DRAFT FINDING OF NO SIGNIFICANT IMPACT (FONSI)
AND
FINDING OF NO PRACTICABLE ALTERNATIVE (FONPA)
EASTERN RANGE PLANNING AND INFRASTRUCTURE DEVELOPMENT
CAPE CANAVERAL SPACE FORCE STATION, FLORIDA

Pursuant to provisions of the National Environmental Policy Act (NEPA), Title 42 United States Code (USC) Sections 4321 to 4347, implemented by Council on Environmental Quality (CEQ) Regulations, Title 40, Code of Federal Regulations (CFR) Parts 1500-1508, and 32 CFR Part 989, Environmental Impact Analysis Process (EIAP), the United States Space Force (USSF) has prepared an Environmental Assessment (EA) to identify and evaluate the potential impacts on the natural and human environment associated with proposed infrastructure improvements at Cape Canaveral Space Force Station (CCSFS), Florida. The EA, incorporated by reference into this finding, also provides environmental protection measures to avoid or reduce potential adverse environmental impacts.

PURPOSE OF AND NEED FOR PROPOSED ACTION

The purpose of the Proposed Action is to enable USSF to meet Department of Defense (DoD) and tenant mission requirements by improving, modernizing, and expanding the infrastructure at CCSFS as described in the *CCSFS District Development Plan* (USSF 2022). Proposed improvements were identified during a two-year planning process that incorporated stakeholder input and an assessment of the current infrastructure condition and mission capability gaps.

The Proposed Action is needed because the current infrastructure at CCSFS, much of which dates back to the 1950s, lacks both the capability and capacity to support current USSF and tenant mission requirements. Legacy infrastructure systems are showing signs of stress (e.g., accelerating failures, outages, and anomalies) at the current Range usage levels, causing delays for launch operations and other missions at CCSFS. Therefore, infrastructure improvements are necessary to successfully implement the Eastern Range mission in a safe and efficient manner. Outdated legacy facilities have been re-purposed for current needs, but they do not provide the state-of-the-art capabilities that are required to achieve mission success. In addition, the current geographical layout of operations at CCSFS and the existing transportation network create inefficiencies, including mandatory evacuations and excess travel for personnel, which expose base operations to disruption, delays, and increased costs.

DESCRIPTION OF THE PROPOSED ACTION/ALTERNATIVES

Infrastructure improvements within the Proposed Action would be implemented throughout CCSFS and align with the following planning goals identified in the *CCSFS District Development Plan*:

- **Provide reliable infrastructure capable of supporting mission requirements** – Infrastructure improvements would enhance the existing infrastructure (e.g., potable water, wastewater, power, and communications). Outdated facilities would be modernized to meet mission requirements.
- **Reduce impacts to personnel and equipment from launch operations** – Infrastructure improvements would relocate personnel and critical equipment out of launch exclusionary safety zones.

- **Eliminate critical periods on the Eastern Range** – Infrastructure improvements would provide additional redundancy and reduce/eliminate the need for critical periods. Currently, critical periods are established before and during critical mission operations. During these periods, the Range is "locked" and many activities, including maintenance, are restricted to ensure no critical infrastructure is damaged.
- **Improve base logistics capacity** – Infrastructure improvements would support more efficient operations at CCSFS with a focus on consolidating similar functions and modernizing the transportation network.
- **Expand developable areas in support of mission requirements** – Infrastructure improvements would maximize developable areas while considering environmental and operational constraints.

The Proposed Action would include site preparation activities (e.g., vegetation clearing, grubbing, and grading), facility construction and demolition, and transportation and utility improvements. . A summary of proposed improvements with estimated acreages by planning goal is presented in **Table 1**.

Table 1. Estimated Required Area for Proposed Improvements by Planning Goal

Planning Goal/Improvement	Site Preparation (acres)	New Impervious (acres)	Facility Construction (acres)	Facility Demolition (acres)
Provide reliable infrastructure	**153.8**	**8.8**	**2.2**	**1.2**
New ICBM/Phillips Parkway utility corridor	100	0	0	0
Potable water improvements	0.5	0	0	0
Wastewater improvements	5	0.02	0	0
Power improvements	0.3	0.3	0	0
Munitions storage consolidation/expansion	48	8.5	2.2	1.2
Reduce impacts to personnel	**119**	**63.0**	**15.3**	**9.4**
New administrative/warehouse facilities	119	63.0	15.3	9.4
Eliminate critical periods	**84**	**0**	**0**	**0**
Concrete duct bank for critical communication lines	84	0	0	0
Improve logistics	**128**	**38.5**	**1.2**	**1.1**
Oversized-load haul routes	115	32.0	0	0
New gas station/restaurant	5	4.0	0.1	0.1
Support shops consolidation	0	0	1	1
South gate redesign	8	2.5	0.1	0
Expand developable areas	**256**	**105.0**	**27.9**	**0.8**
New launch support facilities	219	90.0	22.3	0.5
New engineering test facility	37	15.0	5.6	0
Stand-alone facility demolition	0	0	0	0.3
Grand Total	**740.8**	**215.3**	**46.6**	**12.5**

Based on conceptual planning, it is anticipated that the Proposed Action would result in approximately 740 acres of ground disturbance throughout the installation and would impact up to 20 acres of wetlands, four acres of surface waters, and 240 acres of the 100-year floodplain. Improvements within the Proposed Action would be reevaluated during project design to determine final environmental impacts and any additional NEPA documentation requirements.

Alternatives Eliminated from Further Consideration (EA Section 2.3)

This EA has considered all reasonable alternatives under the CEQ regulation, 40 CFR 1502.14(a), which states that all reasonable alternatives that have been eliminated must be briefly discussed. The scope and location of the improvements within the Proposed Action were reviewed by 45th Civil Engineer Squadron (45 CES) personnel, local government agencies, and supporting installation and USSF staff specialists.

Alternatives dismissed from further consideration did not meet the purpose and need for the Proposed Action or established selection criteria. For example, the conceptual siting locations in the Proposed Action went through an extensive vetting process to minimize environmental conflicts. It is anticipated that other facility siting locations, though viable, would have equivalent environmental impacts as those included in the Proposed Action. Alternatives were also examined to reutilize existing facilities within or outside of CCSFS; however, existing available facilities on CCSFS would not meet personnel and equipment requirements. Additionally, reusing existing facilities in the industrial area would not relocate personnel out of launch exclusionary safety zones. Reducing new development on CCSFS by relocating facilities to the Kennedy Space Center does not meet the purpose and need for the action.

Description of the No-Action Alternative (EA Section 2.2)

CEQ regulations (44 CFR 1502.14) require agencies to consider a "no action" alternative in their NEPA analyses to compare the effects of not taking action with the effects of the action alternative(s). Under the No-Action Alternative, the environmental, social, and economic conditions described as the affected environment in the EA would not be affected by activities described under the Proposed Action. Any existing activities or operations would occur in accordance with existing laws and permits. Existing uses would continue at current levels. Individual actions within the Proposed Action may proceed but would have to be evaluated on their own merit under the EIAP guidelines to determine the scope of environmental impacts and the appropriate level of NEPA analysis.

Under the No-Action Alternative for this EA, the status quo at CCSFS would be maintained and the proposed infrastructure improvements (Proposed Action) would not be implemented. The infrastructure at CCSFS would be maintained but would not be improved. It is anticipated that the capacity and condition of existing facilities would be insufficient to meet SLD 45 and tenant mission requirements. New facilities would not be constructed and USSF would continue to use existing facilities for mission support functions (e.g., research, testing, and payload processing), limiting DoD's technological advantage and impacting mission deployment.

SUMMARY OF ENVIRONMENTAL FINDINGS

Environmental analyses focused on the following areas: air quality and climate; water resources; noise; soils and geological resources; historical and cultural resources; biological resources; land use and visual/coastal zone resources; infrastructure (transportation and utilities); health and safety; hazardous materials and wastes; socioeconomics; environmental justice; Section 4(f) properties, and airspace. USSF has concluded that no significant impacts would result to these resources as summarized below.

Air Quality and Climate (EA Section 3.2.1)

No significant impacts have been identified. Long-term, minor, direct, adverse impacts on ambient air quality (pollutant and GHG emissions) would be expected following implementation of the Proposed Action (including construction/demolition activities and new facility operations). All attainment criteria pollutants are expected to be below the significance indicators during construction; however, site preparation to allow for demolition, new construction, facility renovation, and infrastructure improvements would have the potential to generate fugitive dust and increase the particulate matter in the air. Once the construction phase of the Proposed Action is complete, steady state emissions would be well below *de minimis* threshold values. Brevard County and CCSFS are in attainment with the National Ambient Air Quality Standards (NAAQS), and therefore the General Conformity Rule does not apply. BMPs would include implementing Best Available Control Technologies (e.g., application of water sprays, dust suppressants, use of coverings or enclosures, paving, enshrouding, and planting) during project construction/demolition and complying with United States Environmental Protection Agency (USEPA) regulations to control exhaust emissions. Additional Best Management Practices (BMPs) to minimize impacts on air quality are listed in the EA.

Water Resources (EA Section 3.2.2)

No significant impacts have been identified. The Proposed Action would result in short- and long-term, minor to moderate, direct and indirect, adverse impacts on water resources. Proposed demolition, new construction, facility renovation, and infrastructure improvements would impact up to 20 acres of wetlands and one acre of surface waters, depending on final project design and stormwater requirements. However, those impacts would not result in a permanent loss of function, threaten hydrologic characteristics, endanger public health, or violate laws. During the design and permitting phase of the Proposed Action, jurisdictional wetlands and surface waters would be delineated in accordance with the United States Army Corps of Engineers (USACE) *2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* and Rule 62-340, Florida Administrative Code (FAC). Efforts would be made to minimize impacts to wetlands and surface waters to the greatest extent practicable, in compliance with Executive Order (EO) 11990 and Section 404 of the Clean Water Act. Any necessary agency coordination and required permits would be obtained prior to construction. Environmental permits would include a detailed description of any required mitigation, such as the purchase of wetland mitigation credits or on-site wetland restoration per the Uniform Mitigation Assessment Method (UMAM)/functional assessment. Measures to minimize wetland impacts may include site plan reconfiguration, installation of buffer areas along the perimeter of wetlands, or erosion controls to prevent sedimentation in adjacent wetlands. Construction activities associated with these projects would be conducted in accordance with a Construction Site National Pollutant Discharge Elimination System (NPDES) permit and its associated procedures as detailed in required plans (e.g., Erosion and Sediment Control Plan [ESCP]; Stormwater Pollution Prevention Plan [SWPPP]; and Spill Prevention, Control, and Countermeasures [SPCC] Plan).

The Proposed Action would result in temporary construction activity and the construction of new structures within 240 acres of the 100-year floodplain. The Proposed Action would not reduce the flood storage capacity of the floodplain in any substantive manner. Construction related impacts to floodplains in general would be minimized through implementation of an approved ESCP and other appropriate environmental protection measures and through adherence to the NPDES permit and SWPPP. Long-term impacts to floodplains from the Proposed Action would be minimized by implementing guidelines provided in EO 11988 and EO 13690 for construction in a floodplain to the extent practicable, including site grading so that structures are elevated above the base flood elevation. Remaining floodplain impacts would be compensated to ensure no net loss of floodplains. Additional BMPs to minimize impacts to water resources are listed in the EA.

Noise (EA Section 3.2.3)

No significant impacts have been identified. Construction activities related to the Proposed Action would result in short-term, minor, direct, adverse impacts to the noise environment; however, no change to the noise contours currently experienced within the region of CCSFS are anticipated.

Soils and Geological Resources (EA Section 3.2.4)

No significant impacts have been identified. The Proposed Action may result in short-term, minor, direct, adverse impacts on earth resources during construction through increased soil disturbance and erosion. None of the soils affected are considered as prime or unique farmland soils and all are locally or regionally common. All proposed improvements would be required to comply with USACE, Florida Department of Environmental Protection (FDEP), and St. Johns River Water Management District (SJRWMD) permitting requirements. Under these permits, CCSFS would be required to implement BMPs as part of the ESPC Plan. Implementation of the BMPs listed in the EA would minimize the potential for incremental impacts associated with soil disturbance and erosion.

Historical and Cultural Resources (EA Section 3.2.5)

No significant impacts have been identified. The Proposed Action is not anticipated to impact cultural resources; however, as agreed to by SLD 45 and the State Historic Preservation Office (SHPO) under Section 106 consultation of the National Historic Preservation Act (NHPA), any potential adverse effects identified later would be resolved with their office in accordance with NHPA and the SLD 45 Integrated Cultural Resources Management Plan (ICRMP) and required actions would be integrated into the Mitigation Monitoring Plan (MMP). If prehistoric or historic artifacts that could be associated with Native American, early European, or American settlement, or unmarked human remains were encountered at any time within a project site, all activities involving subsurface disturbance in the vicinity of the discovery would cease and work would not be resumed without authorization from the Florida Division of Historical Resources.

Biological Resources (EA Section 3.2.6)

No significant impacts have been identified. The Proposed Action would result in short-term, moderate, direct and indirect, adverse impacts to biological resources during construction and long-term, minor, indirect, adverse impacts due to habitat loss and alteration. With the implementation of approved mitigation and BMPs, the Proposed Action would not jeopardize the continued existence of a species or adversely modify critical habitat. No impacts to essential fish habitat (EFH), critical habitat, and aquatic wildlife are anticipated. Several state and federally listed wildlife species that inhabit, utilize and/or frequent CCSFS may be affected by the Proposed Action. Further detail and anticipated effects determinations for these species are discussed in the EA.

Consultation with the United States Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act is anticipated to result in concurrence that the Proposed Action would not adversely affect federally listed species with the implementation of approved mitigation and conservation measures described in the EA. It is understood that further consultation may be required should additional impacts be identified during project design. The Proposed Action would also avoid and minimize impacts to biological resources by following the methodologies described in the most recent Integrated Natural Resources Management Plan (INRMP) and implementing the BMPs listed in the EA.

Compatible Land Use, Visual Resources, and Coastal Zone Management (EA Section 3.2.7)

No significant impacts have been identified. The Proposed Action is consistent with current and future land uses as determined by USSF and would result in no or negligible adverse impacts on land use and visual/coastal resources. The future land use plan for CCSFS considers land use compatibility, facility consolidation, mission sustainability, quality of life, safety, and security. Areas selected for rezoning minimize conflicts with a variety of environmental constraints, including operational restrictions, natural and cultural resource protection areas, and security and safety considerations.

Infrastructure (EA Section 3.2.8)

No significant impacts have been identified. The Proposed Action would improve the condition and capacity of utility and transportation infrastructure at CCSFS. Minor, short-term, direct, adverse impacts to transportation would occur during construction, but the proposed improvements to oversized load haul routes and traffic flow would benefit the CCSFS transportation network in the long-term. Temporary impacts would be minimized through the implementation of BMPs listed in the EA.

Health and Human Safety (EA Section 3.2.9)

No significant impacts to health and human safety have been identified. Short-term, minor, direct, adverse impacts on health and safety could occur from construction/demolition activities associated with the Proposed Action. Occupational health and safety hazards associated with construction and demolition would include loud noise, heavy machinery, debris, electricity, and hazardous materials used or encountered during work. Construction workers could also encounter soil or groundwater contamination from an Installation Restoration Program (IRP) site or previously unknown soil or groundwater contamination. However, implementation of appropriate Occupational Safety and Health Administration (OSHA) and Air Force Instruction (AFI) safety standards during these activities would minimize the potential for impacts. Additional BMPs to minimize impacts to human health and safety are listed in the EA. With these protocols in place, health and safety risks would be reduced to acceptable levels.

Hazardous Materials and Wastes (EA Section 3.2.10)

No significant impacts have been identified. The Proposed Action could have short-term, minor to moderate, direct, adverse impacts associated with hazardous materials/waste and solid waste. Demolition and construction activities would increase the use and storage of hazardous materials (e.g., solvents, paints, adhesives, etc.) at CCSFS for the short-term. Some short-term increases would be realized in terms of the quantity of fuel used during construction activities. Demolition would increase the amount of hazardous/solid wastes generated, but these activities would last for 5 to 10 years and all wastes would be disposed of properly.

Several Solid Waste Management Units (SWMUs) managed by IRP are collocated with the Proposed Action, and planned construction activities have potential to impact these sites. Construction or excavation work within SWMUs must be coordinated with IRP, FDEP, and the 45 CES Environmental Office. Any applicable land use controls would be evaluated to ensure continued protection of human health and the environment.

The Proposed Action would involve demolition of existing structures, construction of new buildings and pavements, and potential remediation of contaminated sites, resulting in the generation of construction and demolition debris and removal of soils and other contaminated debris. However, the estimated quantity of generated debris, when compared to regional landfill capacity, would not represent a significant impact to the life expectancy of the landfills. BMPs listed in the EA would be employed to minimize impacts to or from hazardous materials/waste associated with implementing the Proposed Action.

Socioeconomics (EA Section 3.2.11)

No significant impacts have been identified. The Proposed Action and other actions that would occur over the next 5 to 10 years would have short-term, minor to moderate, direct and indirect, beneficial economic impacts on surrounding communities through an increased demand for construction workers and the procurement of goods and services. Construction-related expenditures would not be expected to generate long-term socioeconomic benefits. In the event that construction workers contracted for the Proposed Action were obtained outside of the local or regional area, the temporary increase in the workforce during the construction phase would result in a temporary increase in local housing and lodging needs. Because the Proposed Action would not result in a long-term increase in the installation or regional population, it would not contribute to cumulative demographic impacts in the region.

Environmental Justice (EA Section 3.2.12)

No significant impacts have been identified. Possible direct adverse effects from construction activities could include increased traffic and noise levels and decreased air quality. These effects would be short-term, intermittent, and minor, and are not anticipated to impact off-installation populations. The possible adverse effects would impact the entire installation and would not result in disproportionately high and adverse impacts on environmental justice populations.

Section 4(f) Properties (EA Section 3.2.13)

No significant impacts have been identified. No Section 4(f) properties occur at CCSFS; therefore, the Proposed Action would not directly affect 4(f) properties. No indirect impacts (Consumptive Use) to surrounding Section 4(f) properties are anticipated as the Proposed Action would occur entirely within CCSFS.

Airspace (EA Section 3.2.14)

No significant impacts have been identified. The Proposed Action would have no impact on regional airspace. The Proposed Action would not impose any major restrictions on air commerce opportunities, significantly limit access, or require any modifications to Air Traffic Control systems.

Cumulative Effects (EA Chapter 4)

Overall, the Proposed Action would result in short- and long- term, minor to moderate, direct and indirect, adverse impacts that would be below significance thresholds described for each resource area. Impacts of the Proposed Action would be minimized using BMPs. Compensatory mitigation would be provided for unavoidable impacts as determined through consultation and coordination with federal and state regulatory agencies. As such, the Proposed Action would not significantly contribute to cumulative impacts when considered with other past, present, and reasonably foreseeable future actions occurring at or in the vicinity of CCSFS.

MITIGATIONS

As the proponent for the proposed installation development at CCSFS, USSF will be responsible for ensuring that the mitigations listed above in the environmental findings section and in the EA are in place prior to taking any specific action. USSF will oversee and verify mitigations are fully funded and being carried out, as identified in this FONSI/FONPA and the MMP. The MMP will be developed subsequent to this FONSI and will include points of contact for oversight and completion of the mitigation as well as the anticipated timing for mitigation completion. It is expected the mitigation monitoring will generally consist of on-the-ground inspections and any subsequent actions necessary to address deficiencies discovered during the inspections. The EA also refers to the use of BMPs. For this FONSI/FONPA and in compliance with Air Force regulation, BMPs will be carried forward and monitored in the MMP.

PUBLIC REVIEW

In August 2022, letters and emails were sent to federal, state, and local agencies and municipalities potentially affected by the Proposed Action informing them of the intent to prepare the EA and requesting input. USSF received comments from five public agencies during the review period. When requested, additional information was provided, and agency comments were addressed in the Draft EA. Copies of the notice and coordination are included in Appendix A of the EA.

Tribal consultation letters were mailed to federally recognized tribes in August 2022. A response from the Seminole Nation of Oklahoma was received. Additional attempts to contact tribal representatives were made throughout the preparation of the EA by the SLD 45 Cultural Resources Manager. Appendix A of the EA includes records of correspondence with the tribes.

In June 2022, an Early Public Notice was published in the *Florida Today* and *The Hometown News (Beaches and North Brevard Editions)* announcing commencement of the EA, detailing that the action would take place in a floodplain/wetland, and seeking advanced public comment. No comments were received.

40 CFR 1500-1508 and 32 CFR 989 require that the public have an opportunity to review and comment on draft NEPA documents. A Notice of Availability for public review of the Draft EA and Draft FONSI/FONPA will be published in the *Florida Today* and *The Hometown News (Beaches and North Brevard Editions)* in 2023. The documents will also be made available for review on the internet at https://www.patrick.spaceforce.mil/ and at the following locations:

Cape Canaveral Public Library 201 Polk Avenue Cape Canaveral, FL 32920	Titusville Public Library 2121 S. Hopkins Ave. Titusville, FL 32780	Port St John Public Library 6500 Carole Ave Cocoa, FL 32927
Cocoa Beach Public Library 550 North Brevard Ave. Cocoa Beach, FL 32931	PSFB Library Building 722 842 Falcon Ave Patrick SFB, FL 32925	Merritt Island Public 1195 North Courtenay Parkway Merritt Island, FL 32953

The public comment period is 30 days. All comments received regarding the Draft EA will be incorporated into the Final EA.

FINDING OF NO SIGNIFICANT IMPACT

Based on my review of the facts and analyses contained in the attached EA, conducted under the provisions of NEPA, CEQ Regulations, and 32 CFR 989, I conclude that the implementation of the Proposed Action would not have a significant environmental impact, either by itself or cumulatively with other known projects. Accordingly, an Environmental Impact Statement is not required. This analysis fulfills the requirements of NEPA, the President's CEQ 40 CFR 1500-1508 and the Air Force EIAP regulations 32 CFR 989. The signing of this Finding of No Significant Impact completes the EIAP.

FINDING OF NO PRACTICABLE ALTERNATIVE

Pursuant to Executive Order(s) 11988, 11990, and 13690, and considering all supporting information, I find there is no practicable alternative to the Proposed Action, which will impact floodplains and wetlands. As noted in the attached EA, there are no practicable alternatives that would avoid all impacts or further minimize impacts to wetlands based on conceptual siting requirements and existing environmental constraints. Wetland impacts would be avoided and minimized to the greatest extent practical during project design and permitting. The proposed improvements (i.e., launch support facilities, a consolidated MSA, redesigned South Gate, oversized-load haul routes, water storage tanks, utility corridor, concrete duct banks, and percolation ponds) would be located within the floodplain throughout the installation. The location of existing facilities and utilities, limited developable area outside of the floodplain, and the requirement to avoid listed species habitat to the greatest extent possible preclude placing these improvements outside of the floodplain. This finding fulfills both the requirements of the referenced Executive Orders and the EIAP regulation, 32 CFR 989.14 for a Finding of No Practicable Alternative.

____________________________________ ____________

PAUL G. FILCEK, Col, USAF Date
Chief, Space Force Mission Sustainment
(Engineering, Logistics, & Force Protection)

Draft

Environmental Assessment
for
Eastern Range Planning and Infrastructure Development
Cape Canaveral Space Force Station, Florida

PREPARED FOR:

Department of the Air Force

United States Space Force

April 2023

PRIVACY ADVISORY

This [Draft Environmental Assessment (EA)] is provided for public comment in accordance with the National Environmental Policy Act (NEPA), the President's Council on Environmental Quality (CEQ) NEPA Regulations (40 Code of Federal Regulations [CFR] 1500-1508), and 32 CFR 989, Environmental Impact Analysis Process (EIAP).

The EIAP provides an opportunity for public input on United States Space Force (USSF) decision-making, allows the public to offer input on alternative ways for the USSF to accomplish what it is proposing, and solicits comments on the USSF's analysis of environmental effects.

Public commenting allows the USSF to make better, informed decisions. Letters or other written or oral comments provided may be published in the EA. As required by law, comments provided will be addressed in the EA and made available to the public. Providing personal information is voluntary. Private addresses will be compiled to develop a mailing list for those requesting copies of the EA. However, only the names of the individuals making comments and their specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the Final EA.

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ABBREVIATIONS AND ACRONYMS

ACAM	Air Conformity Applicability Model
ACM	Asbestos Containing Material
AFCEC	Air Force Civil Engineer Center
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFSPC	Air Force Space Command
AFSPCMAN	Air Force Space Command Manual
AICUZ	Air Installation Compatible Use Zone
APE	Area of Potential Effects
APIMS	Air Program Information Management System
APZ	Accident Potential Zone
ARPA	Archaeological Resources Protection Act
ARTCC	Air Route Traffic Control Center
AT/FP	Antiterrorism Force Protection
BACT	Best Available Control Technologies
BASH	Bird/wildlife Aircraft Strike Hazard
BCE	Before Common Era
BDA	Blast Danger Area
BGEA	Bald and Golden Eagle Protection Act
bls	Below Land Surface
BMAP	Basin Management Action Plan
BMP	Best Management Practice
BO	Biological Opinion
BRL	Banana River Lagoon
C&D	Construction and Demolition
CAA	Clean Air Act
CCAFS	Cape Canaveral Air Force Station
CCSFS	Cape Canaveral Space Force Station
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERL	Construction Engineering Research Laboratory
CES	Civil Engineer Squadron
CES/CEIE	Environmental Office
CFR	Code of Federal Regulations
CRM	Cultural Resources Manager
CT	Census Tract
CWA	Clean Water Act
CZ	Clear Zone
CZMA	Coastal Zone Management Act
DAFI	Department of the Air Force Instruction
DAFMAN	Department of the Air Force Manual
dB	Decibel
dBA	A-weighted
DCE	Dichloroethene
DDESB	Department of Defense Explosives Safety Board
DDP	District Development Plan
DESR	Defense Explosives Safety Regulation
DNL	Day-Night Average Noise Level
DoD	Department of Defense
DOT	Department of Transportation
DRSL	DoD Regional Sea Level
EA	Environmental Assessment

EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EPF	Eastern Processing Facility
ERP	Environmental Resource Permit
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
ETF	Engineering Test Facility
FAA	Federal Aviation Administration
FAC	Florida Administrative Code
FCA	Flight Caution Areas
FCMP	Florida Coastal Management Program
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDHR	Florida Department of Historical Resources
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FHA	Flight Hazard Area
FHWA	Federal Highway Administration
FLIGHT	Facility Level Information on Greenhouse Gases Tool
FLUCCS	Florida Land Use, Cover and Forms Classification System
FNAI	Florida Natural Areas Inventory
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
FPL	Florida Power and Light
FS	Florida Statutes
FSA	Fuel Storage Area
FTA	Fire Training Area
FWC	Florida Fish and Wildlife Conservation Commission
GHG	Greenhouse Gas
GIS	Geographic Information Systems
GWP	Global Warming Potential
HAP	Hazardous Air Pollutants
HAPC	Habitat Areas of Particular Concern
HAZWOPER	Hazardous Waste, Operations, and Emergency Response
HDP	Heritage Documentation Programs
HDPE	High Density Polyethylene
HQ	Headquarters
HWMP	Hazardous Waste Management Plan
IBA	Important Bird Area
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IPCC	International Panel on Climate Change
IRL	Indian River Lagoon
IRLNEP	Indian River Lagoon National Estuary Program
IRP	Installation Restoration Program
ISWMP	Integrated Solid Waste Management Plan
JDMTA	Jonathan Dickinson Missile Tracking Annex
KSC	John F. Kennedy Space Center
LBP	Lead Based Paint
LBS	Load Brake Switches
LED	Light-emitting Diode
LID	Low Impact Development
LTM	Long-Term Monitoring

LUC	Land Use Controls
LZ	Landing Zone
MBTA	Migratory Bird Treaty Act
MINWR	Merritt Island National Wildlife Refuge
MMPA	Marine Mammal Protection Act
MOC	Morrell Operations Center
MRTFB	Major Range and Test Facility Base
MSA	Munitions Storage Area
MSAT	Mobile Source Air Toxins
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSGP	Multi-Sector Generic Permit
MTA	Malabar Transmitter Annex
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFA	No Further Action
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOTU	Naval Ordnance Test Unit
NPDES	National Pollution Discharge Elimination System
NPS	National Parks Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSS	National Security Space
ODS	Ozone Depleting Substances
OFW	Outstanding Florida Water
OSHA	Occupational Health and Safety Administration
PAFB	Patrick Air Force Base
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PCDD/PCDF	Polychlorinated Dibenzo-P-Dioxins/Polychlorinated Dibenzofurans
PFAS	Per- and polyfluoroalkyl
PFBS	Perfluorobutane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PM	Particulate Matter
POL	Petroleum, Oil, Lubricants
PPE	Personal Protective Equipment
PSFB	Patrick Space Force Base
PVC	Polyvinyl Chloride
RCP	Representative Concentration Pathway
RCRA	Resource Conservation and Recovery Act
ROI	Region of Influence
RWWTP	Regional Wastewater Treatment Plant
SCA	Special Clear Areas
SF	Square Foot
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer

SI	Site Investigation
SIR	Site Investigation Report
SJRWMD	St. Johns River Water Management District
SLC	Space Launch Complex
SLD 45	Space Launch Delta 45
SLR	Sea Level Rise
SR	State Road
SRCC	Southeast Regional Climate Center
SSCMAN	Space Systems Command Manual
SUA	Special Use Airspace
SWI	Space Wing Instruction
SWMU	Solid Waste Management Unit
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Properties
THPO	Tribal Historic Preservation Officer
U.S.	United States
UFC	Unified Facilities Criteria
UMAM	Uniform Mitigation Assessment Method
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USSF	United States Space Force
VOC	Volatile Organic Compound
WOTUS	Waters of the United States

1 PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

The *Air Force Space Command (AFSPC) Commander's Strategic Intent* identified creating and improving upon United States Space Force (USSF) infrastructure as essential for providing the world class services that would enable globally competitive Ranges (AFSPC 2020).

Some of the current USSF infrastructure, which includes facilities, equipment, utilities, commodities, roads, mobile networks, and transportation connections, are legacy systems largely developed in the 1950s and 1960s for early spaceflight. These aging assets are showing signs of stress under current operations and will quickly limit expanded or future missions (AFSPC 2020). Therefore, Headquarters (HQ) USSF and the Space Launch Delta 45 (SLD 45) identified improving infrastructure at Cape Canaveral Space Force Station (CCSFS) as critical to USSF and tenant mission success. In 2020, SLD 45 began preparing a District Development Plan (DDP) for CCSFS to ensure future development would most efficiently meet mission requirements. The *CCSFS DDP* (USSF 2022a) represents an installation-wide development approach that addresses mission capability gaps, as defined by SLD 45, tenants, and stakeholders, while considering existing environmental constraints and land use patterns.

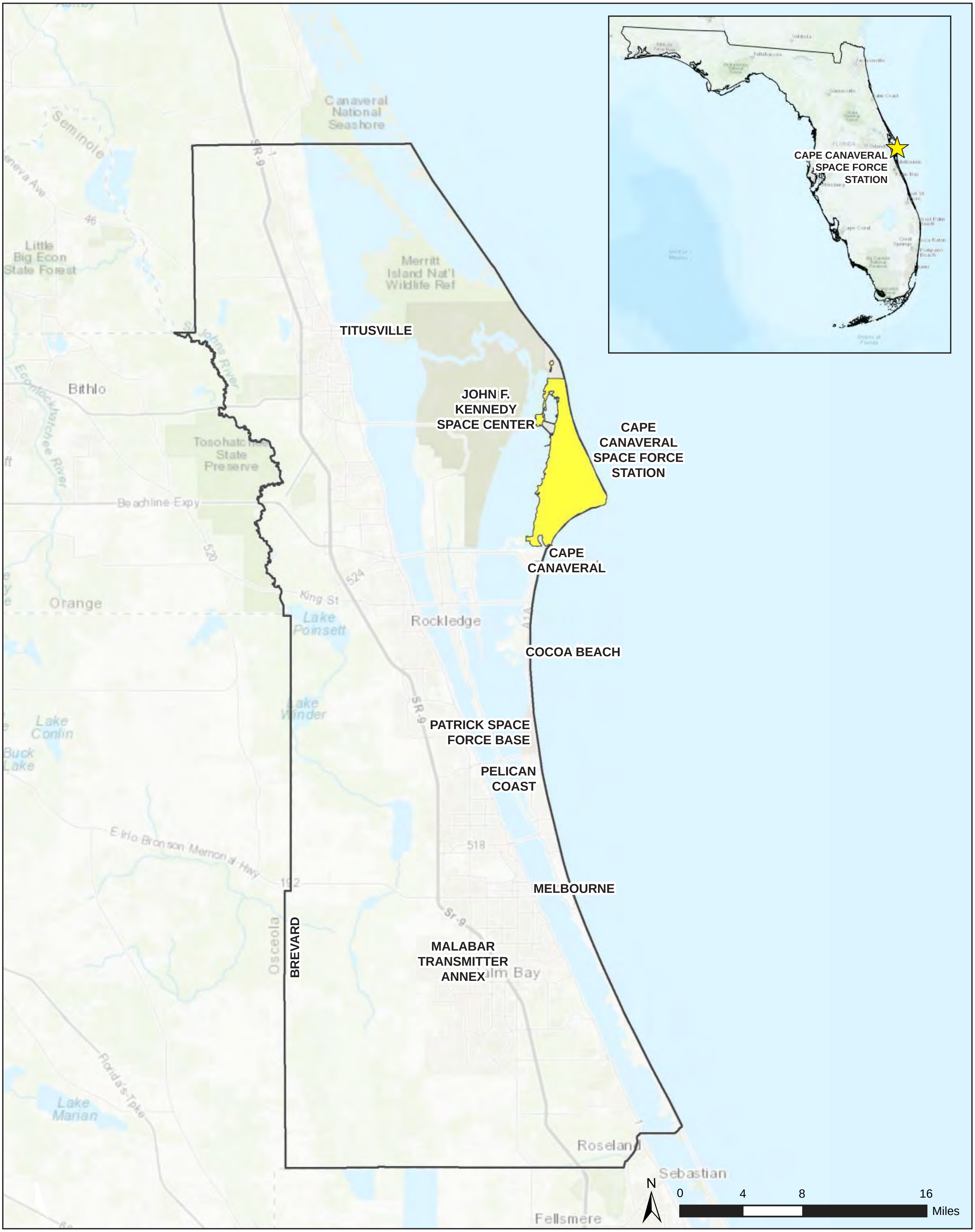
This Environmental Assessment (EA) documents the potential environmental impacts associated with multiple priority infrastructure improvements (Proposed Action) identified in the *CCSFS DDP* (USSF 2022a). The EA was prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] 4321 et seq.), the regulations of the President's Council on Environmental Quality (CEQ) that implement NEPA procedures (40 Code of Federal Regulations [CFR] 1500-1508), the United States Air Force (USAF) Environmental Impact Analysis Process (EIAP) Regulations at 32 CFR Part 989, and Air Force Instruction (AFI) 32-1015, *Integrated Installation Planning*.

1.2 PROJECT SETTING

CCSFS, formerly Cape Canaveral Air Force Station (CCAFS), occupies approximately 15,800 acres along the Atlantic Coast of Brevard County, Florida, southeast of National Aeronautics and Space Administration's (NASA's) Kennedy Space Center (KSC) on adjacent Merritt Island (**Figure 1-1**). It includes 81 miles of paved roads and a 10,000-foot runway (Skid Strip).

CCSFS is managed by SLD 45 as the primary launch site for the Eastern Range. The National Security Space (NSS) Launch Ranges (Eastern and Western) are national assets serving two major functions—long-range missile testing and operational space lift (AFSPC 2020). They are part of the Major Range and Test Facility Base (MRTFB) construct: a set of test installations, facilities and Ranges that support Department of Defense (DoD) Test & Evaluation programs. They are also Spaceports, providing passage to and from space supporting United States (U.S.) national security, commercial, and civil space missions (AFSPC 2020).

Other installations within the Eastern Range managed by SLD 45 include Patrick Space Force Base (PSFB), formerly Patrick Air Force Base (PAFB), and a network of instrumentation stations, including Malabar Transmitter Annex (MTA), Jonathan Dickinson Missile Tracking Annex (JDMTA), Ascension Auxiliary Airfield, and off-base meteorological instrumentation sites. Operations are directed through the Morrell Operations Center (MOC) at CCSFS, which supports flight safety, weather, scheduling, and instrumentation operations for missile and space launch from the Eastern Range.



CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 1-1: LOCATION OF CCSFS

1.3 PURPOSE OF THE ACTION

The **purpose** of the Proposed Action is to enable USSF to meet DoD and tenant mission requirements by improving, modernizing, and expanding the infrastructure at CCSFS as described in the *CCSFS DDP* (USSF 2022a). Proposed improvements were identified during a two-year planning process that incorporated stakeholder input and an assessment of the current infrastructure condition and mission capability gaps. Alternative conceptual siting locations were analyzed based on environmental and economic considerations, relevant mission requirements, and the plan's goals and objectives. The goal of this effort was to ensure proposed future development and infrastructure improvements met the current and anticipated launch cadence (i.e., launch frequency), MRTFB requirements, and SLD 45 and tenant missions, while promoting sustainable and resilient development within the installation.

Each of the proposed improvements evaluated in this EA supports one or more of the following goals identified as critical to mission success during installation development planning:

- ***Provide reliable infrastructure capable of supporting mission requirements*** – CCSFS must provide Range users with continuous and reliable services that support SLD 45 missions, DoD and commercial space launch, MRTFB operations, Naval maritime operations, and DoD training requirements. Infrastructure improvements would enhance the existing infrastructure (e.g., potable water, wastewater, power, and communications). Outdated facilities would be modernized to meet mission requirements.
- ***Reduce impacts to personnel and equipment from launch operations*** – Potential impacts of the launch mission on day-to-day operations must be integrated wholistically into facility siting and district planning. Infrastructure improvements would relocate non-essential personnel and functions out of launch exclusionary safety zones.
- ***Eliminate critical periods on the Eastern Range*** – Systems must be designed so that construction, maintenance, and repair of major utilities can occur without disruption of services. Utility components should be able to be taken out of service with little or no impact on base and launch operations. Infrastructure improvements would provide additional redundancy and reduce/eliminate the need for critical periods. Currently, critical periods are established before and during critical mission operations. During these periods, the Range is "locked" and many activities, including maintenance, are restricted to ensure no critical infrastructure is damaged.
- ***Improve base logistics capacity*** – Transportation networks and facility siting must support efficient base operations. Infrastructure improvements would support more efficient operations at CCSFS with a focus on consolidating similar functions and optimizing haul routes and traffic flow.
- ***Expand developable areas in support of mission requirements*** – Efficient, modern and right-sized systems for CCSFS must sustainably support future growth. Infrastructure improvements would maximize developable areas while considering environmental and operational constraints.

