent territories willing to convert to Catholicism. The first to make the transition from slave to free subjects were the Africans brought by British loyalists during the Revolution, who subsequently escaped. Some 250 of these maroons were granted freedom, forming the nucleus of Florida's free black community in the Second Spanish Period. Among them were "skilled carpenters and masons, hostlers, hunters and fishermen, sailors and soldiers, ranch foremen, butchers, shoemakers and tanners, and field hands" (Landers 2000a:122). Florida's planters, laborers, merchants, hunters, and mariners formed a diverse community during the Second Spanish Period, and included Anglo-Americans, Creek or Seminole Indians, Minorcans, Greeks, Italians, Canary Islanders, African Americans, and, after 1800, French, Irish, Scottish,

and Americans (Griffin 1983; Cusick 2000:179). Many U.S. citizens took advantage of the situation, pledging oaths of loyalty in order to gain fertile lands in Florida.

Both East and West Florida struggled to become the populated economic centers that the Spanish authorities intended. West Florida settlers enjoyed only limited success with staple crops and exports of tobacco, lumber, indigo, and cotton. One of the most important commodities in West Florida became deerskins. This trade, monopolized by the Panton, Leslie, and Forbes Company, provided various finished goods to the Creek Indians in exchange for the skins from the white-tailed deer, which were highly valued in the overseas market (Meide et al. 2010). Traders provided guns, knives, needles, cloth, liquor, cookware, and other manufactured goods in return for a seemingly endless supply of dressed deer pelts. Although lucrative for the company, this did not result in prosperity for the Floridas as a whole. Most of the Panton, Leslie, and Forbes employees lived as resident traders inside Indian villages and operated under the careful watch of Creek leaders.

Following the 1807 halt of slave importation to the United States, Florida became an unregulated epicenter for illegal trade. The first significant European incursions into modern-day Brevard County occurred during this time, with the Reyes Grant plantation (1804-1835) located on 1,000 acres at the north end of the Indian River and the Delespine Grant of 1817 including 40,000 acres around the Titusville area (45 SW 2020). An 1834 map by Henry Schenck Tanner and an 1845 map by Joseph Meyer (1845) illustrate Mosquito County, marking Delespines Grant inland from Cape Canaveral and Flemings Grant further south, both on the Indian River (**Figures 3.5** and **3.6**).

The United States increased pressure to acquire Florida during this period in several ways and for several reasons. Tensions were growing between American settlers and Seminole Indians along the northern border of the Florida territory. Spain became an ally with Great Britain against France in the Napoleonic Wars, and the fear was that Britain would use Florida to launch attacks against the United States. Slave owners in the southern states disliked having free blacks who owned guns living so close to home. The use of the port at Fernandina for smuggling goods and slaves into the United States was becoming a large problem for trade oversight (45 SW 2020; Tebeau 1971). Gaps in Spanish control of Florida became increasingly apparent through the Patriot War (1812-1814) and the War of 1812.

Following the War of 1812 between the United States and Britain, and the related Creek War (1813-1814) between the U.S. and Creek Indians in Alabama, armed parties of American slave owners began to cross the border into Spanish Florida in search of their runaway African American slaves. These maroons often joined with Creek or Seminole tribes in Spanish Florida, many of whom had fought against the U.S. during the Creek War and became known as Black Seminoles. Armed by British traders, the Seminoles and Black Seminoles continued to commit raids across the American side of the border. The cross-border raids by both sides became increasingly bold, and the United States Army under the command of General Andrew Jackson invaded Spanish Florida on multiple occasions between 1817 and 1818 to fight against the Seminole and their African American allies. Collectively, these battles came to be known as the First Seminole War (1816-1819). With the widespread burning of Creek towns and the capture and occupation of the Spanish Fort San Marcos, and later Fort Barrancas at Pensacola, it became increasingly obvious to Spanish authorities that they could not effectively defend their territories against

American incursion. To make the best out of an inevitable outcome, Spain entered negotiations with the U.S. and by 1819 had tentatively agreed to transfer Florida to the United States under the terms of the Adams-Onís Treaty. The treaty was ratified in 1821, and Florida was surrendered to the jurisdiction of the United States (United States Department of State 2020).

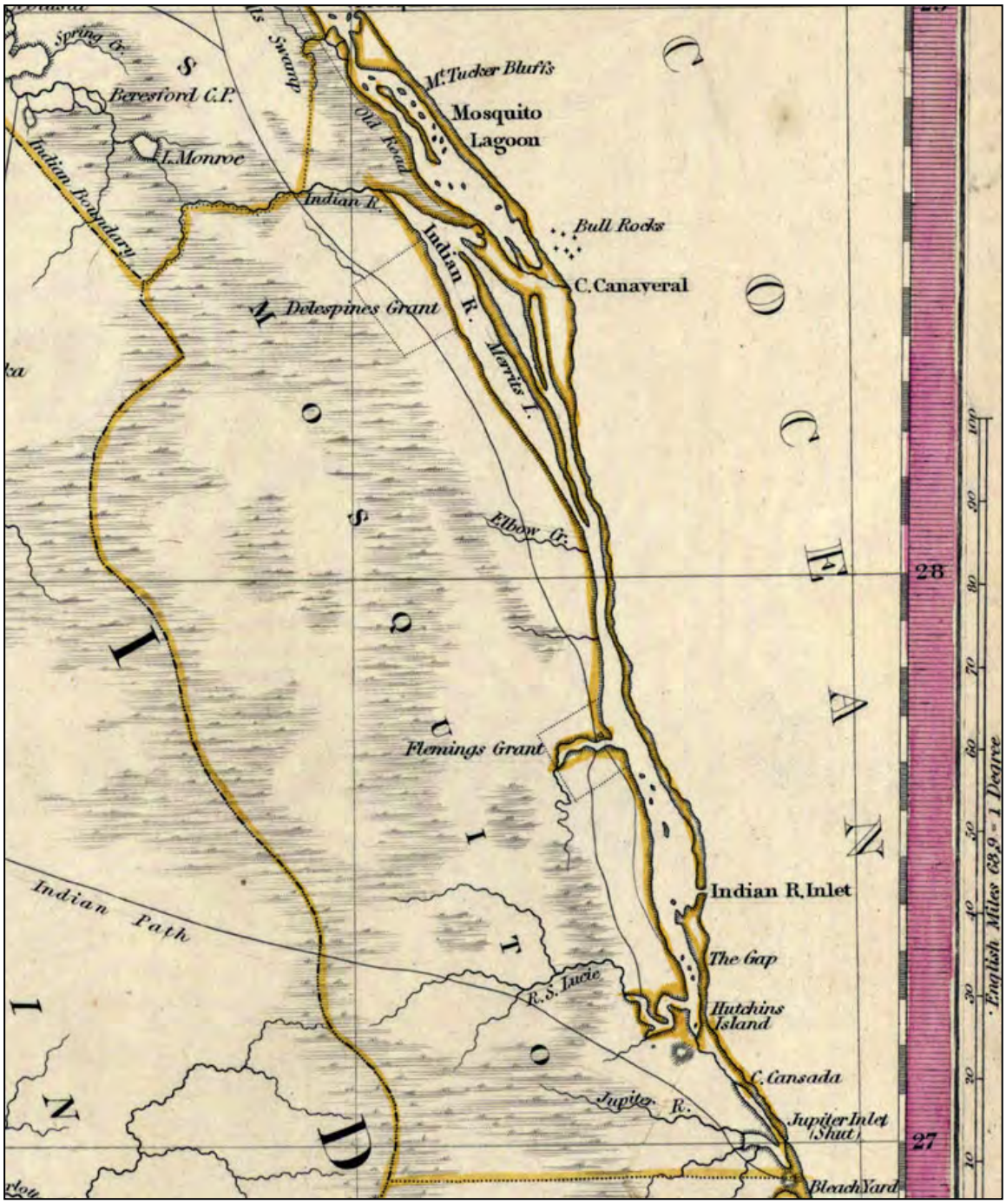

Figure 3.5 1834 Map by Henry Schenck Tanner showing Delespine Grant and Flemings Grant (Map courtesy of the University of South Florida, Special Collections Department).

Figure 3.6 1845 Map by Joseph Meyer showing Delespine Grant and Flemings Grant (Map courtesy of the University of South Florida, Special Collections Department).

3.2.5 American Acquisition, and Settlement (CA. 1819 -1845)

Responsibility for establishing Florida's new government was given to Andrew Jackson. Within weeks, he had divided Florida into two counties. The area previously called West Florida became Escambia County, and the former East Florida became St. Johns County. Jackson established county courts and mayors in the former colonial capitals of St. Augustine and Pensacola and were joined with a new capital established at Tallahassee, a location halfway between St. Augustine and Pensacola. Job done, he appointed William Pope DuVal his successor as Florida's governor. Florida became an official territory of the United States on March 30, 1822 (Florida Department of State 2020b; United States Department of State 2020). New county divisions were created across the territory, and in coming decades, the Merritt Island area would go through several county designation changes (St. Johns, Mosquito, Orange, Volusia, and finally Brevard).

Florida's population grew quickly during this period, ballooning from under 8,000 in 1821 to 34,530 by the 1830s. Cotton, lumber, and the naval stores industry emerged as important economic forces in the territory, joining citrus, fishing, and other colonial period agricultural products (Gannon 2003).

Florida joined the Union as the 27th state in 1845, becoming a slave state balanced by the admission of Iowa as a free state. In the years between achieving statehood and joining the Civil War, significant energy in Florida was focused on economic and social development. Large numbers of schools, churches, and newspapers were established and formalized in new and growing cities, and the population of the state doubled between 1845 and 1860, with nearly half of that population being slaves (Gannon 2003).

3.2.6 The Second and Third Seminole Wars (CA. 1835-1865)

Around 5,000 Seminoles were living in Florida when it became a U.S. territory in 1821. The explicit position of the government was that these Indians should be removed to make way for anticipated waves of white settlers into the new territory. Sharing this motivation were politically powerful slave owners who wanted to eliminate the refuge for runaway slaves that the Seminoles provided. The first step was to confine the Seminoles to a 4,000,000-acre reservation taking up much of the central portion of Florida, south of present-day Ocala. This was accomplished through the Treaty of Moultrie Creek in 1823, though not all Seminoles complied, as the reservation did not suit the tribes' needs or their accustomed means of subsistence by the sea. Once vacated by the Seminoles, Tallahassee became the new territorial capital (Florida Center for Instructional Technology 2002).

In 1829, Andrew Jackson became President of the United States and pressed to have the Indian Removal Act passed by Congress, which would open the entire eastern U.S. for settlement by Americans and Europeans. It became law in 1830, mandating the forced migration of the Seminoles from Florida to Indian Territory in present-day Oklahoma. Its implementation would lead to the Second Seminole War in 1835 (Mahon 1967). One of the most vocal opponents to Indian Removal policy and a warrior leader of the resistance was Osceola. He plotted the attack known as Dade Battle near Bushnell, which made clear that war was the only means to force the Seminoles from Florida (Florida State Parks 2020).

The war devastated much of Florida, gathering national attention as plantations were burned to the ground amid devastating raids and slave revolts. In February 1836, a Baltimore newspaper lamented that "the whole of the country, south of St. Augustine, has been laid waste during the past week, and not a building of any value left standing. There is not a single house now remaining between this city and Cape Florida, a distance of 250 miles... [A]ll, all, have been burnt to the ground" (Niles Weekly Register 1836). In Mosquito County, which includes present day Brevard County, the area was "sparsely populated with mostly sugar plantations along the rivers near the coast. Seminoles ransacked or burned 16 of these plantations on the northern Mosquito Lagoon by January 1836" (Eriksen 1994:36).