1.4 NEED FOR THE ACTION

As identified in the CCSFS planning process, the Proposed Action is **needed** because the current infrastructure at CCSFS lacks the capability and capacity to support USSF and tenant mission requirements. Most facilities and systems on CCSFS date back to the 1950s/1960s and have been reconfigured several times throughout the intervening decades to support various missions. Outdated legacy facilities have been re-purposed for current needs, but they do not provide the state-of-the-art capabilities that are required to achieve mission success. In addition, the current geographical layout of operations at CCSFS and the existing transportation network create inefficiencies, including mandatory evacuations and excess travel for personnel, which expose base operations to disruption, delays, and increased costs. For example, launch hardware movement across the installation is inefficient, reduces traffic flow, and delays operations.

Legacy infrastructure systems are showing signs of stress (e.g., accelerating failures, outages, and anomalies) at the current launch rate (approximately 50 launches annually), causing delays for launch operations and other missions at CCSFS. Based on a review of recently approved NEPA documents, the launch rate from CCSFS is anticipated to increase over the next 5 to 10 years to 142 launches annually (**Table 1-1**). Infrastructure improvements are necessary to successfully implement the Eastern Range mission, including an increased launch cadence, in a safe and efficient manner.

Table 1-1. Recent CCSFS Space Launch Operations with Approved NEPA Documentation

Approved Document	Launch Provider	Project Status	Approved Annual Launches from CCSFS
Environmental Assessment for SpaceX Falcon Launches at Kennedy Space Center and Cape Canaveral Air Force Station (FAA 2020)	SpaceX	Active	50
Environmental Assessment Terran 1 Launch Program Cape Canaveral Air Force Station (USAF 2020h)	Relativity	Under Construction	12
Environmental Assessment for the Reconstitution and Enhancement of Space Launch Complex 20 Multi-User Launch Operations at Cape Canaveral Air Force Station – prepared by Space Florida (USAF 2020g)	Space Florida/ Multi-use	Under Construction	24
Environmental Assessment for the United Launch Alliance Vulcan Centaur Program Space Launch Complex 41 at Cape Canaveral Air Force Station (USAF 2019c)	United Launch Alliance	Under Construction	20
Environmental Assessment for Blue Origin Orbital Launch Site at Cape Canaveral Air Force Station, Florida (USAF 2016)	Blue Origin	Under Construction	12
Environmental Assessment for Space Florida Launch Site Operator License at Launch Complex-46 (FAA 2008)	Space Florida/ Multi-use	Active	24

In accordance with 32 CFR 989.10, previously approved actions, including the launch operations listed in **Table 1-1,** will be incorporated by reference in this EA, which provides a baseline description of the existing physical, social, and economic environment within and around CCSFS. Potential environmental impacts associated with future launches not previously analyzed and the resulting increased launch cadence will be evaluated under separate NEPA documentation when sufficient information is available.

1.5 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

1.5.1 Lead and Cooperating Agency Roles

USSF is the lead agency for the preparation and coordination of the EA (40 CFR 1501.7). USSF owns, or has a permit with NASA for, the real property where the Proposed Action would occur. As the lead federal agency, USSF is responsible for analyzing the potential environmental impacts of the Proposed Action.

USSF requested the participation of the U.S. Navy/ Naval Ordnance Test Unit (NOTU) as a cooperating agency in the preparation of this EA (40 CFR 1501.8) due to their jurisdiction by law and special expertise. The U.S. Navy/NOTU supports the mission capability and readiness of the U.S. Navy's Trident II submarines as well as the Fleet Ballistic Missile Program of the United Kingdom.

NOTU operates from the Poseidon Wharf, Trident Wharf, and various facilities, including Space Launch Complex (SLC) 46, primarily located in the southeast corner of CCSFS. The engineering test facility included in the Proposed Action is a U.S. Navy project. The U.S. Navy/NOTU may decide to adopt this EA to support similar infrastructure development actions. In such cases, the U.S. Navy would issue its own Finding of No Significant Impact (FONSI) and assume responsibility for its environmental decision and any related mitigation measures. A cooperating agency agreement is included in **Appendix A**.

1.5.2 Government to Government Consultations

The National Historic Preservation Act (NHPA) implementing regulations at 36 CFR Part 800 require federal agencies to consult with federally recognized tribes historically affiliated with the area of potential effects for the project to determine the presence of, and resolve adverse effects to, Traditional Cultural Properties (TCPs). Consistent with the NHPA and its implementing regulations, DoD Instruction 4710.02, *DoD Interactions with Federally Recognized Tribes*, and Department of the Air Force Instruction (DAFI) 90-2002, *Air Force Interactions with Federally Recognized Tribes*, federally recognized tribes that are historically affiliated with the CCSFS geographic region were invited to consult on proposed undertakings that have a potential to affect properties of cultural, historical, or religious significance to the tribes. The tribal consultation process is distinct from NEPA consultation or the interagency coordination process, and it requires separate notification to all relevant tribes. The timelines for tribal consultation are also distinct from those of other consultations. The CCSFS point-of-contact for Native American tribes is the Installation Commander.

The USSF solicited early comment from three Native American Tribal governments that may be impacted or have an interest in the Proposed Action: the Seminole Nation of Oklahoma, Miccosukee Tribe of Indians of Florida, and the Seminole Tribe of Florida. Correspondence with the Native American tribal governments regarding the Proposed Action is included in **Appendix A**.

1.5.3 Interagency Coordination and Consultations

Per the requirements of Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, state and local governments that could be directly affected by the Proposed Action were notified during the development of this EA, either directly or through the Florida Department of Environmental Protection (FDEP) Office of Intergovernmental Programs State Clearinghouse Process.

Federal, state, and local agencies with jurisdiction that could be affected by the Proposed Action were notified of the development of this EA and the completion of draft NEPA documents. The agencies contacted during this analysis are listed in **Chapter 6**. Copies of agency correspondence are included in **Appendix A**.

1.5.4 Resource Agency Consultations and Review

Pursuant to the requirements of Section 106 of the NHPA and implementing regulations (36 CFR Part 800), findings of effect and request for concurrence will be transmitted with the Draft EA to the Florida Division of Historic Resources (FDHR), State Historic Preservation Officer (SHPO). Similarly, per Section 7 of the Endangered Species Act (ESA) and implementing regulations (50 CFR 402) and the Migratory Bird Treaty Act (MBTA) (16 USC 703-711), findings of effect and request for concurrence will be transmitted with the Draft EA to the United States Fish and Wildlife Service (USFWS). Correspondence regarding the findings, concurrence, and/or resolution of any adverse effect from the SHPO and USFWS will be included in **Appendix A** of the Final EA.

1.5.5 Public Involvement

The Proposed Action may impact wetlands and/or floodplains; therefore, it is subject to the requirements of EO 11990, *Protection of Wetlands*, EO 11988, *Floodplain Management*, and EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*. In June 2022, USSF published an early notice that the Proposed Action may occur in a floodplain/wetland in *Florida Today* and *The Hometown News (North Brevard and Beaches Editions*) (**Appendix A**). The comment period for public input was 30 days. No comments were received.

Upon completion of the Draft EA and Draft FONSI/Finding of No Practicable Alternative (FONPA), a Notice of Availability (NOA) will be published in *Florida Today* and *The Hometown News (North Brevard and Beaches Editions*) announcing the availability of the NEPA documents for review. The NOA will invite the public to review and comment on the Draft NEPA documents. The public and agency review period will last for 30 days. The NOA and comments received will be included in **Appendix A** of the Final EA.

Copies of the Draft EA and FONSI/FONPA will also be made available for review on the CCSFS website (https://www.patrick.spaceforce.mil/) and at the following locations:

Cape Canaveral Public Library 201 Polk Avenue Cape Canaveral, FL 32920	Titusville Public Library 2121 S. Hopkins Ave. Titusville, FL 32780	Port St John Public Library 6500 Carole Ave Cocoa, FL 32927
Cocoa Beach Public Library 550 North Brevard Ave. Cocoa Beach, FL 32931	PSFB Library Building 722 842 Falcon Ave Patrick SFB, FL 32925	Merritt Island Public 1195 North Courtenay Parkway Merritt Island, FL 32953

1.6 DECISION TO BE MADE

This EA explains why the Action is being proposed, the alternatives that were considered, the potential impacts of the Proposed Action, and the proposed avoidance, minimization, and/or mitigation measures that would lessen impacts. The evaluation summarized in this EA, combined with comments received from the public and reviewing agencies, will provide USSF with the information needed to decide whether the Proposed Action would result in a significant impact to the environment, requiring the preparation of an Environmental Impact Statement (EIS), or whether no significant impacts would occur, resulting in a FONSI. Because the Proposed Action would involve "construction" in a wetland as defined in EO 11990 or "action" in a floodplain under EO 11988 and EO 13690, a FONPA will be prepared in conjunction with the FONSI.

2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

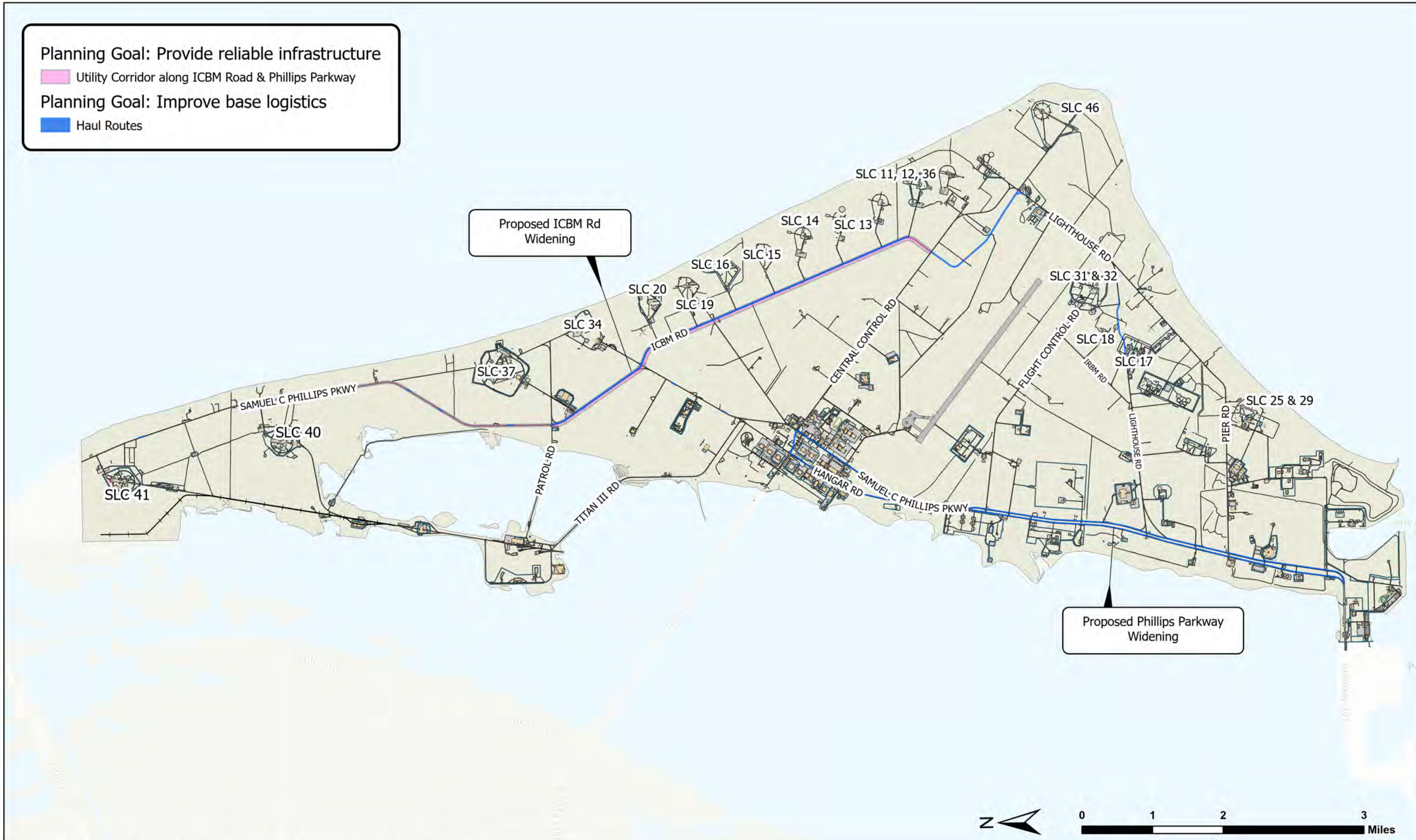
USSF is proposing to improve, modernize, and expand the infrastructure at CCSFS, as described in the *CCSFS DDP* (USSF 2022a), to enable USSF to meet SLD 45 and tenant mission requirements. The Proposed Action is further defined based on the five planning goals described in **Section 1.3** and would include construction of new facilities and infrastructure along with the renovation, modernization, consolidation, and demolition of existing assets to maximize mission capabilities. Locations of the improvements and conceptual facility layouts within the Proposed Action are depicted on **Figures 2-1 through 2-6**.

2.1.1 Provide Reliable Infrastructure Capable of Supporting Mission Requirements

The proposed improvements would modernize and expand infrastructure to support SLD 45 and tenant missions and provide additional system redundancy. Infrastructure improvements would include expanding a utility corridor; providing increased resiliency and redundancy for potable water, wastewater, power, and communications systems; and consolidating the munitions storage areas (MSAs).

2.1.1.1 Utility Corridor Along ICBM Road and Phillips Parkway

A utility corridor would be constructed along ICBM Road and Samuel C. Phillips Parkway (Phillips Parkway) with available connectivity to the SLCs along ICBM Road (SLCs 13, 14, 15, 16, 19, 20, and 34). Utilities within the corridor may include power, potable water, wastewater, communications, and commodities (specific utility improvements described in the following sections). The corridor would begin at the New Glenn Substation and extend to the Delta IV Substation (**Figure 2-1**). Where feasible, utilities would be installed within the cleared corridor west of ICBM Road. However, in order to avoid conflicts with existing utilities, a new corridor (approximately 40-foot wide) east of ICBM Road may be required. Approximately 10 acres of scrub vegetation would be cleared to install utilities; however, these areas would be allowed to revegetate by recruitment and/or through seed bank of surrounding native vegetation. Portions of the proposed corridor would be constructed within wetlands, surface waters, and the 100-year floodplain. The location of the existing SLCs and utility lines preclude siting alternatives that would avoid these resources. Potential impacts to water and biological resources are discussed in **Section 3.2.2.3.2** and **Section 3.2.6.3.2**, respectively. North of the Delta IV Substation, utilities, such as liquid natural gas, would be installed within the existing corridor.



CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 2-1: CCSFS PROPOSED INFRASTRUCTURE IMPROVEMENTS - INSTALLATION VIEW

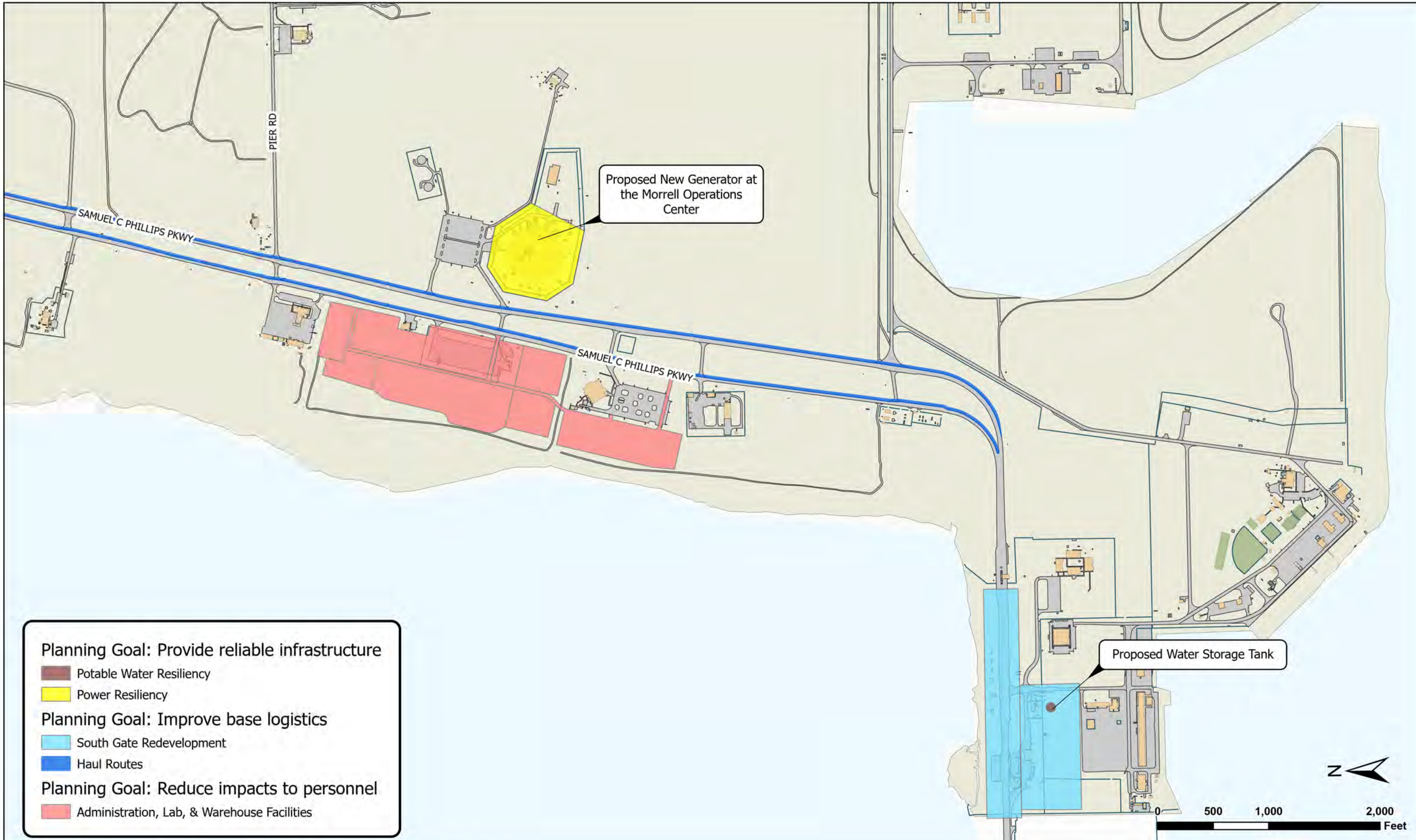


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FIGURE 2-2: CCSFS PROPOSED INFRASTRUCTURE IMPROVEMENTS - SOUTH GATE

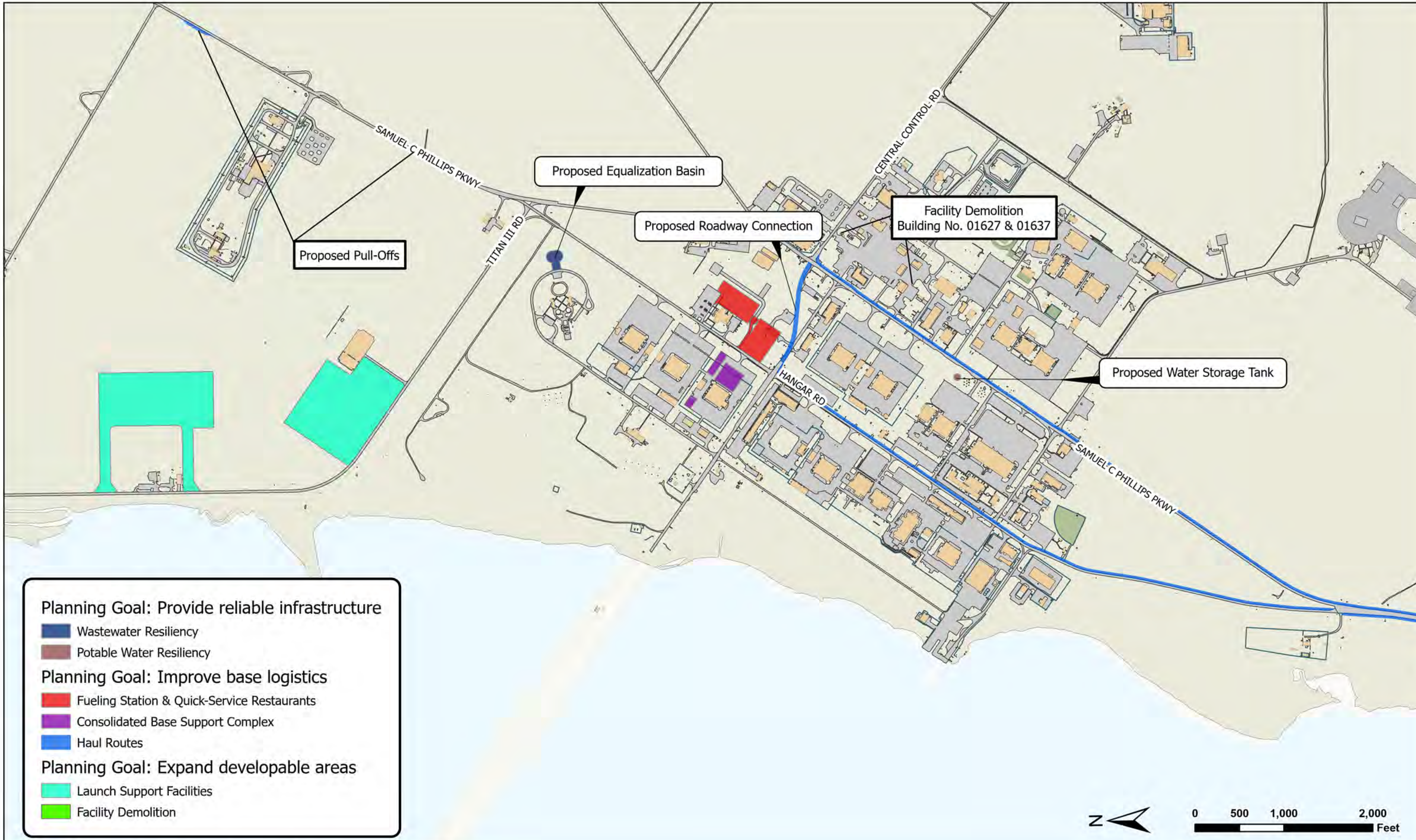

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FIGURE 2-3: CCSFS PROPOSED INFRASTRUCTURE IMPROVEMENTS - INDUSTRIAL AREA

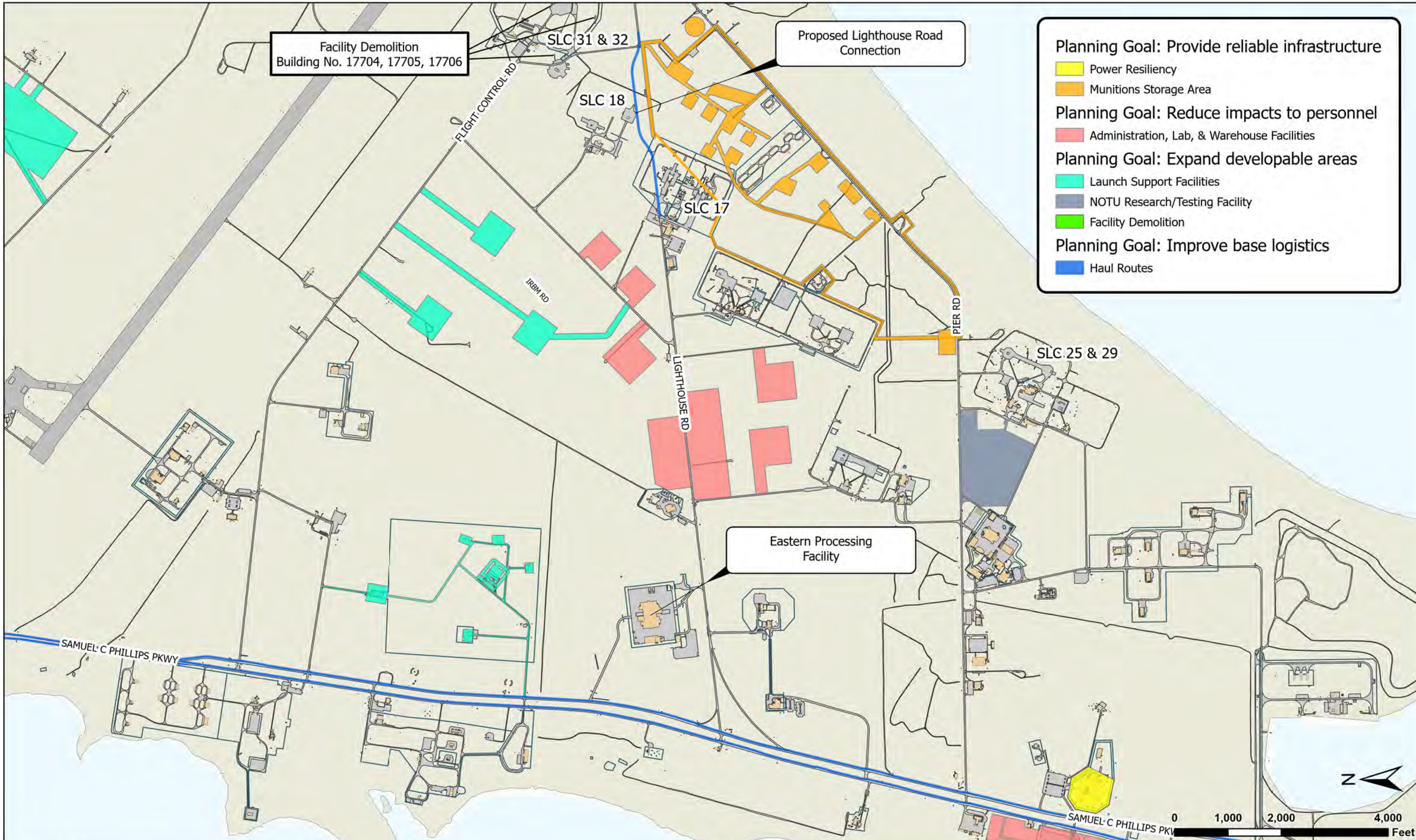

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FIGURE 2-4: CCSFS PROPOSED INFRASTRUCTURE IMPROVEMENTS - CENTRAL

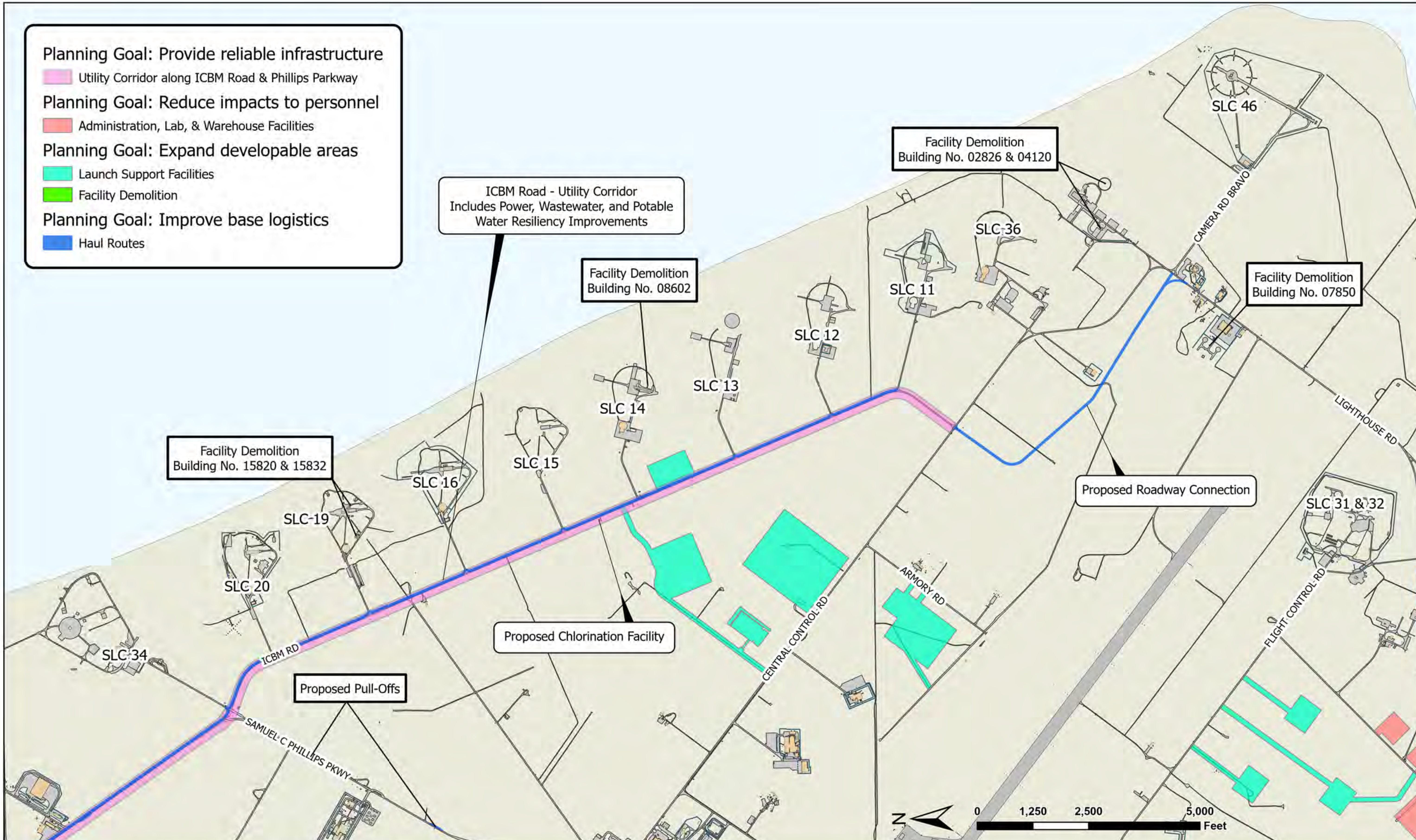

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FIGURE 2-5: CCSFS PROPOSED INFRASTRUCTURE IMPROVEMENTS - LAUNCH OPERATIONS SOUTH

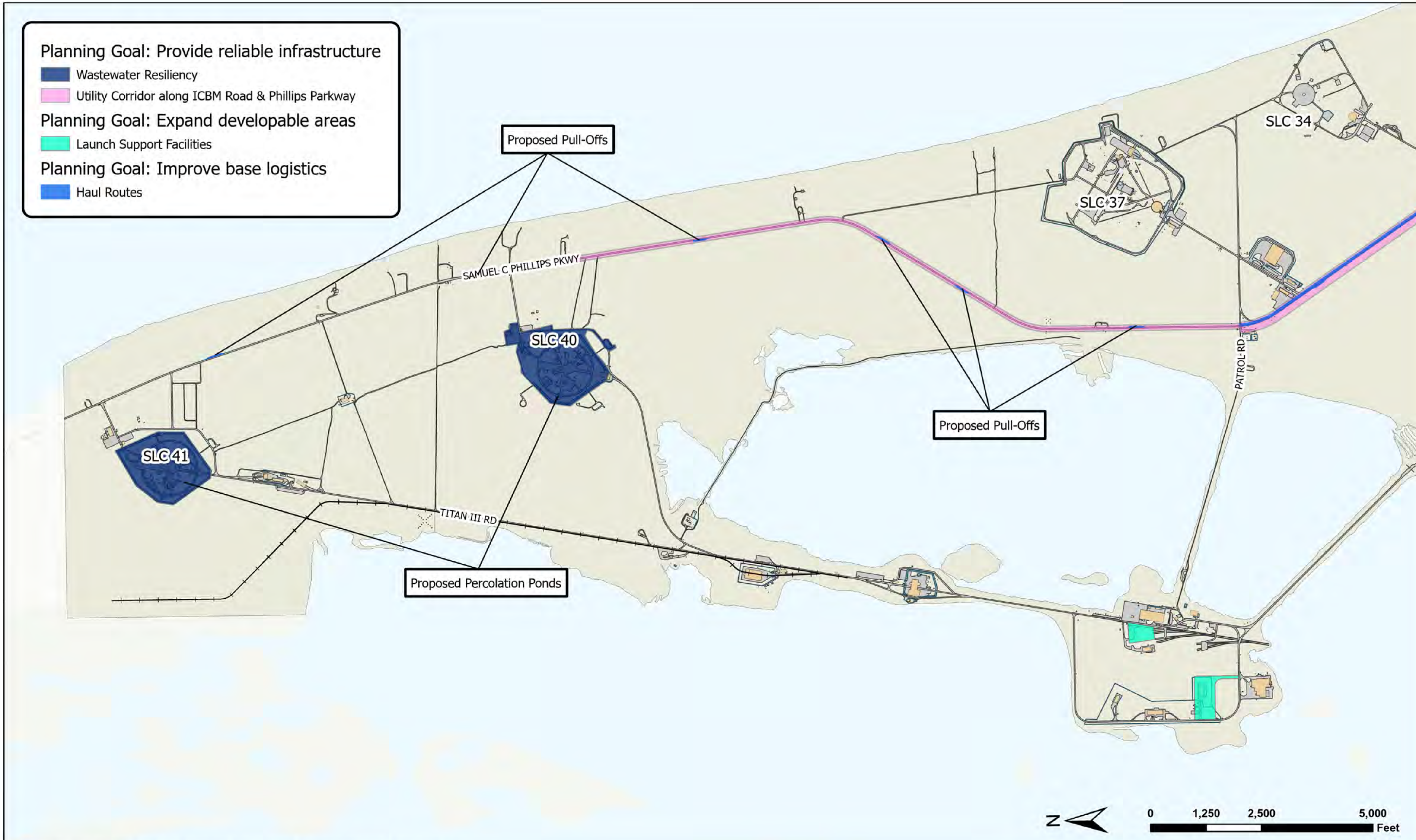

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FIGURE 2-6: CCSFS PROPOSED INFRASTRUCTURE IMPROVEMENTS - LAUNCH OPERATIONS NORTH

2.1.1.2 Potable Water Resiliency

The following improvements would increase potable water resiliency by increasing on-site storage capacity and decreasing pressure variations within the distribution system. Proposed improvements would be constructed within previously cleared sites or included within the utility corridor described in **Section 2.1.1.1**.

- A 750,000-gallon potable water storage tank would be constructed on a grassy, 0.25-acre site located east of the CCSFS South Gate (**Figure 2-2**), which is within the 100-year floodplain. This location was selected because of its proximity to Pump Station 2 and existing utility lines, which preclude siting alternatives outside of the floodplain. Potential impacts to water resources are discussed in **Section 3.2.2.3.2**. A 400,000-gallon water tank would also be constructed on a 0.25-acre site in the industrial area (**Figure 2-3**). Improvements would include chlorination, recirculation, and necessary piping to integrate the tanks into the existing system.
- A new 2.25-mile, 12-inch ductile iron water main and 400-square foot (SF) chlorination injection facility would be installed along ICBM Road (**Figure 2-5**).

2.1.1.3 Wastewater Resiliency and Capacity

The following improvements to the wastewater utility infrastructure are proposed to meet CCSFS operational demands. Proposed improvements would be constructed within previously cleared sites or included within the utility corridor described in **Section 2.1.1.1**.

- An additional 100,000-gallon equalization basin would be constructed on a one-acre, previously cleared, grassy site adjacent to the existing equalization basin at the Regional Wastewater Treatment Plant (RWWTP) (**Figure 2-3**). Improvements would include construction of approximately 1,000 SF of impervious area (i.e., access drive and walkway), installation of two new submersible pumps and repair of related plant components to tie the new equalization basin into the existing system.
- Approximately 2.8 miles of 10-inch high-density polyethylene (HDPE) wastewater collection main would be installed along ICBM Road from its intersection with Phillips Parkway/Freedom Road to SLC 36 (**Figure 2-5**).
- A percolation pond, approximately two acres in size, would be constructed within the developed footprint of both SLC 41 and SLC 40 to treat/store launch-related deluge and washdown water (**Figure 2-6**). These sites are within the 100-year floodplain. The locations of SLCs 40 and 41 preclude siting the ponds outside of the floodplain. Potential impacts to water resources are discussed in **Section 3.2.2.3.2**.

2.1.1.4 Power Distribution Resiliency and Redundancy

The following improvements to the CCSFS power distribution system would increase resiliency and redundancy to support mission requirements, including the space launch cadence listed in **Table 1-1**. Proposed improvements would be constructed within previously cleared sites or included within the utility corridor described in **Section 2.1.1.1**.

- Approximately 2.5 miles of new concrete-encased duct bank with 500-kcmil, 15-kilovolt power conductors in two- to five- inch polyvinyl chloride (PVC) ducts (includes one spare duct) would be installed through pad mount sectionalizing (junction) cabinets along ICBM Road from SLC 12 to SLC 20 (**Figure 2-5**). Improvements to the power distribution along ICBM Road would also include installation of a 600-amp, medium-voltage switch that would be tied into an existing feeder and the installation of loop-feed transformers with integrated switching capability at the ICBM Road SLCs (seven total transformers).

- A 1.5-megawatt/480-volt emergency generator and 2000-amp automatic transfer switch would be installed at the MOC (**Figure 2-2**). Improvements would also include an above-ground storage tank for 500 gallons of fuel, new concrete pads, grounding, conduit, and conductors. Approximately 0.25 acres of impervious area would be added on a previously cleared, grassy site adjacent to the MOC.

2.1.1.5 Munitions Storage Areas

New, modernized, and consolidated munitions storage magazines would be constructed adjacent to the current MSA 3 location. The new MSA complex would require clearing an estimated 40 to 48 acres of native scrub habitat composed of a 50-foot clear zone around each magazine, a 30-foot clear zone on each side of access roads, and a 30-foot clear zone on each side of the perimeter fence (**Figure 2-4**). Within the MSA, site improvements would include 8.5 acres of new impervious area: 15 new buildings, weather tower, new access roads, roadway improvements (gravel to asphaltic concrete), additional parking, security measures, and operational space for assigned personnel to perform administrative functions such as inventory control, access control, and training. MSA 2 and MSA 5 would be demolished and available for future development compatible with land use planning goals. Portions of the consolidated MSA would be constructed within wetlands and the 100-year floodplain. The location of the current MSA 3 precludes siting alternatives that would avoid these resources. Potential impacts to water and biological resources are discussed in **Section 3.2.2.3.2** and **Section 3.2.6.3.2**, respectively.

2.1.2 Reduce Impacts to Personnel and Equipment From Launch Operations

Infrastructure improvements would include constructing and renovating facilities to relocate non-essential personnel and equipment out of launch exclusionary safety zones.

2.1.2.1 Administration, Laboratory, and Warehouse Facilities

Construction of new administrative, laboratory, and warehouse facilities would require clearing of approximately 120 acres within the southern portion of CCSFS.

Administration facilities would be constructed on a 36-acre site west of Phillips Parkway near the existing SLD 45 headquarters facility (**Figure 2-2**). Administrative offices and support services, including the fitness center and pool, running track, dining hall, quick-service restaurant, and convenience store with gas station, would be relocated to this new administrative campus. Site improvements would include approximately 20 acres of facilities, access roads, parking, curbing, sidewalks, and other impervious areas. An estimated 16 acres would be cleared for stormwater management, lawns, and other pervious areas. Area and safety lighting would be provided. Administrative functions and personnel would be relocated from facilities 1645, 1704, 1708, 1711, 44410, 44440, 55150, 60600, 60650, 60701, and 60740. The following facilities would be demolished: 1645, 1704, 1708, 1711, 44410, and 60600 (approximately 200,000 SF), and the remaining facilities would be available for reallocation.

Shop, laboratory, and warehouse facilities would be constructed on four sites, totaling 63 acres, along Lighthouse Road between the Eastern Processing Facility (EPF) and the Air Force Space and Missile Museum (**Figure 2-4**). Facilities include storage and warehouse buildings totaling 225,000 SF, shop/laboratory buildings totaling 95,000 SF, and two 50,000-SF administration and storage facilities. Construction would include approximately 33 acres of impervious improvements (e.g., facilities, access roads, parking, and sidewalks) and 30 acres of pervious improvements (e.g., lawns, stormwater management, and clear zones). Area and safety lighting would be provided. Shop, laboratory, and warehouse functions would be relocated from facilities 1604, 1611, 1612, 1621, 1739, 1744, 1759, 49505, 49535, 49536, 49750, 54814, 54820, and 54935. The following facilities would be demolished: 1604, 1611, 1612, 1621, 1744, 1759, 49505, 49535, 49536, 49750, 54814, and 60701 (approximately 210,000 SF), and the remaining facilities would be available for reallocation.

Two 25,000-SF facilities and supporting infrastructure would be constructed on two five-acre undeveloped sites east of IRBM Road and one 50,000-SF facility and supporting infrastructure would be constructed on 10 acres to the west (**Figure 2-4**). Among the three sites, approximately 10 acres would contain impervious improvements and 10 acres would be reserved for pervious improvements.

2.1.3 Eliminate Critical Periods on the Eastern Range

The following proposed improvement would reduce/eliminate launch critical periods by reducing the risk of a communication infrastructure failure and disruption of critical mission operations. Currently, critical periods are established before and during critical mission operations and span between 8 and 24 hours. During these periods, many activities (e.g., ground disturbance, site preparation, soil compaction, power distribution switching, utility maintenance, and reconfiguring water valves, etc.) are restricted to ensure no critical infrastructure is damaged.

2.1.3.1 Critical Telecommunications Lines

Approximately 23 miles of existing telecommunication lines would be replaced and placed inside concrete-encased duct bank. The duct bank would be constructed adjacent to existing, unprotected duct bank and direct-buried telecommunications lines. New cabling would be installed and connected to existing switches. Additional site improvements would include grading, drainage, and site restoration.

Improvements would require site preparation and trenching within approximately 84 acres, assuming a 30-foot work area. Vegetated areas would be allowed to revegetate by recruitment and/or through seed bank of surrounding native vegetation. Clearing along ICBM Road (approximately 10 acres) would be included in the utility corridor described in **Section 2.1.1.1**. Portions of proposed duct bank would occur within wetlands, surface waters, and the 100-year floodplain. The location the existing communications network precludes siting alternatives that would avoid the floodplain. Wetlands and surface waters would be avoided where possible; however, avoiding all impacts may not be practicable given the location of existing infrastructure. Potential impacts to water resources are discussed in **Section 3.2.2.3.2**.

2.1.4 Improve Base Logistics Capacity

Infrastructure improvements would establish designated haul routes and improve traffic flow, consolidate similar functions, and modernize the CCSFS South Gate to support more efficient operations at CCSFS.

2.1.4.1 Critical Haul Routes and Traffic Flow

The following improvements would be implemented to address traffic flow inefficiencies throughout CCSFS. Several haul route improvements would occur within the 100-year floodplain. The location of the existing roadways precludes siting alternatives that would avoid the floodplain. Potential impacts to water resources are discussed in **Section 3.2.2.3.2**.

- A new 0.25-mile roadway would be constructed to connect NASA Causeway to Central Control Road within the CCSFS industrial area (**Figure 2-3**). NASA Parkway East would be realigned to the north through a previously developed, 1.75-acre, vacant lot between Hangar Road and Phillips Parkway. This roadway connector would include two 12-foot lanes with four-foot shoulders.

- Eight miles of Phillips Parkway would be widened from a four-lane divided roadway to a six-lane divided roadway from the CCSFS South Gate to just south of the industrial area (**Figure 2-1**). A lane would also be added to Hangar Road from its intersection with NASA Causeway to the merge with Phillips Parkway. All proposed lanes would be 12-feet wide with four-foot shoulders. Proposed improvements, including additional pavement and stormwater management facilities, would be constructed on approximately 50 acres adjacent to Philips Parkway and Hangar Road. An estimated 0.5 to 2 acres of scrub habitat would be cleared depending on final project design. Surface water (i.e., canals and roadside drainage ditches) impacts are also anticipated. The location the existing roadway also precludes siting alternatives that would avoid surface water and habitat impacts. Potential impacts to water and biological resources are discussed in **Section 3.2.2.3.2** and **Section 3.2.6.3.2**, respectively.
- Ten 4,000-SF, paved passenger vehicle pullovers/refuge areas, totaling 1.5 acres, would be constructed along the north and southbound lanes of Phillips Parkway from the intersection with Titan III Road to SLC 41 (**Figures 2-3, 2-5, and 2-6**).
- A new 0.70-mile road would be constructed to connect Lighthouse Road through SLC 17 and SLC 18 (**Figure 2-4**). This roadway connector would include two 12-foot lanes with four-foot shoulders, totaling 4.25-acres, generally within the legacy Lighthouse Road corridor.
- A new 1.25-mile road would be constructed to connect ICBM Road to Lighthouse Road and Camera Road Bravo (**Figure 2-5**). This roadway connector would include two 12-foot lanes with four-foot shoulders and would extend from the intersection of ICBM and Central Control Road to the Lighthouse Road and Camera Road Bravo intersection. Proposed improvements, including additional pavement and stormwater management facilities, would be constructed on approximately 7.75 acres of undeveloped forest and freshwater wetlands. The location of the existing roadway network precludes siting alternatives that would avoid wetlands. Potential impacts to water resources are discussed in **Section 3.2.2.3.2**.
- Four miles of Phillips Parkway and ICBM Road would be widened from the New Glenn Substation to Delta IV Substation (**Figures 2-5 and 2-6**). The northbound lane of Phillips Parkway and ICBM Road would be widened to the east. The proposed 12-foot travel lane, four-foot shoulder, and 12-foot swale would be constructed within the existing cleared right-of-way.
- Approximately 34 Florida Power and Light (FPL) poles and transmission lines would be relocated 50 feet to the west of ICBM Road and Phillips Parkway. An estimated five to seven acres of scrub habitat would be impacted to construct the new powerline easement. Impacts to freshwater wetlands are also anticipated. The location of the existing powerline corridor precludes siting alternatives that would avoid wetland and habitat impacts. Potential impacts to water and biological resources are discussed in **Section 3.2.2.3.2** and **Section 3.2.6.3.2**, respectively.

2.1.4.2 Fueling Station and Quick-Service Restaurant

A fueling station would be constructed adjacent to the existing cafeteria (Building 01748) within the CCSFS industrial area (**Figure 2-3**). The existing cafeteria would be renovated to include a convenience store with exterior access to the fueling area. An existing access road from Hanger Road would be improved to accommodate higher traffic volumes. The fueling station would consist of four fueling pumps, aboveground fuel storage, canopy, service bays and waiting area, car wash, and ingress/egress/parking. A quick-service restaurant (approximately 3,000 SF), with access driveways and parking, would be constructed adjacent to the fueling station on a vacant lot at the corner of NASA Parkway and Hangar Road.

The proposed fueling station and restaurant would be constructed on a five-acre, improved, vacant site with approximately four acres of new impervious improvements including facilities, access roads, parking, curbing, and sidewalks. The remaining one acre would consist of pervious improvements (e.g., stormwater management and green space). Area and safety lighting would be provided.

2.1.4.3 Consolidated Base Support Complex

A Consolidated Base Support Complex would be constructed on a 5.75-acre site within the existing impervious parking area around Hangar N (Building 1728), located in the industrial area (**Figure 2-3**). The complex would consist of four buildings: one maintenance shop (30,000 SF) east of Hanger N and three maintenance or storage facilities (5,000 SF each) along the northeastern edge of the paved area. Multiple civil engineering support maintenance shops and a storage facility would be consolidated at this location including the Crane Rigging Shop (Building 1635), Generator Shop (Building 44625), Pest Operations (Building 44633), Searchlight Shop (Building 44636), Electric Shop and Supply (Building 49816), and the Heavy Equipment Shop (Building 49835). Following consolidation, the existing buildings would be demolished (45,310 SF). No clearing or additional impervious areas would be required.

2.1.4.4 South Gate Redevelopment

The following improvements would be implemented to address inefficiencies at the CCSFS South Gate. South Gate improvements would occur within the 100-year floodplain. The location of the existing South Gate entry control point precludes siting alternatives that would avoid the floodplain. Potential impacts to water resources are discussed in **Section 3.2.2.3.2**.

- Phillips Parkway leading to the South Gate of CCSFS would be reconfigured to support 24/7 operations and improve security measures (**Figure 2-2**). Approximately 1,600 feet of Phillips Parkway would be reconstructed to a traffic-calming configuration. Improvements would occur within a 5.5-acre site along the existing roadway corridor between the Pass and Identification Building (Building 01068) and the CCSFS South Gate.
- Two new inspection bays would be added to the existing truck inspection facility (Building 91923). The addition would be constructed on a previously developed, vacant, three-acre site south of the existing vehicle inspection facility (**Figure 2-2**). Approximately 2.5 acres of the site would contain impervious improvements, including the new bays, access roads, parking/queuing area, curbing, and sidewalks. A half-acre would be reserved for pervious improvements such as clear zones, lawns, and stormwater management. Area and safety lighting would be provided.

2.1.5 Expand Developable Areas in Support of Mission Requirements

Infrastructure improvements would include construction of new, state-of-the-art launch support and research and testing facilities and demolition of outdated assets. Facilities were conceptually sited to maximize development opportunities at CCSFS while considering environmental and operational constraints.

2.1.5.1 Launch Support Facilities

Multiple launch support facilities, including payload processing facilities, integration facilities, vehicle refurbishment facilities, and vehicle staging and storage facilities would be constructed on approximately 220 acres in multiple locations at CCSFS. Site improvements would include landscaping, utility installation, area lighting, stormwater management, parking, sidewalks, and service roads. The siting process for these facilities considered the existing transportation network as well as a variety of environmental constraints including explosive safety zones, launch safety exclusionary zones, and listed species habitat (scrub). These constraints preclude siting alternatives that would completely avoid wetlands, surface waters, and floodplains. Potential impacts to water resources are discussed in **Section 3.2.2.3.2**. The proposed facilities are described below.

- A 120,000-SF facility would be constructed on a 31-acre undeveloped site north of the CCSFS runway and directly adjacent to the west side of Armory Road (**Figure 2-5**). Approximately 18 acres would contain impervious improvements and 13 acres would be reserved for pervious improvements.
- A 130,000-SF facility would be constructed on a 50-acre undeveloped site north of Central Control Road, between Armory Road and Azusa Road **(Figure 2-5)**. Approximately 17 acres would contain impervious improvements and 33 acres would be reserved for pervious improvements.
- Three facilities, totaling 100,000-SF, would be constructed on a 26-acre undeveloped site south of an improved and extended Azusa Road, between ICBM Road and Central Control Road **(Figure 2-5)**. Approximately 14 acres would contain impervious improvements and 12 acres would be reserved for pervious improvements. The improved and extended Azusa Road would be constructed between Central Control Road and ICBM Road, with approximately four acres of impervious improvements, of which one acre is the existing road.
- A 50,000-SF facility would be constructed on a 15-acre undeveloped site south of Azusa Road **(Figure 2-5)**. Approximately six acres would contain impervious improvements and nine acres would be reserved for pervious improvements.
- Two 25,000-SF facilities and supporting infrastructure would be constructed on a 10-acre undeveloped site east of ICBM Road (**Figure 2-5**). Approximately five acres would contain impervious improvements and five acres would be reserved for pervious improvements.
- Three 40,000-SF facilities (or one 120,000-SF facility), supporting infrastructure, and access road connections would be constructed on a 34-acre undeveloped site south of Flight Control Road and west of IRBM Road (**Figure 2-4**). Approximately eight acres would contain impervious improvements and 26 acres would be reserved for pervious improvements. An estimated two to three acres of scrub habitat would be cleared for new facility construction. Potential impacts to biological resources are discussed in **Section 3.2.6.3.2**.
- Six facilities, totaling approximately 100,000 SF, and supporting infrastructure would be constructed on the site of MSA 5 along the east side of Phillips Parkway, south of Mission Control Road (**Figure 2-4**). Proposed facilities would be constructed following the demolition and relocation of MSA 5. Because this site is located within threatened and endangered species habitat, new construction outside of currently developed/cleared areas would be minimized. Approximately two acres of scrub habitat would be cleared for new facilities. Potential impacts to biological resources are discussed in **Section 3.2.6.3.2**
- Four facilities, totaling 180,000 SF, supporting infrastructure, and access road connections would be constructed on two 17-acre undeveloped sites along the east side of Titan III Road, near the industrial area (**Figure 2-3**). Approximately 23 acres would contain new impervious improvements and nine acres would be reserved for pervious improvements.
- Two facilities, totaling 120,000 SF, supporting infrastructure, and access road connections would be constructed on two sites (14 acres total) west of the Titan III Road causeway

(**Figure 2-6**). Most of this area has been previously cleared and existing parking and access drives would be reused. Building 70659 (22,983 SF), which is currently vacant, and the surrounding facilities/pavement (approximately 43,503 SF) would be demolished.

2.1.5.2 NOTU Research/Testing Facility

The U.S. Navy would construct an engineering test facility, including offices and laboratories (245,000 SF), on a 37-acre site south of Pier Road **(Figure 2-4)**. The proposed facility would support testing, research, and development requirements. Site improvements would include security fencing, utilities, landscaping, stormwater management, and approximately 405,000 SF of parking, roadways, and sidewalks.

2.1.5.3 Stand-Alone Facility Demolition

USSF maintains a list of facilities proposed for demolition that no longer meet mission requirements and/or have deteriorated beyond repair. Facilities prioritized for demolition on that list are included in the Proposed Action (**Table 2-1**). These stand-alone demolition projects are not associated with the infrastructure improvements described earlier in this chapter. A complete list of proposed facility demolition is included in **Table 3-10** (**Section 3.2.5.3.2**).

Table 2-1. Priority Stand-Alone Facility Demolition

Building Number	Building Description	Area (SF)	Construction Year	Reference Map
1627	Storage	457	1961	Figure 2-3
1637	Maintenance Shop	702	1952	Figure 2-3
2826	Ground Support Storage	274	1983	Figure 2-5
4120	Transformer Storage	292	1953	Figure 2-5
7850	Petroleum, Oil, Lubricants (POL) Storage	204	1959	Figure 2-5
8602	Paint Storage	162	1957	Figure 2-5
15820	Hazardous Storage	3,155	1965	Figure 2-5
15832	Contaminated Liquids Storage	697	1959	Figure 2-5
17704	Museum Rocket Restoration	983	1961	Figure 2-4
17705	Museum Rocket Restoration	1,101	1961	Figure 2-4
17706	Museum Rocket Restoration	278	1961	Figure 2-4

For all proposed demolition, salvageable materials would be recycled, and unsalvageable materials would be disposed of properly. Utility lines, where present, would be isolated, cut, and capped, and the building sites would be backfilled/stabilized and graded for drainage. Where compatible with the CCSFS planning goals, impervious areas would be returned to open space and would be available for future development. Several of the facilities proposed for demolition are in the 100-year floodplain. The locations of these facilities preclude siting alternatives that would avoid the floodplain. Potential impacts to water resources are discussed in **Section 3.2.2.3.2**.

2.2 NO-ACTION ALTERNATIVE

CEQ regulations (40 CFR 1502.14) require agencies to consider a “no action” alternative in their NEPA analyses. The “no action” alternative serves in part to compare the effects of not taking action with the effects of the action alternative(s). Under the No-Action Alternative, the environmental, social, and economic conditions described as the affected environment in the EA would not be affected by activities described under the Proposed Action. Any existing activities or operations would occur in accordance with existing laws and permits. Existing uses would continue at current levels. Individual actions within the Proposed Action may proceed but would have to be evaluated on their own merit under the USAF EIAP guidelines to determine the scope of environmental impacts and the appropriate level of NEPA analysis. Thus, the No-Action

Alternative serves as a baseline to compare the impacts of the Proposed Action and will be carried forward for further analysis in the EA.

Under the No-Action Alternative for this EA, the status quo at CCSFS would be maintained and the proposed infrastructure improvements (Proposed Action) would not proceed or be implemented. Details for the No-Action Alternative in relation to the five installation planning goals presented in **Section 2.1** are described below.

2.2.1 Provide Reliable Infrastructure Capable of Supporting Mission Requirements

In the No-Action Alternative, the infrastructure at CCSFS would be maintained but would not be improved. Range operations, including space launch, would be limited by outdated infrastructure.

- Proposed utilities would not be provided along ICBM Road and current launch providers and tenants would continue to have limited access to utilities, reducing or delaying their operations.
- The MSAs would not be consolidated, and MSA 2 and 5 would be maintained in their current locations and condition. MSA 2 is located along Phillips Parkway, the major north/south transportation route on CCSFS, which limits the types and quantity of ordnance that can be stored. The storage magazines at MSA 5 are antiquated and in poor condition. MSA 3 would not be expanded, and munitions storage capacity would not meet anticipated SLD 45 and tenant storage requirements.
- The capacity limits at the RWWTP would not be increased, and existing operations would be maintained at current levels. Percolation ponds would not be constructed at SLC 41 and SLC 40 and deluge and washdown water would continue to be diverted to the RWWTP. The influx of deluge water would continue to strain operations at the RWWTP. Existing wastewater treatment capacity would limit the launch cadence and constrain SLD 45 and tenant operations.
- Additional capacity would not be added to the CCSFS potable water system (i.e., additional storage tanks would not be constructed). Water quality and pressure issues would continue to occur at SLC 36 and SLC 46.
- Proposed improvements to the CCSFS power distribution system would not be implemented and the existing power infrastructure would be maintained. Mobile generators and other maintenance solutions would be necessary to provide electrical redundancy. These systems would be costly and vulnerable to failure that could delay various space and missile launch operations.

2.2.2 Reduce Impacts to Personnel and Equipment From Launch Operations

Under the No-Action Alternative, facilities and personnel would not be relocated out of the launch exclusionary safety zones. Evacuations of non-essential personnel during launch operations would continue and would increase in frequency with the launch operations included in **Table 1-1**.

New administrative facilities would not be constructed. The existing administration functions would remain disbursed primarily throughout the industrial area. SLD 45 would continue to operate and maintain these facilities. Personnel would be subject to frequent evacuations for launch operations, reducing productivity and efficiency.

2.2.3 Eliminate Critical Periods on the Eastern Range

Under the No-Action Alternative, existing telecommunications lines that are direct buried would not be encased in concrete duct bank, and the current critical period restrictions would stay in place, effectively stopping all construction activity for approximately 60 days per year. This work stoppage would create a significant maintenance backlog and delay new construction.

2.2.4 Improve Base Logistics Capacity

Under the No-Action Alternative, logistics would remain in their existing configuration and operational inefficiencies would continue and worsen with the launch operations included in **Table 1-1**.

- The existing transportation system would remain essentially unchanged except for routine maintenance and repair. The existing road network would limit the movement of large transports (e.g., payloads and launch vehicles) through CCSFS. The ICBM Road/Phillips Parkway corridor would not be a usable transportation route for sensitive payloads and equipment. Lengthier, inefficient haul routes would continue to be used resulting in traffic delays.
- CCSFS would continue to operate without a general-use fueling station and a quick-service restaurant. Personnel would continue to use the existing cafeteria with limited operating hours or travel outside of CCSFS (e.g., KSC or the City of Cape Canaveral) for other dining and fueling options.
- A new vehicle inspection facility would not be constructed at the CCSFS South Gate. The existing vehicle inspection functions would remain. Current delays and long vehicle queuing would continue and worsen with the launch operations included in **Table 1-1**. The South Gate entry control point would not be reconfigured in accordance with antiterrorism force protection (AT/FP) standards. The existing circulation pattern, which endangers personnel stationed at the gate and reduces installation security, would be maintained.
- Various engineering support operations at CCSFS would continue to be conducted from dispersed and outdated facilities. Ongoing maintenance of these facilities would result in continued expenditure of funds for sustainment. The existing facilities would limit the amount of personnel and equipment that could be added to meet mission requirements.

2.2.5 Expand Developable Areas in Support of Mission Requirements

Under the No-Action Alternative, new facilities would not be constructed and USSF would continue to use existing facilities for mission support functions (e.g., research, testing, and payload processing), limiting DoD's technological advantage and impacting mission deployment. It is anticipated that the capacity and condition of existing facilities would be insufficient to meet SLD 45 and tenant mission requirements. The buildings/facilities identified for demolition would not be demolished. Ongoing maintenance of these facilities would result in continued expenditure of funds for sustainment.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER STUDY

Per 32 CFR 989.8(c), USSF may expressly eliminate alternatives from detailed analysis that do not meet established selection criteria. To be considered reasonable, an alternative must

- Fully support the purpose and proposed need of action (specifically to provide reliable/redundant infrastructure at CCSFS to support mission requirements).
- Minimize conflicts with the following constraints identified during installation development planning:
    - Operational restrictions (e.g., noise contours, lines of sight, and air installation compatible use zones [AICUZ])
    - Natural and cultural resource protection areas (e.g., sea-level rise inundation zones, floodplains, Installation Restoration Program [IRP] sites, bird/wildlife aircraft strike hazards [BASH], protected species habitat, wetlands, Banana River Lagoon (BRL), Atlantic Ocean, and cultural and historical sites) and habitat restoration and

    management practices [e.g., prescribed burning and invasive species removal/prevention]
  - Security and safety considerations (e.g., launch exclusionary safety zones [i.e., blast danger areas (BDAs), Flight Hazard Areas (FHAs), Flight Caution Areas (FCAs), and Special Clear Areas (SCAs)], airfield operation clear zone [CZ], Accident Potential Zone [APZ], explosive safety quantity distance [ESQD] arcs, and AT/FP standards)
- Maximize operational efficiency by consolidating functions and optimizing the existing transportation network.
- Improve installation safety and security.
- Promote a sustainable installation that can operate into the future without a decline in either the mission or the natural and man-made systems that support it. Sustainability programs at CCSFS include measures to reduce energy use and emissions, improve water and air quality, reduce waste, and protect natural/cultural resources.

Only alternatives that fully satisfied applicable selection criteria above, as well as the No-Action Alternative, were retained for detailed environmental analysis in the remainder of this EA. Alternatives that were considered but were eliminated from further analysis because they did not fully meet the established selection standards are listed below.

2.3.1 Alternative Infrastructure Improvements

During installation development planning, alternative infrastructure improvements were evaluated based on input from stakeholder meetings, a review of planning documents, and an analysis of geographic information systems (GIS) databases. The infrastructure improvements in the *CCSFS DDP* (USSF 2022a) were conceptually sited to meet the purpose and need for the action while minimizing conflicts with the constraints identified in the selection criteria above.

Alternative improvements or siting that did not minimize these constraints in accordance with the EA selection criteria were eliminated from further analysis as briefly described below.

- Additional/alternate locations for administrative or launch support facilities within the installation were eliminated from analysis due to conflicts with environmental and operational constraints (e.g., wetlands, protected species, ESQD arcs, and existing/planned development). The conceptual siting locations in the Proposed Action have gone through an extensive vetting process to minimize environmental conflicts. It is anticipated that other facility siting locations would be viable; however, these alternatives would have the same or similar environmental impacts as those included in the Proposed Action.
- MSA consolidation at the current MSA 2 location was eliminated from further analysis due to its proximity to Phillips Parkway, which inhibits the amount and type of munitions that can be stored. Similarly, consolidation at MSA 5 was eliminated because this area provides habitat for protected species. Consolidation at legacy SLC 25/29 was also considered but eliminated due to the ESQD arc constraints on U.S. Navy operations.
- Construction of an alternate haul route near the Poseidon Wharf was eliminated from consideration due to the unreconcilable conflicts between Trident Basin operations and oversized load movements.
- Alternative improvements to Phillips Parkway (e.g., reversible travel lanes, pull-offs, and partial widening) were evaluated; however, these were not advanced for analysis because of safety concerns and reduced operational efficiency.

2.3.2 Alternatives Only Reutilizing Existing Facilities or Relocating Functions Outside of CCSFS

Where possible, improvements within the Proposed Action would utilize existing facilities/buildings, pavements, and utilities. However, for launch support, research/testing, and administration facilities, existing available facilities on CCSFS would not meet personnel and equipment requirements. Launch support and research facilities have specific function and size requirements that are not met by existing facilities. Additionally, several of the existing administrative facilities are located in launch exclusionary safety zones that are evacuated during launch operations. Therefore, alternatives to reduce new development at CCSFS by only repurposing existing facilities were eliminated and not carried forward for analysis.

Locating operations to commercial space off the installation or to other Eastern Range installations was also examined during the planning process; however, no existing facilities within or outside of CCSFS were found that could meet the established selection criteria. For example, the alternative to move all the munitions storage to PSFB, MTA, or an off-site armory was considered; however, transporting munitions on the local road network would increase safety and security risks. Utilizing commercial space in Titusville or Cape Canaveral was also evaluated; however, this alternative would reduce operational efficiency, incur high rental fees, and increase security risks. Therefore, alternatives to reduce new development at CCSFS by utilizing commercial or DoD properties off installation were eliminated and not carried forward for analysis.

2.3.3 Alternatives Shifting Infrastructure to KSC

Under the Proposed Action, USSF and NASA would continue to coordinate operations and facility usage (e.g., utility corridors and transportation networks would be coordinated to maximize efficiency). However, reducing new development on CCSFS by relocating facilities to KSC does not meet the purpose and need for the action. Therefore, alternatives to shift proposed improvements to KSC were not carried forward for detailed analysis.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

In compliance with NEPA and CEQ regulations, this chapter describes the existing environment (the affected environment) at CCSFS and environmental consequences associated with the Proposed Action and No-Action Alternative. In the context of this EA, the Proposed Action includes the installation improvements, as described in **Sections 2.1.1 through 2.1.5**, that were identified as priorities for meeting the USSF mission at CCSFS, including DoD and commercial space launch (**Table 1-1**) and MRTFB requirements.

Fourteen broad environmental resource areas were evaluated to provide a context for understanding the potential effects of the Proposed Action and as a baseline for assessing the significance of potential impacts. These resource areas include

- Air Quality and Climate
- Water Resources
- Noise and Noise Compatible Land Use
- Soils and Geology Resources
- Historical and Cultural Resources
- Biological Resources
- Compatible Land Use/Visual Resources/Coastal Zone Management
- Infrastructure
- Health and Safety
- Hazardous Materials and Wastes
- Socioeconomics
- Environmental Justice
- Department of Transportation [DOT] Act Section 4(f) Properties
- Airspace

Each resource area section summarizes the affected environment (current conditions); environmental consequences of the Proposed Action; and proposed mitigation (where applicable) and recommended best management practices (BMPs). The following paragraphs briefly describe these subsections.

3.1.1 Affected Environment/Current Conditions

The Affected Environment subsection generally defines the resource area and the regulatory setting as well as the current conditions specific to the study area or Region of Influence (ROI). The ROI is the geographic area potentially affected by the Proposed Action and is defined for each resource area. Generally, the ROI will be the boundary of CCSFS; however, a few resource areas, such as Air Quality, Water Resources, and Socioeconomics, discuss a wider ROI.

3.1.2 Environmental Consequences.

The Environmental Consequences subsection provides an evaluation of the environmental impacts that may result from implementing the Proposed Action or No-Action Alternative. Potential impacts are evaluated in the context of the scope of the Proposed Action as described in **Chapter 2** and in consideration of the potentially affected environment, as characterized in the preceding subsection for each resource area. Potential impacts were evaluated based on the conceptual layouts developed for the *CCSFS DDP* (USSF 2022a). Final resources area impacts would be verified during project design and permitting.

The general approach for this subsection is to describe the criteria for determining a significant impact followed by a discussion of the impacts that may occur by implementing the Proposed Action. As discussed in **Section 2.3** of this EA, and consistent with 32 CFR 989.8(c), alternatives not fully achieving established selection standards were not retained for detailed analysis. Closely related or "connected actions" are also considered, consistent with 40 CFR 1501.9(e)(1).

Determination of the significance of the impact, as described in 40 CFR 1501.3(b), requires an analysis of the potentially affected environment and degree of the effects of the action. The potentially affected environment considers the affected area and its resources, including the natural, human, cultural, and physical environment. Significance can vary with the context or setting of the Proposed Action. The degree of effects considers the duration, type, quality, and intensity of the impact (summarized below) and whether effects would violate federal, state, tribal, or local laws protecting the environment (as described for each resource area).

Duration (short- or long- term): In general, short-term effects are those that would occur only with respect to an activity, for a finite period, or only during the time required for construction or demolition activities. Long-term effects are those that are more likely to be persistent and may be permanent or related to operations of a newly constructed facility.

Type (direct or indirect): A direct effect is caused by an action and occurs around the same time and place. An indirect effect is caused by an action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action.

Quality (adverse or beneficial): An adverse impact is one having unfavorable or undesirable outcomes on the natural or man-made environment. Beneficial impacts provide desirable situations or outcomes.

Intensity (No impact, negligible, minor, moderate, or significant):

- No Impact: no change from existing conditions is expected to occur.
- Negligible: the impact is localized and not measurable or at the lowest level of detection.
- Minor: the impact is localized, slight but detectable, and has little to no effect on the environment.
- Moderate: the impact is readily apparent and appreciable. Moderate impacts may not meet the criteria to be classified as significant, but the degree of change is noticeable and has the potential to become significant if not effectively mitigated.
- Significant: the impact is severely adverse or highly noticeable. Significant impacts warrant heightened attention and examination for potential means for mitigation or the preparation of an EIS to fulfill the policies set forth in NEPA.

3.1.3 Mitigation and Best Management Practices

This subsection describes the estimated mitigation and suggested BMPs that would eliminate or reduce potentially adverse environmental effects of the Proposed Action on each resource area. However, final mitigation plans and BMPs would be developed in coordination with regulatory agencies during project design and permitting. The analysis contained in this subsection, including necessary consultations, coordination, and public input, will provide CCSFS managers with information for decision making and can be used to manage implementation of the Proposed Action into the future.

3.2 RESOURCE AREA ASSESSMENT

3.2.1 Air Quality and Climate

3.2.1.1 Definition of the Resource/Regulatory Setting

Air quality impacts can range from localized effects to the dispersal and transport of air pollutants across large geographic areas. Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The levels of pollutants are generally expressed on a concentration basis in units of parts per billion (ppb), parts per million (ppm), or micrograms per cubic meter ($\mu g/m^3$). CCSFS is in the Central Florida Intrastate Air Quality Control Region, which includes six Central Florida counties, including Brevard County. Therefore, the Brevard County jurisdictional boundary constitutes the ROI for air quality.

The U.S. Environmental Protection Agency (USEPA) sets National Ambient Air Quality Standards (NAAQS) to protect the public health and environmental welfare under the Clean Air Act (CAA) of 1990 (42 USC 7401 et seq) (**Table 3-1**). USEPA has identified the following six criteria air pollutants for which NAAQS are applicable: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM) less than or equal to 10 microns in diameter (PM_{10}), PM less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). USEPA calls these "criteria" air pollutants because it sets standards for information regarding their effects on health or welfare. As part of these criteria, it established two standards:

- ***Primary standards*** provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly.
- ***Secondary standards*** provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Short-term standards (1-, 3-, 8-, and 24- hour periods) are established for pollutants contributing to acute health effects, while long-term standards (quarterly and annual averages) are established for pollutants contributing to chronic health effects.

Table 3-1. Federal Air Quality Standards (NAAQS)

Pollutant		Primary/Secondary Standards	Averaging Time	Level	Threshold
Carbon Monoxide (CO)		Primary	1 Hour	35 ppm	Not to be exceeded more than once per year
			8 Hours	9 ppm	
Lead (Pb)		Primary/Secondary	Rolling 3 Month Average	0.15 µg/m³	Not to be exceeded
Nitrogen Dioxide (NO_2)		Primary	1 Hour	100 ppb	98th percentile of 1-hour daily maximum concentrations (averaged over 3 years)
		Secondary	1 Year	53 ppb	Annual Mean
Ozone (O_3)		Primary/Secondary	8 Hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration (averaged over 3 years)
Particle Pollution (PM)	$PM_{2.5}$	Primary	1 Year	12.0 µg/m³	Annual Mean (averaged over 3 years)
		Secondary	1 Year	15.0 µg/m³	Annual Mean (averaged over 3 years)
		Primary/Secondary	24 Hours	35 µg/m³	98th percentile (averaged over 3 years)
	PM_{10}	Primary/Secondary	24 Hours	150 µg/m³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		Primary	1 Hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, (averaged over 3 years)
		Secondary	3 Hours	0.5 ppb	Not to be exceeded more than once per year

Source: https://www.epa.gov/criteria-air-pollutants/naaqs-table
Notes: ppb = parts per billion by volume, ppm = parts per million by volume, µg/m³= micrograms per cubic meter

NAAQS are expressed in terms of pollutant concentrations. If concentrations of one or more of the six criteria pollutants in a geographic area exceeds the respective NAAQS, the USEPA classifies the area as a "nonattainment" area. Nonattainment designations are generally based on the degree of nonattainment (e.g., serious, severe, moderate, and marginal), which dictates the deadline (i.e., the attainment year) by which the area must be brought back into attainment of a NAAQS. States with nonattainment areas must develop a State Implementation Plan demonstrating how the area will be brought back into attainment of the NAAQS within designated timeframes. A maintenance area is an area that was once designated as nonattainment but is currently meeting and maintaining the NAAQS. Maintenance areas are redesignated by USEPA from "nonattainment" to "attainment with a maintenance plan." An area with concentrations of criteria pollutants below the NAAQS is classified as an "attainment" area for those pollutants. Areas may be in attainment for one pollutant and nonattainment for others.

3.2.1.1.1 Hazardous Air Pollutants

According to USEPA, Hazardous Air Pollutants (HAPs) are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects. Although HAPs (e.g., benzene, which is found in gasoline) do not have established NAAQS, USEPA is required under CAA to control 187 HAPs. Some volatile organic compounds (VOCs) are classified as HAPs. VOCs are also ozone precursors and include any organic compound involved in atmospheric photochemical reactions, except those designated by a USEPA administrator as having negligible photochemical reactivity.

In 2020, the State of Florida repealed sections of the Chapter 62-204, Florida Administrative Code (FAC), *Air Pollution Control*, which outlines the general provisions for air pollution control in the state. In its place, the State of Florida adopted all federal regulations under a modified Chapter 62-204.800, FAC. FDEP is responsible for administering the air quality program in the state. In July 2021, USEPA approved FDEP's State Implementation Plan for attaining and maintaining compliance with NAAQS under 40 CFR Part 52, Subpart K-Florida. Greenhouse Gases and Climate Change

Greenhouse gases (GHGs) affect the earth's atmospheric temperature through physical processes involving both light and thermal energy. GHGs trap the sun's radiation in the Earth's lower atmosphere and re-radiate the absorbed energy, warming the atmosphere and the planet's surface (i.e., the greenhouse effect). GHGs exist in the atmosphere as a result of both natural processes and human activity. Among the most prominent GHGs associated with human activities are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These gases are a combustion byproduct of fossil fuel (i.e., gasoline, diesel, oil, coal, and natural gas) and other organic matter such as wood. Other pollutants that are considered to be GHGs, but which are much less prevalent in the atmosphere, include hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride. Each GHG has a different Global Warming Potential (GWP) and persists for a different length of time in the atmosphere; therefore, GHG emissions are converted into CO_2 equivalents (CO_{2e}) so they can be compared.

Under EO 13990, CEQ is reviewing, revising, and updating the 2016 *Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change*. Currently, the EO recommends using this guidance for assessing the Proposed Action's potential effect on climate change. The guidance also emphasizes that agency analyses should be commensurate with projected GHG emissions and climate impacts and ensure useful information is available to inform the public and the decision-making process in distinguishing between alternatives and evaluating required mitigation. Currently, there are no published thresholds of significance for greenhouse gas emissions, but the federal government recognizes the need to reduce energy consumption and shift to renewable and alternative fuels to reduce emissions.

DoD Directive 4715.21, *Climate Change Adaptation and Resilience*, states that DoD must assess and manage risks associated with the impacts of climate change on DoD missions and installations and strengthen resilience to those impacts. DoD must consider all the strategic implications of climate, as well as continue to assess the ways climate impacts DoD installations, operations, and planning. Additionally, EO 14008, *Tackling the Climate Crisis At Home and Abroad*, requires DoD to review hazards, risks, and security implications of climate change as well as incorporate consideration of climate into relevant strategy, planning, and processes (DoD 2021a, 2021b).

3.2.1.2 Affected Environment / Existing Conditions

3.2.1.2.1 Ambient Air Quality of Brevard County

Brevard County is considered by the USEPA to be in "attainment" for all criteria pollutants (40 CFR 81.310 - Florida); therefore, the General Conformity rule does not apply, nor are there any requirements posed by FDEP for a conformity analysis of the Proposed Action. Although General Conformity does not apply, USSF is required to evaluate the significance of emissions increases from the Proposed Action (40 CFR 1500-1508).

FDEP measures ambient air pollutant levels throughout Florida, and there are two monitoring stations located in Brevard County: Cocoa Beach and Melbourne. The Melbourne monitoring station measures for O_3, $PM_{2.5}$, and PM_{10}, and the Cocoa Beach monitoring station measures for O_3. No other criteria pollutants are currently measured within Brevard County. **Table 3-2** summarizes levels of criteria pollutants for 2020 in Brevard County.

Table 3-2. Highest Ambient Air Quality of Criteria Pollutants by Monitoring for 2020 Station

Site Name and Number	Criteria Pollutants				
	Highest Daily Average of Ozone Concentrations (ppb)			Highest Daily Average of PM Concentrations (µg/m³)	
	1-hour Average	Max 1-hour Average	Max 8-hour Average	$PM_{2.5}$	PM_{10}
Melbourne C009-0007	68	69	63	27.6	93.7
Cocoa Beach C009-4001	73	73	64	-	-
Source: FDEP 2021a https://fldep.dep.state.fl.us/air/flaqs/selectreport.asp?					

3.2.1.2.2 Climate

Climate is defined as the year-to-year persistence of weather patterns over time in a particular area. CCSFS experiences a subtropical climate, with hot, humid summers and distinct wet and dry seasons. Over the course of a year, the temperature typically varies from 55 degrees Fahrenheit (°F) (13 degrees Celsius [°C]) to 88 °F (31 °C) and is rarely below 42 °F (6 °C) or above 91 °F (33 °C) (Southeast Regional Climate Center [SRCC] 2021). The climate of central Florida is characterized by two seasons: warm and cool. The warm season is from May to October, with an average daily high temperature above 84 °F (29 °C), and the cool season is from November to April with an average daily high temperature below 73 °F (23 °C) (SRCC 2021).