Several forts were constructed in Eastern Florida in support of the war. These included Fort Ann, Fort Pierce, Fort Taylor, Fort Christmas, and Fort Bassinger. Fort Ann was constructed in December 1837 at the haulover on the Indian River side of the crossing. "The intent was to erect a fortified depot that would serve as a place to supply troops continuing down the Indian River" (KSC ICEMP 2014:9-28). At the time of its completion, 900 troops were

in place at the haulover. The fort was abandoned in 1838 but used again as a Union camp during the Civil War and as a station for the U.S. Schooner Beauregard to prevent trafficking on the inland waterway.

Devastation from the war, along with a postwar hurricane in 1848, caused many people to refrain from building homes or businesses outside the fort (McKay 1924). It was not until after the Civil War that the area saw significant growth again.

As regular army troops and state militias were mobilized and sent into action, the Seminoles were slowly forced to the south, seeking refuge in the swampy wilderness. Several pitched battles were fought in the Everglades region, most notably the Battle of Lake Okeechobee on Christmas Day 1837.

With most of its remaining Seminole inhabitants, perhaps 300-400, restricted to a 2,500,000-acre hunting and farming reserve in southwest Florida, the territory saw the passage by U.S. Congress of the Armed Occupation Act. Designed to stimulate white immigration and pressure the remaining Seminoles to leave the territory, the law provided men willing to settle on the Florida frontier 160 acres of land. Most of those taking the proffered lands engaged in agriculture, such as Robert Gamble who settled on the Manatee River in 1844 to grow sugar cane, and whose holdings eventually grew to 3,500 acres (Schene 1981:69-76). Thereafter economic development progressed rapidly in Florida. The population passed 54,000 by 1840, and soon after the war, on March 3, 1845, Florida's legislature applied for and was granted entry into the U.S. as the nation's 27th state. Over the next 15 years, St. Augustine was eclipsed by rapid economic growth in the Gulf Coast, particularly Apalachicola and St. Marks. Devastated by the Seminole War, many of the plantations around St. Augustine would never recover. Complicating the recovery were property claims from the Second Spanish Period while middle Florida (with equally rich agricultural land) benefited from a good infrastructure and readily available land.

With the increase in population, tensions inevitably grew amidst reports of "Indian Rebellions" in South Central Florida. Indian territories continued to be encroached upon and the almost inevitable Third Seminole War broke out in 1855. Also known as the Billy Bowlegs War, this conflict saw Indian troops pushed even further south, and eventually another 200 Indians surrendered and were removed to Oklahoma. Despite the defeat, a small group persisted in the swamps of south Florida, in land impassable for federal troops. The descendants of these unconquered warriors are the modern Seminoles and Miccosukee (Clement 2020).

Haulover Canal

The Haulover Canal is located at a narrow spot of Merritt Island that was used as a boat "Haul over" as early as the 1600s. Boats were moved overland from the Mosquito Lagoon to the Indian River using rollers and skids. The difficulty of this process caused residents and businessmen to discuss a canal and although recommendations for a canal were made as early as 1824, an appropriation was not passed until 1844 and the canal was completed in 1854. The canal was excavated by slave labor provided by a local citrus grower and measured 1/3 mile in length, 10-12 ft in width and 3 ft deep and allowed shallow draft vessels to cross from Mosquito Lagoon into the Indian River (Foster 2013b:18). "Within 15 years, the canal proved to be inadequate because of the shoals that accumulated at each end and the strong current. It was so narrow and shallow in places that only small boats could navigate it. Waters of the Indian River were usually two or 3 feet higher than the lagoon, with a strong current thus making it

difficult for vessels trying to move against it, some slumping occurred, and bigger boats had to be pulled through or 'hauled over' on rollers" (Foster 2013b:18). By the 1880s the canal was in disrepair and had shrunk to a length of 1,000 ft, width of 12 ft and a depth of only 18 inches. The Florida Coast Line Canal & Transportation Company attempted to improve the canal through dredging, beginning in 1885. They first had to clear enough area to accommodate the dredges and brought in Italian laborers for this purpose. The dredging project was unsuccessful, and portions of the canal were impassable within two months (Parker 2008:49). In 1888, the Old Haulover Canal was replaced by a new canal at Allenhurst, today's New Haulover Canal on the Atlantic Intracoastal Waterway (Parker 2008:49).

3.2.7 The Civil War, Reconstruction, and the Late Nineteenth Century (CA. 1865-1899)

Florida joined other Southern states in seceding from the Union on January 10, 1861. Union forces in Florida quickly focused on controlling the coast, taking many of the port towns, while Confederate forces sought to maintain control of the agricultural and cattle-producing interior of the state to supply food to its troops. The Cape Canaveral Lighthouse lamp was dismantled and removed by the Confederacy during the war to prevent benefit to Union naval forces. In addition, cattle, salt (for curing meat), and citrus (for medical treatment) produced in the Cape Canaveral area were important to the war effort (45 SW 2020).

While most Floridians were loyal to the Confederacy, the Union Navy largely controlled the seas. During the war, the interior of Florida remained firmly Confederate while Union forces occupied and controlled the coast. The Union took Fernandina and St. Augustine on the east coast, Tampa, Charlotte Harbor, Cedar Key and Pensacola on the west coast, Ft. Myers on the southwest coast, and held Key West for the duration of the war.

During the Civil War, the Union Navy patrolled the Florida coastline but for the most part left the interior alone. Confederate soldiers in Florida served in the "cow cavalry," so named because their main duty was to round up cows. Tens of thousands of cattle roamed the central region of the Florida peninsula in Kissimmee Valley. Confederate army patrols gathered these cattle and drove them north into the heart of the Confederate States to provide troop provisions (FCIT 2009). After the war, soldiers who fought not only in the Civil War but the Second and Third Seminole Wars (and had first-hand knowledge of the southern frontier) remained in the region to settle.

While Florida did not see the major battles and extensive destruction of the Civil War experienced by other southern states, it did undergo many of the same changes as roughly 15,000 troops went off to fight, many of whom did not return unscathed, if at all, and the economic system of slavery responsible for much of the state's success to that point was abolished. As in the rest of the South, Reconstruction and the final decades of the nineteenth century in Florida would be marred by pervasive racial prejudice. But unlike its neighbors, Florida had few physical scars from the Civil War and adopted a laissez-faire approach to governance, and as a result it experienced significant economic growth and financial investment before the turn of the century (Gannon 2003).

Railroads were a major catalyst for and manifestation of this boom time in Florida. The state held 550 miles of railroad in 1881, and in just twenty years that number grew to 3,500 miles (Gannon 2003). William D. Chipley constructed a rail line that connected the Florida Panhandle with the East Coast, Henry B. Plant linked the Atlantic and Gulf Coasts with a line between Jacksonville and Tampa, and Henry Flagler created the Florida East Coast

Railroad, which ran the full length of Florida to Key West. With the railroads came easily transported building materials, development in previously impenetrable parts of the state, and scores of people seeking land, employment, and recreation.

3.2.8 Twentieth Century (CA. 1900-1999)

The boom of the late 1800s continued into the early 1900s, through hurricanes, citrus crop freezes, yellow fever, and influenza epidemics. Resort hotels anchored railroad hubs, and development promoting the tropical attractions and health benefits of Florida's climate drew tourists and seasonal residents in droves. A new economic force in Florida emerged with the advent of Prohibition in 1919. Florida's extensive and still largely undeveloped coastline, coupled with its proximity to rum distilleries in Cuba and the Bahamas, made it ripe for importing and transporting illegal liquor. A land boom took Florida by storm in the late 1910s, and by the Roaring '20s had grown into a "land delirium" (Gannon 2003).

By 1925, ambitious construction of splendidly furnished mansions and vast neighborhoods of stucco, Mediterranean-style homes gave way to the selling and reselling of vacant, unimproved lots, tied to dreams of future development that were only drawn in brochures. A dramatic bust to end the land boom came in September of 1926, when a devastating hurricane slammed into Miami. A fruit fly infestation crippled the citrus crop in early 1929, making the stock market crash the final nail in a coffin that was already shut. The Great Depression found Florida's economy in ruins.

Floridians found hope and improvement again in FDR's New Deal programs, which acted in the state predominantly through the Civilian Conservation Corps (CCC), the Public Works Administration (PWA), the Federal Emergency Relief Administration (FERA), and the Works Progress Administration (WPA), from 1933 to 1942. New industry came to the area in the form of paper mills, phosphate mining, mechanized factories for cigar making, fruit packing and canning, and sugar refining. Tourism began to pick up again, and by the start of World War II, Florida had new life.

3.2.9 History of Merritt Island and Kennedy Space Center

3.2.9.1 Merritt Island

One of the first settlers on Merritt Island was Douglas Dummitt, who moved to the area in the 1820s from Tomoka where he was the Postmaster and a sugar cane farmer. He began growing oranges on a "narrow stirp of high land with abundantly rich soil near the 'Haulover'" (Foster 2014a:18). Dummitt was the first to "bud" sweet orange trees onto the native sour-orange trees to create a hardier orange tree. "Because the bud union was at least 3 feet off the ground and the trees were budded and not seedlings, the Dummitt trees survived the devastating freeze of 1835, thus establishing the famous Indian River Groves (Foster 2014a:19). Following the Second Seminole War, Dummitt transplanted his crop to Dummitt Grove and by 1859 was harvesting 60,000 oranges per year. "By 1869, his grove was referred to as the largest in Florida, with more than 1,300 bearing trees that produces over 70,000 oranges (Foster 2014a:21). Dummitt contributed to the growth of citrus farming by selling budwood to other growers to start new groves. He died "at his orange grove" in 1873 (FWS 2015; see also Kanaski 2015).

Another early settler of Brevard County was Captain Miles O. Burnham, the first lighthouse keeper on Cape Canaveral. The population of the county grew slowly, the 1850 census recorded a population of 139. Settlers formed communities on the east coast near rivers and the first settlement of any size occurred in 1856 when 30-40 families formed the community of Canaveral, where Cape Canaveral is today. Settlement did not increase until regular steamer service began on the Indian River in the 1880s (Huckle et al. 1974:2).

Merritt Island, while never heavily populated, was home to several small communities of citrus farmers and fishermen, especially along the Haulover Canal. "As recently as 1962, there were approximately 17 towns, settlements, and hamlets scattered across North Merritt Island and Canaveral, comprised of a reported 400 people, mostly farmers and citrus growers (Foster 2013a:20). The northernmost of these towns was Shiloh, located on the north end of Merritt Island and the southern end of Volusia County, at one time the county line ran through the center of town. The town was founded in the early 1880s by George Kuhl, who owned and operated the town store, named the town, and established the post office in 1885. The town eventually became a trade center for the Indian River area (Foster 2015a:18-30).

Clifton was located just south of Shiloh near the Haulover Canal. "The area around the canal was referred to as 'the Haulover' and was renamed Clifton in 1889" (Foster 2015b:21). It was populated primarily by citrus growers. This small town was the home of the Clifton Colored School, constructed for the children of two African American families, the Campbells and the Jacksons. The school was constructed in 1890 and 1891. The school operated for approximately 10 years, until the Campbell and Jackson children "were of the age to be out of school" (Foster 2016a:20-27). Foster reports that Clifton did not have electricity until 1928, however, Penders (2008:48) states that Clifton "no longer existed after 1928 and Eugenia Campbell supposedly returned to live in the building in 1924." The building ruins were overlooked by the US government when the area was purchased what would become the Kennedy Space Center. The schoolhouse was dismantled in 2004 by the North Brevard Heritage Foundation and moved to Titusville.

The town of Allenhurst was founded in 1888 when the New Haulover Canal was opened. It "boasted" a hotel, fishing camp and marina, and several homes (Foster 2016b:17). The Allenhurst Fishing Camp and Marina "offered 500 feet of free dock, free water, homemade bread, staple and fancy groceries at city prices, and launch supplies" (Foster 2016b:17). Allenhurst had a hotel, opened in 1913, "was visited by many dignitaries from all over the world" (Foster 2016b:17). The Indian River Company owned and operated the Fishing Camp and Marina and hotel and advertised throughout the eastern half of the United States.