The average precipitation for the ROI is 53.0 inches per year (SRCC 2021). The wet season is from June to September. The peak of the wet season is the month of August, with 18.1 days of rain and an average precipitation accumulation of 1.7 inches per day (SRCC 2021). The dry season is from October to May. The peak of the dry season is the month of January with 4.5 days of rain and an average precipitation accumulation of 0.28 inches per day (SRCC 2021).

Inclement weather for Brevard County is characterized by large storm cells moving west to east across North America in the cool, winter months and local or tropical systems during the hot, summer months. Occasional hurricanes do affect the area, with storm surge and wind playing a dominant factor in the damage incurred. The Atlantic hurricane season extends from June through November. The Central Florida region has the highest number of thunderstorms in the U.S. during the summer months (May to September). During thunderstorms, wind gusts of more than 60 miles per hour and rainfall of over one inch often occur in a one-hour period, and there are numerous cloud-to-ground lightning strikes.

Increasing temperatures, changing precipitation patterns, and more frequent, intense, and unpredictable extreme weather conditions are predicted due to climate change. Climate projections for CCSFS suggest minimum and maximum temperatures will increase over time under two emission scenarios (Representative Concentration Pathway [RCP] 4.5 and RCP 8.5). For the decade centered around 2030, both scenarios project a similar increase in annual average temperature of between 2.2 °F (1.2 °C) and 2.6 °F (1.4 °C) over the historic average. The two emission scenarios show higher warming by 2050, with RCP 4.5 expressing a warming of 2.8 °F (1.6 °C) and RCP 8.5 expressing a greater warming of 4.0 °F (2.2 °C). Due to uncertainties with ocean-atmosphere dynamics, the annual average precipitation varies between emission scenarios with RCP 4.5 predicting a 0.4% increase in precipitation and RCP 8.5 predicting a 5% decrease. Sections 2.2.1.4 and 2.2.4.4 of the *SLD 45 Integrated Natural Resources Management Plan* (INRMP) contain additional information on climate change projections for SLD 45 installations (USAF 2020a).

3.2.1.2.3 Greenhouse Gas Emissions

The Facility Level Information on Greenhouse gases Tool (FLIGHT) was reviewed to provide the CO_{2e} factor for Brevard County (USEPA 2021a). The review of this database indicated that Brevard County had approximately 2,444,972 metric tons of CO_{2e} emitted into the atmosphere in 2019. Over 99% of these emissions (2,444,548 metric tons of CO_{2e}) were generated from power plants.

3.2.1.2.4 Emissions at CCSFS

CCSFS, which had previously been permitted under the federal Title V air permitting program, was reclassified in March 2017 as an exempt air emission source due to a reduction in stationary source air emission levels. CCSFS currently operates under an Air General Permit, which covers stationary internal combustion engines and generators. Stationary sources operate under exemption thresholds established by FDEP (Chapter 63-210 FAC). Use of diesel fuel is limited to less than 250,000 gallons per year, as established by the Air General Permit. However, past usage has never approached that level (in 2021, diesel usage was approximately 73,500 gallons). The use of ODS is strictly prohibited at CCSFS.

3.2.1.3 Environmental Consequences

3.2.1.3.1 Analysis Approach

An impact on air quality would be significant if the Proposed Action

- Increased ambient air pollution concentrations above the NAAQS.
- Contributed to existing violations of the NAAQS.
- Interfered with, or delayed timely attainment of, the NAAQS.
- Resulted in the potential for any new stationary source to be considered a major source of emissions as defined in 40 CFR 52.21.

Because Brevard County is in attainment for all pollutants, General Conformity does not apply; therefore, the significance threshold for criteria pollutant emissions is 250 tons per year (tpy) (25 tpy for Pb) from both mobile and stationary sources. The USAF Air Conformity Applicability Model (ACAM) Version 5.0.18a was used to analyze the potential air quality impacts associated with the Proposed Action, in accordance with AFMAN 32-7002, the EIAP (40 CFR 1500-1508), and the General Conformity Rule (40 CFR 93). GHG emissions (CO_{2e}) were also included in the analysis.

3.2.1.3.2 Proposed Action

The Proposed Action would result in short- and long- term, negligible to minor, direct, adverse impacts on air quality; however, no significant air quality impacts are anticipated, as described in the following subsections.

3.2.1.3.2.1 Construction/Renovation/Demolition

The majority of air emissions associated with the Proposed Action would be short-term in nature (limited to the duration of demolition and construction activities) and would be caused by construction equipment and vehicle operation, asphalt paving, and dust generated from demolition and disturbance of unpaved areas. These activities could result in the following air quality impacts:

- Fugitive dust generated by demolition and construction operations.
- Emissions of criteria pollutants (VOC and NO_X [as precursors of O_3], CO, PM_{10}, and $PM_{2.5}$ [including its precursor SO_2], and GHG emissions) from demolition and construction activities such as
    - Use of diesel-powered and gas-powered demolition and construction equipment
    - Evaporation of architectural coatings and paving asphalt
    - Construction workers' commutes and haul truck trips

Contractors may be required to obtain appropriate permits and comply with all permit provisions for certain types of equipment and temporary facilities (e.g., portable crushers, batch plants, or burn curtains for cleared trees and brush).

3.2.1.3.2.2 Facility Operations

Operational levels and resulting emissions from existing stationary and mobile emissions sources at CCSFS are not expected to change considerably with the implementation of the Proposed Action. The ACAM steady state emissions estimates include heating systems and emergency generators in proposed facilities to evaluate potential operational impacts on air quality.

Although some emission types within the Proposed Action would be exempt from air permitting requirements per FAC Rule 62-210.300(3)(a), *Categorical Exemptions*, proposed stationary sources (e.g., the emergency generator at the MOC) are regulated and would require coordination with SLD 45.

3.2.1.3.2.3 Emissions Results

As mentioned earlier, the General Conformity Rule does not apply to the Proposed Actions because CCSFS is located within an area designated in attainment for all criteria pollutants. General Conformity *de minimis* threshold values are the maximum net change an action can acceptably emit in nonattainment and maintenance areas. These values would also be a conservative indicator that an action's emissions within an attainment area would also be acceptable (USAF 2019a).

Construction and operational emissions resulting from the Proposed Action were calculated using ACAM. Since emissions from the Proposed Action can vary from year-to-year depending on activity, the greatest annual net change in emissions for each pollutant forms the basis of the analysis. Implementation years are an estimate and represent the worst-case scenario for multiple major improvements occurring in the same year. The annual emissions during 2028, which was the worst-case year for emissions during the construction phase of the Proposed Action, are presented in **Table 3-3**. Steady state emissions (i.e., once the action is fully implemented and operational with no further net change in emissions) are presented in **Table 3-4**. See **Appendix B** for the ACAM Record of Air Analysis and full ACAM calculations for the Proposed Action.

Table 3-3. Proposed Action ACAM Assessment Summary: 2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
VOC	8.1	250	No
NOx	20.1	250	No
CO	26.8	250	No
SO_2	0.1	250	No
PM_{10}	242.9	250	No
$PM_{2.5}$	0.8	250	No
Pb	0	25	No
NH_3	0.02	250	No
CO_{2e}	6,190.4	-	-
VOC: volatile organic compound; NOx: nitrogen oxides; CO: carbon monoxide; SO_2: sulfur dioxide; PM_{10} and $PM_{2.5}$: particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; Pb: lead; NH_3: Ammonia; CO_{2e}: carbon dioxide equivalent			

Table 3-4. Proposed Action ACAM Assessment Summary: Steady State (2031)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
VOC	1.0	250	No
NOx	14.3	250	No
CO	11.9	250	No
SO_2	0.3	250	No
PM_{10}	1.2	250	No
$PM_{2.5}$	1.2	250	No
Pb	0.0	25	No
NH_3	0.0	250	No
CO_{2e}	16,213.0	-	-
VOC: volatile organic compound; NOx: nitrogen oxides; CO: carbon monoxide; SO_2: sulfur dioxide; PM_{10} and $PM_{2.5}$: particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; Pb: lead; NH_3: Ammonia; CO_{2e}: carbon dioxide equivalent			

For the Proposed Action, all attainment criteria pollutants are below the significance indicators (**Table 3-3** and **Appendix B**). Site preparation for demolition, new construction, facility renovation, and infrastructure improvements would result in approximately 740 acres of ground disturbance throughout the installation. This amount of site preparation, spanning the next 10 years, would have the potential to generate fugitive dust and increase the particulate matter in the air. BMPs (**Section 3.2.1.3.2.5**) would be applied to reduce dust during clearing/grading activities. Once the construction phase of the Proposed Action was complete, steady state emissions would be well below *de minimis* threshold values (**Table 3-4**). Therefore, the potential air quality impact from all criteria pollutants is not significant.

3.2.1.3.2.4 Climate Change and Greenhouse Gases

The estimated increase of GHG emissions associated with construction activities would produce about 6,400 metric tons of CO_{2e} at its predicted peak in 2025. Using the USEPA GHG Equivalencies Calculator (USEPA 2022b) for context, construction emissions would be equivalent to the greenhouse emissions from 1,380 gasoline-powered cars in one year or from 0.016 natural gas power plants annually. Additionally, the equivalent to offset (avoid) this amount of greenhouse gas emissions would be to recycle 2,200 tons of waste that would otherwise go to a landfill (USEPA 2022b).

For the steady state (or operational phase) of the Proposed Action, the newly installed heating equipment and generators are expected to yield an annual net increase of approximately 16,200 tons of CO_{2e} per year (assuming most of the new facilities have heating and operate back-up diesel generators). This is equivalent to the greenhouse emissions from 3,500 gasoline-powered cars in one year or from 0.04 natural gas power plants annually (USEPA 2022b). The equivalent to offset (avoid) this amount of greenhouse gas emissions would be to recycle 5,600 tons of waste that would otherwise go to a landfill (USEPA 2022b).

The estimated GHG emissions from the construction or operational phases of the Proposed Action are not anticipated to contribute significantly to climate change, but any emission of GHGs represents an incremental increase in global GHG concentrations. The Department of the Air Force supports climate change initiatives globally, while preserving military operations, sustainability, and readiness, by working to reduce GHG emissions. During the design of each proposed facility, sustainability measures would be employed to reduce emissions and offset increases (efficient heating/air conditioning and backup generators, recycling, energy saver fixtures/appliances, and natural habitat conservation), when feasible. Therefore, with the implementation of BMPs, no significant impacts to GHGs associated with the Proposed Action are anticipated.

3.2.1.3.2.5 Best Management Practices

During construction and demolition activities, the contractor would be required to reduce fugitive dust from ground-disturbing and demolition activities with the application of Best Available Control Technologies (BACT), such as application of water sprays, dust suppressants, use of coverings or enclosures, paving, enshrouding, and planting. Other BMPs that may be implemented include

- Control exhaust emissions from diesel-fueled construction equipment and vehicle engines by minimizing idling and complying with USEPA mobile and non-road regulations.
- Use air curtains to burn cleared vegetation when authorized by SLD 45 personnel.
- Use vapor recovery systems for the proposed gas station if design includes above-ground storage tanks.

3.2.1.3.3 No-Action Alternative

The No-Action Alternative would not involve construction/demolition activities or the operation of new facilities. Therefore, no impacts to climate or air emissions and air quality would occur.

3.2.2 Water Resources

3.2.2.1 Definition of the Resource/Regulatory Setting

Water resources analyzed in this EA include surface waters, wetlands, floodplains, groundwater, and water quality.

Surface waters are any body of water at land's surface and include natural (e.g., streams, rivers, ponds, lakes, marshes, bayous, and oceans) and man-made (e.g., impoundments, canals, drainage ditches, and stormwater runoff catchments) features. Surface water resources are important for a variety of reasons, including economic, ecological, recreational, and human health factors.

Wetlands are areas of transition between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water (Mitsch and Gosselink 2000) and include, but are not limited to, swamps, marshes, bogs, sloughs, and mud flats. These ecosystems are considered to be some of the most biologically productive of all habitats. Wetlands provide a variety of functions, including groundwater recharge and discharge, flood flow attenuation, sediment stabilization, sediment and toxicant retention, and nutrient removal and transformation.

Floodplains are lowland areas adjacent to surface water bodies (i.e., lakes, rivers, oceans), where flooding events periodically cover areas with water. Floodplains are defined by EO 11988 as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, the area subject to a 1% or greater chance of flooding in any given year" (that area inundated by a 100-year flood). EO 13690 includes the 500-year floodplain in the Federal Flood Risk Standard. A 500-year flood has a 0.2% chance of occurring in any given year. Floodplains and riparian habitat are biologically unique and highly diverse ecosystems providing a rich diversity of aquatic and terrestrial species, as well as promoting riverbank stability and regulating water temperatures. Floodplain areas are likely to be impacted by predicted sea level rise (SLR). Recent predictions for SLR in Florida are approximately one to four feet in the next century (USEPA 2016).

Groundwater is defined as water below the land surface in a zone of saturation. These resources are important for a variety of reasons, including drinking water, irrigation, power generation, and human health.

Water quality is defined as the chemical, physical, and biological condition of water resources. The Clean Water Act (CWA) (33 USC 1251-1387), as amended, is the primary law that regulates water quality in the U.S. The CWA established water quality standards, surface water classifications, methods for reporting impaired water quality in streams and open water bodies, programs to remediate impairment by setting Total Maximum Daily Load (TMDL), and the requirement of water quality certification for federally permitted projects under Section 401 (33 USC 1341).

A TMDL is the maximum amount of a pollutant that a water body can receive and still meet water quality standards. The CWA requires FDEP to establish TMDLs for impaired waters and implement plans to reduce impairment by point and non-point sources. For the State of Florida, FDEP is responsible for development of Basin Management Action Plans (BMAPs). These plans provide the framework for water quality restoration and contain commitments from federal, state, and local stakeholders to reduce pollutant loading through current and future projects. The BMAPs contain a comprehensive set of solutions, including permit limits on wastewater facilities, urban and agricultural BMPs, and conservation programs designed to achieve pollutant reductions established by a TMDL. BMAPs are adopted by FDEP Secretarial Order and are legally enforceable pursuant to 403.121, 403.141, and 403.161, F.S.

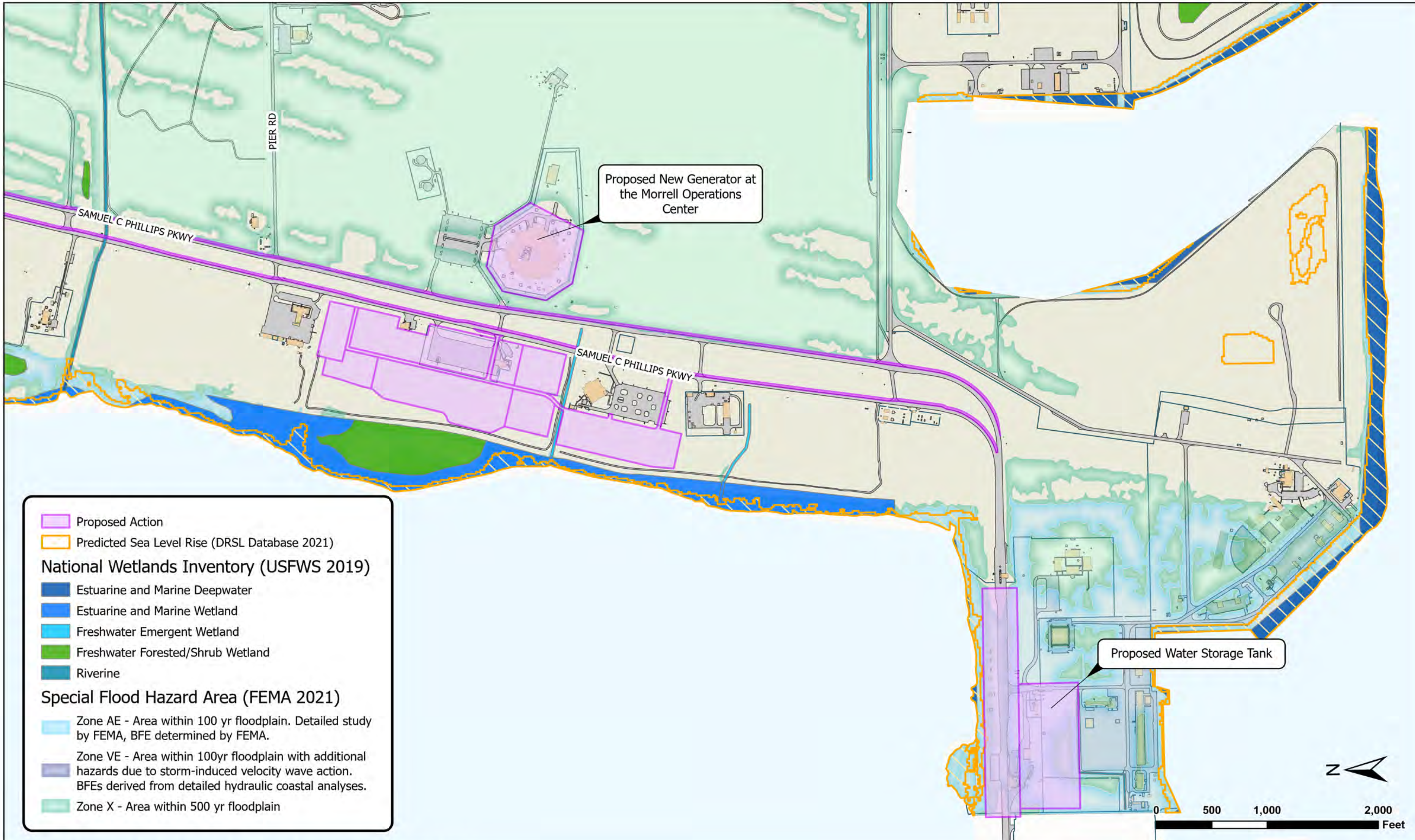
Outstanding Florida Waters (OFWs) are designated by FDEP as worthy of special protection because of their natural attributes (e.g., excellent water quality or exceptional ecological, social, educational, or recreational value). This special designation is intended to protect and preserve existing water quality and affords the highest level of regulatory protection.

In Florida, the Environmental Resource Permit (ERP) Program (62-330, FAC), administered jointly by FDEP and Florida's Water Management Districts, regulates activities involving the alteration of water resources. This includes new activities in uplands that generate stormwater runoff from upland construction, the construction/alteration of stormwater management systems, as well as dredging and filling in wetlands and surface waters. The St. Johns River Water Management District (SJRWMD) is the regulatory agency responsible for implementing the ERP program on CCSFS. The U.S. Army Corps of Engineers (USACE) permits impacts to navigable waterways and wetlands (Waters of the U.S. [WOTUS]) in accordance with Section 10 of the Rivers and Harbors Act (33 USC 403) and Section 404 of the CWA (33 USC 1344) for "retained waters," while FDEP permits impacts under Section 404 for "state assumed waters". Water resource laws and requirements related to the Proposed Action are summarized in **Table 3-5**.

The ROI for water resources includes CCSFS and adjacent waterways including the Atlantic Ocean to the east, the BRL to the west, and Port Canaveral waters to the south. **Figures 3-1 through 3-5** present the locations of surface waters, wetlands, floodplains, and predicted SLR at CCSFS.

Table 3-5. Water Quality Regulation Requirements

Law or Rule	Permit/Action(s)	Requirement	Agency or Organization
Clean Water Act (Sections 401 and 402; 33 USC 1341-1342)	A National Pollutant Discharge Elimination System permit and a state water quality certificate for pollutant discharge from a "point source" into any surface water.	Ensure the "restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters."	USEPA/FDEP/ Water Management Districts
Clean Water Act (Section 404; 33 USC 1344)	A general or individual permit for discharge of dredge or fill material into WOTUS.	Regulate the discharge of dredged and fill material into WOTUS, including wetlands.	USACE/FDEP
62-330, FAC, *Environmental Resource Permitting*	A general or individual permit for work in wetlands and surface waters (as defined and delineated in Chapter 62-340, FAC) or construction/alteration of stormwater management systems.	Implement the comprehensive, statewide environmental resource permit program under Section 373.4131, F.S.	FDEP/Water Management Districts
403.067 Florida Statutes (F.S.)	Establishment and implementation of TMDLs.	Promote improvements in water quality throughout the state through the coordinated control of point and nonpoint sources of pollution.	FDEP
Section 10 of the Rivers and Harbors Act (33 USC 403)	A general or individual permit for any work or creation of structures in, over, under, or affecting the course, location, or condition of navigable waters.	Prohibit the unauthorized obstruction or alteration of any navigable WOTUS.	USACE
EO 11988, *Floodplain Management*	Avoidance of floodplain impacts to the extent practicable, prepare a FONPA, if necessary.	Reduce the risk of flood loss, minimize the impact of floods on human safety, health and welfare, and restore and preserve the natural and beneficial values served by floodplains.	DoD
EO 11990, *Protection of Wetlands*	Avoidance of wetland impacts to the extent practicable, prepare a FONPA, if necessary.	Minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.	DoD
EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*	Follow implementing guidelines to increase the resilience against flooding and help preserve the natural values of floodplains.	Improve the resilience of communities and federal assets against the impacts of flooding and provide guidance to agencies on the implementation of EO 11988.	DoD
Energy Independence and Security Act of 2007 (42 USC 17001 et seq) and UFC 3-210-10, *Low Impact Development*	Development of a federal facility with a footprint that exceeds 5,000 SF must maintain or restore the predevelopment hydrology of the property.	Manage stormwater on federal facilities.	DoD



CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 3-1: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - WATER RESOURCES - SOUTH GATE

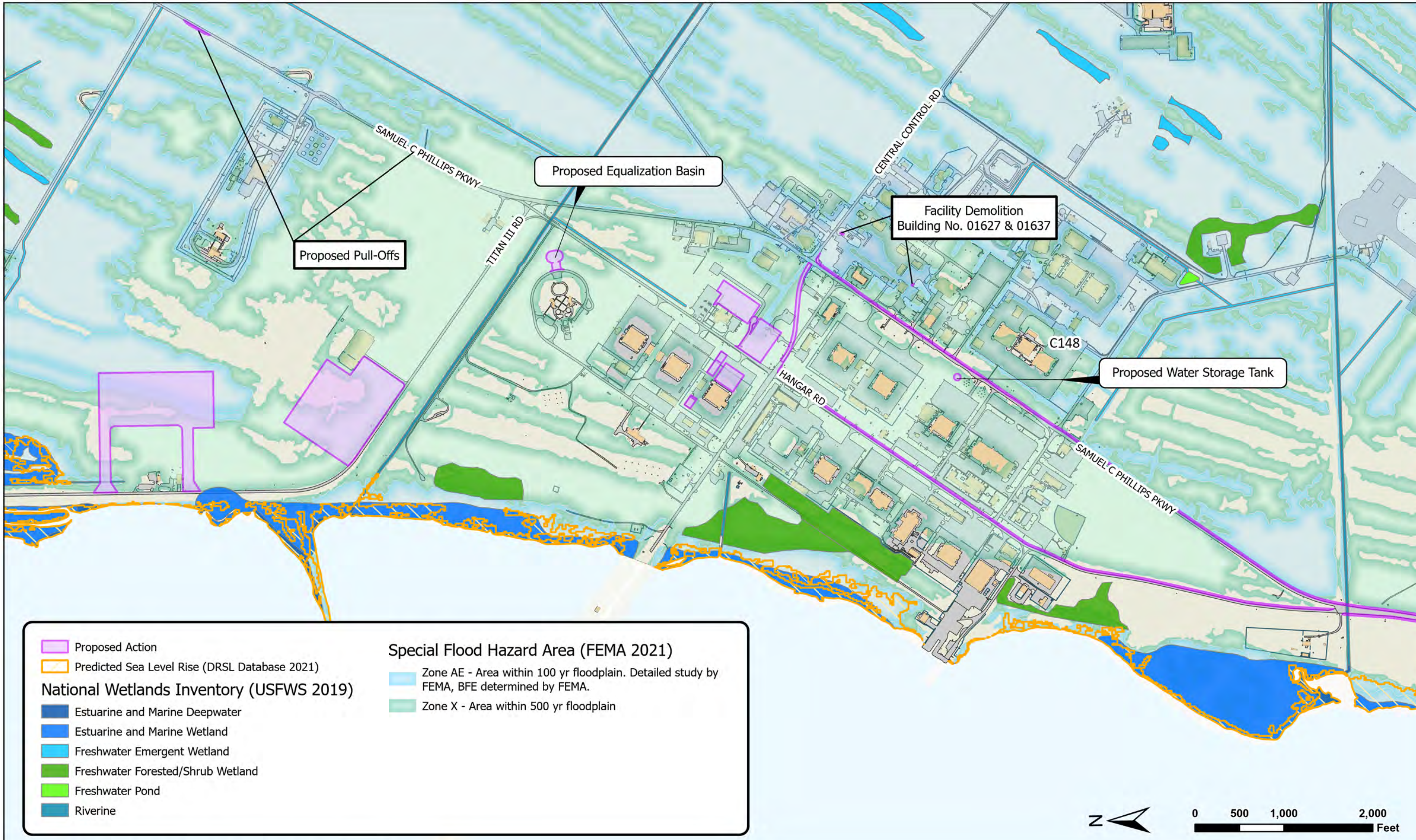


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FIGURE 3-2: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - WATER RESOURCES - INDUSTRIAL AREA

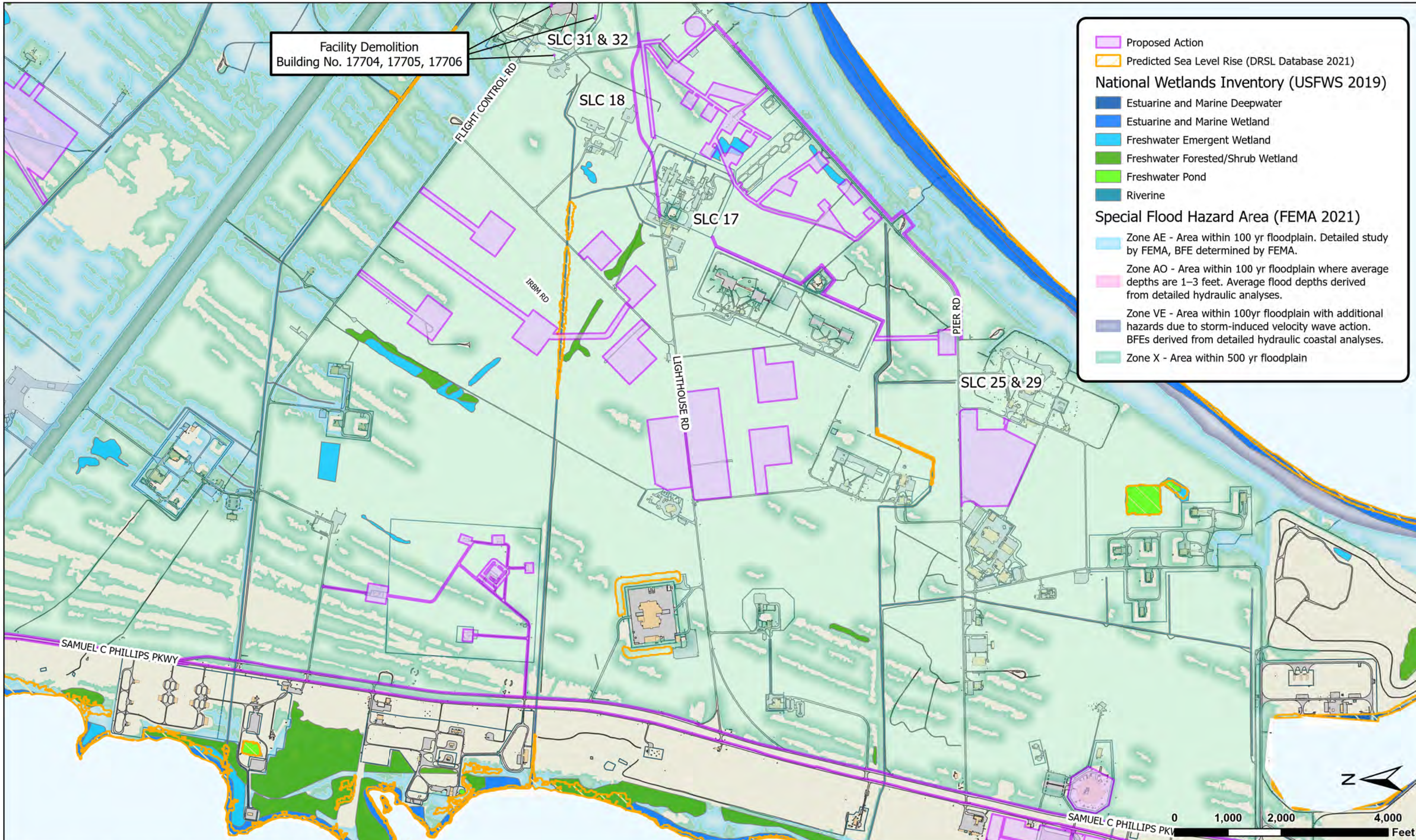

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FIGURE 3-3: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - WATER RESOURCES - CENTRAL

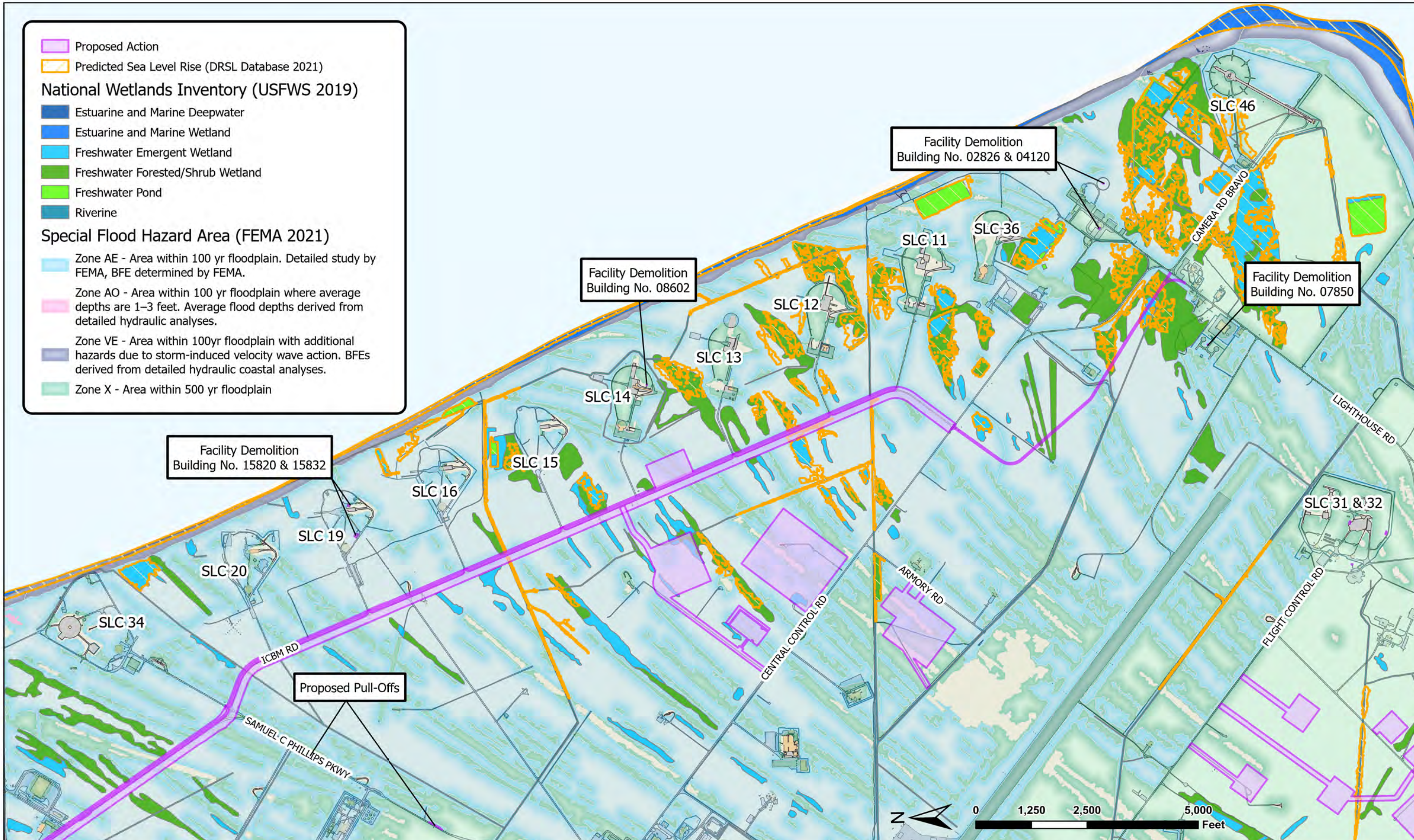

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FIGURE 3-4: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - WATER RESOURCES - LAUNCH OPERATIONS SOUTH

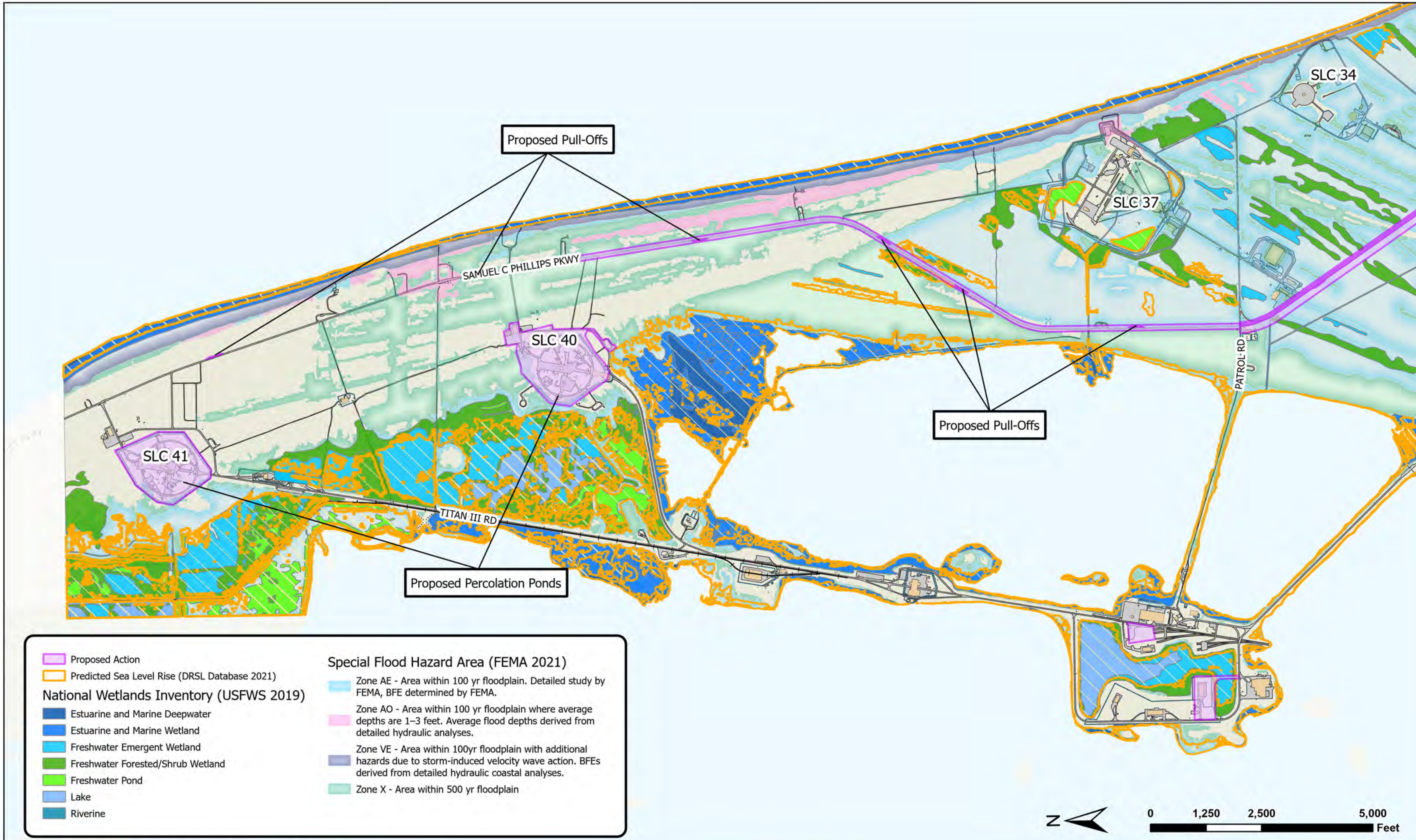

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FIGURE 3-5: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - WATER RESOURCES - LAUNCH OPERATIONS NORTH

3.2.2.2 Affected Environment/ Existing Conditions

3.2.2.2.1 Surface Waters

CCSFS is within the Indian River Lagoon (IRL) watershed and is situated on a barrier island that separates the BRL from the Atlantic Ocean. The watershed contains three major bodies of water: the BRL to the immediate west, Mosquito Lagoon to the north, and the IRL to the west of Merritt Island. Several nearby water bodies have been designated as OFWs, including most of Mosquito Lagoon and the BRL, Indian River Aquatic Preserve, Banana River Aquatic Preserve, Pelican Island National Wildlife Refuge, and Canaveral National Seashore. Additionally, in 1990 the IRL system was designated as an Estuary of National Significance under the USEPA's National Estuary Program. Estuaries of National Significance are identified to balance conflicting uses of the nation's estuaries while restoring or maintaining their natural character. The BRL subbasin surface waters have been designated as Class II and III waters in accordance with Chapter 62-302, FAC. Water quality for Class II waters are intended to have suitable water quality for shellfish propagation or harvesting. Class III waters are meant to be suitable for recreational use and for the propagation and maintenance of a healthy, well-balanced population of fish and wildlife (FDEP 2021b). With the exception of the shoreline near the South Gate, the BRL adjacent to CCSFS is not approved or conditionally approved for shellfish harvest (FDACS 2009). Permitting requirements for impacts to surface waters are determined through coordination with SJRWMD, USACE, and FDEP during project design.

3.2.2.2.1.1 Stormwater Management

The topography at CCSFS is flat and stormwater runoff is managed primarily through a network of upland-cut drainage ditches/canals and stormwater retention ponds. Drainage ditches may contain water throughout the year because of the shallow water table aquifer, and many contain associated wetlands. Ditches may support various aquatic species such as fish, turtles, and alligators (*Alligator mississippiensis*). Wetland vegetation may include white top sedge (*Dichromena colorata*), sawgrass (*Cladium jamaicense*), white beggar ticks (*Bidens alba*), broom grass (*Andropogon virginicus*), wax myrtle (*Morella cerifera*), saltbush (*Baccharis halimifolia*), St. John's wort (*Hypericum* spp.), Brazilian pepper (*Schinus terebinthifolia*), and other nuisance/exotic wetland vegetation.

3.2.2.2.2 Wetlands

CCSFS contains a variety of freshwater and estuarine wetlands that vary in quality based on previous land use and current management of exotic plant species. The *SLD 45 INRMP* (USAF 2020a) identifies 2,650 acres of wetlands on CCSFS and four broad wetland types:

- Basin marsh is a freshwater herbaceous marsh that is regularly inundated. Characteristic plant species of a basin marsh include sawgrass, sand cordgrass (*Spartina bakeri*), American white waterlily (*Nymphaea odorata*), maidencane (*Panicum hemitomum*), pickerelweed (*Pontederia cordata*), bulltongue arrowhead (*Sagittaria lancifolia*), giant leather fern (*Acrostichum danaeifolium*), and herb-of-grace (*Bacopa monnieri*).
- Coastal interdunal swale is freshwater wetland community formed in linear depressions found between successive dune ridges such as sandy barrier islands, capes, or beach plains and may take the form of a marsh, damp flats, moist grasslands, or dense shrubs. The predominant vegetative species can vary depending on local hydrology, substrate, and the age of the swale.
- Hydric hammock is a wetland community of well-developed evergreen hardwood and/or a palm forest. The understory vegetation varies, but it is frequently dominated by palms/oaks and ferns occurring on moist soils, often with limestone very near the ground surface.

Characteristic plant species include laurel oak (*Quercus laurifolia*), live oak (*Quercus virginiana*), cabbage palm (*Sabal palmetto*), and red cedar (*Juniperus virginiana*).

- Estuarine wetlands can include mangrove and salt marsh communities, which are both present on CCSFS. Characteristic species of a salt marsh may include saltmarsh cordgrass (*Spartina alterniflora*), needle rush (*Juncus roemerianus*), perennial glasswort (*Sarcocornia ambigua*), saltmeadow cordgrass (*Spartina patens*), marsh elder (*Iva frutescens*), and christmasberry (*Lycium carolinianum*).

Figures 3-1 through 3-5 display CCSFS wetlands and surface waters mapped through the National Wetlands Inventory (NWI) (USFWS 2019). Jurisdictional wetland boundaries and quality assessments are determined on a case-by-case basis through coordination with USACE, FDEP, and SJRWMD during project design (USAF 2020a).

3.2.2.2.3 Floodplains and Sea Level Rise

At the coast, mean sea level (MSL) is defined as the height of the sea with respect to a local land benchmark, averaged over a period of time long enough to eliminate the effects of wave and tidal fluctuations. The land surface at CCSFS is level and gently sloping with elevations that range from sea level to 20 feet above MSL. The Federal Emergency Management Agency (FEMA) 100- and 500-year floodplains are displayed on **Figures 3-1 through 3-5**.

According to the International Panel on Climate Change (IPCC), global mean sea level continues to rise due to thermal expansion of the oceans in addition to the loss of mass from glaciers, ice caps and the Greenland and Antarctic Ice Sheets (IPCC 2022). Climate change and sea level rise (SLR) may modify the CCSFS landscape in the long term. For CCSFS, SLR is projected to reduce installation area by between 2.5% (RCP 4.5 in 2035) and 2.9% (RCP 8.5 in 2065) (USAF 2020a). Projections for a 20-year storm surge event (5% probability occurring in any year) estimate between 9.2% inundation of the installation area for the RCP 4.5 scenario in 2035 to 9.8% for the RCP 8.5 scenario in 2065 (USAF 2020a).

The DoD Regional Sea Level (DRSL) Database (DoD 2021c) was used to predict future SLR at CCSFS (https://drsl.serdp-estcp.org/sealevelrise/1273). Details on the development and use of this database are described in Hall et al (2016). Coastal flooding projections at CCSFS were modeled for five SLR scenarios in 2035, 2065, and 2100. Model outputs for the “medium” SLR 2065 scenario and the “low” SLR 2100 scenario predict approximately a two-foot SLR for CCSFS. **Figures 3-1 through 3-5** display the predicted permanent coastline and inundation in low-lying areas given a two-foot SLR.

3.2.2.2.4 Groundwater

Two continuous aquifer systems, the surficial aquifer and the Floridan aquifer, are present in Brevard County. The surficial aquifer consists of groundwater that occurs at depths a few feet below land surface (bls). A confining unit composed of clays, sands, and limestone separates the surficial aquifer from the underlying Floridan aquifer. The relatively low hydraulic conductivity of the confining unit restricts the vertical exchange of water between the surficial aquifer and the confined Floridan aquifer. The Floridan aquifer is the primary source of potable water in central Florida and is composed of several carbonate units with highly permeable zones. The surficial aquifer is recharged by infiltration of precipitation through the thin vadose zone. Groundwater deeper than the surficial aquifer is affected more by regional boundaries such as the Atlantic Ocean and the BRL (USAF 2020a).

Overall, the general groundwater flow direction across the coastal launch areas along ICBM Road is to the south and west under a relatively flat hydraulic gradient but varies with specific locations.

Depth to groundwater varies but is approximately 3.3 feet in those areas. Localized flow in the surficial aquifer is from topographic highs (mounds, swells, dune ridges) toward surface water bodies (creeks, ponds, drainage canals). Rates of groundwater movement are generally substantially less than one foot per day (USAF 2020a).

3.2.2.2.5 Water Quality

The BRL is listed on the CWA Section 303(d) as impaired for nutrients (i.e., nitrogen and phosphorous) and dissolved oxygen (DO) (FDEP 2021b). Water quality of the BRL has been monitored since the early 1990s, and records show a steady negative trend (IRL Project 2022). Greater incidents of toxic algae blooms, reduced seagrass beds, and fish kills have been documented. In most recent years (2011 through 2019) the over-all water quality has been the lowest recorded. USSF is a stakeholder in the BRL BMAP (FDEP 2021b) and has committed to implementing projects and BMPs that will reduce nutrient and DO loading to the BRL.

CCSFS operates under a Multi-Sector Generic Permit (MSGP) for stormwater discharge (Sector S and Q) with facility number FLR05A947-005 (expires 5/12/2026). Stormwater management at CCSFS is of major importance since all run-off either percolates into the ground or finds its way to the canal system and eventually to the BRL. CCSFS maintains a robust stormwater management program in accordance with the SJRWMD. The facility currently manages well over 100 active ERPs, which are publicly available on the SJRWMD e-permitting website. CCSFS has also developed a TMDL Compliance Master Plan, which is currently under review.

3.2.2.3 Environmental Consequences

3.2.2.3.1 Analysis Approach

The criteria for evaluating impacts to water resources include the loss of, or adverse impacts to, a particular resource and its functions and adherence to applicable regulations. An impact to water resources would be significant if the Proposed Action

- Permanently impacted surface waters, wetlands, or floodplains without the provision of compensatory mitigation (i.e., caused the “net loss” of these water resources).
- Threatened or damaged hydrologic characteristics.
- Adversely affected water quality or endangered public health by contributing pollutants to surface water or groundwater.
- Violated established laws or regulations that have been adopted to protect or manage water resources of the area.

3.2.2.3.2 Proposed Action

The Proposed Action would result in short-term, minor to moderate, direct and indirect, adverse impacts on water resources. Proposed demolition, new construction, and infrastructure improvements would impact approximately 12 to 20 acres of wetlands, one acre of surface waters, and 240 acres of the 100-year floodplain. Proposed improvements would add approximately 215 acres of impervious surfaces (**Table 3-6**).

Table 3-6. Proposed Action Water Resource Impacts (Acres)

Planning Goal/Improvement	New Impervious	Construction within the 100-year Floodplain	Impacts		Impact Rationale
			*Wetland**	*Surface Water*	
Provide reliable infrastructure	**8.8**	**101.0**	**2.6–8.0**	**0.4**	
New utility corridor	0	97.3	1.4–3.0	0.4	Existing Infrastructure
Potable water improvements	0	0.1	0	0	Existing Infrastructure
Wastewater improvements	0.02	0.9	0	0	Existing Infrastructure
Power improvements	0.3	0	0	0	Existing Infrastructure
Munitions storage consolidation	8.5	2.7	1.2–5.0	0	Existing Infrastructure
Reduce impacts to personnel	**63.0**	**0**	**0**	**0**	
New facilities	63.0	0	0	0	-
Eliminate critical periods	**0**	**18.0**	**3.0**	**0.4**	
Concrete duct bank	0	18.0	3.0	0.4	Existing Infrastructure
Improve logistics	**38.5**	**12.3**	**1.2–4.0**	**0.1**	
Oversized-load haul routes	32.0	5.6	1.2–4.0	0.1	Existing Infrastructure
New gas station/restaurant	4.0	0.2	0	0	Existing Infrastructure
Support shops consolidation	0	0	0	0	-
South gate redesign	2.5	6.5	0	0	Existing Infrastructure
Expand developable areas	**105.0**	**104.1**	**5.0**	**0.1**	
New launch support facilities	90.0	104	5.0	0.1	Existing Infrastructure; Species Habitat
New engineering test facility	15.0	0	0	0	-
Stand-alone facility demolition	0	0.1	0	0	Existing Infrastructure
Grand Total	**215.3**	**235.5**	**11.8–20.0**	**1.0**	

Note: Values are presented in acres.
*Acreages are expressed as a range based on conceptual layouts; final impact acreages would be determined during project design.
Impact Rationale Definitions:
Existing Infrastructure: Location of existing infrastructure precludes placement outside of floodplain and/or wetlands.
Species Habitat: Improvements were sited in floodplain or wetlands to avoid impacts to priority upland habitats that support protected species.

The conceptual project layouts in the Proposed Action were extensively reviewed during the preparation of the *CCSFS DDP* (USSF 2022a) to minimize impacts to water resources to the greatest extent feasible, particularly given that the majority of CCSFS occurs within the 100- and 500- year floodplains (**Figures 3-1 through 3-5**). In accordance with EO 11988, EO 11990, and EO 13690, no practicable alternatives were identified that would avoid or further minimize impacts. Additionally, during project design and construction, impacts would be avoided or minimized through proper construction techniques, BMPs (**Section 3.2.2.3.2.6**), erosion-control measures, and engineering designs. Agency-approved mitigation would be provided for unavoidable impacts; therefore, the Proposed Action would not result in a “net loss” of water resources, threaten hydrologic characteristics, endanger public health, or violate laws. Therefore, no significant impacts to water resources are anticipated as a result of the Proposed Action, as described in the following subsections.

3.2.2.3.2.1 Surface Waters

Although impacts would be avoided to the greatest extent practicable, proposed construction of the utility corridor, concrete duct bank, roadway improvements, and launch support facilities would directly impact (i.e., fill) approximately one acre of NWI-mapped, jurisdictional surface waters (e.g., canals and drainage ditches/swales) on CCSFS (**Table 3-6**). No impacts to non-jurisdictional surface waters are anticipated. The Proposed Action would not adversely impact water quality within individual basins and adjacent surface waters (e.g., increase sedimentation, turbidity, and pollution loading on the canal system), as discussed in **Section 3.2.2.3.2.5**.

Prior to construction and consistent with the ERP/Section 404 dredge and fill permit obtained for the project, required mitigation would be provided to ensure no net loss of surface waters within the ROI. Mitigation may include the purchase of wetland mitigation credits, replacement of surface waters in-kind following construction, or on-site wetland restoration/construction per a Uniform Mitigation Assessment Method (UMAM) functional assessment. Currently, two mitigation banks service this basin (21-Northern IRL): NeoVerde and Green Wing. Mitigation coordination would occur early in project planning, following surface water/wetland delineations and design review, to ascertain credit availability of current and potential mitigation banks or to develop an on-site wetland mitigation plan. With agency-approved mitigation and the implementation of BMPs listed in **Section 3.2.2.3.2.6**, no significant impacts to surface waters are anticipated.

3.2.2.3.2.2 Wetlands

Although impacts would be avoided to the greatest extent practicable, proposed construction of the utility corridor, concrete duct bank, new MSA facilities, roadway improvements, and launch support facilities would directly impact (i.e., fill) approximately 12 to 20 acres of NWI-mapped, jurisdictional wetlands on CCSFS, depending on final project design and stormwater requirements (**Table 3-6**). No impacts to non-jurisdictional wetlands are anticipated. The proposed utility corridor, MSA consolidation, concrete duct bank, Lighthouse Road/ICBM Road connection, and power pole relocation would update, replace, or expand existing infrastructure; therefore, siting alternatives that avoid wetland impacts are not feasible and would not meet the purpose and need of the Proposed Action. The proposed launch support facilities were sited to utilize existing roadways and avoid conflicts with listed species habitat (scrub) to the greatest extent practicable (as described in **Section 2.3**). The tradeoff to avoid priority habitat would potentially result in impacts to wetlands. Detailed wetland impacts would be quantified during project design through the federal and state permitting process. Impacts to wetlands would be avoided and minimized to the greatest extent practicable. The Proposed Action would not adversely impact water quality within adjacent wetlands, as discussed in **Section 3.2.2.3.2.5**.

Prior to construction and consistent with the ERP/Section 404 dredge and fill permit obtained for the project, required mitigation would be provided to ensure no net loss of wetlands within the ROI. As described above for surface waters, mitigation coordination would occur early in project planning and may include the purchase of wetland mitigation credits, replacement of wetlands in-kind following construction, or on-site wetland restoration/construction per a Uniform Assessment Method (UMAM) functional assessment. With an approved mitigation plan and the implementation of BMPs listed in **Section 3.2.2.3.2.6**, no significant impacts to wetlands are anticipated.

3.2.2.3.2.3 Floodplains and Sea Level Rise

The Proposed Action would result in approximately 240 acres of construction activity within the 100-year floodplain (**Table 3-6**). Construction within the floodplain could result in an increased flood risk both within the project areas and to surrounding areas. All potential impacts, if any, would remain on CCSFS property.

The proposed improvements in the floodplain would be located throughout the installation. The proposed utility corridor, CCSFS South Gate improvements, water storage tank, percolation ponds, concrete duct banks, haul routes, MSA consolidation, and power pole relocation would update, replace, or expand existing infrastructure; therefore, siting alternatives that avoid floodplain impacts are not feasible and would not meet the purpose and need of the Proposed Action. The limited developable area outside of the floodplain for large facilities and the requirement to avoid listed species habitat to the greatest extent possible preclude placing the proposed launch support facilities outside of the floodplain. Facilities were sited outside of the predicted two-foot SLR to the greatest extent practicable.

Long-term, adverse impacts to floodplains would be minimized by implementing guidelines provided in EO 11988, EO 13690, and the BMPs listed in **Section 3.2.2.3.2.6**. In general, facilities would be elevated above the Base Flood Elevation and building footprints would be reduced as much as possible to minimize encroachments into the floodplain. Proposed improvements would include stormwater management systems, as appropriate, that would convey and store stormwater and not impede floodwater flows during major storm events. Unavoidable floodplain impacts would be compensated to ensure no net loss of floodplains. Floodplain compensation areas would be provided within or adjacent to the same floodplain without disturbing or impacting wetlands, sensitive species, hazardous material, or cultural sites.

The design measures discussed above (e.g., raised finished floor and floodplain compensation) would also reduce the risk of inundation and minimize impacts on predicted SLR. Since the Proposed Action would span several years, updated SLR models would be evaluated as new data become available. Given these measures, combined with BMPs (**Section 3.2.2.3.2.6**), the Proposed Action is not anticipated to significantly impact floodplains and or result in significant impacts to/from SLR.

As discussed, no practicable alternatives were found that would meet the requirements for the Proposed Action and avoid impacts to wetlands or floodplains. The public was notified of potential floodplain and wetland impacts through public notices in the *Florida Today* and *Hometown News* newspapers (**Section 1.5.5**).

3.2.2.3.2.4 Groundwater

The Proposed Action would result in negligible impacts on groundwater. Groundwater within the surficial aquifer may be encountered during certain types of construction activities such as excavation within the footprint of new facilities. Neither the Proposed Action nor the No-Action Alternative use groundwater for any purpose. Potable water would be supplied by the existing water distribution systems at CCSFS. Required dewatering could limit the timing and rate of construction. Any dewatering activities would be coordinated with SLD 45 to avoid impacts to groundwater quality or flow. Hazardous materials used and hazardous waste generated during construction would be managed in accordance with all applicable environmental compliance regulations and CCSFS environmental management plans (see **Section 3.2.10.3** for more detail about hazardous materials). The increase in impervious areas as a result of the Proposed Action would have a minor impact on the rate of recharge of the surficial aquifer underlying CCSFS. With approximately 215 acres of new impervious surface, each project would be required to develop a stormwater management system that would capture and encourage natural percolation into the local groundwater. With implementation of BMPs (**Section 3.2.2.3.2.6**), the Proposed Action is not anticipated to significantly impact groundwater.

3.2.2.3.2.5 Water Quality

The Proposed Action would increase impervious surfaces at CCSFS by approximately 215 acres (**Table 3-6**); however, adverse impacts to water quality would be avoided by incorporating runoff treatment measures consistent with the *CCSFS Stormwater Pollution Prevention Plan (SWPPP)* (USAF 2019d), USSF TMDL commitments for the BRL watershed (FDEP 2021), and project ERP requirements. Any increase in surface water runoff resulting from proposed construction would be attenuated through the use of temporary and/or permanent stormwater management features to maintain or reduce the site's pre-development runoff rates and volumes. Given these design measures and the implementation of BMPs (**Section 3.2.2.3.2.6**) to ensure the protection of water quality, no significant impacts to water quality are anticipated.

3.2.2.3.2.6 Mitigation and Best Management Practices

A jurisdictional determination and delineation of surface waters and wetlands within project areas would be conducted during the state and federal environmental permitting process. Surveys would be used to avoid/minimize surface water and wetland impacts where practicable, to develop required ERP and USACE/FDEP CWA Section 404 permit applications, and to quantify unavoidable impacts and required wetland mitigation.

Proposed improvements would require state and federal environmental permitting to conserve and protect water resources. Required permit types would be determined during design and obtained prior to construction. Anticipated permits are listed below:

- Most of the proposed improvements would require an ERP and/or modifications of an existing ERP from the SJRWMD with SLD 45 as co-applicant. In addition, a SWPPP would be required to address sedimentation and erosion to protect water quality before, during, and after construction. If necessary, USACE, FDEP, SLD 45, and SJRWMD would identify mitigation required to offset impacts to jurisdictional wetlands and surface waters. Floodplain impacts and proposed compensation would be further evaluated during the design and environmental permitting process for each project.
- For disturbed areas greater than one acre, a National Pollutant Discharge Elimination System (NPDES) Stormwater Construction Permit would be required by FDEP and a SWPPP would be implemented. This process ensures that design follows current and applicable stormwater and wastewater regulations and avoids/minimizes impacts to wetlands.
- FDEP coordination/permitting would be required for installation of any potable water and sanitary sewer mains and potable water storage tanks.
- Modifications to the RWWTP Permit (Number: FL0102920) would require coordination with FDEP.
- A CWA Section 404 permit (USACE/FDEP) and a Section 401 water quality certification (SJRWMD) would be required prior to any dredge and/or fill actions within federal or state-assumed jurisdictional wetlands.

Permit conditions would specify BMPs and mitigation measures required to prevent fugitive soil, sediment, and other potential contaminants from entering water bodies and wetlands. Such conditions could include minimizing earth-moving activities during wet weather/conditions, covering soil stockpiles, installing silt fencing and sediment traps, and revegetating disturbed areas with native plants as soon as possible to contain and prevent any off-site migration of sediment or eroded soils from the project areas.

During design, projects may qualify for TMDL credits by incorporating non-structural practices (e.g., such as public education, litter cleanup, monitoring and data collection, and fertilizer reduction) and structural projects (e.g., ponds, wetland filters, shoreline stabilization projects, and stormwater retrofit applications). Water quality treatment requirements and TMDL credits would be calculated and documented within the ERP of each applicable project prior to construction.

New construction and redevelopment projects would follow the SLD 45 TMDL Guidance summarized below:

- All new development must provide reasonable assurance in accordance with Rule 62-330.060 FAC and to the standards contained in Sections 373.042, .413, .414, .416, .426, .429, F.S. In addition, to address TMDL and the BRL and Central IRL BMAP (FDEP 2021), each project shall demonstrate, through modeling or calculations, that their proposed stormwater system is designed to meet the greater of the following nutrient load reduction criteria:
    - A 95% reduction of the average annual loading of total phosphorus and total nitrogen from the post-development project land use.
    - A reduction such that the post-development condition average annual loading of nutrients does not exceed the predevelopment condition nutrient loading.

  Note: Load reductions for nutrients shall not be required to result in loads that are less than those demonstrated for undeveloped or natural conditions for the project area.

- Stormwater treatment systems serving redevelopment activities shall meet the appropriate minimum level of treatment allowable for these sites as follows:
    - A 95% reduction of the post-development average annual loading of total phosphorus and a 50% reduction of the post-development average annual loading of total nitrogen from the project area.

3.2.2.3.3 No-Action Alternative

Under the No-Action Alternative, none of the proposed construction or demolition activities would occur; therefore, there would be no change to water resources. Since no new facilities would be constructed, only the existing facilities would be subject to future sea level rise predictions.

3.2.3 Noise and Noise Compatible Land Use

3.2.3.1 Definition of the Resource/Regulatory Setting

Noise is defined as any unwanted sound that interferes with normal activities or the natural environment. The measurement and human perception of sound are based on three principal physical characteristics: intensity, frequency, and duration. Intensity is a measure of a sound's acoustic energy and is related to sound pressure. The greater the sound pressure, the more energy is carried by the sound and the louder the perception of that sound. Frequency, which is measured in terms of cycles per second, also called hertz, determines how the pitch of the sound is perceived. Duration is the length of time a sound can be detected.

Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between the source and receptor, receptor sensitivity, and time of day. Affected receptors are specific (e.g., residential areas, schools, churches, or hospitals) or broad (e.g., nature preserves or designated areas) areas in which occasional or persistent sensitivity to noise above ambient levels exists. These are generally referred to as noise sensitive receptors.

The decibel (dB), which is a logarithmic unit that accounts for the large variation in sound pressure amplitudes, is the standard unit for the measurement of sound. Sound levels that have been adjusted to correspond to the frequency response of the human ear are referred to as A-weighted (dBA) sound pressure levels. Environmental noise is often expressed in terms of dBA. The threshold of audibility is generally within the range of 10 to 25 dBA for normal hearing. The threshold of pain occurs at the upper boundary of audibility, which is normally in the region of 135 dBA (USEPA 1981). **Table 3-7** compares common sounds and shows how they rank in terms of auditory impacts.

Table 3-7. Sound Levels and Human Response

Noise Level (dBA)	Common Sounds	Effect
10	Just audible	Negligible
30	Soft whisper (15 feet)	Very quiet
50	Light auto traffic (100 feet)	Quiet
60	Air conditioning unit (20 feet)	Intrusive
70	Noisy restaurant or freeway traffic	Telephone use difficult
80	Alarm clock (2 feet)	Annoying
90	Heavy truck (50 feet) or city traffic	Very annoying. Hearing damage (8 hours)
100	Garbage truck	Very annoying
110	Pile drivers	Strained vocal effort
120	Jet takeoff (200 feet) or auto horn (3 feet)	Maximum vocal effort
140	Carrier deck jet operation	Painfully loud
Source: USEPA 1981		

The average day/night sound level (DNL) metric is a measure of the total community noise environment. DNL is the average A-weighted sound level over a 24-hour period, with a 10-dBA adjustment added to the nighttime levels (between 10:00 P.M. and 7:00 A.M.). This adjustment is an effort to account for increased human sensitivity to nighttime noise events. Noise levels occurring at night generally produce a greater annoyance than those of the same levels occurring during the day. It is generally agreed that people perceive intrusive noise at night as being 10 dBA louder than those occurring during the day, at least in terms of its potential for causing community annoyance.

DNL is endorsed by USEPA for use by federal agencies (USEPA 1974, FICAN 1997) in quantifying annoyance to humans from general environmental noise, including aviation and construction noise. Land use compatibility and incompatibility are determined by comparing the predicted DNL at a site with the recommended land uses. Continuous and long-term noise levels greater than 65 dBA DNL are normally unacceptable for noise-sensitive receptors such as residences, schools, churches, and hospitals (USEPA 1974). Values of DNL can be measured with standard monitoring equipment or predicted with computer models such as NOISEMAP. AFI 32-1015 requires plotting DNL contours of 65, 70, 75, 80, and 85 dB for analyzing the land use compatibility of current and projected missions in a 5- to 10- year range. DoD Instruction 4165.57, *Air Installations Compatible Use Zones* provides additional information on AICUZ study procedures.

Construction noise results from the use of typical construction equipment: heavy equipment (e.g., excavating machinery like excavators, backhoes, and front loaders, as well as graders, pavers, rollers, and dump trucks); stationary equipment (e.g., pumps, power generators, and air compressors generally run continuously at relatively constant power and speeds); and impact equipment (e.g., pile drivers, jackhammers, pavement breakers, rock drills, and other pneumatic tools). **Table 3-8** presents noise levels (dBA at 50 feet from source) estimated by the Federal Highway Administration (FHWA) for typical construction equipment (FHWA 2006).

Table 3-8. Noise Levels for Typical Construction Equipment 50 Feet from Source

Equipment	dBA*
Backhoe	78
Chain Saw	84
Compactor (ground)	83
Crane	81
Dump Truck	76
Excavator	81
Generator	81
Impact Pile Driver	101
Jackhammer	89
Paver	77
Scraper	84
*Actual measured maximum sound level at 50 feet (dBA, slow) Source: FHWA 2006	

The Noise Control Act of 1972 (42 USC 4901) directs federal agencies to comply with applicable federal, state, and local noise control regulations. Additionally, the Occupational Safety and Health Administration (OSHA) established workplace standards for noise. The minimum requirement states that constant noise exposure must not exceed 90 dBA over an 8-hour period. The highest allowable sound level to which workers can be constantly exposed to is 115 dBA, and exposure to this level must not exceed 15 minutes within an 8-hour period (OSHA 1910.95). These standards limit instantaneous exposure, such as impact noise, to 140 dBA. If noise levels exceed these standards, employers are required to provide hearing protection equipment that will reduce sound levels to acceptable limits.

The ROI for noise concerns is the area within approximately 1,000 feet of each Proposed Action site.

3.2.3.2 Affected Environment/ Existing Conditions

Existing noise sources at CCSFS include industrial activities, vehicle traffic, construction equipment operation, infrequent aircraft operations at the Skid Strip, and periodic rocket launch and landing operations at CCSFS and KSC. Noise levels around industrial facilities at CCSFS approximate those of any urban industrial area, reaching levels of 60 to 80 dBA (50 feet from source). During the day, individuals on-base may be subjected to multiple sources of noise, including launch, airfield, and construction operations, normal operation of heating and air-conditioning systems, and general installation maintenance.

The closest residential communities to CCSFS vary, but in general, are Cape Canaveral, the north end of Cocoa Beach and Cocoa, Port Canaveral, Merritt Island, and Titusville. Ambient noise levels in these communities are normally low, with higher noise levels occurring in industrial areas, and lower noise levels (normally about 45 to 55 dBA) in the residential areas and along the beaches. Typical construction and operational activities on CCSFS do not impact the noise environment of surrounding communities given their distance from the installation. CCSFS has no sensitive receptors (e.g., schools, hospitals, and churches) in its vicinity.

Temporary noise from construction equipment (e.g., earth-moving machinery, dump trucks, cranes, and power tools) at CCSFS typically ranges from 73 to 100 dBA and attenuates to below 65 dBA within 1,000 feet from the source depending on the equipment used (FHWA 2006). Contractors at CCSFS are required to follow all applicable noise laws and guidelines during construction and demolition operations. Workers are also required to use proper personal hearing protection in accordance with OSHA standards to limit exposure. Appropriate noise attenuation equipment is used where applicable.

Launch related noise at CCSFS includes both engine noise and sonic booms produced as launch vehicles reach supersonic speeds on launch and landing operations. KBRwyle (2018) estimated that for a daytime Falcon 9 Block 5 launch, when background levels are in the 50 dB to 60 dB range, residents of Titusville, Merritt Island, and Cape Canaveral may notice launch noise levels above 70 dB. This study also estimated the DNL for the total SpaceX launches from CCSFS and KSC (in 2017 and projected in 2024) would not be above 65 dB in residential areas closest to launch operations (KBRwyle 2018). No change to aircraft or launch-related noise is included within the Proposed Action; therefore, annoyance and DNL associated with these activities are not evaluated in this EA.

3.2.3.3 Environmental Consequences

3.2.3.3.1 Analysis Approach

Noise impact analyses typically evaluate potential changes to existing noise environments that would result from implementation of the Proposed Action. Potential changes in the noise environment can be beneficial (i.e., if they reduce the number of sensitive receptors exposed to unacceptable noise levels), negligible (i.e., if the total area exposed to unacceptable noise levels is essentially unchanged), or adverse (i.e., if they result in increased exposure to unacceptable noise levels).

An impact on the noise environment would be significant if the Proposed Action

- Conflicted with applicable federal, state, interstate, or local noise control regulations or ordinances.
- Resulted in continuous and long-term noise levels at 85 dB and above, which is the threshold of hearing damage with prolonged exposure (OSHA Standard 1910.95(c)(1)).
- Increased noise levels 3 dB or more above the 65 dB DNL noise contour.

3.2.3.3.2 Proposed Action

The Proposed Action would result in short-term, negligible to minor, direct, adverse impacts on the human noise environment; however, no significant impacts are anticipated, as described in the following subsections. Potential impacts of noise on biological communities are discussed in **Section 3.2.6.3.2**.

3.2.3.3.2.1 Construction/Renovation/Demolition

Construction and demolition activities associated with the Proposed Action would result in short-term, negligible to minor, direct, adverse impacts on the noise environment at CCSFS. Increases in noise levels would occur intermittently during demolition, construction, and renovation/repair activities. There are no noise-sensitive receptors in the vicinity of the Proposed Action areas. No long-term impacts are anticipated.

Construction activities would involve land clearing, land grading, and building construction. Construction projects would require the use of common construction equipment, all of which would be expected to meet local, state, and federal noise regulations. Noise would vary depending on the type of equipment being used, the area in which the action would occur, and the distance of the receptor from the noise source. Heavy construction equipment would be used periodically during construction; therefore, noise levels would fluctuate. Most equipment used would be expected to produce noise levels between 70 and 95 dBA at 50 feet (FHWA 2006). Noise levels at the upper end of this range would be associated with equipment such as pile drivers and limited to short durations of intermittent bursts. Sound levels on the lower end of the range would be more constant during construction and demolition activities. These noise levels would decrease with distance from the project areas. As a general rule, the sound intensity decreases 6 dBA with each doubling of the distance from the source (USEPA 1971).

Construction noise would be temporary and localized to the areas immediately surrounding the demolition, construction, or renovation/repair site. As the Proposed Action would be confined to CCSFS, noise annoyance to off-installation residents would not be expected, and local noise ordinances would not apply.

Potential noise impacts from the active work phases of each Proposed Action would be minimized by the employment of the BMPs listed below and measures specified in 23 CFR Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. Accordingly, construction-related noise impacts are anticipated to be temporary and minor and would not significantly impact the noise environment.

3.2.3.3.2.2 Facility Operations

The proposed improvements would be located within compatible land uses, and no impacts on sensitive noise receptors in the vicinity of CCSFS would occur. Therefore, a quantitative analysis of operational noise is not included in this EA. No long-term impacts on the ambient noise level would occur as a result of implementing the Proposed Action.

3.2.3.3.2.3 Best Management Practices

The implementation of the proposed projects would occur over multiple years and be phased to minimize noise disturbance. Demolition and construction activities would be restricted to daytime hours (7:00 A.M. to 5:00 P.M.) to the greatest extent possible. OSHA standards would be followed to protect worker safety related to noise levels, including monitoring of worker exposure to noise.

3.2.3.3.3 No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not occur, and existing conditions discussed in **Section 3.2.3** would continue. Implementation of the No-Action Alternative would not result in any new or additional impacts on the noise environment.

3.2.4 Soils and Geological Resources

3.2.4.1 Definition of the Resource/Regulatory Setting

Earth resources include the soil, underlying geology, and potential for geologic hazards and erosion within the ROI of the Proposed Action. The ROI for earth resources includes CCSFS with a focus on the locations of the proposed improvements evaluated within this EA. The term “soil” refers to unconsolidated materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility all determine the capacity of the ground to support man-made structures and facilities, provide a landscaped environment, and control the transport of eroded soils into nearby drains, canals, and eventually surface waters such as the BRL. In undeveloped areas, the quality and productivity of soil are critical components of agricultural production.

3.2.4.2 Affected Environment/ Existing Conditions

3.2.4.2.1 Geology

CCSFS is located within the East-Coast Barrier System, which is mapped as a Holocene in age, and is a geologically recent barrier island complex formed after sea levels rose when the Wisconsinan glaciers retreated. Cape Canaveral, which is the approximate center of the East Coast Barrier

System, is considered a cuspate foreland (a triangular area of coastal deposition dominated by many shingle ridges and often terminating on the landward side into poorly drained terrain).

Beach ridge and dune areas are of the Pleistocene/Holocene age and covered by undifferentiated quaternary sediments; much of Florida's surface is covered by a varying thickness of undifferentiated sediments consisting of siliciclastics, organics, and freshwater carbonates. The limestone bedrock is a principal part of one of the major Florida Artesian Aquifers, located 75 to 300 feet bls. It is overlaid by sandy limestone, calcareous clay with fragments of shells, coquinold limestone, and unconsolidated, well-graded quartz sand. The upper unit (about 700 feet bls) is sand, silt, clay, and limestone. Beneath the upper unit (to a depth of about 13,000 feet) is a section of sedimentary rocks, mostly limestone and dolomite. Dense igneous and metamorphic rocks are found at depths greater than 13,000 feet bls.

3.2.4.2.2 Soils

The most prominent soil association at CCSFS is the Canaveral-Anclote complex, comprising approximately 50% of the U.S. Department of Agriculture (USDA)/Natural Resources Conservation Service (NRCS) mapped soil types on the installation (**Figure 3-6**). This association is composed of nearly level and gently sloping ridges interspersed with narrow wet sloughs that generally parallel the ridges and includes areas of broad floodplains. Below this layer are stratified beds of sandy clay loam, fine sand, shell fragments, and marly sandy clay loam that were deposited during the Pliocene age. The Canaveral series consists of very deep, somewhat poorly to moderately well drained, very rapidly permeable soils on side slopes of dune-like ridges with water table depths of 10 to 40 inches. The drainage class for Anclote is very poorly drained, with a depth to water table of about six inches. Canaveral-Urban complex, approximately 11% of the mapped soil types, is found primarily around structures and impervious surfaces within CCSFS. These soils are moderately well drained with a depth to surface water of 30 to 60 inches.

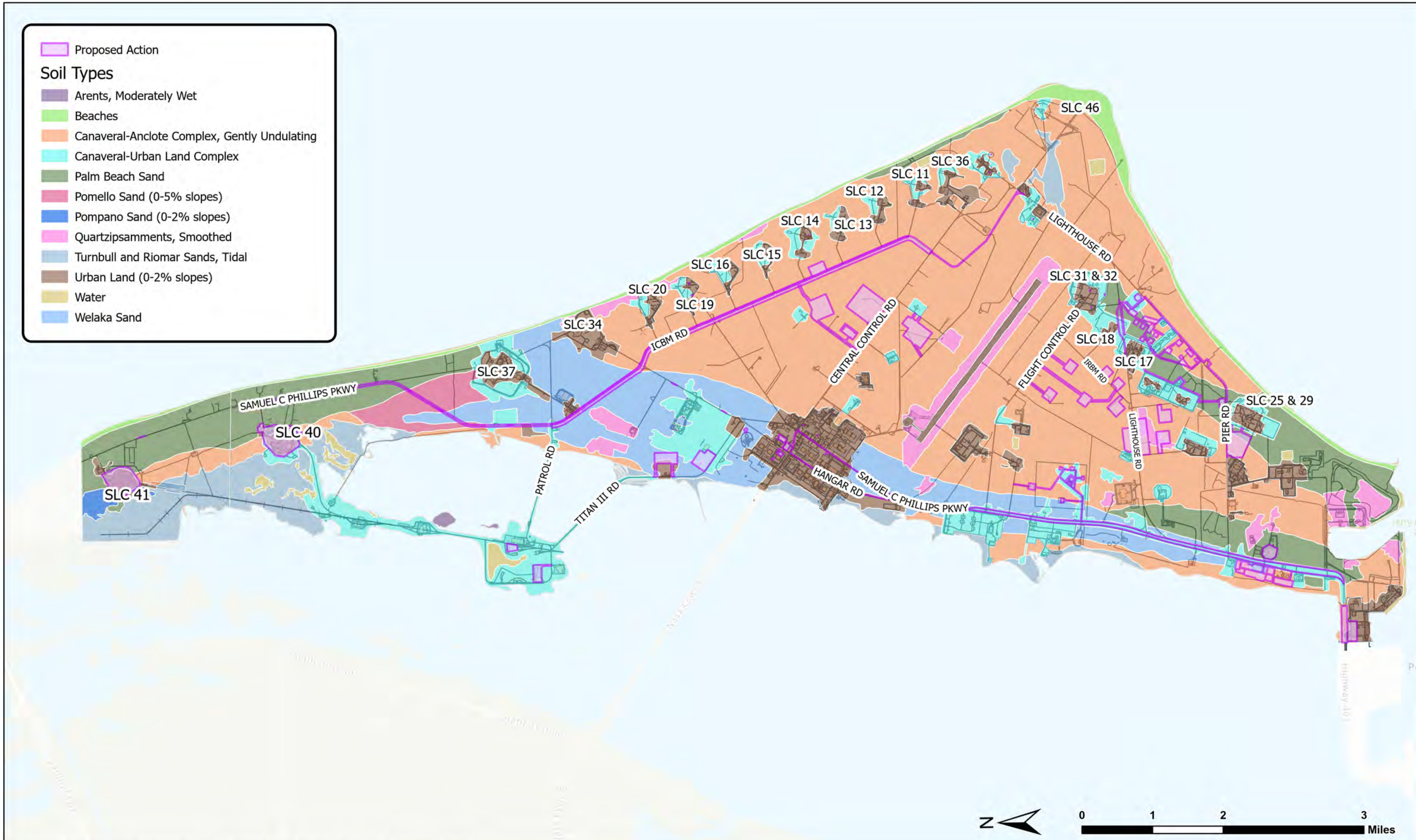

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FIGURE 3-6: USDA NRCS SOILS

The predominant wetland soils, Turnbull and Riomar, are located primarily in the northern part of CCSFS, adjacent to the BRL. Turnbull is described as muck on top of clay, very poorly drained, with frequent flooding and ponding; the parent material is herbaceous organic matter over estuarine deposits. Riomar soil is mucky clay, very poorly drained, with frequent flooding and ponding; the parent material is loamy and clayey marine deposits over limestone. There are no farms or agriculturally important soils or facilities at CCSFS. Additional land and soil information can be found in the *SLD 45 INRMP* (USAF 2020a).

3.2.4.3 Environmental Consequences

3.2.4.3.1 Analysis Approach

Impacts to geology and soils would be significant if the Proposed Action

- Increased the likelihood of, or resulted in exposure to, foundation instability, land subsidence, or other severe geologic hazards.
- Resulted in the loss of soil used for agriculture or habitat, loss of aesthetic value from a unique landform, or loss of mineral resources.
- Caused severe erosion or sedimentation from site preparation, construction/demolition, or operational activities.