Orsino, located within the current project area, was named for its first postmaster, Orsino Smith. The town had a school, post office, service station, grocery store, and several homes. "The Howes were a prominent family who had aspirations of making their community a modern city with all the latest conveniences—electricity, telephone and telegraphs. Stock was sold in the Orsino Telephone, Telegraph & Power Company in 1925, Walter H. Howe President" (Foster 2016b:27).

Courtenay, located just south of Orsino, was settled in the late nineteenth century, primarily through land granted by the 1860 Homestead Act. Courtenay resident Edward Porcher contributed to the success of the citrus industry

by founding the Indian River Orange Growers Association in 1891 and the Indian River and Lake Worth Pineapple Growers Association in 1895 (Foster 2017).

Indianola was a small rural community on central Merritt Island founded by the Field brothers of Macon Georgia in 1868. It was reportedly named for the Indian mounds in the area. Samuel Field opened the first post office in 1880 and the town became a shipping center for oranges, due to the narrow-gauge railway that "ran down the center of the dock which was used to transport heavy boxes of oranges from the packing houses to waiting boats (Foster 2017:30).

Several smaller, short-lived towns were also located on Merritt Island. Wilson, or Wilson's Corners, was located on north Merritt Island and "was known as one of the richest fishing grounds of this part of Florida" (Foster 2016b:23). The town, named for President Woodrow Wilson, was populated by fishermen, farmers, and fruit growers. Two trailer parks were constructed near Wilson in the late 1950s. Danenburg Trailer Park (with a convenience store), built by Coleridge Danenburg on his farm, and the Wallace Trailer Park, "just down the road." The construction of the trailer parks coincided with the beginning of the Space Center and helped to alleviate the housing shortage caused by the large influx of families employed there.

Other short-lived communities included Wisconsin Village, located approximately one mile south of Route 402, west of Wilson, which was populated by 10 families from Wisconsin. Mortonhurst, located south of Wilson, was established by George W. Morton and "faded away just prior to the turn of the century (Foster 2016b:25). Heath consisted of several homes located in the vicinity of the VAB, and Happy Creek, which consisted of the Happy Creek Hunting and Fishing Lodge, run by the Benecke family. The hunting and fishing lodge was created in the 1940s by a son of the original owners.

Hunting and Fishing Camps of Merritt Island

At the beginning of the twentieth century, following an increase in tourism as the railroad extended into the state, several hunting and fishing camps were established on Merritt Island and the surrounding area. These included the Indian River Haulover and Outing Club and the Canaveral Club. These were popularized by magazines such as Harper's New Monthly Magazine and pamphlets such as A Tourist and Hunter's Guide to Indian River Country, 1889-1890 and Dr. James A. Henshall's Camping and Cruising in Florida. Other camps included the Beacon 42 Fish Camp, which opened in 1939. The camp included 20 cottages, 40 boats, a 60-seat restaurant, an airstrip, and a hotel. Activities included duck hunting and fishing. The Beacon 42 Fish Camp advertised nationally in Fish and Stream and was featured in an article by Charles Elliott in Outdoor Life magazine (Foster 2016b).3.2.9.2 NASA and Kennedy Space Center

3.2.9.2 Kennedy Space Center

The National Aeronautics and Space Administration (NASA) was established on July 28, 1958, when President Dwight D. Eisenhower signed Public Law 85-568. Operations were initially centered at Official operations began on October 1st, but additional space was needed to support the Apollo Lunar Landing Program, prompting a search for a new space center. Merritt Island was chosen for the space center due to its proximity to Cape Canaveral and

the 9,000-mile tracking network of the Atlantic Missile Range. Other areas under consideration included sites in the Bahamas, White Sands Missile Range in New Mexico, Christmas Island in the south Pacific, Hawaii, Texas, and Georgia (Benson and Faherty 1978:5-4). Merritt Island Launch Area (MILA) was created in 1961. In 1963, the Launch Operations Center (LOC) and MILA were renamed the John F. Kennedy Space Center to honor the late President.

The first Master Plan for the Space Center was completed in September of 1961. This plan included locations for the early Saturn and Nova test rocket launch pads along the eastern shore of the island, a rail transfer system and canals to transport rocket stages, a vehicle assembly area, spacecraft checkout, and launch control areas. The Industrial Area "was placed near the town of Orsino to provide space for a wide variety of industrial and scientific support facilities such as the KSC Headquarters Building, cafeteria, hospital/dispensary, physical plant maintenance, vehicle maintenance, and spacecraft assembly and checkout buildings" (NASA 1972: n.p. in Price 2013a:22).

Once the planning was complete, the acquisition of land began on September 1, 1961, NASA requested appropriations for initial land purchases on Merritt Island. Once the site was chosen, NASA began to purchase what would become 88,000 acres of land on Merritt Island. The process of acquisition was handled by the US Army Corps of Engineers (USACE). In addition to coordinating the purchase of the land, the USACE was also integral in the design and construction of the space center's early buildings and infrastructure. "Whether through direct purchase or condemnation, NASA and the USACE acquired all of the Merritt Island property by 1964, including nearly 1,500 properties containing scattered homes, businesses, and citrus groves" (Benson and Faherty 1978:5-7, 5-11 in Price 2013b:22). Although many people were displaced by the acquisition "three-fourths of the owners were absentee, three-fifths lived outside of Florida" (Benson and Faherty 1978:5-7).

When MINWR was established, approximately 2,500 acres were managed as commercial citrus groves. Beekeepers were needed to support the citrus industry on the Refuge. Active grove operations declined after the 1990s and in 2008 all grove leases at KSC expired (KSC-PLN-1911, Revision G:245). Beekeepers are no longer active at KSC.

Three private burial grounds with 19 graves still exist on KSC and visitation is allowed. A Baptist church was relocated, a second church was purchased by NASA and converted into an office and laboratory. Summer homes along the Atlantic beachfront were purchased and converted into offices and storage (Harris 1970:6).

Construction of launch facilities and support facilities began in 1962. "In the 1962-1963 fiscal year, NASA spent $162 million on roads, utilities, launch pads, towers, propellant depots, cables, and communication systems" (Price 2013b:22). Construction of the Vehicle Assembly Building, located approximately five miles north of the APE, began on August 20, 1963. This building, the largest in the world at the time, was where the Saturn rockets were assembled before being transported to the launch pad. Construction of the Industrial Area, immediately east of the APE, began during this period as well. The major buildings in the Industrial Area were constructed between 1963 and 1966 (**Figure 3.7**) (Grinter 2007).

On August 28, 1963, the "Bureau of Sport Fisheries and Wildlife", later the United States Fish and Wildlife Service (FWS), entered into an interagency agreement with NASA to manage all lands within the KSC that are not currently

being used for NASA/KSC operations. These lands, known today as the Merritt Island National Wildlife Refuge, provide habitat for more than 1,500 species of plants and wildlife (FWS 2015).

Figure 3.7 Construction Activity in the Industrial Area ca. 1965 (from Grinter 2007).

3.2.9.3 Project Tract History

The property tract was purchased from the State of Florida by A.H. Jones in 1844 (FDEP 2023a). Between 1949 and 1951 a system of drainage canals was created on the property tract, and the property was used as an orange grove. Between 1961 and 1964 the property was purchased by NASA, though the beginning of Kennedy Space Center is not visible until the 1969 aerial. The 1976 USGS Orsino, FL topographic map shows the APE with rows of orange groves, as well as the 1994 aerial photograph. After 2003, the area is seen to become more overgrown in the Google Earth aerial imagery (**Figure 3.8**). In the 2005 aerial photograph, the area adjacent north to the APE is modified to build a retention pond and building, with some modification in the very northeastern portion of the APE (**Figure 3.9**). No major modifications within the APE are seen since orange grove operations ceased.

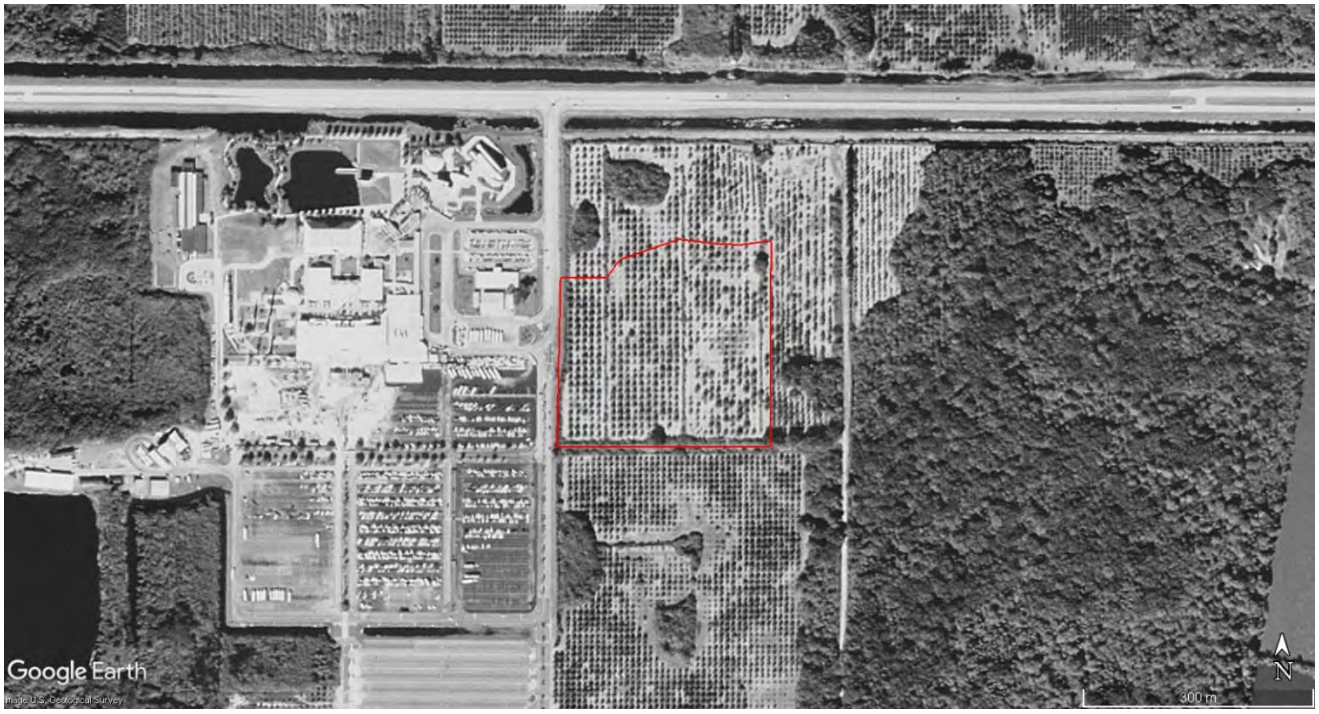

Figure 3.8 2004 Google Earth aerial photograph of the project area, with the APE in red.