3.2.4.3.2 Proposed Action

Site preparation and construction activities associated with the Proposed Action would result in short-term, minor, direct, adverse impacts to earth resources. Construction activities associated with the Proposed Action would directly disturb approximately 740 acres of native and non-native soils and potentially expose soils to wind, rain, and stormwater runoff. No unique geologic features of exceptional interest mineral resources or farmland occur in the ROI. Impacts to earth resources would be avoided or minimized by incorporating proper construction techniques, erosion-control measures, and structural engineering designs into project development (see BMPs listed below); therefore, no significant impacts to earth resources are anticipated.

3.2.4.3.2.1 Best Management Practices

Any soil disturbance that would expose the soils to wind, rain, and stormwater runoff must be stabilized. An NPDES permit would be obtained by the contractor prior to construction for projects that involve ground-disturbing activities that exceed one acre. The construction contractor would be required to develop a SWPPP specific to each site that would provide detailed erosion prevention and control measures to be implemented during site preparation and construction activities. Special emphasis must be placed on protecting adjacent wetlands and preventing fugitive dust from leaving the sites by wetting surfaces regularly.

3.2.4.3.3 No-Action Alternative

Under the No-Action Alternative, no construction or ground disturbing activities would occur; therefore, this alternative would have no impact on earth resources.

3.2.5 Historical and Cultural Resources

3.2.5.1 Definition of the Resource/Regulatory Setting

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, and any other physical evidence of human activity considered important to a culture or community for scientific, traditional, religious, or other reasons. They include archaeological resources (both prehistoric and historic), historic architectural resources, American Indian sacred sites, traditional cultural properties (TCPs), and historic properties (as defined in 36 CFR 800.16(l)(1)). Historic properties are significant archaeological, architectural, or traditional resources that are either eligible for listing or listed on the National Register of Historic Places (NRHP).

Archaeological resources may be defined as the physical evidence of any past human activity. Examples of archaeological sites include burials, artifacts, shell middens, cemeteries, rock piles, rock shelters, chimney falls, brick walls, piers, trash pits and piles, and building remains. The Archaeological Resources Protection Act (ARPA) limits archaeological resources to sites or items that are more than 100 years old. However, under NHPA and other legislation, sites more than 50 years old and, in rare cases of exceptional significance, less than 50 years old, may be evaluated for their historical significance. Specific cultural resource laws and requirements related to Proposed Action are summarized in **Table 3-9**.

Table 3-9. Summary of Cultural Resource Regulation Requirements

Law or Rule	Permit/Action(s)	Requirement	Agency or Organization
National Historic Preservation Act (Section 106; 36 CFR Part 800)	Section 106 compliance process consists of four primary stages: initiation of the Section 106 process with the Advisory Council on Historic Preservation (ACHP), SHPO, Tribal Historic Preservation Offices (THPO), and other appropriate consulting parties; identification of historic properties potentially affected by the Proposed Action; assessment of adverse effects, which determines whether the Proposed Action will affect historic properties and if effects to those resources might be adverse; and resolution of adverse effects between the affected and consulting parties, which includes developing and evaluating alternatives that could avoid, minimize, or mitigate impacts on historic resources.	Consider the effects of the Proposed Action on historic properties listed or eligible for listing on the NRHP.	ACHP/SHPO/ THPO
AFMAN 32-7003, *Environmental Conservation*	Manage cultural resources on the installation.	Protect cultural resources on USAF managed lands.	DoD
Archeological and Historic Preservation Act (AHPA, 16 USC 469) of 1974	Consultation with the SHPO, any potentially impacted Native American groups, and the responsible Department of Interior Bureaus and offices.	Preserve historical and archeological data (including relics and specimens) which might otherwise be irreparably lost or destroyed as the result of an alteration of the terrain caused as a result of any federal construction project or federally licensed activity or program.	National Park Service/SHPO/ THPO

Law or Rule	Permit/Action(s)	Requirement	Agency or Organization
American Indian Religious Freedom Act (AIRFA, 42 USC 1996) of 1978	Consultation with the SHPO and any potentially impacted Native American groups.	Protect the rights of Native Americans to exercise their traditional religions by ensuring access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. Any effects that may occur, as a result of providing access to such sites may trigger Section 106 review under the NHPA.	SHPO/THPO
Native American Graves Protection and Repatriation Act (NAGPRA, 25 USC 3001 et seq)	Permits for the excavation and/or removal of “cultural items” protected by the Act require Tribal consultation, as do discoveries of “cultural items” made during activities on federal or tribal lands.	Provide a process for museums and federal agencies to return certain Native American cultural items – human remains, funerary objects, sacred objects, or objects of cultural patrimony – to lineal descendants, and culturally affiliated Indian tribes and Native Hawaiian organizations.	SHPO/THPO
DAFI 90-2002, *Interactions with Federally Recognized Tribes*	Follow DAFI procedure for interactions with tribes who have a documented interest in Department of the Air Force lands and activities.	Ensure policy compliance, assign responsibilities, and outline procedures to guide Department of the Air Force interactions with federally recognized tribes.	DoD

The ROI for cultural resources is based on locality but is generally defined under 36 CFR 800.16(d) as the Area of Potential Effects (APE) or “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties if such properties exist. The APE is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking.” For this EA, the APE was each Proposed Action site with a 50-foot buffer.

3.2.5.2 Affected Environment/ Existing Conditions

Occupation of CCSFS dates to at least 5,000 Before Common Era (BCE), though exact dates are hampered by the lack of radiometric data (USAF 2020e). Older previously unrecorded historic sites may be present on CCSFS given its appearance on maps dating to the mid-nineteenth century, the recent identification of a freshwater lake at the tip of Cape Canaveral, known interaction between the Ais culture and Europeans dating to at least 1513, and the numerous shipwrecks off the coast (USAF 2020e).

The Ais culture occupied the region around CCSFS during the sixteenth and seventeenth centuries. There is no definitive link or living tradition between the original native peoples of the area who were known by the Spanish as the Ais and the recognized Native Americans in Florida today. Representatives from the Miccosukee and Seminole Tribes believe that the Ais represent their ancestors. The Seminole Tribe of Florida, Seminole Nation of Oklahoma, and the Miccosukee Tribe of Florida are recognized as the appropriate Native American cultures for consultation in the treatment of Ais sites on CCSFS. The burial mounds and occupation sites containing human remains present at CCSFS are recognized as significant and sacred places for Native Americans. In addition to the requirements of the *SLD 45 Integrated Cultural Resource Management Plan* (ICRMP) (USAF 2020e) to protect and preserve these sites, issues affecting Native American spiritual concerns must also be recognized and incorporated into site management. The Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida have stated, during review of the *SLD 45 ICRMP* (USAF 2020e), they do not wish to review or participate in any action unless it involves a prehistoric archaeological site or there is a Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC 3001 et seq) issue.

Prehistoric archaeological sites at CCSFS primarily consist of large shell middens along the east bank of the BRL and west of Phillips Parkway. The middens are primarily composed of coquina shell with minor species such as clam, oyster, and whelk. The sites along the river tend to be large and appear to have been permanent or semi-permanent occupation sites. They are readily identifiable by the black organic soils filled with shell. This distinguishes the sites from the typical tan to white beach sand deposits. The “black earth” or “sheet” middens are typical of sites in the region. In addition to the large occupation sites, a series of smaller permanent seasonal camps or middens are found adjacent to the dune line along the coast. These sites tended to be special use camps with at least one site thought to be a shark procurement site occupied in late spring through the summer. Between these sites are smaller artifact scatters thought to be associated with seasonal movements between the Atlantic Ocean and BRL.

Nearly all of CCSFS has been surveyed for archaeological sites, and surveys of remaining areas are ongoing or scheduled. Ninety-five archaeological sites are recorded within CCSFS. Sites range from Late Archaic to the mid-twentieth century. Of the 95 sites, 12 contain burials and are NAGPRA concerns. A total of 24 sites have been determined by the SHPO to be NRHP eligible (USAF 2020e).

The modern history of CCSFS is almost entirely associated with the U.S. missile testing and space launch programs. The oldest known historic site found at CCSFS is the 1840s Cape Canaveral Lighthouse site located adjacent to SLC 46. Other sites range from the 1860s up to the 1950s and include homesteads, cisterns, cemeteries, old missile facilities, and missile crash sites.

Various historic resource studies have been conducted at CCSFS, including Heritage Documentation Programs (HDP), the National Historic Landmark (NHL) nomination, two National Park Service (NPS) studies, an architectural documentation report by the USACE Construction Engineering Research Laboratory (CERL), and research conducted by the SLD 45 Cultural Resource Manager (CRM) (USAF 2020e). Historic resource assessments at CCSFS are ongoing and will be complete by the end of 2023.

All known cultural resources at CCSFS are covered in the *SLD 45 ICRMP* (USAF 2020e) and have SHPO concurrence on their status. Archaeological site buffers and historic properties are displayed on **Figures 3-7 through 3-11**. Locations of archaeological sites are highly buffered to protect these sensitive resources.

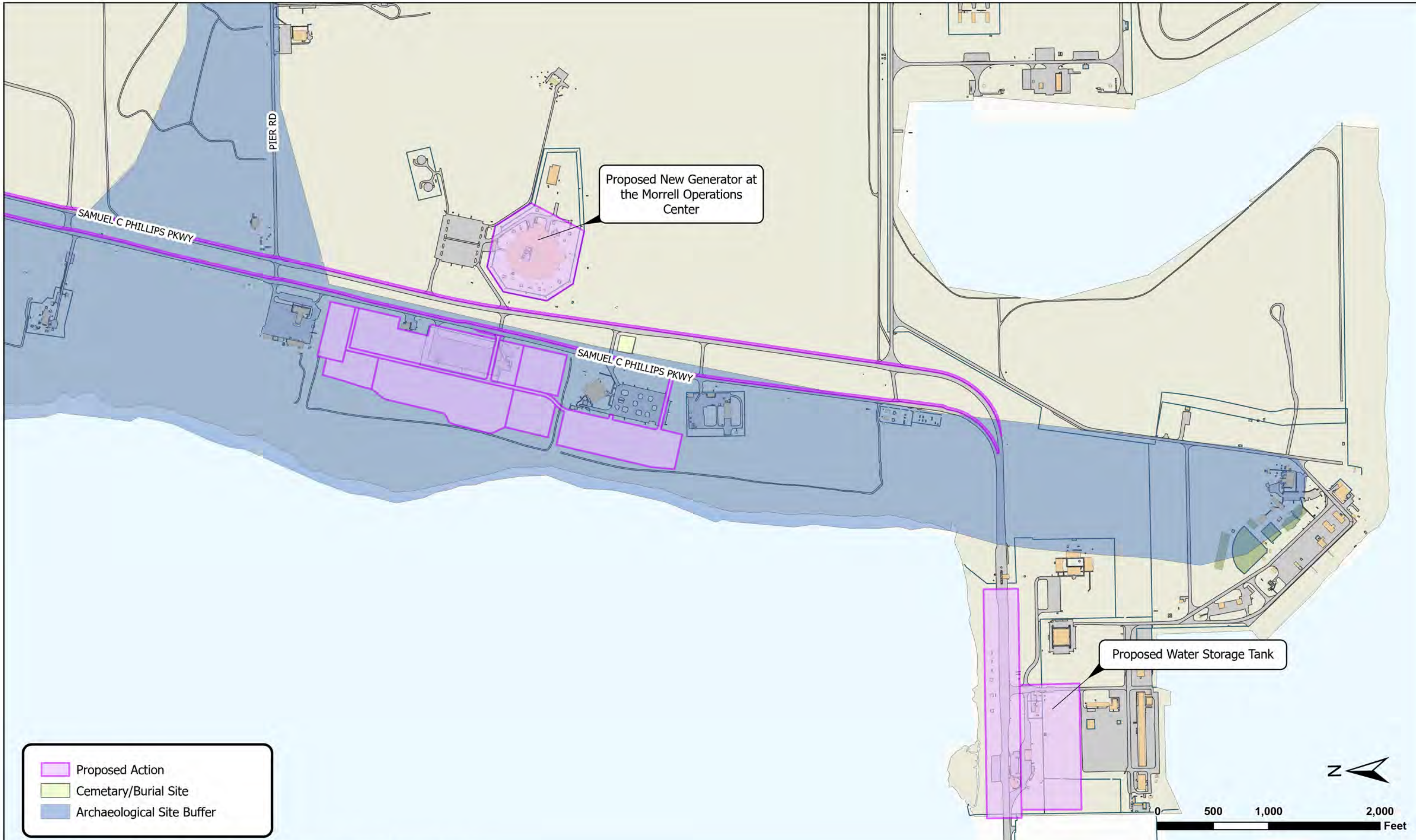

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FIGURE 3-7: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - CULTURAL RESOURCES - SOUTH GATE

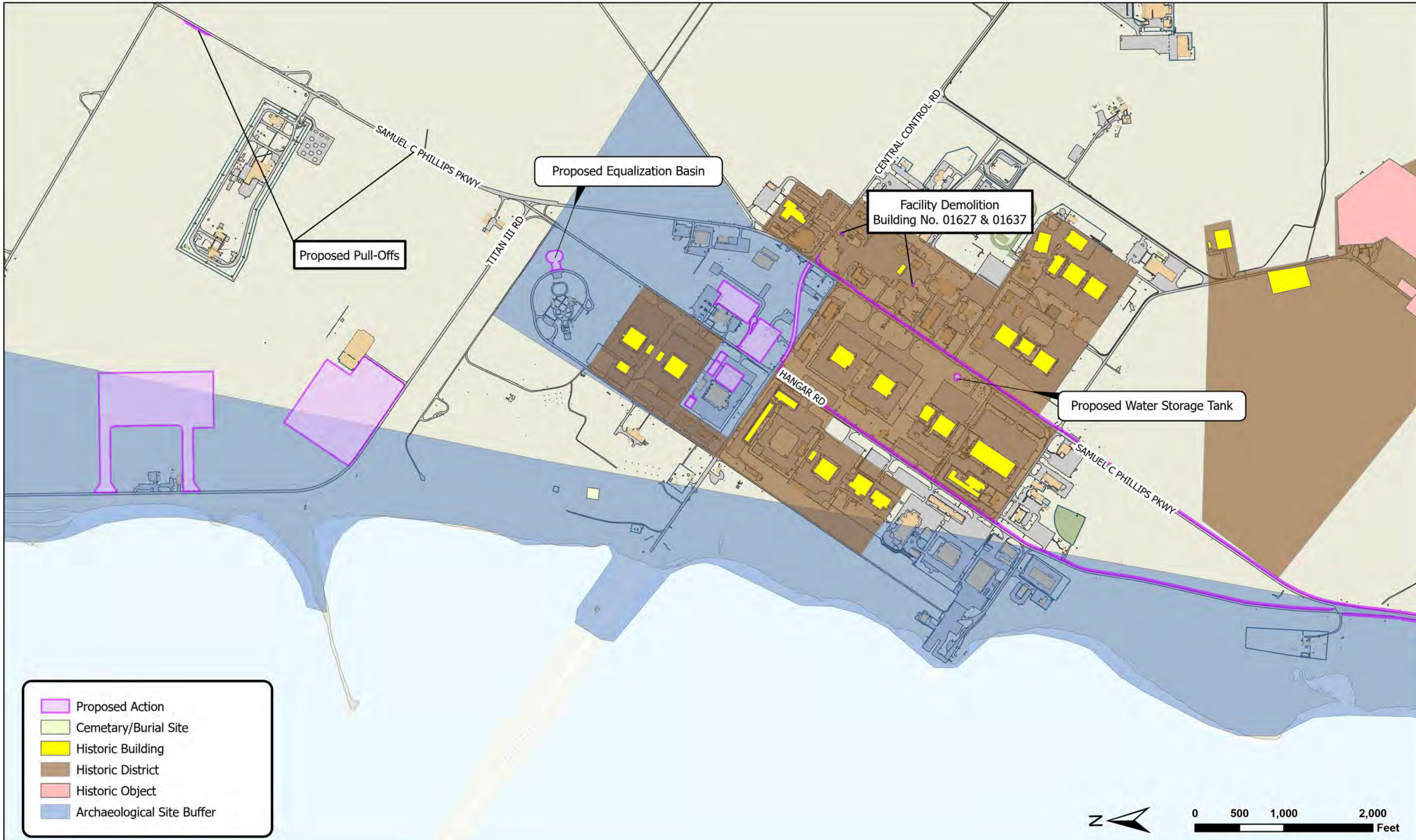

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FIGURE 3-8: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - CULTURAL RESOURCES - INDUSTRIAL AREA

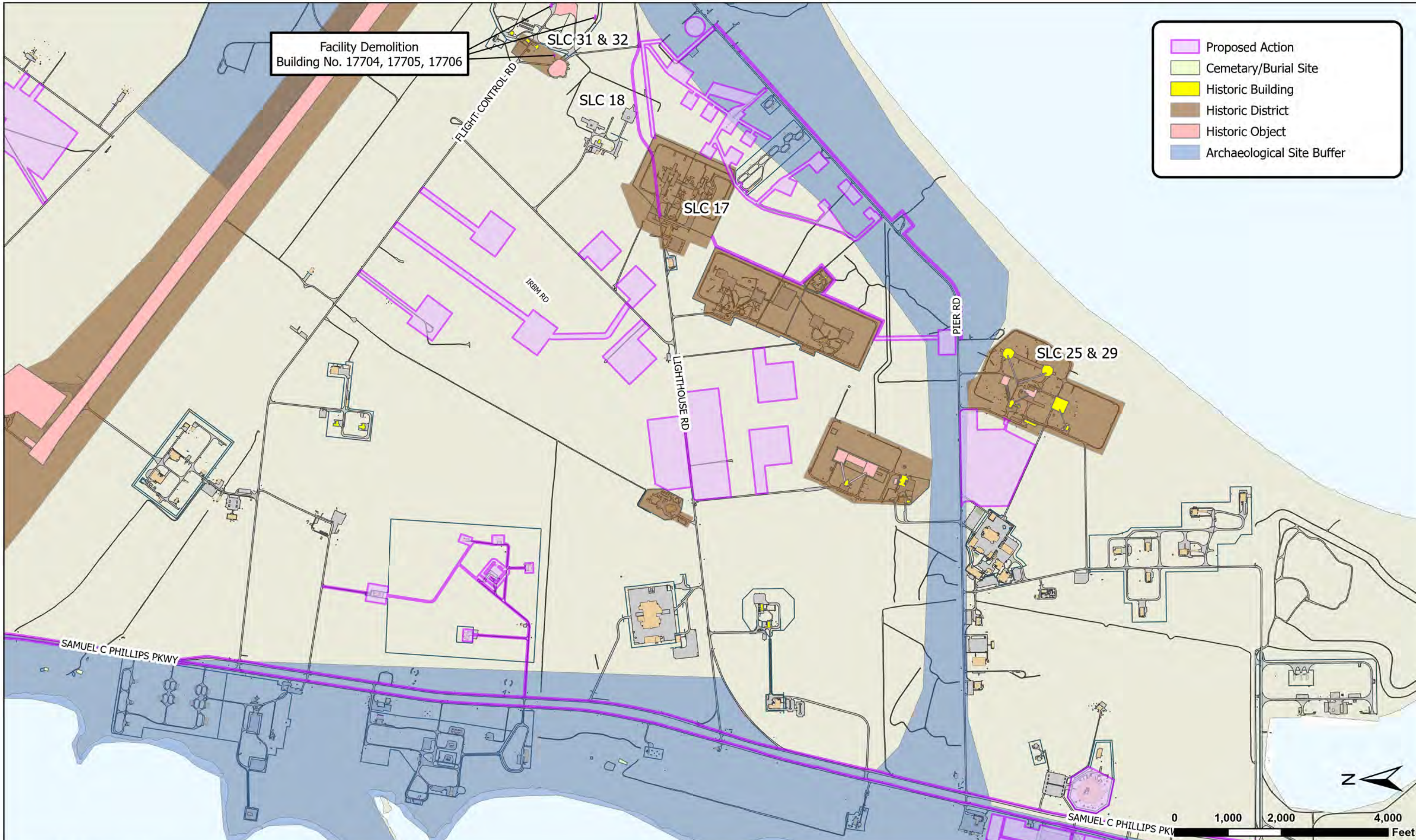

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FIGURE 3-9: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - CULTURAL RESOURCES - CENTRAL

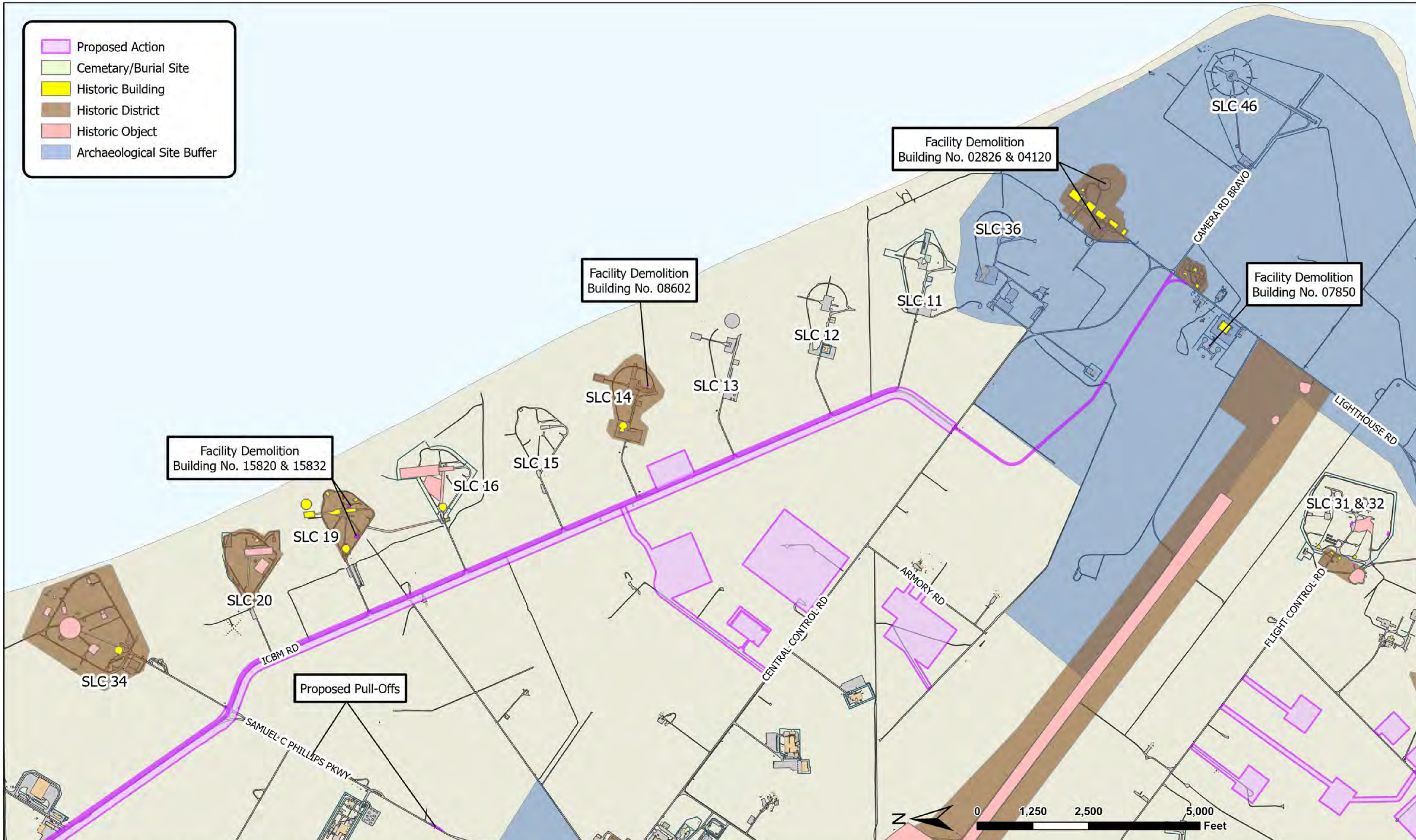

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FIGURE 3-10: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - CULTURAL RESOURCES - LAUNCH OPERATIONS SOUTH

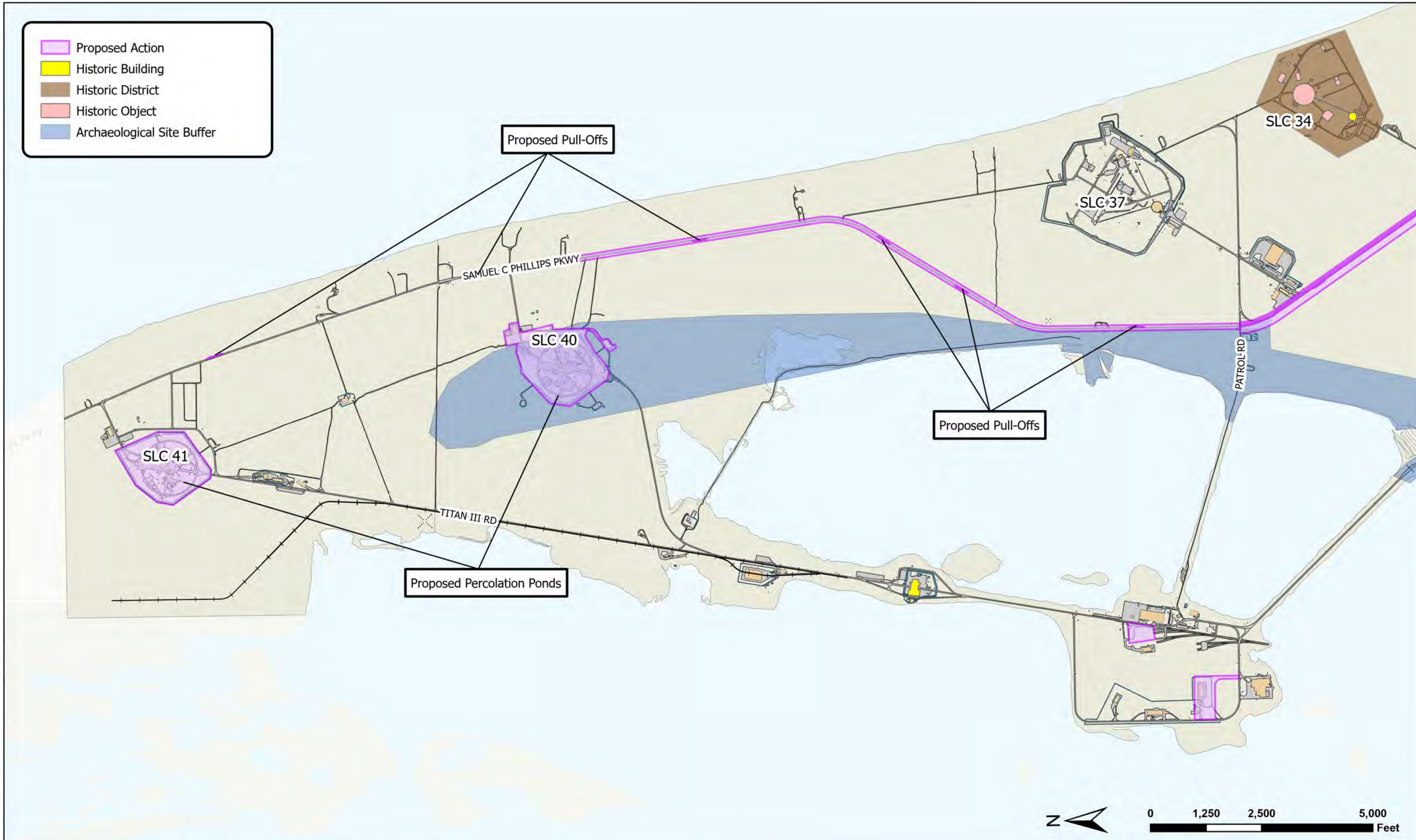

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FIGURE 3-11: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - CULTURAL RESOURCES - LAUNCH OPERATIONS NORTH

3.2.5.3 Environmental Consequences

3.2.5.3.1 Analysis Approach

This section documents potential impacts to cultural resources, including traditional, historic, and prehistoric resources, located within and adjacent to the proposed project areas. The analysis of potential cultural resource impacts focused on historic structures that may be impacted by the Proposed Action, including activities such as ground clearing, road/infrastructure construction, and facility demolition/renovation/construction.

A significant impact to cultural resources may occur if the Proposed Action

- Altered, damaged, or destroyed an NRHP-listed or eligible resource.
- Altered the characteristics of the surrounding environment that contribute to a resource's significance.
- Resulted in neglecting the resource to the extent that it deteriorates or is destroyed.

3.2.5.3.2 Proposed Action

The conceptual siting of facilities and improvements in the *CCSFS DDP* (USSF 2022a) avoided documented cultural resources to the greatest extent practicable. As a result, the Proposed Action would result in no or negligible adverse impacts on documented cultural resources. Several projects occur within the archaeological site buffer (i.e., expanded site buffer to protect sensitive cultural resource locations). However, further data review indicated only two proposed projects are in close proximity to archeological resources: the proposed South Administrative Campus, which is near NRHP-eligible prehistoric mounds that occur along the BRL (**Figure 3-7**) and the consolidated MSA, which is in proximity to NRHP-eligible archaeological sites along Pier Road (**Figure 3-9**). Based on a review of the GIS data and conceptual site plans, it is anticipated both archaeological sites would be avoided during project design.

Proposed facility demolition is not anticipated to adversely impact historic buildings/structures. As documented in the *SLD 45 ICRMP* (USAF 2020e), with SHPO concurrence, none of the facilities proposed for demolition (listed in **Table 3-10**) are identified for long-term preservation/maintenance; therefore, they are subject to demolition.

1 **Table 3-10. Proposed Facility Demolition Within the Proposed Action**

Planning Goal/Improvement	Building Number	Area (SF)	Construction Year	NRHP-listing Status
Provide reliable infrastructure				
Munitions storage consolidation	MSA 2-72650	3,416	1960	Not Eligible
	MSA 2-72665	1,822	1960	Not Eligible
	MSA 2-72680	1,809	1960	Not Eligible
	MSA 2-72700	356	1957	Not Eligible
	MSA 2-72701	1,240	1957	Not Eligible
	MSA 2-72702	1,620	1957	Not Eligible
	MSA 2-72703	1,620	1957	Not Eligible
	MSA 2-72706	304	1957	Not Eligible
	MSA 2-72707	1,080	1957	Not Eligible
	MSA 2-72708	1,620	1957	Not Eligible
	MSA 2-72709	1,860	1957	Not Eligible
	MSA 2-72810	3,264	1958	Not Eligible
	MSA 2-72910	3,080	2000	Not Eligible
	MSA 2-77200	2,031	1958	Not Eligible
	MSA 2-77350	1,159	1959	Not Eligible
	MSA 2-80505	3,272	1964	Not Eligible
	MSA 5-61820	3,225	1985	Not Eligible
	MSA 5-61830	2,206	1985	Not Eligible
	MSA 5-61875	1,732	1960	Not Eligible
	MSA 5-61900	4,980	1987	Not Eligible
	MSA 5-67210	4,260	1962	Not Eligible
	MSA 5-67400	6,884	1989	Not Eligible
Reduce impacts to personnel				
New administrative facilities	1645	29,756	1954	Not Eligible*
	1704	3,8095	1957	Not Eligible
	1708	75,905	1956	Not Eligible
	1711	32,517	1955	Not Eligible
	44410	16604	1961	Not Eligible
	60600	5,332	1958	Not Eligible
New shop, laboratory, warehouse facilities	1604	31,715	1956	Not Eligible
	1611	42,248	1956	Not Eligible
	1612	42,512	1956	Not Eligible
	1621	25,703	1955	Not Eligible
	1744	41,032	1957	Not Eligible
	1759	2,779	2014	Not Eligible

Planning Goal/Improvement	Building Number	Area (SF)	Construction Year	NRHP-listing Status
New shop, laboratory, warehouse facilities	49505	228	1991	Not Eligible
	49535	468	1957	Not Eligible
	49536	5,414	1958	Not Eligible*
	49750	10783	1985	Not Eligible
	54814	29	1993	Not Eligible
	60701	8,574	1985	Not Eligible
Improve logistics				
Support shops consolidation	1635	10,312	1954	Not Eligible
	44625	10,207	1965	Not Eligible
	44633	2,855	1993	Not Eligible
	44636	7,357	1994	Not Eligible
	49816	7,818	1998	Not Eligible
	49835	6,759	1958	Not Eligible
Expand developable areas				
New launch support facilities	70659	22,983	1987	Not Eligible
Stand-alone facility demolition	1627	457	1961	Not Eligible
	1637	702	1952	Not Eligible
	2826	274	1983	Not Eligible
	4120	292	1953	Not Eligible*
	7850	204	1959	Not Eligible
	8602	162	1957	No Further Action*
	15820	3,155	1965	No Further Action*
	15832	697	1959	No Further Action*
	17704	983	1961	No Further Action*
	17705	1,101	1961	No Further Action*
	17706	278	1961	No Further Action*

NRHP: Nation Register of Historic Places
*Consultation and SHPO concurrence were conducted through the preparation of the current SLD 45 ICRMP (USAF 2020e).

3.2.5.3.2.1 Mitigation and Best Management Practices

No adverse effects to historic properties are anticipated as a result of the Proposed Action. Potential impacts on cultural/historic resources would be reevaluated during project design, and consultation would be completed prior to any demolition, construction, or renovation in compliance with Section 106 of the NHPA and as set forth in the *SLD 45 ICRMP* (USAF 2020e).

Should prehistoric or historic artifacts, such as pottery or ceramics, projectile points, dugout canoes, metal implements, historic building materials, or any other physical remains that could be associated with Native American, early European, or American settlement be encountered, subsurface disturbance in the vicinity of the discovery would cease. The SLD 45 CRM would be notified, and activities would not resume without verbal and written authorization from the SHPO.

3.2.5.3.3 No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not occur, thus no impacts to historical or cultural resources would occur. Existing historic structures would continue to be maintained in their current state. Unknown potential areas containing cultural or prehistoric material would not be surveyed, discovered, or impacted. Long-term, the maintenance of outdated facilities, without major renovation, may result in the eventual deterioration of the resources.

3.2.6 Biological Resources

3.2.6.1 Definition of the Resource/Regulatory Setting

Biological resources include native or naturalized plants, fish, wildlife, and the habitats in which these species occur. Sensitive biological resources are defined as plant, fish, and wildlife species that are federally and state listed as threatened, endangered, or candidate and their habitat. Sensitive habitats include those areas designated as critical habitat protected by the ESA and sensitive ecological areas designated by federal or state court rulings. Sensitive habitats also include wetlands, sensitive upland communities, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, feeding/forage areas, and crucial summer/winter habitats). The ROI for biological resources includes CCSFS (with a focus on the locations of the proposed improvements evaluated within this EA) and adjacent sections of the Atlantic Ocean and the BRL.

The ESA (16 USC 1531 et seq) of 1973, as amended, was enacted to provide a program for the preservation of endangered and threatened species and to provide protection for the ecosystems upon which these species depend for their survival. Federal species of concern are not protected under the ESA; however, these species could become listed and therefore are given consideration when addressing biological impacts of an action.

The National Marine Fisheries Service (NMFS) and USFWS share responsibility for implementing the ESA. Generally, USFWS manages land and freshwater species, while NMFS manages marine and anadromous species. USFWS and NMFS also share responsibility for implementing the Marine Mammal Protection Act (MMPA) (16 USC 1361 et seq): NMFS is responsible for the protection of whales, dolphins, porpoises, seals, and sea lions, and USFWS is responsible for the protection of walrus, manatees, sea otters, and polar bears. NMFS is also the regulatory agency responsible for the nation’s living marine resources and their habitats, including Essential Fish Habitat (EFH). This authority is designated by the Magnuson–Stevens Fishery Conservation and Management Act (MSFCMA) (16 USC 1801 et seq), as amended. The Florida Fish and Wildlife Conservation Commission (FWC) identifies and lists state-protected species and habitats. Florida state-listed species and their habitats are protected in accordance with 379.2291, F.S. Specific biological resource laws and requirements related to the Proposed Action are summarized in **Table 3-11**.

1 **Table 3-11. Summary of Natural Resource Regulation Requirements**

Law or Rule	Permit/Action(s)	Requirement	Agency or Organization
Endangered Species Act (16 USC 1531 et seq)	Consultation with USFWS and, if necessary, obtain and comply with biological opinions/incidental take permits and comply with existing threatened and endangered species permits and commitments.	Conserve ecosystems that support threatened and endangered species. Section 7 requires federal agencies to ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat.	USFWS
Florida Endangered and Threatened Species Act of 1977 (379.2291, F.S.)	Follow approved Species Conservation Measures and Permitting Guidelines for projects that may adversely affect protected species.	Conserve and protect threatened and endangered species as a natural resource.	FWC
Sikes Act (16 USC 670 et seq)	Cooperation between the Department of Interior and DoD with state agencies to plan, develop and maintain fish and wildlife resources on U.S. military installations.	Develop an INRMP that is reviewed/approved by USFWS, NMFS, FDEP, and FWC.	DoD
Migratory Bird Treaty Act (16 USC 703-712)	Consultation with USFWS as necessary.	Prohibit intentional destruction of the eggs or nest of migratory and resident birds without a permit. Beach nesting locations must be protected and avoided during beach restoration activities.	USFWS
Marine Mammal Protection Act (16 USC 1361 et seq)	Consultation with USFWS and NMFS as necessary.	Prohibit, with certain exceptions, the "take" of marine mammals in WOTUS and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S.	USFWS/NMFS
Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 et seq)	Consultation with NMFS as necessary.	Promote the conservation and management of marine fisheries and essential fish habitat.	NMFS
Bald and Golden Eagle Act (BGEA, 16 USC 668-668c)	Coordination with USFWS and if necessary, obtain individual or programmatic permits.	Prohibit, without a permit issued by USFWS, the taking of bald eagles (*Haliaeetus leucocephalus*) or golden eagles (*Aquila chrysaetos*).	USFWS
EO 13112, *Invasive Species*	Remove and control invasive species.	Prevent the introduction of invasive species and provide for their control.	DoD
EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*	Incorporate migratory bird protection measures into federal agency activities.	Protect migratory birds, in accordance with the MBTA, BGEA, the Fish and Wildlife Coordination Act, ESA, and NEPA.	DoD
AFMAN 32-7003, *Environmental Conservation*	Long-term management of natural and cultural resources on the installation.	Implement the INRMP and ICRMP. Protect listed species, biodiversity, migratory birds, wetlands, floodplains, and cultural/historic resources.	DoD
45 Space Wing Instruction (SWI) 32-7001, *Exterior Lighting Management*	Use full cut off, well shielded, low wattage, limited wavelength amber light-emitting diode (LED) lights.	Reduce the amount of exterior lighting visible from the beach during the sea turtle nesting season to reduce mortality.	SLD 45

Law or Rule	Permit/Action(s)	Requirement	Agency or Organization
Marine Animal Regulation, Florida Marine Turtle Protection Act (379.2431, F.S.)	Coordination with FWC and consultation with USFWS as necessary.	Ensure FWC has the appropriate authority and resources to implement its responsibilities under USFWS Recovery for five species of marine turtle.	USFWS/FWC
Model Lighting Ordinance for Marine Turtle Protection Rule (62B-55, FAC)	Consultation with USFWS as necessary.	Protect hatchling marine turtles from the adverse effects of artificial lighting, provide overall improvement in nesting habitat degraded by light pollution, and increase successful nesting activity and production of hatchlings.	USFWS
Mangrove Trimming and Preservation Act (403.9323, F.S.)	Coordination with FDEP and SJRWMD.	Protect and preserve mangrove resources valuable to the environment and economy from unregulated removal, defoliation, and destruction.	FDEP/SJRWMD

3.2.6.2 Affected Environment/ Existing Conditions

3.2.6.2.1 Vegetation and Habitat

CCSFS is located on a barrier island that supports many plants, animals, and natural communities. **Figure 3-12** displays the broad land cover types at CCSFS based on the Florida Department of Transportation's (FDOT's) Land Use, Cover and Forms Classification System (FLUCCS) (SJRWMD 2014). Barrier islands along the Atlantic coast are especially important to nesting sea turtles, populations of small mammals, and as foraging and roosting habitat for a variety of resident and migratory birds. The following natural communities are found at CCSFS: oak scrub (including live oak/saw palmetto shrubland and hammock), maritime hammock, coastal strand/grassland, estuarine wetlands, xeric hammock, coastal interdunal swale, tropical hammock, basin marsh, hydric hammock, and beach dune (Gulledge et al. 2009). Descriptions of dominant habitat types are found in the *SLD 45 INRMP* (USAF 2020a).