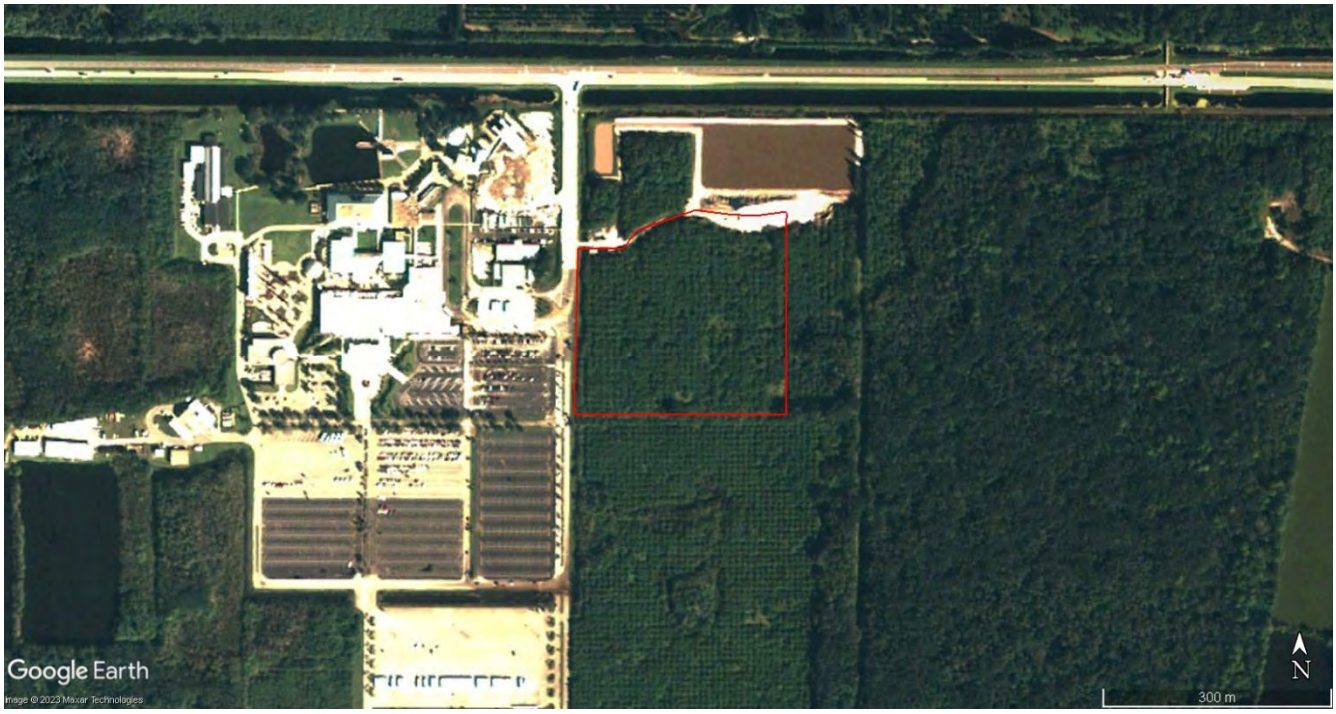

Figure 3.9 2005 Google Earth aerial photograph of project area, with APE in red.

4.0 RESEARCH DESIGN

The purpose of this investigation was to identify and document cultural resources within the project area and to assess their potential for listing in the NRHP based on their historical, archaeological, or architectural value. Project methods generally included the following tasks: 1) background research, 2) field survey, and 3) analysis and documentation.

4.1 Background Research

Archival research began with a search of the Florida Master Site File (FMSF) database maintained by the Division of Historic Research (DHR) of the Florida Department of State and a review of the material provided by the KSC Cultural Resources Manager (CRM). The records included in the FMSF provide relevant data regarding previous surveys, recorded archaeological sites, cemeteries, bridges, structures, and resource groups in the Cape Canaveral area. LG2 also used historic aerial photos (1943 to 1969), topographic maps, and historic maps to analyze the environmental character of the project area and to search for potential historic sites, non-standing historic structures, and historic roads. According to historical aerial photographs, the town of Orsino was located northeast of the APE, which contained orange groves and several structures, as shown on a 1936 map (see **Figure 4.2**). This indicated that historic-era cultural materials may be present in the study area.

Seven cultural resource surveys have been conducted within a one-mile radius of the APE (**Table 4.1**). The closest survey, which includes the current APE, is a 1990 *Archaeological Survey to Establish Zones of Archaeological Potential in the VAB and Industrial Areas of KSC* by Archaeological Consultants, Inc. (Deming and Almy 1990). The survey included several discontinuous parcels throughout the Vehicle Assembly and Industrial Areas. No cultural resources were identified within the current APE during the 1990 survey.

Archaeological Consultants, Inc. conducted an *Archaeological Survey for Established Zones of Archaeological Potential (ZAPs) in the Launch Complex Area (Option 1) of the Kennedy Space Center* (Deming 1991). The survey included several discontinuous areas and resulted in the identification of eight new archaeological sites and the relocation of four previously identified sites. Approximately 5.4 acres of the survey area is located within a one-mile radius of the current APE. None of the previously identified or newly identified sites are located within one mile of the current APE.

An *Archaeological Survey to Establish Zones of Archaeological Potential (ZAPs) in the Shuttle Landing and KSC South Area (Option 2) of the Kennedy Space Center* was conducted by Archaeological Consultants, Inc. in 1991. This survey, which included several discontinuous areas (one of which extends into the one-mile radius around the current APE), resulted in the identification of one new archaeological site and the relocation of 12 previously identified sites. The newly identified site and those that have been relocated, have no direct bearing or consequence, as their locations are not within proximity of the current APE.

In 2012, Archaeological Consultants, Inc. conducted a *Historical Survey and Evaluation of the Jay Jay Bridge, Railroad System, and Locomotives, John F. Kennedy Space Center, Brevard County, Florida* (Berger and Deming

2012). The survey resulted in the recordation of 27 new historic structures. None are within the current one mile of the APE.

A *Phase I Cultural Resources Assessment Survey of Exploration Park North Expansion EA, Brevard County, Florida* was conducted by LG2 Environmental Solutions, Inc. in 2020 (Lombardi and Nelson 2020). This survey was located to the southeast of the current project area and resulted in the identification of one new archaeological site and one new historic resource group. Archaeological site 8BR04364 is the remains of a 20th century homestead. Linear resource 8BR04367, Howe Grove Road, is an early to mid-20th century unimproved road. Both are ineligible for the NRHP.

Three historic structure surveys have been conducted in the vicinity of the APE. The surveys assessed and evaluated structures within KSC (**Table 4.1**). None of these structures are included within the APE. 8BR02998, 8BR02967, and 8BR02960 are within 1-mile of the APE and are recommended ineligible for the NRHP.

Table 4.1 Previous surveys within one mile of the APE

Survey Number	Title	Date	Author	Sponsor
2471	Archaeological Survey to Establish Zones of Archaeological Potential in the VAB and Industrial Areas of Kennedy Space Center	1990	Deming and Almy	NASA
2992	Archaeological Survey for Established Zones of Archaeological Potential (ZAPs) in the Launch Complex Area (Option 1) of the Kennedy Space Center	1991	Deming Joan	NASA
3447	Archaeological Survey to Establish Zones of Archaeological Potential (ZAPs) in the Shuttle Landing and KSC South Area (Option 2) of the Kennedy Space Center	1991	Archaeological Consultants, Inc.	NASA
22465	Cultural Resource Assessment Survey of the Proposed FPL Mars Substation at the John F. Kennedy Space Center, Brevard County, Florida	2015	Archaeological Consultants, Inc.	Florida Light and Power
26810	Cultural Resource Assessment Survey of the Discovery Solar Energy Center Property, Brevard County, Florida	2019	Archaeological Consultants, Inc.	Florida Power and Light
28010	Cultural Resource Assessment Survey for Space Commerce Way from NASA Parkway West to Kennedy Parkway, Brevard County, Florida	2022	Janus Research	Space Florida
28108	Phase I Cultural Resources Assessment Survey of Exploration Park North Expansion EA, Brevard County, Florida	2020	Lombardi and Nelson	Space Florida, BRPH, and Jones Edmunds

Survey Number	Title	Date	Author	Sponsor
N/A	An Archaeological Survey of the Proposed Space Station Facilities Site and the Child Care Facility Site	1989	Johnson	E.G&G. Florida, KSC
N/A	An Archaeological Assessment Survey of the Proposed NASA State Road 3 Expansion Project, Brevard County, Florida	1990	Johnson and Ashley	E.G.&G Florida, KSC
N/A	Cultural Resource Assessment Survey of the Proposed International Space Research Park at the John F. Kennedy Space Center Brevard County, Florida	2003	Deming and Horvath	Dynamac Corporation, NASA
N/A	A Cultural Resources Assessment Survey of Five Improvement Locations on NASA Causeway	2020	Martinkovic	Space Florida
N/A	A Cultural Resource Assessment Survey for the Proposed Roberts Road Site Florida Power & Light (FP&L) Feeder Line Brevard County, Florida	2020	Keel	SpaceX

One archaeological site and one resource group have been identified within a one-mile radius of the current APE (**Table 4.2**). Both are recommended ineligible for the NRHP.

Table 4.2 Archaeological Sites within a one mile radius of the APE

Site Number	Site Name	Site Description	Distance and Direction from APE	Eligible for NRHP
BR04364	Granite Rock Homestead	Homestead, building remains, 1900-present	0.25 mi southeast	Ineligible
BR04367	Howe Grove Road	Early to mid-20th Century unimproved road	0.06 mi east	Ineligible

Three historic structures have been recorded within a one-mile radius of the APE (**Table 4.3**). None of these structures have been determined eligible for the NRHP. No cemeteries have been recorded within a one-mile radius of the APE.

Table 4.3 Previously recorded historic structures within one mile of the project vicinity

Site ID	Address	Year Built	SHPO Evaluation
BR02960	Base Support Building (M & O Building)	1964	Ineligible
BR02967	Electromagnetic Laboratory	1963	Ineligible

BR02998	Spaceport Central	1967	Ineligible

4.2 Historic Map and Aerial Photograph Review

Historic maps and aerial photographs of the project area were analyzed to gain a better understanding of historic land use and development in the region. Historic maps, U.S. Geological Service (USGS) topographic quadrangles, and U.S. Department of Agriculture aerial photographs were studied to determine potential historic development within the APE. Maps consulted during this analysis include the original 1859 plat map for Section 1 of Township 23 South/Range 36 East and the 1949 Orsino USGS topographic map. US Department of Agriculture (USDA) aerial photographs from 1943 to 2023 were also analyzed. The General Land Office records show that three patentees held land that encompassed the APE between 1918 and 1928 (**Table 4.4)**.

The earliest historic map to depict the project area is the original 1859 plat map for Section 1 of Township 23 South/Range 36 East (**Figure 4.1**). The plat map shows nothing within the APE. The surveyor's notes describe the land as 2nd rate pine and palmetto (Jones 1844).

The next historic resource that depicts the project area with some detail is the 1936 Brevard County Forida State Road Department map (FSRD 1936). This map illustrates an unimproved, unnamed road, oriented east/west north of the APE, and an improved road running north/south east of the APE. Both of these roads lead towards the town of Orsino, FL. Additionally, the map depicts two buildings located northeast of the Project APE.

In 1943, the USDA utilized aerial photography to document the region. This resource indicates that the region was primarily comprised of wetlands, including the entirety of the Project APE, though some orange groves are visible and one structure northeast of the APE. Furthermore, the 1949 Orsino USGS topographic map depicts a residential structure in the same area as the 1943 aerial and the Project APE is now an orange grove. The 1951 aerial photograph shows that drainage canals had been added to the orange grove (**Figure 4.2**).