Several native habitats at CCSFS, including oak scrub and coastal grasslands, are fire dependent (i.e., without a fire regime these habitats degrade or transition to another habitat type). The restoration and management of these habitats for wildlife requires regular prescribed burns. Burn operations for habitat restoration and fuel reduction are defined in the *SLD 45 INRMP* (USAF 2020a) and are also commitments to USFWS.

CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 3-12: CCSFS LAND USE AND LAND COVER (SJRWMD 2014)

3.2.6.2.2 Essential Fish Habitat

The MSFCMA defines EFH as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 USC 1802 [10]). Habitat Areas of Particular Concern (HAPCs) have also been designated within EFH areas; these include localized areas that are vulnerable to degradation or are especially important ecologically. NMFS defines EFH for highly migratory species under its jurisdiction, while regional management councils define EFH for species under their jurisdiction. The South Atlantic Fishery Management Council currently manages fisheries for several species in the vicinity of CCSFS, including the South Atlantic snapper and grouper fishery; dolphin and wahoo fishery; South Atlantic shrimp; coastal migratory pelagic species; highly migratory species; spiny lobster (*Panulirus argus*); golden crab (*Chaceon fenneri*); coral, coral reefs, and live/hardbottom habitats; and sargassum (*Sargassum* spp.). Substrates designated as EFH and HAPC include live/hard bottom, coral reefs, submerged aquatic vegetation (e.g., seagrasses and macroalgae), outcroppings around the shelf break zone, estuarine nursery areas, oyster reefs or shell banks, unconsolidated bottom (i.e., soft sediments), estuarine scrub/shrub (e.g., mangrove fringe), shelf current systems, sandy offshore shoals/bars, tidal creeks, coral, and coastal inlets.

Seagrass is documented along the western shoreline of CCSFS in the BRL and in the impounded area north of Titan III Road. Seagrass and several macroalgae species are generally found in patchy distribution with occasional dense beds. Mangroves are found along the BRL shoreline and within canals connected to the river. These mangroves are noncontiguous and interspersed in between herbaceous wetland vegetation. Florida laws also provide some protection to mangroves through the Mangrove Trimming and Preservation Act (403.9323, F.S.).

3.2.6.2.3 Wildlife and Migratory Birds

A diverse array of species of wildlife inhabit, utilize and/or frequent CCSFS. Specifically, 25+ mammalian species, 50+ amphibian and reptile species, and 200+ bird species are known to occur on CCSFS (USAF 2020a). Common terrestrial species include the opossum (*Didelphis virginiana*), hispid cotton rat (*Sigmodon hispidus*), raccoon (*Procyon lotor*), river otter (*Lontra canadensis*), gray fox (*Urocyon cinereoargenteus*), and bobcat (*Lynx rufus*). The developed areas of CCSFS provide roosting and/or nesting habitat for bird and bat species and the landscaped areas may also support foraging, nesting, and other wildlife behaviors.

The area of east-central Florida that includes CCSFS is considered by the Audubon Society to be the fourth most diverse Important Bird Area (IBA) in Florida, with over 330 documented species. Many species are year-round residents, and some are only seasonally present. CCSFS is located along one of the major migratory flyways for neo-tropical migrants that breed in eastern North America. A 2007 migratory bird study found significant use of mangrove, scrub hammock taller than 20 feet, oak-palmetto scrub shorter than 20 feet, and coastal strand habitats (SpecPro 2007 and 2009). Migratory and resident birds on CCSFS benefit from scrub habitat restoration activities ongoing at CCSFS (USAF 2020a).

The MBTA was originally signed by the U.S. and Canada in 1918 for the purpose of ending the commercial trade in feathers. The treaty prohibits the hunting, killing, capturing, possession, sale, transportation, and exportation of migratory birds and their feathers, eggs, and nests. The MBTA protects both resident and migrant species. Birds that are considered non-native species are not protected. USFWS has jurisdictional responsibility for species covered under the MBTA.

CCSFS manages birds and wildlife near the Skid Strip under AFI 91-212 (Air Force Guidance Memorandum 2021-01), *Bird/wildlife Aircraft Strike Hazard (BASH) Management Program*. The purpose of this program is to minimize bird/wildlife strike damage to aircraft by reducing the presence of wildlife in the developed areas.

3.2.6.2.4 Critical Habitat

Critical habitat is generally defined as specific areas that contain physical or biological features essential to the conservation of the species, which may need special management or protection. Although there are no federally designated critical land habitat at CCSFS under Section 4 of the ESA, critical in-water habitat for the West Indian manatee (*Trichechus manatus*) is mapped within the BRL, inlets/bays of CCSFS that connect to the BRL, and the Atlantic Ocean. Federally designated critical habitat for the loggerhead sea turtle (*Caretta caretta*) and North Atlantic right whale (*Eubalaena glacialis*) is also mapped along the Atlantic Coast. CCSFS is exempt from the critical habitat designation for loggerhead sea turtle on land because sea turtle management actions implemented by SLD 45 are beneficial to the species (USFWS 2014). CCSFS is not exempt from the in-water critical habitat designation (by NMFS) for the loggerhead sea turtle or the North Atlantic right whale since these waters are not owned by DoD (USAF 2020a). Adjacent critical habitats are displayed on **Figures 3-13 through 3-17**.

3.2.6.2.5 Other Protected Species or Habitats

Bald Eagle

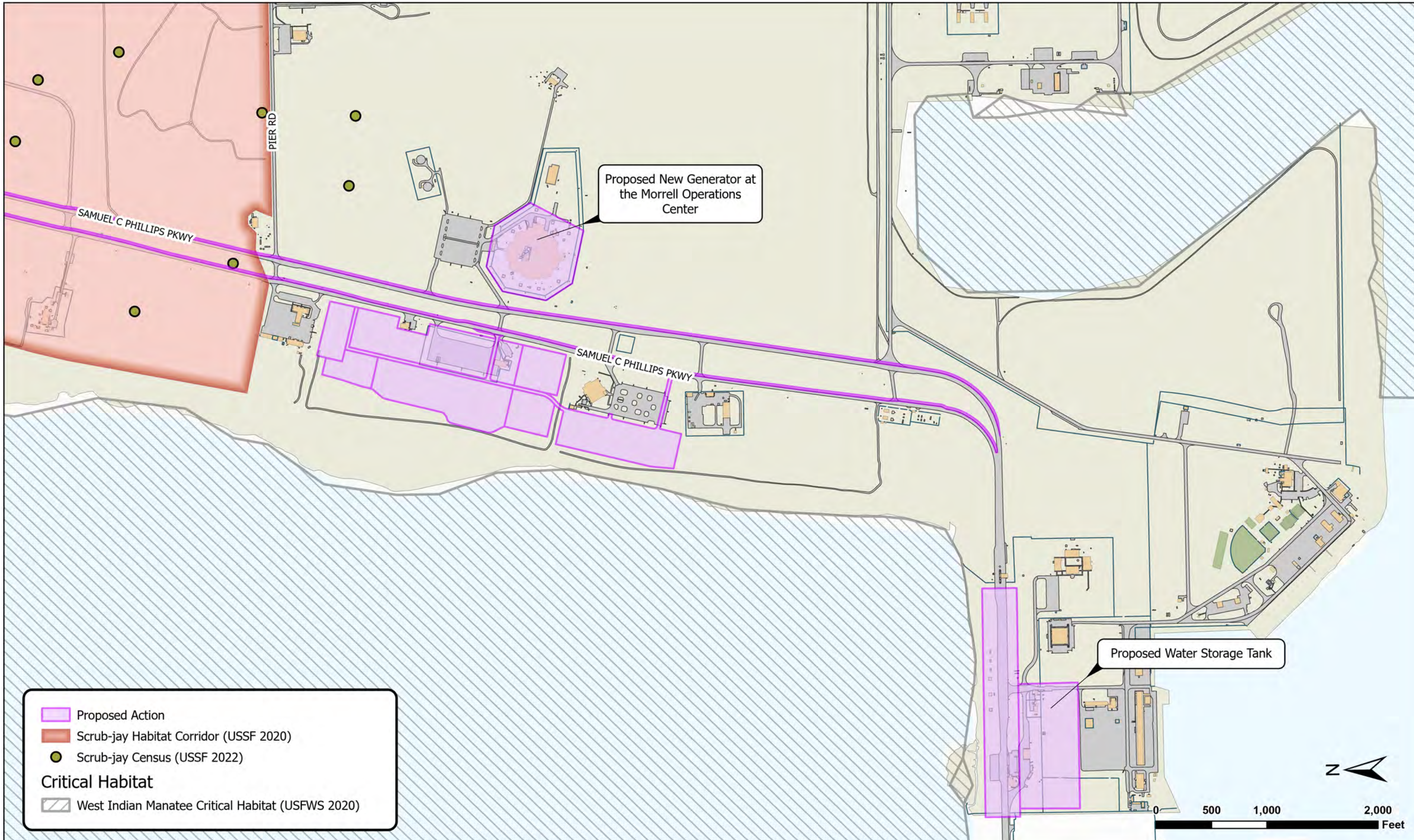
The bald eagle was removed from protection under the ESA in August 2007. Although, it is still protected under the MBTA (16 USC 703-712), Bald and Golden Eagle Act (BGEA) (16 USC 668-668c), Lacey Act (16 USC 3371-3378) and Chapter 68A-16.002, FAC. USFWS has jurisdictional responsibility for the species. To reduce the potential for human activity to adversely affect bald eagles, *USFWS Management Guidelines* suggest the protection of a 660-ft habitat buffer around each active and alternate bald eagle nest (USFWS 2007). A review of the Audubon Eaglewatch database found no documented nests at CCSFS; however, several are documented on KSC and across the BRL in Merritt Island (Audubon 2022).

Osprey

The osprey is protected by the MBTA. This species is no longer listed in Florida as of 2018 but is part of the Imperiled Species Management Plan. The osprey is a species of raptor that is sometimes mistaken for the bald eagle. In Florida, ospreys commonly capture a variety of fish from coastal habitats and freshwater lakes and rivers. Ospreys build large stick nests located in the tops of large living or dead trees and on manmade structures such as utility poles, channel markers, and nest platforms. Ospreys have adapted very well to artificial nest sites. Nests are commonly reused for many years. Nesting begins from December (south Florida) to late February (north Florida). The incubation and nestling period extends into the summer months. Inactive nests (i.e., nests without eggs or flightless young) can be removed without a permit (FWC 2019b).

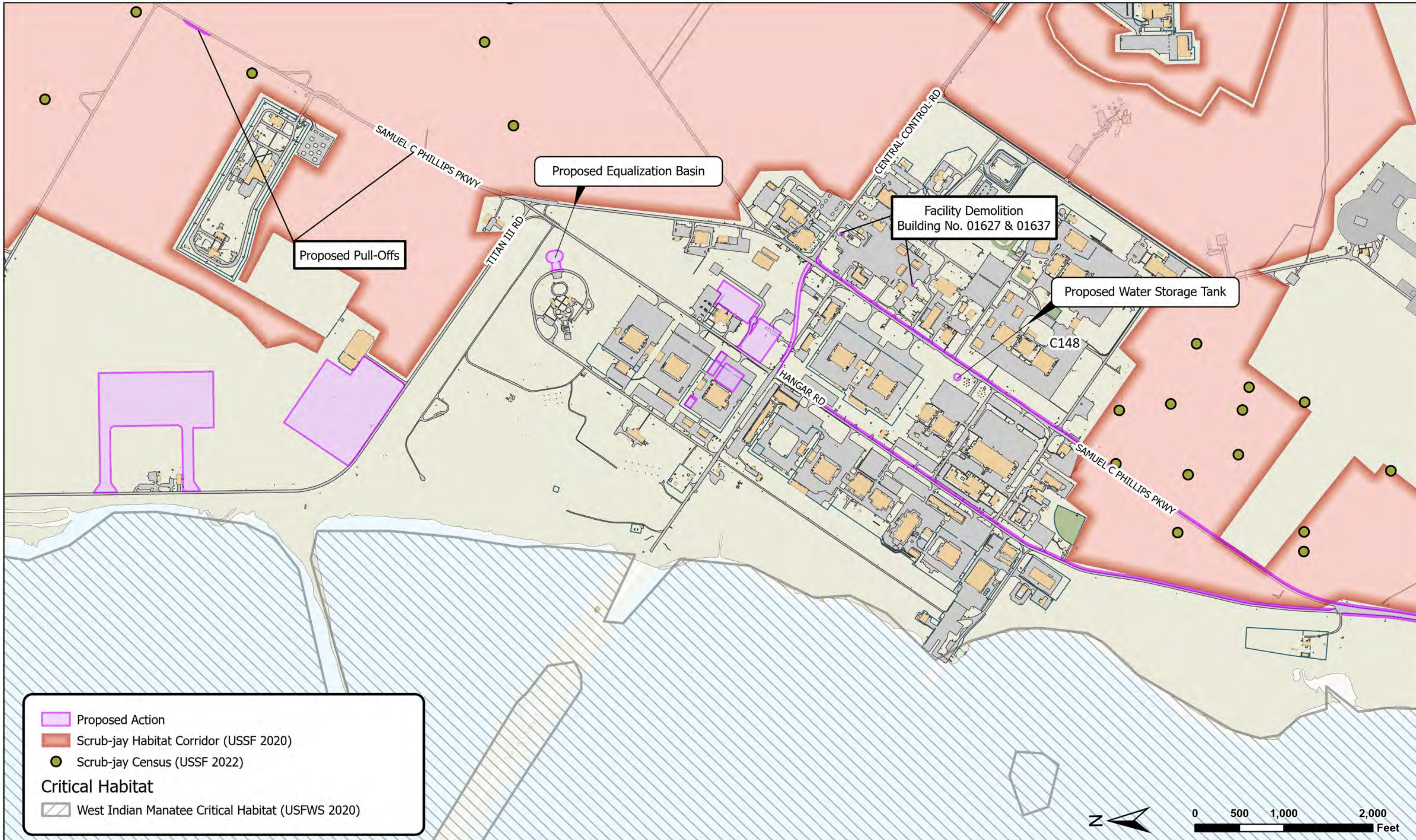
Bats

There are 13 bat species native to Florida, and the majority of these species are listed by the State of Florida as Species of Greatest Conservation Need (SGCN). CCSFS has a number of these bat species, including tricolored bats (discussed in more detail in **Section 3.2.6.2.6**). They can be found roosting/nesting in trees, buildings, and culverts. Bats are protected from illicit take per 68A-4.001 and 68A-9.010, FAC. Loss of natural roosting sites such as trees and caves are a threat to the species. The most critical times to avoid activities near roosting bats are during maternity/breeding season, defined as April 15th to August 15th. Should bats need to be removed from buildings, FAC requires exclusions be conducted outside of maternity season, and exclusionary devices must be in place a minimum of four nights when the overnight temperature is forecast to be at least 50 °F (10 °C).



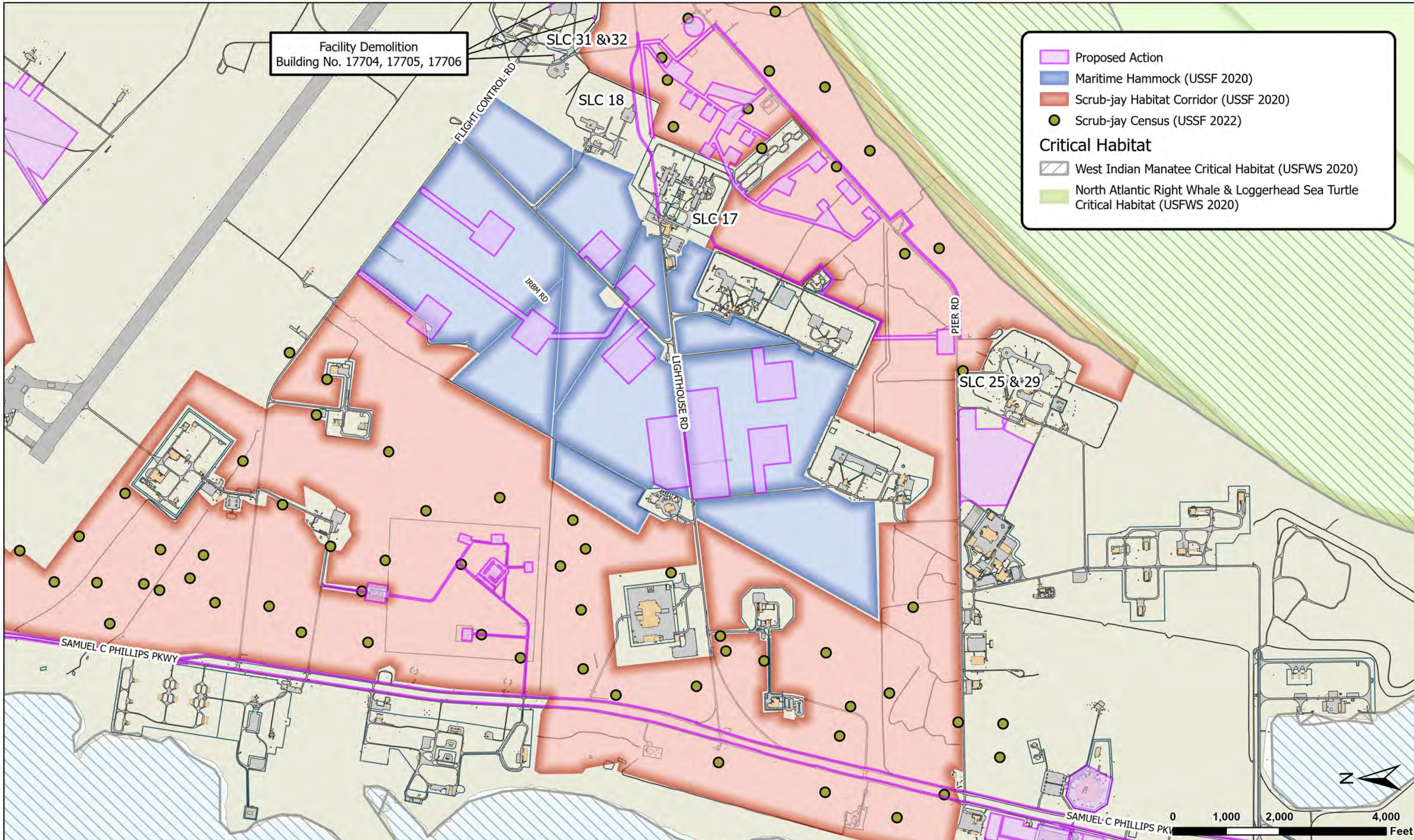
CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 3-13: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - BIOLOGICAL RESOURCES - SOUTH GATE



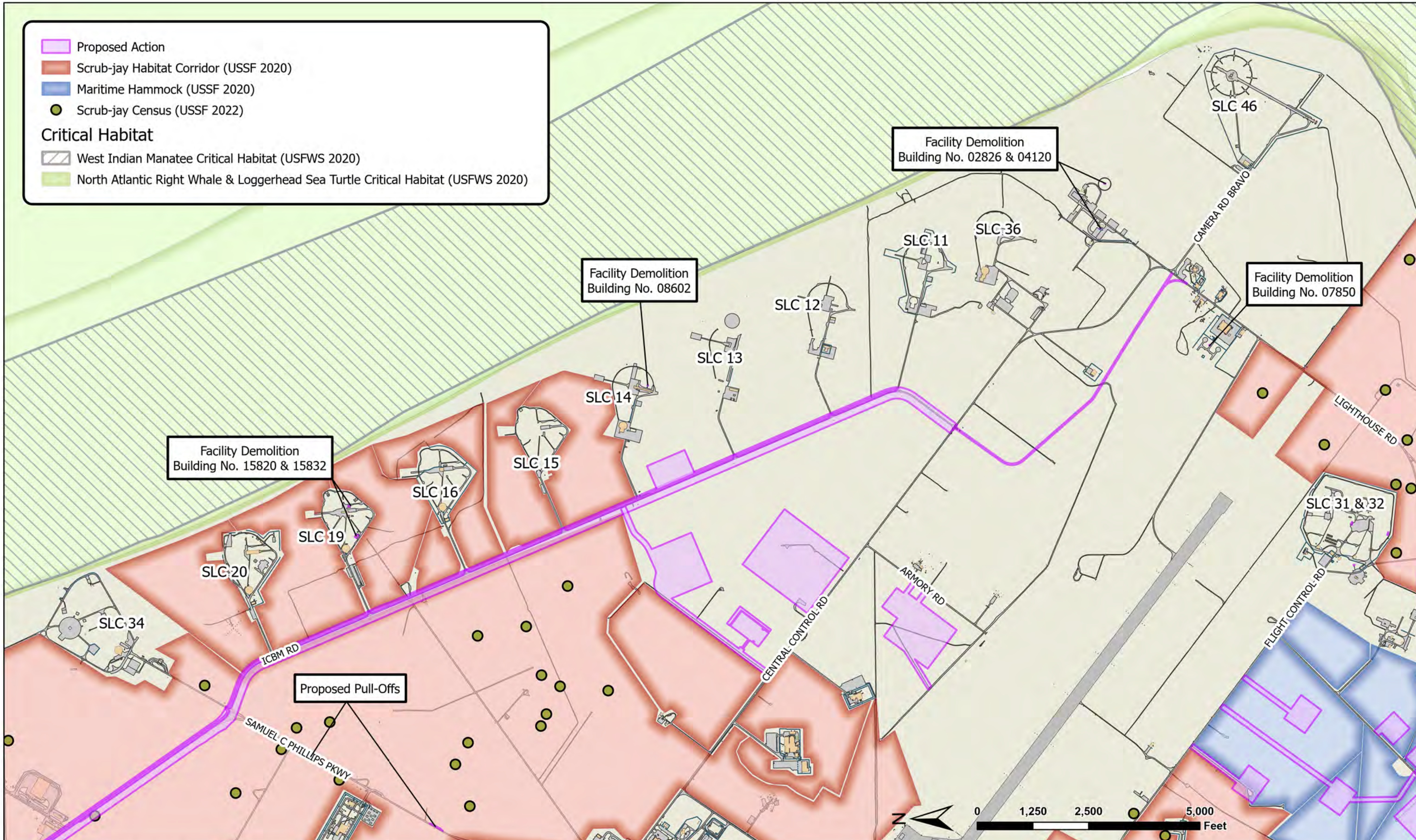
CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 3-14: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - BIOLOGICAL RESOURCES - INDUSTRIAL AREA



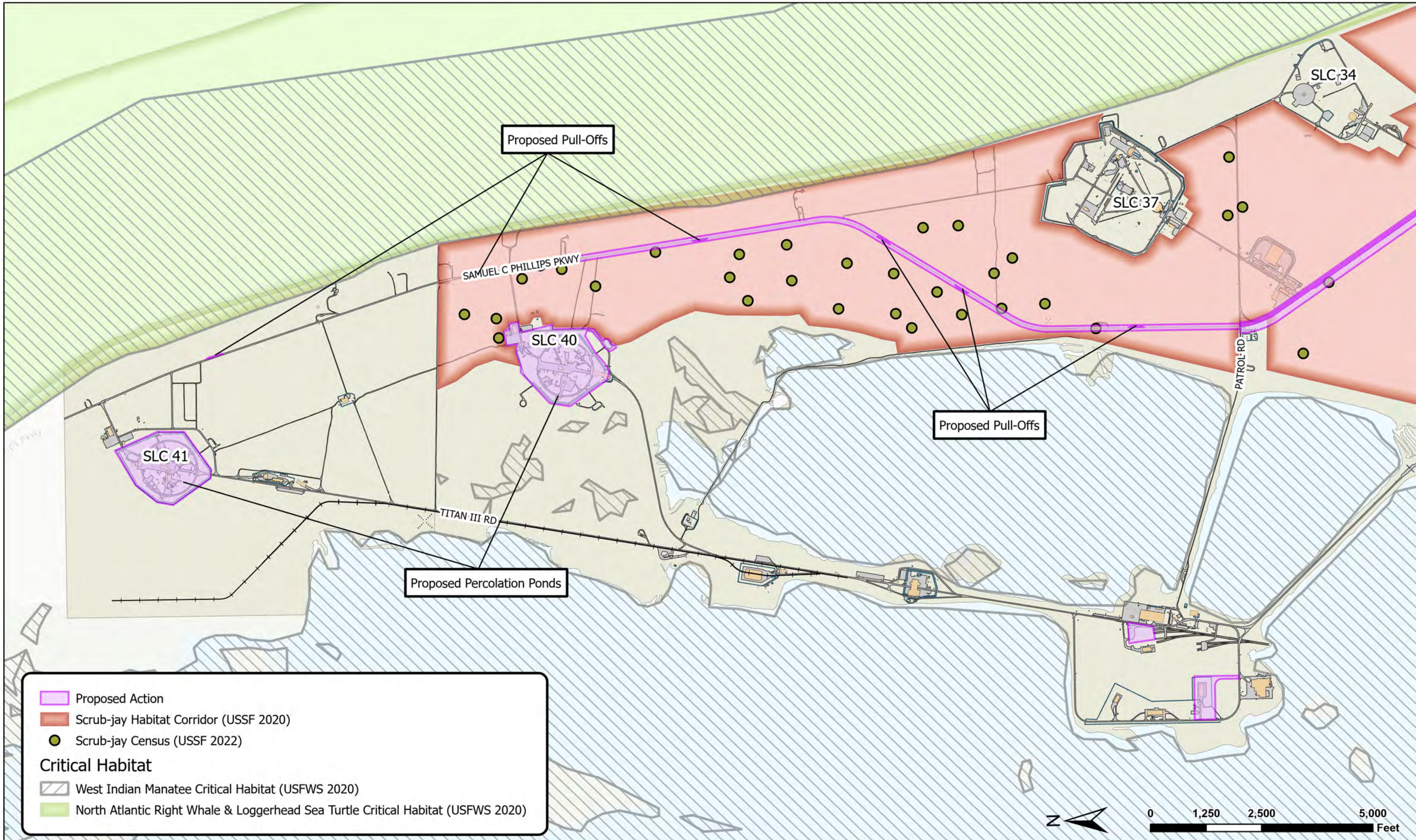
CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 3-15: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - BIOLOGICAL RESOURCES - CENTRAL



CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 3-16: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - BIOLOGICAL RESOURCES - LAUNCH OPERATIONS SOUTH



CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 3-17: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - BIOLOGICAL RESOURCES - LAUNCH OPERATIONS NORTH

3.2.6.2.6 Sensitive Species

Sensitive species are defined as those listed under Section 4 of the ESA; Chapter 68A-27, FAC, *Florida Endangered and Threatened Species List*; Chapter 5B-40, FAC*, Preservation Of Native Flora Of Florida*, and the *Regulated Plant Index*; species with other regulatory protection; and those that are otherwise considered rare or vulnerable to human disturbance. The *SLD 45 INRMP* (USAF 2020a) identified 44 federally or state listed species occurring within CCSFS including five fish, nine reptiles, 15 birds, four mammals, and 11 plants. A review of the USFWS Information for Planning and Consultation (IPaC) database (USFWS 2022), identified 19 federally listed species with the potential to occur at CCSFS. The resulting list of sensitive species is included in **Table 3-12**.

1 **Table 3-12. Sensitive Species with Known or Potential Occurrence Within or Near CCSFS**

Common Name	Scientific Name	Federal Status	State Status
Birds			
American oystercatcher	*Haematopus palliates*	-	T
Audubon's crested caracara	*Caracara plancus*	T	-
Black skimmer	*Rynchops niger*	-	T
Florida burrowing owl	*Athene cunicularia*	-	T
Florida scrub-jay	*Aphelocoma coerulescens*	T	-
Least tern	*Sternula antillarum*	-	T
Little blue heron	*Egretta caerulea*	-	T
Piping plover	*Charadrius melodus*	T	-
Red knot	*Calidris canutus rufa*	T	-
Reddish egret	*Egretta rufescens*	-	T
Roseate spoonbill	*Platalea ajaja*	-	T
Roseate tern	*Sterna dougallii*	T	-
Snowy plover	*Charadrius nivosus*	-	T
Southeastern American kestrel	*Falco sparverius paulus*	-	T
Tricolored heron	*Egretta tricolor*	-	T
Wood stork	*Mycteria americana*	T	-
Fish			
Atlantic sturgeon	*Acipenser oxyrinchus*	E	-
Giant manta ray	*Manta birostris*	T	-
Oceanic whitetip shark	*Carcharhinus longimanus*	T	-
Nassau grouper	*Epinephalus striatus*	T	-
Smalltooth sawfish	*Pristis pectinata*	E	-
Reptiles			
American alligator	*Alligator mississippiensis*	T(S/A)	-
Eastern indigo snake	*Drymarchon corais couperi*	T	-
Florida pine snake	*Pituophis melanoleucus mungitus*	-	T
Gopher tortoise	*Gopherus polyphemus*	-	T
Green sea turtle	*Chelonia mydas*	T	-
Hawksbill sea turtle	*Eretmochelys imbricata*	E	-
Kemp's ridley sea turtle	*Lepidochelys kempii*	E	-
Loggerhead sea turtle	*Caretta*	T	-
Leatherback sea turtle	*Dermochelys coriacea*	E	-
Mammals			
North Atlantic right whale	*Eubalaena glacialis*	E	-
Southeastern beach mouse	*Peromyscus polionotus niveiventris*	T	-
Tricolored bat	*Perimyotis subflavus*	E (Proposed)	-
West Indian manatee	*Trichechus manatus*	T	-
Insects			
Monarch butterfly	*Danaus plexippus*	C	-
Plants			
Beach star	*Cyperus pedunculatus*	-	T
Carter's mustard	*Warea carteri*	E	-
Coastal vervain	*Glandularia maitima*	-	E
Common wild-pine	*Tillandsia fasciculata*	-	E
Curtiss' milkweed	*Asclepias curtissii*	-	E
Inkberry	*Scaevola plumieri*	-	T
Lewton's Polygala	*Polygala lewtonii*	E	-
Nodding pinweed	*Lechea cernua*	-	T
Pineland Florida lantana	*Lantana depressa var. floridana*	-	E
Satin-leaf	*Chyrsophyllum oliviforme*	-	T
Sea lavender	*Argusia gnaphalodes*	-	E
Shell mound prickly-pear cactus	*Opuntia stricta*	-	T
Sand-dune spurge	*Chamaesyce cumulicola*	-	E

Source: *SLD 45 INRMP* (USAF 2020a), USFWS IPaC 2022. Notes E: Endangered; T: Threatened; T(S/A): Threatened by Similarity of Appearance; C: Candidate; E (Proposed): Proposed for listing as Endangered (September 2022)

3.2.6.2.7 Federally Listed Species

3.2.6.2.7.1 Birds

Audubon's Crested Caracara

The Audubon's crested caracara (caracara) is federally listed as threatened. It is a large raptor with a crest, naked face, heavy bill, elongate neck, and unusually long legs. It is about 20 to 25 inches long and has a wingspan of 47 inches. Caracaras are highly opportunistic in their feeding habits, eating carrion and capturing live prey. Their diets include insects and other invertebrates, fish, snakes, turtles, birds, and mammals. Several authors have noted that caracaras may also consume unusual items, including turtle, various eggs, and coconut meat (USFWS 2009).

Historically, this subspecies was a common resident in Florida from northern Brevard County, south to Fort Pierce, Lake Okeechobee, and Hendry County. Available evidence indicates that the range of this subspecies in Florida has experienced a long-term continuing contraction, with birds now rarely found as far north as Orlando in Orange County or east of the St. Johns River. Caracaras prefer to nest in cabbage palms surrounded by open habitats with low ground cover and low-density tall or shrubby vegetation. Current habitat use consists of improved pasture, dry prairie, freshwater marsh, mixed upland hardwoods, shrub swamp, shrub and brushland, grassland, pinelands, bare soil, urban, other agriculture, citrus, and scrub. Core habitat lies within the Kissimmee Prairie, located northwest of Lake Okeechobee (USFWS 2009). Brevard County's barrier island system is within the less frequent distribution/range of caracara. However, CCSFS contains suitable nesting and foraging habitat, and caracara sightings have become more common on CCSFS over the past five years. Caracara have been recently observed at the following locations on CCSFS: near the Camera Road Alpha terminus, the SLC 40 beach area, the area around Pump Station 7, and the CCSFS Airfield CZ (north side near landfill).

Florida Scrub-jay

The Florida scrub-jay (scrub-jay), which is federally listed as threatened, is a non-migratory bird endemic to Florida that is found only within specific types of scrub habitat. This blue and gray bird, about the size of a blue jay, typically inhabits fire-dominated, low-growing, oak scrub habitat found on well-drained sandy soils. Scrub-jays are territorial and will occupy a territory for life. Juvenile scrub-jays stay in their natal territory for up to five years and only disperse a short distance upon reaching breeding age. Therefore, although scrub-jays will tolerate low levels of development, habitat loss, alteration, and fragmentation are the primary threats to species persistence. Tall trees, buildings, and other structures (e.g., towers and utility poles) also pose a threat by providing perches for predators. The Merritt Island/Cape Canaveral Complex (includes CCSFS, KSC, and MINWR) is one of three core Florida scrub-jay populations. The 2022 CCSFS scrub-jay census identified 142 family groups on the installation (depicted on **Figures 3-13 through 3-17**).

Conservation of this species depends upon restoration of sufficient optimal habitat to support large populations. The scrub habitat management and restoration program at CCSFS utilizes mechanical treatment to reduce height of the scrub and prescribed burning to provide open patches of sand and prevent accumulation of fuels. Restored sites can be maintained as suitable scrub-jay habitat with prescribed burning on a regular cycle depending on site conditions. The 45th Civil Engineer Squadron Environmental Office (45 CES/CEIE) has a USFWS commitment to burn 300 acres of scrub annually (10-year average) and an INRMP goal of 500 acres/year on average to promote the recovery of the species.

Shorebirds: Piping Plover, Red Knot, and Roseate Tern

The piping plover, red knot, and roseate tern are federally listed as threatened. The piping plover is a small, stocky, sandy-colored bird. Adult plovers have yellow-orange legs, a black band across the forehead from eye to eye, and a black ring around the base of the neck. The red knot is a robin-sized shorebird with distinctive orange-red plumage in spring and summer months. Plovers and red knots feed on invertebrates like small clams, mussels, and snails, as well crustaceans, marine worms, and horseshoe crab eggs. On the breeding grounds knots mainly eat insects. The roseate tern is a medium-sized, gull-like tern about 15 inches long. When not in breeding season, it has a black bill, black legs, white forehead and most of the crown, and a long, deeply forked tail. Roseate terns nest on small barrier islands, often at ends or breaks.

The preferred wintering habitat for these species includes sandy beaches, sand flats, and mudflats along coastal areas. They may be observed near CCSFS during the non-breeding (wintering and migrating) season from July 15 through May 15. Development on beaches has reduced the amount of suitable wintering areas available.

Wood Stork

Wood storks, federally listed as threatened, are large, long-legged wading birds that nest in hardwood swamps, sloughs, mangroves, and cypress domes (USFWS 1997). They forage on small to medium-sized fish, crayfish, amphibians, and reptiles in a variety of sites including both freshwater and estuarine wetlands, marshes, swales, ponds, hardwood and cypress swamps, narrow tidal creeks or shallow tidal pools, and artificial wetlands free of dense aquatic vegetation (such as stock ponds; shallow, seasonally flooded, roadside or agricultural ditches; and impoundments). Wood storks generally use foraging sites that are located within 18 to 31 miles of the nesting colony. Wood storks display social nesting behavior, as they are often seen nesting in large colonies of 100-500 nests. Wood storks need periodic flooding and drying of the environment for successful rookeries.

The southern portion of CCSFS is located within 15 miles of a documented wood stork colony. Freshwater wetlands on CCSFS provide potential foraging habitat. Wood storks have also been observed foraging in shallow canals and ditches.

3.2.6.2.7.2 Fish

Atlantic Sturgeon

The Atlantic sturgeon, federally listed as endangered, inhabits both salt and freshwater habitats. Some sturgeon migrate into brackish and saltwater during the fall and feed there throughout the winter months and migrate into freshwater rivers during the spring and summer months, while others remain at sea for years (Atlantic Sturgeon Status Review Team 2007). This species of sturgeon can be found from Canada to the St. Johns River in Florida. Waters of the BRL may provide suitable habitat (USAF 2020a).

Smalltooth Sawfish

The smalltooth sawfish is federally listed as endangered. Juveniles utilize unvegetated mud and sand bottoms along red mangrove shorelines within estuaries, river mouths, and bays (NMFS 2009a). Adults are typically found in open water habitats, but females have been encountered near coral reefs and inshore during the spring. The historical range of the smalltooth sawfish included estuarine habitats of all coastal waters of Florida, including the BRL. CCSFS does not occur within designated critical habitat for the smalltooth sawfish (NMFS 2009b); however, suitable habitat is present in surface waters in the BRL and the open waters of the Atlantic Ocean adjacent to CCSFS (USAF 2020a).

Atlantic Ocean Fish: Giant Manta Ray, Oceanic Whitetip Shark, Nassau Grouper

Three threatened deep-water fish have the potential to occur in the Atlantic Ocean waters adjacent to CCSFS. The giant manta ray occupies tropical, subtropical, and temperate oceanic waters and productive coastlines where they feed on zooplankton. Giant manta rays are commonly offshore in oceanic waters but are sometimes found feeding in shallow waters (less than 32.8 feet) during the day (Miller and Klimovich 2017). Giant manta rays can dive to depths of over 3,280 feet and conduct night descents to between 650 to 1,475 feet deep.

The oceanic whitetip shark is a large pelagic shark distributed globally throughout open ocean waters, outer continental shelves, and around oceanic islands, primarily from 10 degrees North to 10 degrees South, but up to 30 degrees North and 35 degrees South (Young 2016). They occur from the surface to at least 500 feet deep and display a preference for water temperatures above 68 °F (20 °C).