Table 4.4 Land Patentees in Section 1 within the Project Area

Patentee	Date	Acreage	Type of Grant	Location	Within APE
Benjamin W. Guedry	June 7, 1918	143.77	Homestead	NE ¼, lot/tract 2	Yes
Mary S. Hurd	March 2, 1917	160.5	Homestead	S1/2 of the NE1/4	Yes
Wilbur Olin Taylor	August 17, 1928	160.5	Homestead	N1/2 of NE1/4	Yes

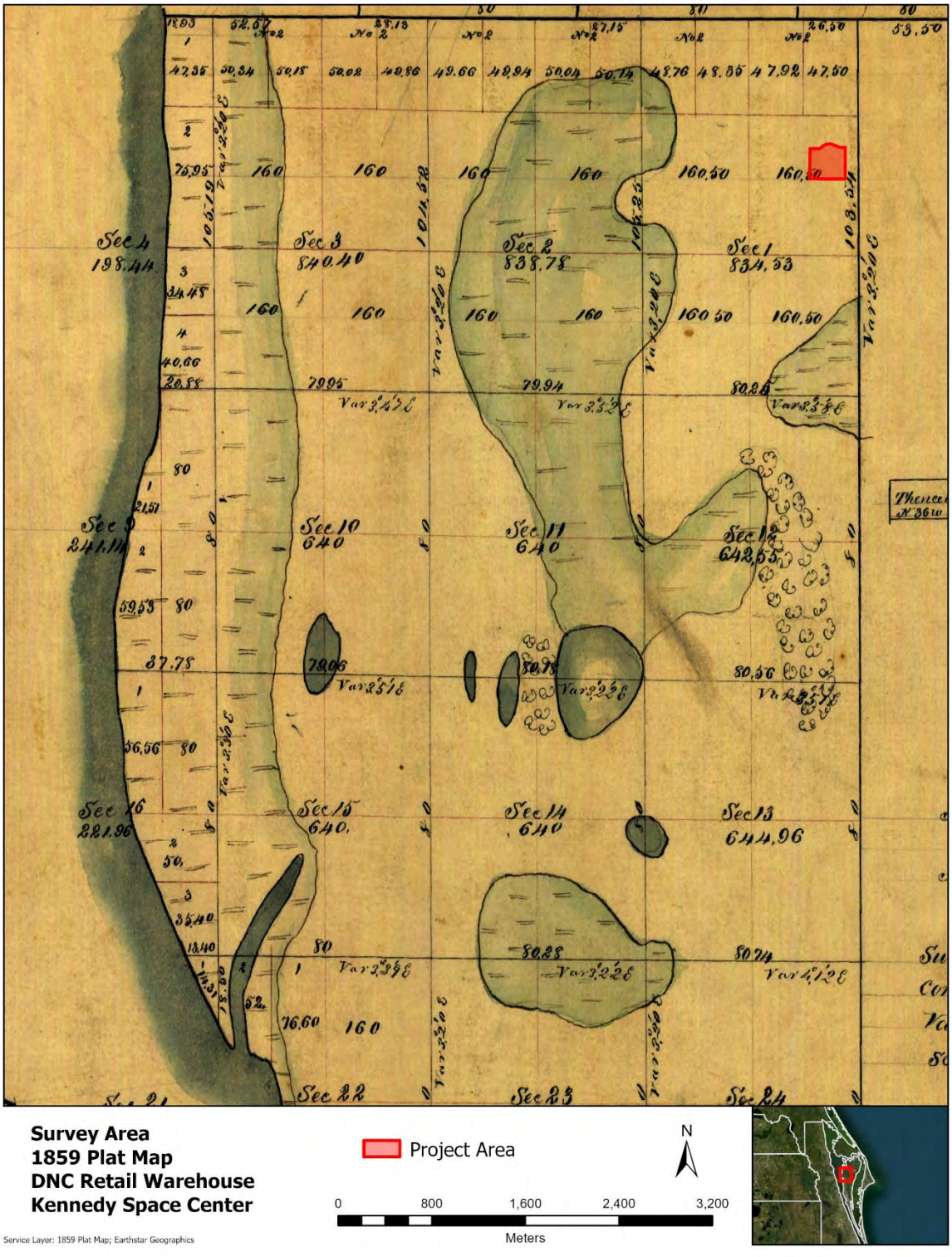

Figure 4.1 Original 1859 (FLDEP) plat map

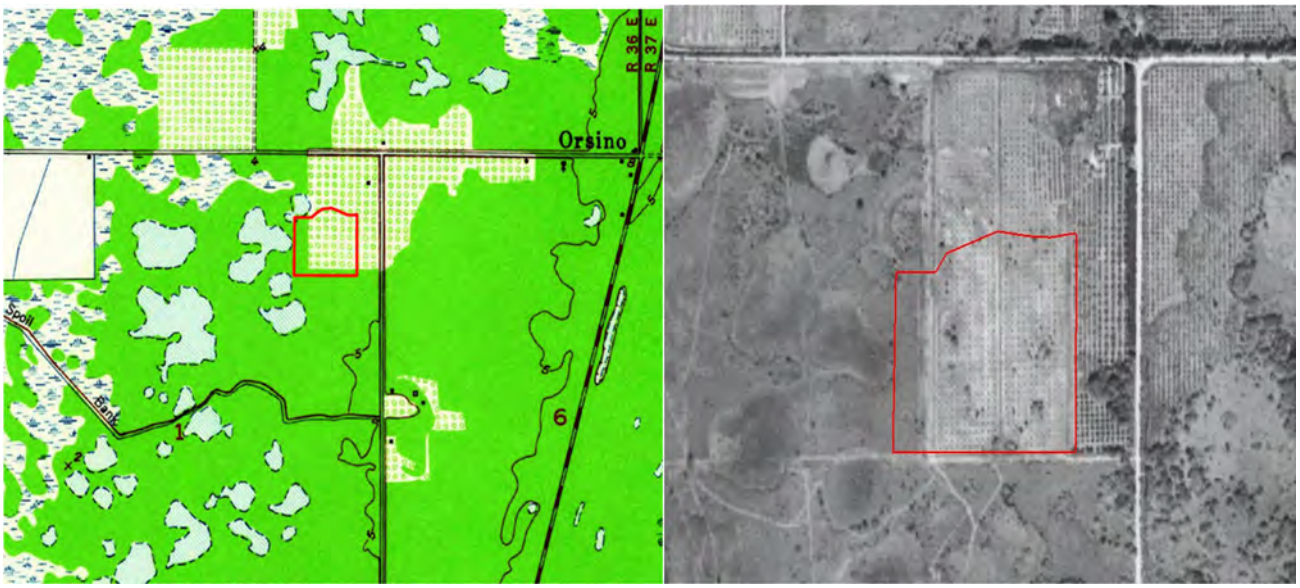

Figure 4.2 The 1949 Orsino topographic map of the project area (left) and the 1951 USDA aerial depicting the Project APE (right).

4.3 Archaeological Research Expectations

For this Phase I CRAS study, a review of the above information in conjunction with probability modelling based on proximity to natural, prehistoric, and historic resources was completed to determine if archaeological materials may be present. Due to the project area's proximity to previously recorded sites, aquatic environments, and historic roadways and towns, the overall project area is classified as having a low to moderate probability for containing archaeological sites. Nearly all the project area is situated within very poorly drained soils, which indicates the Project APE has a low probability of containing prehistoric cultural resources. Historic maps show that the APE was historically an orange grove with canals for drainage. The APE was previously surveyed in the 1990s, no cultural resources were identified during that time (Deming and Almy 1990). The APE was deemed low probability for cultural resources due to the poorly drained nature of the soil, the soil disturbance from agriculture, and the fact that the previous survey discovered nothing.

4.4 Field Survey

The archaeological survey included a systematic inspection of the project area in a manner consistent with The Historic Preservation Compliance Review Program of the Florida Department of State, Division of Historic Resources. All work was performed in compliance with the requirements set forth in the updated Cultural Resources Management Standards Operational Manual (2002) published by the Florida Division of Historical Resources.

Survey areas were determined and located with the use of geospatial information system (GIS) background files depicting the APE boundary overlain with an east/west oriented transect grid. These files were uploaded onto a handheld Trimble Nomad device for reference during fieldwork.

As stated above, the APE is located within an area of low probability which requires 10% testing at 100 m intervals. Where permitted, subsurface testing was carried out. Instead of a systematic survey like the one completed in the 1990s of the project area, the shovel tests were judgmentally plotted based on better drained soils within the APE and the location of historic oak trees which indicated less disturbed areas (Deming and Almy 1990). All shovel test unit locations were planned and documented using a hand-held GPS unit (as stated above) with an accuracy of one meter. STP 3 was skipped during numbering so excavated STPs include STPs 1-2 and 4-11.

All shovel tests were excavated to a minimum width of 50 cm and a minimum depth of one meter (100 cm) unless water was reached prior to the planned complete depth. All excavated soil was screened through 1/4-inch mesh for standardized collection of any artifacts present. Shovel test logs were maintained and provide information on the size, depth, soil conditions, and contents of all excavation units. The Munsell Soil Color Chart was used to describe the color of all soil layers. During the shovel test survey, no cultural features or phenomena were identified within the shovel test walls or floors. All shovel test excavations were backfilled after documentation, and all areas were restored to their previous condition to the greatest extent possible.

4.5 Laboratory Analysis

No artifacts were identified or collected as part of this project. Associated project documentation will be prepared for in-perpetuity curation.

4.6 Procedures to Address Unexpected Discoveries

Although the project area has received a complete cultural resource assessment survey, it is impossible to ensure that all cultural resources have been discovered. This section of the report has been developed as a mechanism for clients and agencies to treat archaeological finds that were not identified and assessed for eligibility for listing in the NRHP during survey on the property.

Unexpected discoveries consist of types of archaeological remains not typically encountered during a project. Examples of such discoveries include human skeletal remains and associated funerary objects (AFOs). If an unexpected discovery is encountered, all work within a 100 m buffer must cease and all reasonable efforts must be made to avoid and minimize the impacts (KSC 2014). If unexpected cultural resources or suspected cultural resources are discovered, the following steps should be taken:

1. All work within 100 m of the discovery should cease and reasonable efforts should be made to avoid and minimize impacts.
2. The KSC CRM must be contacted immediately and should evaluate the nature of the discovery.
3. The KSC CRM will the notify the SHPO, State Archaeologist located at the Florida Bureau of Archaeological Research (BAR) as stated in FS 872.05, and federally recognized tribes as required per the Native American Graves Protection and Repatriation Act (NAGPRA).
4. Work cannot commence in the area until written permission from the KSC CRM has been received.

If unexpected finds are encountered at any point in construction, the point of contact for KSC is the KSC Cultural Resources Manager.

4.7 NRHP Site Evaluation Criteria

The archaeological significance of a site is determined using criteria defined in 36 CFR 60.4, in coordination with the State Historic Preservation Office (SHPO). The significance of a site, as established by 36 CFR 60.4, may be in history, architecture, archaeology, engineering, or culture. Districts, sites, buildings, structures, and objects may be eligible for listing in the NRHP if they possess "integrity of location, design, setting, materials, workmanship, feeling, or association" and meet one of the following criteria (from http://www.gpo.gov):

A. Be associated with events that have made a significant contribution to the broad patterns of our history, or

B. Be associated with the lives of persons significant in our past, or

C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values or that represent a significant and distinguishable entity whose components may lack individual distinction, or

D. Have yielded or may be likely to yield, information important in prehistory or history.

Under Criterion D, 'importance' is based on the likelihood that a site possesses configurations of artifacts, soil strata, structural remains, or other features that allow it to: 1) test a hypothesis about events, groups or processes in the past, 2) support or strengthen currently available information suggesting that a hypothesis is true or false, or 3) reconstruct the known archaeological sequence for an area (National Register Bulletin 1995: 21). While the evaluation of archaeological sites usually fall under Criterion D, historic buildings and structures are typically evaluated for significance under Criteria A, B, and C.

NRHP-eligible districts must possess a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development. NRHP-eligible districts and buildings must also possess historical significance, historical integrity, and historical context.

4.8 Archival Research

Archival research began with a search of the FMSF database maintained by DHR of the Florida Department of State. The site file forms at the FMSF provide relevant survey data from previous surveys at KSC and show the location of previously recorded archaeological sites, cemeteries, bridges, structures, and resource groups.

Archival research uses a range of historical and human resources. Numerous available historic period resources for the KSC area were consulted at the Central Brevard Library and Reference Center, the Genealogy Room at the Brevard Library, the Brevard County Historical Commission, the Florida Historical Society, and the Library of Florida History. In addition, digitized historical resources were consulted through online repositories including the Bureau of Land Management's General Land Office, the Florida Memory Project, the University of Florida Maps and Imagery Library, the University of South Florida's Special Collections Department, and the University of North Florida's Florida History Online.

5.0 RESULTS

On August 2, 2023, LG2 conducted a Phase I CRAS of an approximately 15-acre parcel in support of the proposed DNC Retail Warehouse Pre-Construction Site Assessment at Kennedy Space Center Visitor Complex on Merritt Island in Brevard County, Florida.

5.1 Current Environmental Conditions

The current environmental conditions documented within the APE are characterized by two patterns of vegetation. Most of the APE is characterized as an overgrown orange grove with impenetrable Brazilian pepper (*Schinus terebinthifolius*) plants and cabbage palms which accounts for approximately 90 percent of the Project APE. Some oaks are present throughout the property, including two large, historic oaks. Portions of the APE are very poorly drained and inundated. Besides the Brazilian pepper, oaks, and cabbage palm, that make up most of the vegetation in the rest of the APE, wetland grasses and ferns are also present and account for approximately 10 percent of the Project APE (**Figure 5.1**).

Mapped soils within the APE consist entirely of poorly drained and very poorly drained classifications. The Project APE consists of two soil types. Most of the APE, especially in the central and northeast portions, is Wabasso sand, 0 to 2 percent slopes, which is poorly drained. Along the western and southern edges of the APE is Bradenton fine sand, limestone substratum, which is also poorly drained.

5.2 Archaeological Survey

The field survey began with a pedestrian survey to locate any other areas with potential for cultural resources that were not indicated on the historic maps or aerials. Inundated drainage canals occur along the west, south, and east boundaries of the project study area, there are also two that run north/south within the APE. The canals are two separate linear resources, each is a line headed east/west with a canal on either end going north/south (8BR4572 and 8BR4573).

Ten shovel tests were excavated in the APE. The deepest shovel test went to 63 cmbs, though most were around 50 cmbs. The FMSF survey log is included in **Appendix A.** STPs excavated within the APE exhibit three strata. Stratum I is described as very dark greyish brown (10YR 3/2) sandy loam, Stratum II is described as greyish brown (10YR 5/2) sand or sandy loam, and Stratum III is described as greyish brown (10YR 5/2) mottled with brownish yellow (10YR 6/8) sandy clay. Most STPs in the APE were terminated at the water table, which was generally encountered between 35-50 cmbs, being terminated due to clay or water (**Figure 5.2**).

Figure 5.1 Representative environmental photographs across the Project APE; (left to right) the middle APE; the northeastern APE and the southern APE.

Figure 5.2 Representative shovel test with water at base.

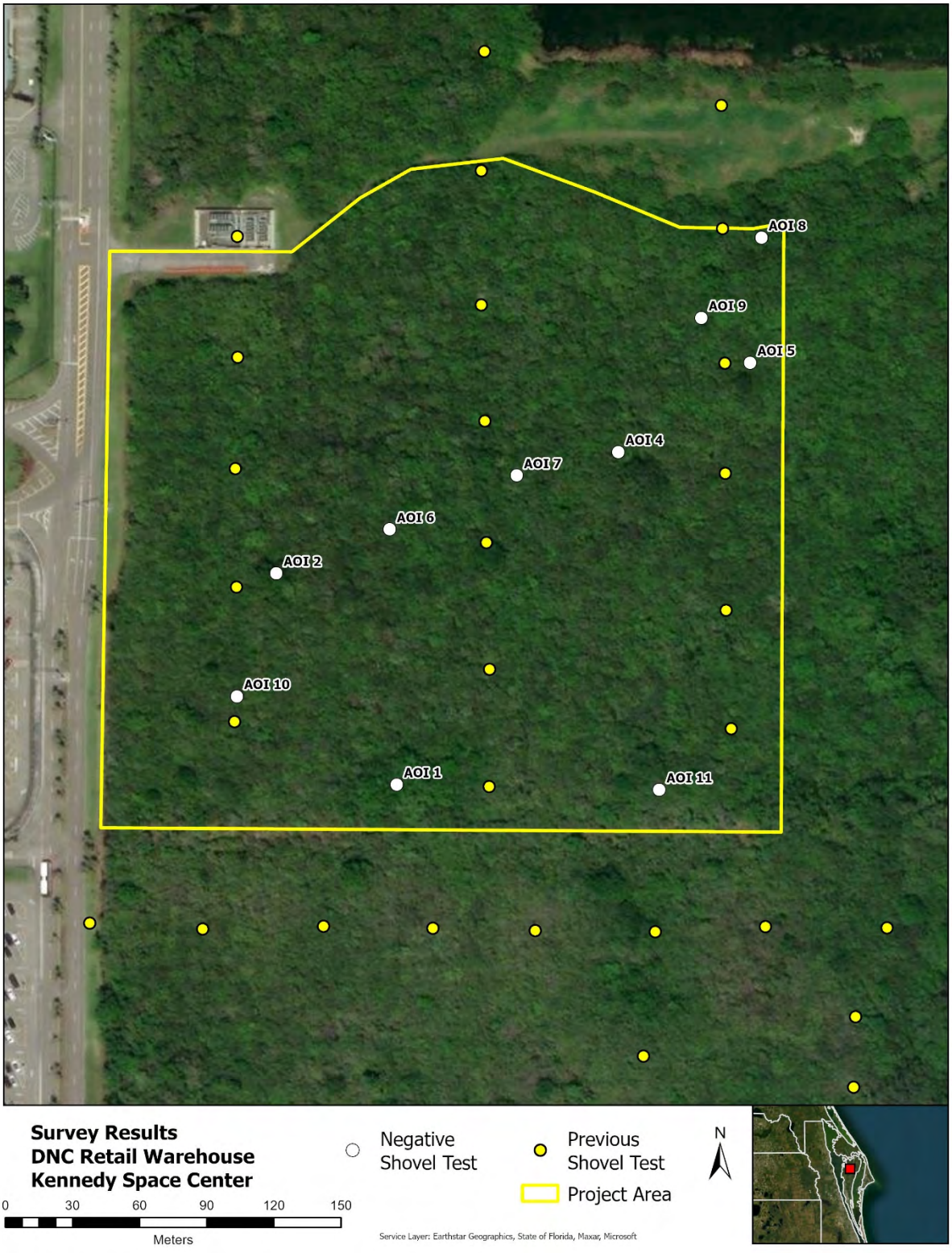

Figure 5.3 Shovel Test Results.

5.3 Linear Resources

8BR04572, DNC West Canal

Setting: Hydric Hammock

Soils/Drainage: Wabasso-Brynwood-Cypress Lake-Pineda complex and Bradenton Fine, Poorly Drained.

Survey Methodology: Pedestrian Survey

Site Type: Drainage Canal

Site Size: Western line 184m, Eastern line 142m, Southern line 109m. Total 435m

Depth of Deposit: 3-5 feet

Cultural Periods: American-20th Century

Discussion: The 1949 topographic map is the first map that shows orange groves on the project tract. The 1951 aerial photograph of the project tract is the first aerial to show the drainage canals on the property (see **Figure 4.2**).

The canal system is located in a forested area. Brazillian pepper, oak, and cabbage palms are the abundant vegetation in the area (**Figure 5.4**). The canal consists of one line running west/east, and two ditches running north/south, these intersect at the south. The canal is located to the west of another drainage canal, they are separated by a small area of land, likely to allow for movement between the groves.

Shovel testing was completed in 1990 on transects in between the north/south running lines of the canals (Deming and Almy 1990). Shovel testing was also conducted during this 2023 survey, in better drained soils within the Project APE. Neither survey recovered artifacts related to the canal system. The 2023 map from Atlantic Environmental shows both the West Canal and the East Canal (**Figure 5.5**).

Interpretation: Site 8BR04572 represents an early- to mid-twentieth century Florida drainage canal system for an orange grove. The 1943 aerial of the Project APE shows that before the area was utilized as an orange grove it was a wooded wetland area. The drainage canals would have allowed for access to the project tract and dryer soil to enable orange trees to thrive.

Evaluation: Site 8BR04572 represents an early- to mid-twentieth century Florida drainage canal system for an orange grove. This linear resource does not exhibit distinctive designs or characteristics, is not associated with important events or influential people, and does not have the potential to yield important information and therefore, does not meet the minimum requirements for inclusion on the NRHP. LG2 recommends 8BR04572 not eligible for the NRHP, and no further archaeological consideration is suggested. The FMSF resource group form is included in **Appendix A.**

Figure 5.4 DNC West Canal, North end of the West leg

Figure 5.5 Atlantic Environmental Drainage Map of APE and Canals (2023, provided by Ivey Construction).

8BR04573, DNC East Canal

Setting: Hydric Hammock

Soils/Drainage: Wabasso-Brynwood-Cypress Lake-Pineda complex and Bradenton Fine, Poorly Drained.

Survey Methodology: Pedestrian Survey

Site Type: Drainage Canal

Site Size: Western line 241m, Eastern line 227m, Southern line 118m. Total 586m

Depth of Deposit: 3-5 feet

Cultural Periods: American-20th Century

Discussion: The 1949 topographic map is the first map that shows orange groves on the project tract. The 1951 aerial photograph of the project tract is the first aerial to show the drainage canals on the property (see **Figure 4.2**).

The canal system is located in a forested area. Brazillian pepper, oak, and cabbage palms are the abundant vegetation in the area (**Figure 5.6**). The canal consists of one line running west/east, and two running north/south, these intersect at the south. The canal is located to the east of another drainage canal system, they are separated by a small area of land, likely to allow for movement between the groves.

The canal is made up of three lines. The Western line runs north/south and is approximately 241 meters long. The Eastern line runs north/south and is approximately 227 meters long. The Southern line runs west/east and is approximately 118 meters long and connects the Western and Eastern lines.

Shovel testing was completed in 1990 on transects in between the north/south running lines of the canals (Deming and Almy 1990). Shovel testing was also conducted during this 2023 survey, in better drained soils within the Project APE. Neither survey recovered artifacts related to the canal system. The 2023 map from Atlantic Environmental shows both the West Canal and the East Canal (see **Figure 5.5**).

Interpretation: Site 8BR04573 represents an early- to mid-twentieth century Florida drainage canal system for an orange grove. The 1943 aerial of the Project APE shows that before the area was utilized as an orange grove it was a wooded wetland area. The drainage canals would have allowed for access to the project tract and dryer soil to enable orange trees to thrive.

Evaluation: Site 8BR04573 represents an early- to mid-twentieth century Florida drainage canal system for an orange grove. This linear resource does not exhibit distinctive designs or characteristics, is not associated with important events or influential people, and does not have the potential to yield important information and therefore, does not meet the minimum requirements for inclusion on the NRHP. LG2 recommends 8BR04572 not eligible for the NRHP, and no further archaeological consideration is suggested. The FMSF resource group form is included in **Appendix A.**

Figure 5.6 DNC East Canal North end of West leg

6.0 CONCLUSIONS

In August 2023, LG2 conducted a Phase I CRAS of an approximately 15-acre parcel located adjacent east of the KSC Visitor Complex in support of the proposed DNC Retail Warehouse Pre-Construction Site Assessment at Kennedy Space Center on Merritt Island in Brevard County, Florida. The project area is contained to the *Orsino, Florida* 7.5-minute quadrangle (USGS 1976). This survey was conducted on behalf of DNC and Ivey's Construction to assist in meeting their regulatory obligations under Section 106 of the NHPA, as amended. Proposed project activities include the construction of a retail warehouse facility to support development and growth of the KSC Visitor Complex.

The Archaeological Area of Potential Effects (APE) is situated within the Merritt Island National Wildlife Refuge in the northern portion of Brevard County, approximately 230 m south of NASA Parkway W, 370 m east of the Kennedy Space Center Visitor Complex, and 800 m north of Space Commerce Way. The APE is comprised of a wooded area measuring approximately 15 acres.

The CRAS was conducted August 03, 2023 and consisted of historic background research, pedestrian survey, and the excavation of 10 STPs, all of which were negative for cultural material. Although all subsurface tests were negative for cultural material the canal systems located on the property are historic. **Table 6.1** summarizes the documented cultural resources and NRHP recommendations resulting from this CRAS.

Table 6.1 Sites Documented during the Phase I CRAS with NRHP Recommendations

Site Number	Site Name	Site Type	NRHP Recommendation
8BR04572	DNC West Canal	Linear resource/canal	Not Eligible
8BR04573	DNC East Canal	Linear resource/canal	Not Eligible

Sites 8BR04572 and 8BR04573 are drainage canal systems that were created on the property to make it usable for agricultural land. The canal systems run along the boundaries and within the Project APE. These linear resources do not exhibit distinctive designs or characteristics, are not associated with important events or influential people, and do not have the potential to yield important information. Therefore, they do not meet the minimum criteria for inclusion on the NRHP. No further archaeological investigation is recommended.

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APPENDIX A: Florida Master Site File Forms

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Ent D (FMSF only) _____

Survey Log Sheet

Florida Master Site File
Version 5.0 3/19

Survey # (FMSF only) _____

Consult *Guide to the Survey Log Sheet* for detailed instructions.

Manuscript Information

Survey Project (name and project phase)

Cultural Resources Assessment Survey of the DNC Retail Warehouse Pre-Con Site

Report Title (exactly as on title page)

Phase I Cultural Resources Assessment Survey of the DNC Retail Warehouse Pre-Con Site, Brevard County, Florida

Report Authors (as on title page)

1. Frank Keel
2. Elizabeth Zieschang
3. Wendy Puckett
4. Sierra DeVanie

Publication Year 2023 **Number of Pages in Report** (do not include site forms) 62

Publication Information (Give series, number in series, publisher and city. For article or chapter, cite page numbers. Use the style of *American Antiquity*.)

Supervisors of Fieldwork (even if same as author) Names Elizabeth Zieschang

Affiliation of Fieldworkers: Organization LG 2 Environmental Solutions, Inc. City Jacksonville

Key Words/Phrases (Don't use county name, or common words like *archaeology*, *structure*, *survey, architecture, etc.*)

1. Orange Grove
2. Kennedy Space Center
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Survey Sponsors (corporation, government unit, organization, or person funding fieldwork)

Name DNC Parks and Resorts at KSC Organization _____

Address/Phone/E-mail State Road 405, Kennedy Space Center, FL 32899

Recorder of Log Sheet Elizabeth Zieschang **Date Log Sheet Completed** 10-4-2023

Is this survey or project a continuation of a previous project? ☒No ☐Yes: **Previous survey #s (FMSF only)** _____

Project Area Mapping

Counties (select every county in which field survey was done; attach additional sheet if necessary)

1. Brevard
2. _____
3. _____
4. _____
5. _____
6. _____

USGS 1:24,000 Map Names/Year of Latest Revision (attach additional sheet if necessary)

1. Name ORSINO Year 2021
2. Name _____ Year _____
3. Name _____ Year _____
4. Name _____ Year _____
5. Name _____ Year _____
6. Name _____ Year _____

Field Dates and Project Area Description

Fieldwork Dates: Start 8-2-2023 End 8-2-2023 **Total Area Surveyed** (fill in one) _____ hectares 15.00 acres

Number of Distinct Tracts or Areas Surveyed 1

If Corridor (fill in one for each) **Width:** _____ meters _____ feet **Length:** _____ kilometers _____ miles

Florida Master Site File / Div. of Historical Resources / R.A. Gray Bldg / 500 S Bronough St., Tallahassee, Florida 32399-0250
Phone 850.245.6440, Fax 850.245.6439, Email: SiteFile@dos.myflorida.com

Survey Log Sheet

Survey #_____

Research and Field Methods

Types of Survey (select all that apply): ☒archaeological ☐architectural ☒historical/archival ☐underwater ☐damage assessment ☐monitoring report ☐other(describe): _____

Scope/Intensity/Procedures

Phase I shovel testing involving the excavation of 10 shovel test pits.

Preliminary Methods (select as many as apply to the project as a whole)

☐Florida Archives (Gray Building)	☐library research- *local public*	☒local property or tax records	☐other historic maps	☐LIDAR
☐Florida Photo Archives (Gray Building)	☐library-special collection	☐newspaper files	☒soils maps or data	☐other remote sensing
☒Site File property search	☐Public Lands Survey (maps at DEP)	☒literature search	☐windshield survey	
☒Site File survey search	☐local informant(s)	☐Sanborn Insurance maps	☒aerial photography	

☐other (describe): _____

Archaeological Methods (select as many as apply to the project as a whole)

☐Check here if **NO** archaeological methods were used.

☐surface collection, controlled	☐shovel test-other screen size	☐block excavation (at least 2x2 m)	☐metal detector
☐surface collection, **un**controlled	☐water screen	☐soil resistivity	☐other remote sensing
☒shovel test-1/4"screen	☐posthole tests	☐magnetometer	☒pedestrian survey
☐shovel test-1/8" screen	☐auger tests	☐side scan sonar	☐unknown
☐shovel test 1/16"screen	☐coring	☐ground penetrating radar (GPR)	
☐shovel test-unscreened	☐test excavation (at least 1x2 m)	☐LIDAR	

☐other (describe): _____

Historical/Architectural Methods (select as many as apply to the project as a whole)

☒Check here if **NO** historical/architectural methods were used.

☐building permits	☐demolition permits	☐neighbor interview	☐subdivision maps
☐commercial permits	☐windshield survey	☐occupant interview	☐tax records
☐interior documentation	☐local property records	☐occupation permits	☐unknown

☐other (describe): _____

Survey Results

Resource Significance Evaluated? ☒Yes ☐No

Count of Previously Recorded Resources 0 **Count of Newly Recorded Resources** 2

List Previously Recorded Site ID#s with Site File Forms Completed (attach additional pages if necessary)

none

List Newly Recorded Site ID#s (attach additional pages if necessary)

BR04572, BR04573

Site Forms Used: ☐Site File Paper Forms ☒Site File PDF Forms

REQUIRED: Attach Map of Survey or Project Area Boundary

SHPO USE ONLY **SHPO USE ONLY** **SHPO USE ONLY**

Origin of Report: ☐872 ☐Public Lands ☐UW ☐1A32 # _____ ☐Academic ☐Contract ☐Avocational ☐Grant Project # _____ ☐Compliance Review: CRAT # _____

Type of Document: ☐Archaeological Survey ☐Historical/Architectural Survey ☐Marine Survey ☐Cell Tower CRAS ☐Monitoring Report ☐Overview ☐Excavation Report ☐Multi-Site Excavation Report ☐Structure Detailed Report ☐Library, Hist. or Archival Doc ☐Desktop Analysis ☐MPS ☐MRA ☐TG ☐Other: _____

Document Destination: Plottable Projects **Plotability:** _____

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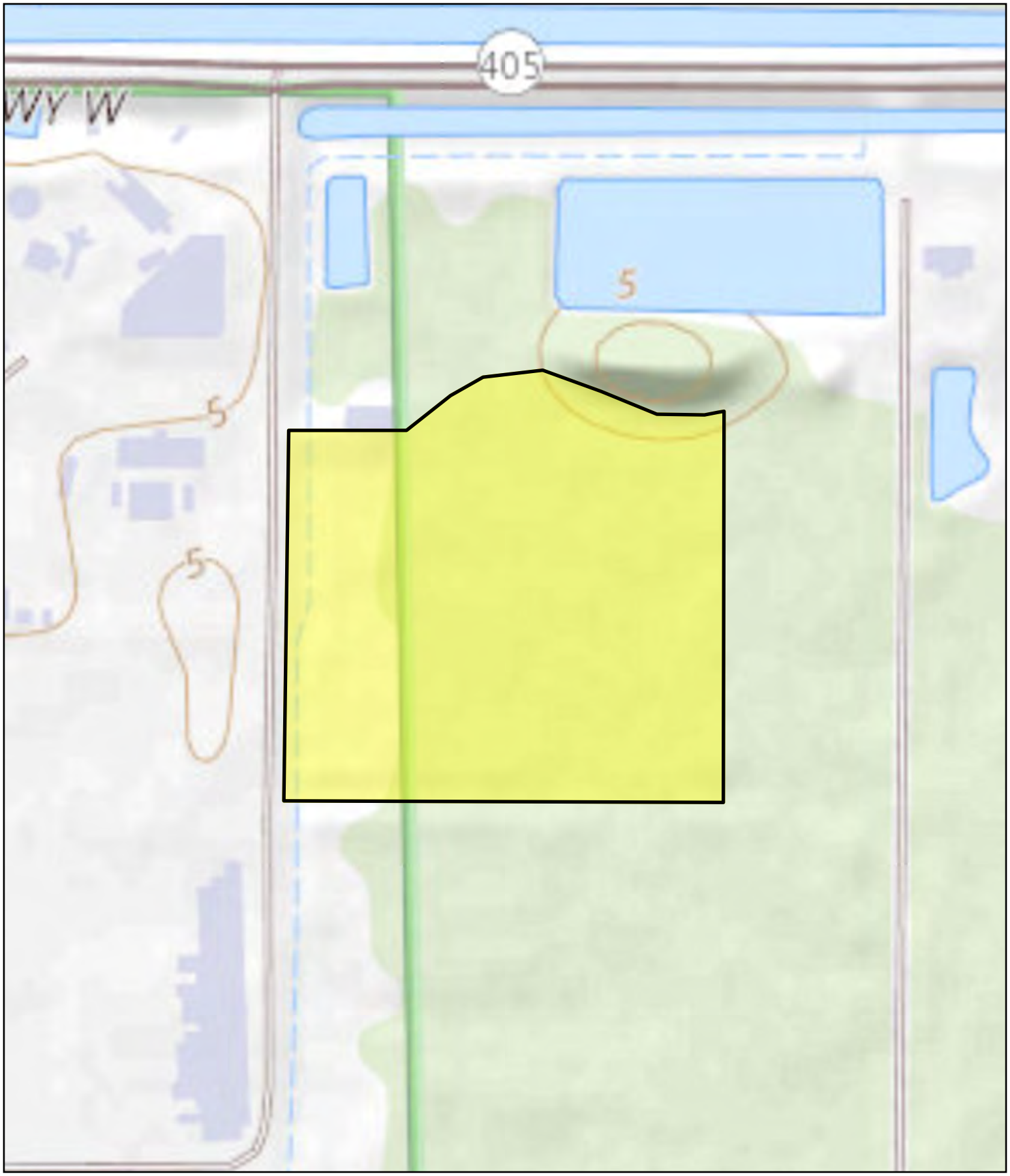

Probability of Lease Area
Exploration Park North Extension
Kennedy Space Center

Lease Area

Low Probability

N

0 50 100 150 200 250

Meters

Service Layer: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed April, 2023.

☒Original
☐Update

RESOURCE GROUP FORM
FLORIDA MASTER SITE FILE
Version 5.0 3/19

Consult the *Guide to the Resource Group Form* for additional instructions

Site #8 BR04572
Field Date 8-3-2023
Form Date 8-16-2023
Recorder# _____

NOTE: Use this form to document districts, landscapes, building complexes and linear resources as described in the box below. Cultural resources contributing to the Resource Group should also be documented individually at the Site File. **Do not use this form for National Register multiple property submissions** (MPSs). National Register MPSs are treated as Site File manuscripts and are associated with the individual resources included under the MPS cover using the Site File manuscript number.

Check ONE box that best describes the Resource Group:

- ☐ **Historic district** (NR category "district"): buildings and NR structures only: NO archaeological sites
- ☐ **Archaeological district** (NR category "district"): archaeological sites only: NO buildings or NR structures
- ☐ **Mixed district** (NR category "district"): includes more than one type of cultural resource (example: archaeological sites and buildings)
- ☐ **Building complex** (NR category usually "building(s)"): multiple buildings in close spatial and functional association
- ☐ **Designed historic landscape** (NR category usually "district" or "site"): can include multiple resources (see *National Register Bulletin #18*, page 2 for more detailed definition and examples: e.g. parks, golf courses, campuses, resorts, etc.)
- ☐ **Rural historic landscape** (NR category usually "district" or "site"): can include multiple resources and resources not formally designed (see *National Register Bulletin #30, Guidelines for Evaluating and Documenting Rural Historic Landscapes* for more detailed definition and examples: e.g. farmsteads, fish camps, lumber camps, traditional ceremonial sites, etc.)
- ☒ **Linear resource** (NR category usually "structure"): Linear resources are a special type of structure or historic landscape and can include canals, railways, roads, etc.

Resource Group Name DNC West Canal Multiple Listing [DHR only] _____
Project Name DNC Retail Warehouse Pre-Con Site FMSF Survey #_____
National Register Category (please check one): ☐building(s) ☒structure ☐district ☐site ☐object
Linear Resource Type (if applicable): ☒canal ☐railway ☐road ☐other (describe): _____
Ownership: ☐private-profit ☐private-nonprofit ☐private-individual ☐private-nonspecific ☐city ☐county ☐state ☒federal ☐Native American ☐foreign ☐unknown

LOCATION & MAPPING

Address: Street Number | Direction | Street Name | Street Type | Suffix Direction
City/Town (within 3 miles) Orsino In Current City Limits? ☒yes ☐no ☐unknown
County or Counties (do not abbreviate) Brevard
Name of Public Tract (e.g., park)_____
1) Township 23S Range 36E Section 1 ¼ section: ☐NW ☐SW ☐SE ☒NE Irregular-name: _____
2) Township _____ Range _____ Section _____ ¼ section: ☐NW ☐SW ☐SE ☐NE
3) Township _____ Range _____ Section _____ ¼ section: ☐NW ☐SW ☐SE ☐NE
4) Township _____ Range _____ Section _____ ¼ section: ☐NW ☐SW ☐SE ☐NE
USGS 7.5' Map(s) 1) Name ORSINO USGS Date 1949
2) Name _____ USGS Date _____
Plat, Aerial, or Other Map (map's name, originating office with location) land surveyor plat map 1859, LABINS
Landgrant _____
Verbal Description of Boundaries (description does not replace required map)

Kennedy Space Center parking lot to west, structure to north.

DHR USE ONLY	OFFICIAL EVALUATION	DHR USE ONLY
NR List Date _____ ☐Owner Objection	SHPO – Appears to meet criteria for NR listing: ☐yes ☐no ☐insufficient info Date _____ Init._____ KEEPER – Determined eligible: ☐yes ☐no Date _____ NR Criteria for Evaluation: ☐a ☐b ☐c ☐d (see *National Register Bulletin 15*, p. 2)	

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RESOURCE GROUP FORM

Site #8 BR04572

HISTORY & DESCRIPTION

Construction Year: 1949 ☒approximately ☐year listed or earlier ☐year listed or later
Architect/Designer: _____ Builder: _____
Total number of individual resources included in this Resource Group: # of contributing 1 # of non-contributing _____
Time period(s) of significance (choose a period from the list or type in date range(s), e.g. *1895-1925*)
1. WW II & Aftermath 1941-1950 3. _____
2. _____ 4. _____
Narrative Description (*National Register Bulletin 16A* pp. 33-34; attach supplementary sheets if needed)

Canal system is located in a forested area. Brazillian pepper, oak, and cabbage palms are the abundant vegetation in the area. The canal consists of one line running west/east, and two running north/south, these intersect at the south.

RESEARCH METHODS (check all that apply)

☒FMSF record search (sites/surveys)	☐library research	☐building permits	☐Sanborn maps
☐FL State Archives/photo collection	☐city directory	☐occupant/owner interview	☐plat maps
☒property appraiser / tax records	☐newspaper files	☐neighbor interview	☒Public Lands Survey (DEP)
☐cultural resource survey	☒historic photos	☐interior inspection	☐HABS/HAER record search

☐other methods (specify) _____
Bibliographic References (give FMSF Manuscript # if relevant)

OPINION OF RESOURCE SIGNIFICANCE

Potentially eligible individually for National Register of Historic Places? ☐yes ☒no ☐insufficient information
Potentially eligible as contributor to a National Register district? ☐yes ☒no ☐insufficient information
Explanation of Evaluation (required, see *National Register Bulletin 16A* p. 48-49. Attach longer statement, if needed, on separate sheet.)

Typical drainage canal design, these are very common in central and south Florida.

Area(s) of Historical Significance (see *National Register Bulletin 15*, p. 8 for categories: e.g. "architecture", "ethnic heritage", "community planning & development", etc.)
1. _____ 3. _____ 5. _____
2. _____ 4. _____ 6. _____

DOCUMENTATION

Accessible Documentation Not Filed with the Site File - including field notes, analysis notes, photos, plans and other important documents

1) Document type All materials at one location Maintaining organization LG 2 Environmental Solutions, Inc.
Document description Maps, photos, notes File or accession #'s _____

2) Document type _____ Maintaining organization _____
Document description _____ File or accession #'s _____

RECORDER INFORMATION

Recorder Name Sierra DeVanie Affiliation LG 2 Environmental Solutions, Inc.
Recorder Contact Information 10475 Fortune Parkway, Suite 201 Jacksonville, FL 32256, 904.288.8631
(address / phone / fax / e-mail)

Required Attachments

❶ **PHOTOCOPY OF USGS 7.5' MAP WITH DISTRICT BOUNDARY CLEARLY MARKED**
❷ **LARGE SCALE STREET, PLAT OR PARCEL MAP WITH RESOURCES MAPPED & LABELED**
❸ **TABULATION OF ALL INCLUDED RESOURCES -** Include name, FMSF #, contributing? Y/N, resource category, street address or other location information if no address.
❹ **PHOTOS OF GENERAL STREETSCAPE OR VIEWS (Optional: aerial photos, views of typical resources)** When submitting images, they must be included in digital AND hard copy format (plain paper grayscale acceptable). Digital images must be at least 1600 x 1200 pixels, 24-bit color, jpeg or tiff.

Project: Retail Warehouse

Figure 5: Land Use (FLUCFCS) Map

0 100 200 400 Feet

2023 Aerial, Brevard County, Florida

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AE Proj #: 23152

☒Original
☐Update

RESOURCE GROUP FORM
FLORIDA MASTER SITE FILE
Version 5.0 3/19

Consult the *Guide to the Resource Group Form* for additional instructions

Site #8 BR04573
Field Date 8-3-2023
Form Date 8-16-2023
Recorder# _____

NOTE: Use this form to document districts, landscapes, building complexes and linear resources as described in the box below. Cultural resources contributing to the Resource Group should also be documented individually at the Site File. **Do not use this form for National Register multiple property submissions** (MPSs). National Register MPSs are treated as Site File manuscripts and are associated with the individual resources included under the MPS cover using the Site File manuscript number.

Check ONE box that best describes the Resource Group:

- ☐ **Historic district** (NR category "district"): buildings and NR structures only: NO archaeological sites
- ☐ **Archaeological district** (NR category "district"): archaeological sites only: NO buildings or NR structures
- ☐ **Mixed district** (NR category "district"): includes more than one type of cultural resource (example: archaeological sites and buildings)
- ☐ **Building complex** (NR category usually "building(s)"): multiple buildings in close spatial and functional association
- ☐ **Designed historic landscape** (NR category usually "district" or "site"): can include multiple resources (see *National Register Bulletin #18*, page 2 for more detailed definition and examples: e.g. parks, golf courses, campuses, resorts, etc.)
- ☐ **Rural historic landscape** (NR category usually "district" or "site"): can include multiple resources and resources not formally designed (see *National Register Bulletin #30, Guidelines for Evaluating and Documenting Rural Historic Landscapes* for more detailed definition and examples: e.g. farmsteads, fish camps, lumber camps, traditional ceremonial sites, etc.)
- ☒ **Linear resource** (NR category usually "structure"): Linear resources are a special type of structure or historic landscape and can include canals, railways, roads, etc.

Resource Group Name DNC East Canal Multiple Listing [DHR only] _____
Project Name DNC Retail Warehouse Pre-Con Site FMSF Survey # _____
National Register Category (please check one): ☐building(s) ☒structure ☐district ☐site ☐object
Linear Resource Type (if applicable): ☒canal ☐railway ☐road ☐other (describe): _____
Ownership: ☐private-profit ☐private-nonprofit ☐private-individual ☐private-nonspecific ☐city ☐county ☐state ☒federal ☐Native American ☐foreign ☐unknown

LOCATION & MAPPING

Address: Street Number | Direction | Street Name | Street Type | Suffix Direction
City/Town (within 3 miles) Orsino In Current City Limits? ☒yes ☐no ☐unknown
County or Counties (do not abbreviate) Brevard
Name of Public Tract (e.g., park) _____
1) Township 23S Range 36E Section 1 ¼ section: ☐NW ☐SW ☐SE ☒NE Irregular-name: _____
2) Township _____ Range _____ Section _____ ¼ section: ☐NW ☐SW ☐SE ☐NE
3) Township _____ Range _____ Section _____ ¼ section: ☐NW ☐SW ☐SE ☐NE
4) Township _____ Range _____ Section _____ ¼ section: ☐NW ☐SW ☐SE ☐NE
USGS 7.5' Map(s) 1) Name ORSINO USGS Date 1949
2) Name _____ USGS Date _____
Plat, Aerial, or Other Map (map's name, originating office with location) land surveyor plat map 1859, LABINS
Landgrant _____
Verbal Description of Boundaries (description does not replace required map)

Kennedy Space Center parking lot to west, structure to north.

DHR USE ONLY	OFFICIAL EVALUATION	DHR USE ONLY
NR List Date _____ ☐Owner Objection	SHPO – Appears to meet criteria for NR listing: ☐yes ☐no ☐insufficient info Date _____ Init._____ KEEPER – Determined eligible: ☐yes ☐no Date _____ NR Criteria for Evaluation: ☐a ☐b ☐c ☐d (see *National Register Bulletin 15*, p. 2)	

Florida Master Site File / Div. of Historical Resources / R. A. Gray Bldg / 500 S Bronough St., Tallahassee, FL 32399-0250
Phone **850.245.6440** / Fax **850.245.6439** / E-mail **SiteFile@dos.myflorida.com**

RESOURCE GROUP FORM

Site #8 BR04573

HISTORY & DESCRIPTION

Construction Year: 1949 ☒approximately ☐year listed or earlier ☐year listed or later
Architect/Designer: _____ Builder: _____
Total number of individual resources included in this Resource Group: # of contributing 1 # of non-contributing _____
Time period(s) of significance (choose a period from the list or type in date range(s), e.g. *1895-1925*)
1. WW II & Aftermath 1941-1950 3. _____
2. _____ 4. _____
Narrative Description (*National Register Bulletin 16A* pp. 33-34; attach supplementary sheets if needed)

Canal system is located in a forested area. Brazillian pepper, oak, and cabbage palms are the abundant vegetation in the area. The canal consists of one line running west/east, and two running north/south, these intersect at the south.

RESEARCH METHODS (check all that apply)

☒FMSF record search (sites/surveys)	☐library research	☐building permits	☐Sanborn maps
☐FL State Archives/photo collection	☐city directory	☐occupant/owner interview	☒plat maps
☒property appraiser / tax records	☐newspaper files	☐neighbor interview	☒Public Lands Survey (DEP)
☐cultural resource survey	☒historic photos	☐interior inspection	☐HABS/HAER record search

☐other methods (specify) _____
Bibliographic References (give FMSF Manuscript # if relevant)

OPINION OF RESOURCE SIGNIFICANCE

Potentially eligible individually for National Register of Historic Places? ☐yes ☒no ☐insufficient information
Potentially eligible as contributor to a National Register district? ☐yes ☒no ☐insufficient information
Explanation of Evaluation (required, see *National Register Bulletin 16A* p. 48-49. Attach longer statement, if needed, on separate sheet.)

Typical drainage canal design, these are very common in central and south Florida.

Area(s) of Historical Significance (see *National Register Bulletin 15*, p. 8 for categories: e.g. "architecture", "ethnic heritage", "community planning & development", etc.)
1. _____ 3. _____ 5. _____
2. _____ 4. _____ 6. _____

DOCUMENTATION

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