The Nassau grouper, federally and state listed as threatened, is distributed from south Florida throughout the Caribbean, and Bermuda (Sadovy and Eklund 1999). They are mostly absent from the continental U.S., with the exception of Florida, where larger juveniles and adults have been recorded. No larval Nassau grouper or juveniles smaller than 20 inches in length have been collected or observed in Florida waters. Juveniles inhabit macroalgae, coral clumps, and seagrass beds and are relatively solitary. As they grow, they occupy progressively deeper areas and offshore reefs and can be in schools of up to 40 individuals. When not spawning, adults are most common in waters less than 328 feet deep.

3.2.6.2.7.3 Reptiles

American Alligator

The American alligator (alligator) is listed under the ESA based on its similarity of appearance to the threatened American crocodile (*Crocodylus acutus*). CCSFS does not fall within the range of the American crocodile. Alligators are highly mobile and can be found in most permanent bodies of freshwater in Florida. They have been observed along the BRL shorelines of CCSFS and in many of the upland ditches, wetlands, and surface waters. At times they have been observed crossing roads at CCSFS.

Eastern Indigo Snake

The eastern indigo snake (indigo snake) is federally listed as endangered. The indigo snake is a non-venomous, bluish-black colored snake that inhabits pine flatwoods, hardwood forests, moist hammocks, and areas that surround cypress swamps. They often take refuge in gopher tortoise burrows and are more likely to inhabit areas that have a mixture of wetlands and tortoise-inhabited uplands. The indigo snake's diet consists of a variety of species, including small mammals, birds, toads, frogs, turtles and their eggs, lizards, and small alligators. CCSFS contains hundreds of gopher tortoise burrows and suitable habitat is available. The most recent documented indigo snake sighting near CCSFS was in 2018: a roadkill on KSC approximately 0.25 miles north of CCSFS. Sightings prior to that date back to the early 1990s.

Sea Turtles

Five federally listed sea turtles may occur in the waters adjacent to CCSFS: green, leatherback, loggerhead, hawksbill, and Kemp's ridley. With the exception of the hawksbill, these species have also been observed nesting on CCSFS beaches. Each year from March to November, between 1,400 to 3,600 sea turtle nests are deposited on CCSFS. The threatened loggerhead and green sea turtles are the most common species found nesting on CCSFS beaches. Sea turtles also forage within the Trident Basin.

As a developed area on the Atlantic Ocean, CCSFS manages facility lights to reduce the indirect impacts to nesting/hatching sea turtles. Artificial lighting is known to cause disorientation (loss of bearings) for sea turtle hatchlings when it overwhelms the natural moonlight reflecting off the ocean's breaking waves. When sea turtles are disoriented, or energy is wastefully expended due to disorientation caused by artificial lighting, they become easy prey, dehydrated, or unable to make it to the ocean, which reduces or prevents survival. SLD 45 currently has an active Biological Opinion (BO) for sea turtle protection through light management (USFWS Log #4191 0-2009-F-0087).

45 CES/CEIE implements management measures that contribute to the recovery of the CCSFS sea turtle population, which include predator control, exterior light management, sea turtle walks and education, rescue and release of hatchlings, daily nest surveys, stranding and salvage activities, nest relocation, and beach habitat restoration.

3.2.6.2.7.4 Mammals

North Atlantic Right Whale

North Atlantic right whales (right whale), is federally listed as endangered; the latest preliminary population data suggest there are fewer than 350 remaining (NMFS 2022). Right whales have stocky black bodies with no dorsal fins, and their blow spouts are shaped like a "V." Their tails are broad, deeply notched, and all black with a smooth trailing edge. Their bellies may be all black or have irregularly shaped white patches. Pectoral flippers are relatively short, broad, and paddle-shaped. Calves are about 14 feet at birth and adults can grow to lengths of 52 feet. During winter months, right whales migrate south from feeding grounds off the coast of Canada and New England to give birth in the warmer waters of the Atlantic, along the Florida and Georgia coastlines.

In 2008, the NMFS finalized critical habitat for the right whale, including off-shore of CCSFS, to reduce ship-whale collisions. In critical habitat areas boats are not to get within 500 yards of the right whale. Additionally, all vessels 65 feet or longer must travel at reduced speeds (10 knots or less) in certain locations along the U.S. East Coast (north of the CCSFS shoreline) during whale migration season. In August 2022, National Oceanic and Atmospheric Administration (NOAA) Fisheries announced proposed changes to the right whale vessel speed rule to further reduce the likelihood of mortalities and serious injuries to right whales from vessel collisions (87 FR 46921). The changes would broaden the spatial boundaries (to include the CCSFS coastline and Port Canaveral) and timing of seasonal speed restriction areas along the U.S. East Coast. They would also expand mandatory speed restrictions of 10 knots or less to include most vessels 35 to 65 feet in length. The public comment period on the proposed rule change closed October 31, 2022.

Southeastern Beach Mouse

The southeastern beach mouse (beach mouse) is federally listed as threatened. A subspecies of the widely distributed old field mouse (*P. polionotus*), beach mice originally occurred on coastal dunes and coastal strand communities along the Atlantic coast of Florida. This beach mouse generally occurs along the beach primary dune line and is presently known to occur in six sites in Brevard, Indian River, and St. Lucie Counties. Reproduction of beach mice can occur year-round, although their peak in reproduction appears to occur in late summer and fall and leads to increased population levels in late fall and January (USFWS 2020). Females can produce two or more litters per year, with litters averaging three to four offspring.

Historical distribution of the species was regarded as limited to coastal dune and coastal strand communities; however, other large, healthy populations have been observed in disturbed oak scrub communities (Oddy et al. 1999). Recent studies at CCSFS indicate beach mice are present in greater densities in scrub rather than dune habitat (Simmons 2009). A live-trapping study conducted at CCSFS from 1995 to 1997 indicated steady to increasing beach mice populations, with highest abundances observed in fall and lowest in winter (Oddy et al. 1999). Camera-trap surveys conducted adjacent to CCSFS Skid Strip in December 2020 found mice at 13 of the 21 trap locations (USSF 2021). Given these findings, beach mice may occur within areas proposed for improvement, especially north of the Skid Strip.

Tricolored Bat

On September 13, 2022, USFWS announced a proposal to list the tricolored bat as endangered under the ESA. The bat faces extinction due to the impacts of white-nose syndrome, a deadly disease affecting cave-dwelling bats across the North America. The tricolored bat is one of the smallest bats native to North America. This once common species is wide ranging across the eastern and central United States and portions of southern Canada, Mexico, and Central America. During the winter, tricolored bats are found in caves and mines, although in the southern U.S., where caves are sparse, tricolored bats may be found roosting in man-made structures (e.g., buildings, culverts, and bridges). During the spring, summer, and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves. As its name suggests, the tricolored bat is distinguished by its unique tricolored fur that appears dark at the base, lighter in the middle and dark at the tip. Tricolored bats are documented from CCSFS and may be present in bridges, culverts, or forested sites within proposed project areas.

West Indian Manatee

The West Indian manatee (manatee) is federally listed as threatened. The manatee is known to occur within marine, brackish, and freshwater systems in coastal and riverine areas throughout their range. Manatees are herbivores that feed opportunistically on a wide variety of marine, estuarine, and freshwater plants, including submerged, floating, and emergent vegetation. USFWS has designated the Atlantic Ocean and BRL adjacent to CCSFS as critical manatee habitat due to the presence of warm water refuges and seagrass beds for foraging. Additionally, FWC Manatee Protection Zones (Chapter 68C-22.006, FAC), which restrict the speed and operation of vessels to protect manatees, are located throughout the BRL. Manatees have been observed adjacent to CCSFS in the BRL, especially near the Hangar AF Wharf and the NOTU Trident Basin.

3.2.6.2.7.5 Insects

Monarch Butterfly

In December 2020, USFWS determined that listing the monarch butterfly as an endangered or threatened species is warranted but precluded by higher priority listing actions (USFWS 2020). With this 12-month finding, the monarch butterfly became a candidate for listing. Candidate species are provided no statutory protection under the ESA but could be listed as threatened or endangered in the future and therefore are given consideration when addressing biological impacts of an action. Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. During the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily *Asclepias* spp.). Individual monarchs in temperate climates, undergo long-distance migration; however, Florida’s warm climate and continuous availability of host plants allow much of Florida's monarch population to stay in the state year-round and breed continuously throughout the year. Monarch butterflies are documented from CCSFS and may occur within open, grassy proposed project areas, especially where milkweed are present.

3.2.6.2.8 State-listed Species

3.2.6.2.8.1 Birds

Florida Burrowing Owl

The Florida burrowing owl (burrowing owl) is state listed as threatened. FWC has developed *Species Conservation Measures and Permit Guidelines* (FWC 2019a) for this species. The burrowing owl is a pint-sized bird that lives in open, treeless areas. The burrowing owl spends most of its time on the ground, where its sandy brown plumage provides camouflage from potential predators. The diet of burrowing owls is primarily insects; however, they will also feed on snakes, frogs, small lizards, birds, and rodents. The typical breeding season is February to July, though they can breed earlier or later. Nesting occurs in burrows the owls dig in the ground, which are maintained and can/may be used for consecutive years. The females can lay up to eight eggs and will incubate for up to 28 days. Due to degradation of native prairie habitat, owls may inhabit golf courses, airports, pastures, agricultural fields, and vacant lots. Burrowing owls been observed on CCSFS, and suitable habitat is available.

Southeastern American Kestrel

The southeastern American kestrel, state listed as threatened, is a non-migratory subspecies of kestrel found in Florida and the southeastern U.S. FWC has developed *Species Conservation Measures and Permitting Guidelines* (FWC 2020) for the continued protection of this species. Kestrels utilize open habitats, such as pine scrub, dry prairies, pine savannahs, sandhills, mixed pine and hardwood forests, and pastures, for foraging and nest in tree cavities. The southeastern American kestrel has been observed on CCSFS where suitable habitat is available.

Shorebirds: American Oystercatcher, Black Skimmer, Snowy Plover, and Least Tern

The American oystercatcher, black skimmer, snowy plover, and least tern are all state listed as threatened. These shorebirds inhabit beaches, sandbars, spoil islands, shell rakes, salt marsh, and oyster reefs. Least terns nest annually on the CCSFS beach. Black skimmers have been documented nesting on CCSFS beaches in the past, but nesting has not been observed in many years (personal communication, 45 CES/CEIE).

Wading birds: Little Blue Heron, Reddish Egret, Tricolored Heron, and Roseate Spoonbill

The little blue heron, reddish egret, tricolored heron, and roseate spoonbill are all state listed as threatened. FWC has developed *Species Conservation Measures and Permit Guidelines* (FWC 2019c) for these species. These wading birds occur statewide where they forage in a variety of coastal and inland wetlands including swamps, marshes, and the edges of water bodies. Nesting occurs in a variety of forested or shrub wetlands. Habitat is available on CCSFS, and these species are documented from the installation.

3.2.6.2.8.2 Reptiles

Florida Pine Snake

The Florida pine snake (pine snake), state listed as threatened, is one of the largest snakes in eastern North America (Bartlett and Bartlett 2003). This species can reach a length of up to 84 inches. It has a brown back with dark blotches, white belly, ridged scales, small head, and pointed snout. Pine snakes are habitat specialists that can be found in open pine forests. They have similar habitat requirements as gopher tortoises. A very secretive snake, it spends much of its time underground in burrows excavated by gopher tortoises and pocket gophers. This species is documented from CCSFS; however, open pine forest habitat is limited.

Gopher Tortoise

The gopher tortoise is state listed as threatened due to habitat loss, degradation, and a declining number of individuals. FWC has jurisdictional responsibility for the management and continued existence of this species. The gopher tortoise is a moderate-sized, terrestrial turtle, averaging 9 to 11 inches in length when fully grown. Gopher tortoises are found in dry habitats such as longleaf pine sandhills, xeric oak habitats, dry pine flatwoods, and coastal dunes; however, they also commonly occur in developed areas including urban green space, road rights-of-way, and SLCs at CCSFS. Suitable gopher tortoise habitat consists of well-drained sandy soils for digging burrows and nesting and abundant herbaceous plants for foraging. Gopher tortoises are prevalent on CCSFS and suitable habitat is available within the locations of proposed improvements.

3.2.6.2.9 Plants

No federally listed plants are documented at CCSFS. However, the IPaC Report identified a potential for Carter's mustard and Lewton's polygala (both federally listed as endangered) to occur. These species are found in sandhills and scrub in central Florida. They are not documented at CCSFS. Eleven state-listed plants have been documented at CCSFS. The State of Florida affords no protection to plants except from commercial exploitation.

3.2.6.3 Environmental Consequences

3.2.6.3.1 Analysis Approach

An impact on biological resources would be significant if the Proposed Action

- Jeopardized the continued existence of a federally listed threatened or endangered species or resulted in the destruction or adverse modification of federally designated critical habitat, as determined by USFWS or NMFS.
- Substantially diminished a regionally or locally important plant or animal species population.
- Interfered substantially with wildlife movement or reproductive behavior.
- Resulted in a substantial infusion of exotic plant or animal species.

Any action that may affect federally listed species or their critical habitats requires consultation with USFWS under Section 7 of the ESA of 1973 (as amended). Also, the MMPA of 1972 prohibits the take of marine mammals, including harassing them, and may require consultation with USFWS/NMFS. NMFS is also responsible for evaluating potential impacts to EFH and enforcing the provisions of the 1996 amendments to the MSFCMA.

3.2.6.3.2 Proposed Action

Based on the analysis presented below, the Proposed Action would result in short-term, moderate, direct and indirect, adverse impacts to biological resources during construction and long-term, minor, indirect, adverse impacts due to habitat loss and alteration. With the implementation of approved mitigation and BMPs (**Section 3.2.6.3.2.4**), the Proposed Action would not jeopardize the continued existence of a species or adversely modify critical habitat. Therefore, the Proposed Action is not anticipated to result in significant impacts on biological resources as described in the following subsections.

3.2.6.3.2.1 Terrestrial Habitats and Wildlife

The Proposed Action would result in long-term, moderate, direct, adverse impacts to native vegetation. Of the approximately 740 acres proposed for site preparation, approximately 415 acres of native habitat would be permanently cleared for the proposed construction of new facilities and infrastructure improvements, including up to 110 acres of maritime hammock and 62 acres of priority scrub habitat (**Table 3-13**). Maritime hammock and priority scrub habitats are displayed on **Figures 3-13 through 3-17** and habitat descriptions are included in **Appendix C.** A mixture of xeric oak (140 acres), mixed upland forest/herbaceous (75 acres), and shrub/brushland (8 acres) comprise the remaining native habitat impacts.

Table 3-13. Proposed Action Terrestrial Habitat Impacts (Acres)

Planning Goal/Improvement	Site Preparation	Native Vegetation Removal	Habitat Impacts	
			*Scrub**	*Maritime Forest*
Provide reliable infrastructure	**153.8**	**48**	**40–48**	**0**
New utility corridor**	100	0	0	0
Potable water improvements	0.5	0	0	0
Wastewater improvements	5	0	0	0
Power improvements	0.3	0	0	0
Munitions storage consolidation	48	48	40–48	0
Reduce impacts to personnel	**119**	**115**	**0**	**80**
New facilities	119	115	0	80
Eliminate critical periods	**84**	**0**	**0**	**0**
Concrete duct bank**	84	0	0	0
Improve logistics	**128**	**16.8**	**5.5–9**	**0**
Oversized-load haul routes	115	16.8	5.5–9	0
New gas station/restaurant	5	0	0	0
Support shops consolidation	0	0	0	0
South gate redesign	8	0	0	0
Expand developable area	**256**	**235**	**4–5**	**30**
New launch support facilities	219	198	5	30
New engineering test facility	37	37	0	0
Stand-alone facility demolition	0	0	0	0
Grand Total	**740.8**	**414.8**	**49.5–62**	**110**

Note: Values are presented in acres.
*Acreages are expressed as a range based on conceptual layouts; final impact acreages would be determined during project design.
**Impacts to native vegetation would be temporary. Native vegetation would recolonize sites following construction.

Construction of the utility corridor along ICBM Road would result in approximately 10 acres of temporary impacts to scrub habitat. Following construction, sites would be revegetated with native species. Installation of concrete duct banks would temporarily disturb approximately 84 acres, with an estimated 20 acres adjacent to scrub habitat. Duct banks would primarily be located within an existing utility corridor/right-of-way. Clearing within scrub habitat is not expected.

The construction of new facilities within or near fire-dependent habitats may indirectly impact vegetative communities and species composition by hindering prescribed burn operations. An increased launch rate, additional payload processing, and more frequent hardware movement could also restrict the prescribed burn program.

Proposed impacts to habitat were minimized during the planning process by identifying the location of sensitive environmental resources and restricting development in those areas to the greatest extent feasible. A corridor of scrub habitat was identified to preserve large, contiguous tracts of land that would conserve wildlife and facilitate species movement and dispersal. With the implementation of approved mitigation plans and the BMPs listed in **Section 3.2.6.3.2.4**, no significant impacts to vegetation and habitat are anticipated.

The Proposed Action would result in short-term, moderate, direct and indirect, adverse impacts to wildlife, including migratory birds, during construction and long-term, minor, indirect, adverse impacts due to habitat loss and alteration. Clearing and construction activities associated with the Proposed Action would span a 5- to 10- year period, and the amount of construction/demolition would vary during that period of time. However, due to the nature of the proposed activities during the construction phase (i.e., complete disturbance within project sites), wildlife in the vicinity could be adversely affected. Collisions with vehicles or heavy machinery could result in injury or mortality. Increased vehicular traffic and human presence from construction and operations may displace wildlife. Individuals could leave the area, abandon den sites, and possibly miss foraging and mating opportunities. Wildlife fleeing the area may also be more vulnerable to predation and intraspecific aggression. In addition to physical disturbances, wildlife present in the area could be affected by construction noise.

Wildlife response to noise can be physiological or behavioral. Physiological responses can range from mild, such as an increase in heart rate, to more damaging effects on metabolism and hormone balance. Noise generated during construction activities would potentially have discernible, temporary effects on nearby wildlife. Effects may include disruption of normal activities due to noise and ground disturbance; however, these effects would be short-term and would elicit a “startle response” to move away from the noise and potentially avoid the threat. A degree of buffering of noise is afforded to wildlife by vegetation; attenuation rates of up to 10 dBA per 328 feet have been demonstrated in vegetated areas. Given that rate, noise would be expected to carry 984 to 1,312 feet away from the construction sites. Most wildlife occurring closer to noise sources would be free to move away or find shelter (e.g., burrows); therefore, adverse impacts from construction noise are expected to be short-term and minor (NASA 2013).

Long-term, adverse impacts to wildlife would be minimized through the implementation of BMPs during construction. If construction was scheduled to occur during the avian breeding season, construction would occur in accordance with the MBTA to avoid impacts to nesting migratory birds. Biological surveys would occur prior to commencement of construction activities. Bird nests would be marked and monitored during construction. Workers would not directly or indirectly disturb nests or adjacent areas until a biologist determines the nest is no longer in use. Additionally, the conservation of a corridor of scrub habitat would benefit wildlife, including migratory birds. With the implementation of approved mitigation plans and the BMPs listed in **Section 3.2.6.3.2.4**, no significant impacts to wildlife are anticipated.

3.2.6.3.2.2 Marine Habitat and Wildlife (including listed marine species)

The Proposed Action would not impact marine life, their critical habitats, or EFH. Potential impacts to water quality are discussed in **Section 3.2.2.3.2.5**.

3.2.6.3.2.3 Sensitive Species

Due to the lack of suitable habitat and no documented occurrences from wildlife surveys in the vicinity of the areas, it is anticipated the Proposed Action would have ***no effect*** on the federally protected Carter’s mustard, Lewton’s polygala, and bald eagle. ***No effect*** on the American alligator or crocodile is anticipated due to the high mobility of these species and because CCSFS is not within the range of the American crocodile. Proposed construction and demolition improvements would have ***no effect*** on the giant manta ray, oceanic whitetip shark, Nassau grouper, North Atlantic right whale, Atlantic sturgeon, smalltooth sawfish, and West Indian manatee because no work or activities are proposed in or adjacent to suitable habitat (i.e., marine and estuarine habitats).

In accordance with ESA Section 7, USSF determined that the Proposed Action ***may affect and is likely to adversely affect*** the Florida scrub-jay, eastern indigo snake, and southeastern beach mouse due to potential incidental take through injury/mortality or modification/removal of habitat that may alter essential behaviors, such as breeding, feeding, or sheltering. USSF also determined that the Proposed Action ***may affect but is not likely to adversely affect*** Audubon’s crested caracara, piping plover, red knot, roseate tern, wood stork, tricolored bat, sea turtles (i.e., loggerhead, green, leatherback, hawksbill, and Kemp's Ridley sea turtles), and monarch butterfly. USSF also determined that the following state-listed species may be affected by the Proposed Action: black skimmer, least tern, snowy plover, little blue heron, reddish egret, roseate spoonbill, tricolored heron, Florida pine snake, gopher tortoise, and several species of bats. Further detail for these species is provided in the sections below.

SLD 45 will request formal Section 7 consultation with USFWS for federally listed species potentially impacted by the Proposed Action. Agency correspondence will be included upon receipt in the Final EA. With the implementation of an approved mitigation plan ***as developed through consultation with USFWS*** and the BMPs listed in **Section 3.2.6.3.2.4**, the Proposed Action is not anticipated to have a significant impact on sensitive species.

3.2.6.3.2.3.1 Florida Scrub-Jay

The Proposed Action ***may affect and is likely to adversely affect*** the Florida scrub-jay. The Proposed Action would result in the loss of up to 62 acres of scrub habitat. Impacts would result from the MSA consolidation (40 to 48 acres), Phillips Parkway widening (0.5 to 2 acres), launch support facility construction on Flight Control Road and at MSA 5 (4 to 5 acres), and the relocation of power poles along ICBM Road/Phillips Parkway (5 to 7 acres). Acreages are expressed as a range based on conceptual layouts; final impact acreages would be determined during project design.

Scrub-jays may also be impacted by construction (e.g., noise, increased traffic, and habitat fragmentation) as discussed in **Section 3.2.6.3.2.1**. Road-kill mortality in Florida scrub-jays has been documented when occupied territories are immediately adjacent to a road, not from dispersing some unknown distance across a road to a new territory (Dreschel et al. 1990, Fitzpatrick et al. 1991). No new roads are proposed in occupied territory; however, the proposed widening of existing roads (Philips Parkway and ICBM Road) would occur adjacent to scrub habitat.

A compensatory mitigation plan, developed through consultation with USFWS, would offset adverse impacts resulting from the Proposed Action. USSF proposes to restore an estimated 73 to 118 acres of overgrown oak hammock/unoccupied scrub-jay habitat to mitigate for scrub habitat loss (mitigation calculation: 2:1 ratio for 33.5 to 56 acres of occupied scrub-jay habitat and 1:1 ratio for 6 acres of unoccupied habitat adjacent to occupied habitat and within a corridor). The location of habitat restoration is anticipated to occur in Land Management Unit (LMU) 35 as previously decided during Range of the Future planning meeting and as discussed with USFWS during the 2022 annual INRMP meeting. Long-term monitoring will occur to determine follow-up habitat treatments to maintain good-quality scrub for Florida scrub-jay and other scrub species. Based on previous Biological Opinions, there is also the option for scrub restoration as mitigation for only the 2:1 loss (67 to 112 acres) and 1:1 mitigation of 6 acres to include invasive vegetation removal in other Florida scrub-jay occupied LMUs not previously designated for mitigation such as LMUs 80, 81, 99, 100, etc., or to fund comparable cost habitat/species studies. Consultation with USFWS will result in defined mitigation terms and conditions.

3.2.6.3.2.3.2 Eastern Indigo Snake

The Proposed Action ***may affect and is likely to adversely affect*** the eastern indigo snake. Following the *Eastern Indigo Snake Programmatic Effect Determination Key* (USFWS 2013) leads to a ***may affect*** determination, with USFWS consultation requested. It is difficult to determine the number of eastern indigo snakes that would be directly affected by the Proposed Action for a variety of reasons: wide-ranging distribution; a patchy distribution within suitable habitat; and limited detectability due to use of burrows or existing cavities for shelter and affinity for thick vegetation. However, since the Proposed Action would result in clearing approximately 415 acres of native habitat, USSF acknowledges that incidental take may occur through death or injury over the duration of the Proposed Action. Snakes that are not killed, may be harmed or harassed. Any detected dead or injured eastern indigo snake or egg clutch would be reported to USFWS within one business day.

Indigo snakes may also be impacted by construction (e.g., noise, increased traffic, and habitat fragmentation) as discussed in **Section 3.2.6.3.2.1**. The eastern indigo snake has a low probability of being impacted by increased traffic on the roads. However, since a portion of their suitable habitat would be impacted by the Proposed Action, snakes may have to go elsewhere causing them to cross roads, which could result in road-kill mortality.

A compensatory mitigation plan, developed through Section 7 consultation with USFWS, would offset adverse impacts resulting from the Proposed Action. The proposed restoration of an estimated 73 to 118 acres of scrub habitat is expected to also benefit indigo snakes. The *Standard Protection Measures for the Eastern Indigo Snake* (USFWS 2021b) and *SLD 45 Eastern Indigo Snake Protection/Education Plan* would be used during site preparation and project construction. Furthermore, any indigo snakes encountered during gopher tortoise burrow excavation would be safely moved out of the project area. An eastern indigo snake monitoring report would be submitted in the event that any indigo snakes were observed.

3.2.6.3.2.3.3 Southeastern Beach Mouse

The Proposed Action ***may affect and is likely to adversely affect*** the southeastern beach mouse. While no construction activities are planned for coastal beach areas, beach mice have been observed in a variety of upland habitats on CCSFS (**Section 3.2.6.2.7.4**). Therefore, USSF estimates that the Proposed Action would impact approximately 626 acres of potential beach mouse habitat. This estimate includes the permanent clearing of native upland habitat (394 acres) and ruderal areas within the Phillips Parkway right-of-way (48 acres), as well as temporary clearing associated with construction of the utility corridor (100 acres) and concrete duct banks (84 acres). Beach mice may recolonize temporarily disturbed sites once vegetation is reestablished. Since the Proposed Action would disturb potentially occupied beach mice habitat, USSF assumes presence and acknowledges that incidental take may occur as a result of habitat loss and injury, mortality, or destruction of beach mice burrows by heavy equipment.

A compensatory mitigation plan, developed through consultation with USFWS, would offset adverse impacts resulting from the Proposed Action. The proposed restoration of an estimated 73 to 118 acres of scrub habitat is expected to benefit beach mice. Based on past studies completed for CCSFS, beach mice benefit from the same land management activities conducted for scrub-jays, and the population is expanding into inland locations. Trapping and relocation may be required for beachside locations, natural scrub habitat, and other areas dependent on USFWS review of designs, results of species surveys, and mitigation proposed during Section 7 consultation. If a dead beach mouse is found at the project site, it would be salvaged in accordance with proper protocols and USFWS would be notified.

3.2.6.3.2.3.4 Audubon's Crested Caracara

The Proposed Action ***may affect but is not likely to adversely affect*** Audubon's crested caracara. Although the amount of occupied caracara habitat that would be affected by the Proposed Action is currently unknown, habitat loss for this species may occur. No Audubon's crested caracara core nesting habitat is known to occur within locations of proposed improvements; however, if nesting or foraging habitat is found during the project design phase, caracara surveys would be conducted prior to construction. In accordance with USFWS guidelines, surveys would involve approximately four months of survey effort (from January to April) within nesting habitat and surrounding foraging areas. If caracara or their nests were present, USSF would further coordinate with USFWS to determine appropriate measures to conserve this species. Thus, adverse impacts to caracara are not anticipated.

3.2.6.3.2.3.5 Shorebirds: Piping Plover, Red Knot, Roseate Tern

The Proposed Action ***may affect but is not likely to adversely affect*** federally listed shorebirds at CCSFS. No construction is proposed within 1000 feet of the Atlantic coast beach areas (shorebird habitat).

3.2.6.3.2.3.6 American Wood Stork

The Proposed Action ***may affect but is not likely to adversely affect*** the American wood stork (*Effect Determination Key for the Wood Stork in Central and North Peninsular Florida* [USFWS 2010]). The Proposed Action is expected to impact 12 to 21 acres of wetlands and surface waters that may provide wood stork foraging habitat.

Wetland impacts to foraging habitat would be avoided and minimized to the greatest extent practicable. Prior to construction, and consistent with USFWS consultation, any required mitigation would be provided to compensate for unavoidable impacts to wood stork habitat. Thus, adverse impacts to this species are not anticipated.

3.2.6.3.2.3.7 Tricolored Bat

The Proposed Action ***may affect but is not likely to adversely affect*** the tricolored bat. The proposed rule to list the tricolored bat as endangered currently does not specify activities that would violate the ESA because the bat occurs in a variety of habitat conditions across its range; however, it is likely that site-specific conservation measures may be needed for activities that may directly or indirectly affect the species. Proposed infrastructure improvements that include forest clearing, bridge/culvert modification, and building demolition (or others identified by USFWS) may require further consultation with USFWS during project siting and design. Based on site-specific consultation, USFWS may identify additional conservation measures required to address potential impacts. With the implementation of BMPs listed in **Section 3.2.6.3.2.4** and further coordination with USFWS, adverse impacts to the tricolored bat are not anticipated.

3.2.6.3.2.3.8 Sea Turtles

The Proposed Action ***may affect but is not likely to adversely affect*** the loggerhead, green, leatherback, hawksbill, and Kemps ridley sea turtles. Although the proposed clearing and construction of new facilities would not impact the nesting beach, exterior lighting proposed for the new facilities has the potential to be visible from the beach. Disorientation of adult or hatchling sea turtles could result in an indirect take on the adjacent beach. Lighting visible from the beach can cause adult and hatchling sea turtles to move landward, rather than seaward, which increases the chances of mortality.

To prevent or minimize impacts to sea turtles from new or temporary facility lighting, all exterior lighting proposed for this project would be constructed in accordance with the 45 SWI 32-7001, *Exterior Lighting Management*. Consultation with USFWS would be required to ensure changes to exterior lighting at CCSFS comply with the active BO for sea turtle protection through light management (FWS Log #4190-2009-F-0087). Light Management Plans would be reviewed and approved by USFWS in the early design phase to incorporate the best available sea turtle “friendly” lighting technology. Additional BMPs are listed in **Section 3.2.6.3.2.4**. With the implementation of these measures, adverse impacts to these species are not anticipated.

3.2.6.3.2.3.9 Monarch Butterfly

The Proposed Action ***may affect but is not likely to adversely affect*** the monarch butterfly. The amount of suitable habitat for monarch butterflies or their host plants within proposed project areas is currently unknown; however, habitat loss for this species may occur. The proposed restoration of an estimated 73 to 118 acres of scrub habitat would benefit monarch butterflies by providing open canopy conditions and stimulating the native seed bank. Additional voluntary conservation measures for this species may be coordinated during consultation with USFWS. Consequently, adverse impacts to the monarch butterfly are not anticipated.

3.2.6.3.2.3.10 State-listed Species

Florida Burrowing Owl

All project alternatives that contain open, grassy areas could impact Florida burrowing owls as this species utilizes open habitat (e.g., lawns/green space, open lots, airfields, and road rights-of-way), is tolerant of human activity, and has been observed at CCSFS. Species-specific surveys would be conducted within suitable habitat during the design and permitting phase of each project in accordance with the *SLD 45 INRMP* (USAF 2020a) and FWC species guidelines (FWC 2019a). If burrowing owls were observed, construction would be prohibited during the breeding/nesting season (February-July). Coordination with FWC would be required to determine if a permit is necessary if the burrows or owls would be impacted outside of the breeding season. In addition, 45 CES/CEIE would monitor for burrowing owl activity throughout the project's construction. Given these measures and the BMPs listed in **Section 3.2.6.3.2.4**, *no adverse effect* is anticipated on Florida burrowing owls from the Proposed Action.

Southeastern American Kestrel

The southeastern American kestrel has been observed on CCSFS, and proposed construction within open, grassy habitat may impact this species. If kestrels were observed during project design and permitting, conservation measures would be coordinated with FWC in accordance with the most current species guidelines (FWC 2020). In addition, 45 CES/CEIE would monitor for kestrel activity throughout the project's construction. Given these measures and the BMPs listed in **Section 3.2.6.3.2.4,** *no adverse effect* is anticipated on southeastern American kestrels from the Proposed Action.

American Oystercatcher, Black Skimmer, Snowy Plover, and Least Tern

Proposed construction/demolition activities would not occur within suitable shorebird beach habitat. Least terns could be impacted by projects with proposed exterior renovations, including roofing and painting projects and demolition of any flat roof facilities.

Roofing and painting on or near gravel, flat roof facilities and demolition of flat roof facilities would avoid active nesting roofs with eggs or chicks. Regulations prohibit harming or destroying eggs/chicks or harassing nesting adults. These type projects would be avoided during nesting season, April-August. For flat roof facilities near the airfield, BASH personnel can deter initial nesting under the USFWS migratory bird depredation permit. Birds generally switch to another flat gravel roof or leave the area entirely when BASH is implemented. Given these measures and the BMPs listed in **Section 3.2.6.3.2.4**, *no adverse effect* is anticipated on state-listed shorebirds from the Proposed Action.

Little Blue Heron, Reddish Egret, Tricolored Heron, and Roseate Spoonbill

No wading bird rookeries are documented within the Proposed Action; however, as stated above for wood stork, proposed improvement sites contain suitable foraging habitat for wading birds. The Proposed Action would impact 12 to 21 acres of wetlands and surface waters that may provide wading bird foraging habitat.

Wetland impacts to foraging habitat would be avoided and minimized to the extent practicable. Prior to construction, and consistent with FWC guidelines, any required mitigation would be provided to compensate for unavoidable impacts to wading bird habitat; *no adverse effect* to these species is anticipated.

Florida Pine Snake

The proposed clearing of native habitat with gopher tortoise burrows may impact the Florida pine snake where it occurs. In addition to habitat loss, pine snakes would also be vulnerable to injury or mortality as a result clearing and construction activities. The probability and level of impact is dependent upon the number of pine snakes within the locations of proposed improvements; their ability to disperse; and the amount and distribution of available suitable habitat.

The proposed restoration of an estimated 73 to 118 acres of habitat for the scrub-jay is expected to be mutually beneficial to the pine snake. The *Standard Protection Measures for the Eastern Indigo Snake* (USFWS 2021b) and *SLD 45 Eastern Indigo Snake Protection/Education Plan* would also be used for the pine snake during site preparation and project construction to minimize impacts. Furthermore, any pine snakes encountered during gopher tortoise burrow excavation would be allowed to leave the area. Thus, *no adverse effect* to this species is anticipated.

Gopher Tortoise

The Proposed Action would result in the loss of occupied gopher tortoise habitat. Due to the potential adverse impacts during clearing activities (e.g., injury, mortality, entombment, increased predation, or exposure to weather extremes), all tortoises that may be impacted would be safely excavated by FWC authorized gopher tortoise agents and relocated to an approved gopher tortoise recipient site on CCSFS property or an approved off-site relocation site. Relocation activities on military bases are exempt from FWC permitting and fees per the *FWC Gopher Tortoise Management Plan* (FWC 2012). All excavation activities follow state protocol and requirements (FWC 2008, Revised 2020).

Based on recent gopher tortoise surveys at SLCs 20 and 16, the Skid Strip, and along ICBM Road, the Proposed Action is likely to result in the need to relocate hundreds of tortoises over the next decade. During project design, coordination with 45 CES/CEIE would be required to ensure land within the installation or at off-site relocations sites was available. With the proposed relocation of individuals out of construction/demolition areas, implementation of BMPs in **Section 3.2.6.3.2.4**, and restoration of an estimated 73 to 118 acres of scrub habitat, *no adverse effect* to this species is anticipated.

Bats

Several bat species are documented at CCSFS with varying population levels. Bats use palm trees and facilities at CCSFS for roosting/breeding. Bats could be impacted by projects with proposed tree clearing, building demolition, and exterior renovations, such as roofing and painting.

Projects involving tree removal and palm tree trimming as well as facility demolition would not occur during bat maternity season (April to August) without prior exclusion. Any exclusion required prior to facility demolition would be conducted in accordance with Florida laws. Given the implementation of these measures and the BMPs listed in **Section 3.2.6.3.2.4,** *no adverse effect* is anticipated to these species as a result of the Proposed Action.

3.2.6.3.2.4 Mitigation and Best Management Practices

With the implementation of a USFWS mitigation plan for the incidental take of Florida scrub-jay, eastern indigo snake, and southeastern beach mice, the Proposed Action is not anticipated to result in significant impacts on biological resources. When the details of the proposed improvements are known, the project footprint, design, and all potential staging areas would be surveyed and evaluated for potential impacts to protected species and habitat prior to construction and demolition.

If required, species-specific surveys would be conducted at the appropriate time of the year prior to construction and demolition and would follow established survey protocols approved by USFWS and FWC. Designs would be reviewed to determine potential impacts to listed species, especially exterior lighting, facility orientation, interior lighting being visible to the exterior (tinting/glazing), and the use of occupancy sensors to reduce impacts to listed sea turtles that nest/hatch on CCSFS beaches.

As the tempo of range operations increases, routine payload processing and hardware movement cannot place undue restrictions on the installation's prescribed burn program. New and current users of the Range must cooperate with prescribed burning activities on CCSFS. Users will be responsible for the protection of their spacecraft, flight hardware, and other critical systems from smoke. This can be accomplished by a variety of methods to include but not limited to upgrading or installing heating and cooling equipment/systems necessary to protect property and flight hardware from smoke damage, relocating critical hardware out of potential smoke areas, and encapsulating critical hardware during burning.

In addition to conducting an evaluation of each project site, CCSFS is committed to implementing species and habitat conservation measures outlined in the *SLD 45 INRMP* (USAF 2020a) and following project and species-specific construction conditions to prevent or reduce future conflicts with sensitive species. Examples of conservation measures and construction conditions that would apply to projects within the Proposed Action include

- Consult with USFWS to ensure changes to exterior lighting at CCSFS comply with the active BO for sea turtle protection through light management (FWS Log #4190-2009-F-0087). Light Management Plans must be reviewed and approved by USFWS in the early design phase to incorporate the best available sea turtle "friendly" lighting technology.
- For all beachfront properties, include tinting for glass windows, doors, etc., achieving an industry-approved, inside to outside light transmittance value of 15%. Such transmittance is limited to the visible spectrum (400 to 700 nanometers) and is measured as the percentage of light that is transmitted through the glass. For locations landward (west) of the beachfront, any interior lighting directly visible from the beach due to glass windows/doors, etc. must include tinting to achieve an industry-approved, inside to outside light transmittance of 45% or less. However, USFWS recommends reducing inside to outside light transmittance to a value as close to 15% as possible for any facilities visible from the beach in accordance with lighting recommendations provided by FWC.
- Add perch deflectors, if feasible, to new lighting fixtures near the airfield to reduce BASH impacts to federal trust species.
- Avoid site preparation and construction activities in scrub habitat during scrub-jay nesting season (March to June).
- Implement BMPs in accordance with MBTA and BGEA to the most practical extent possible for all new building construction.
- Limit construction and demolition activities to daylight hours during sea turtle nesting/hatching season (May 1 to October 31) to reduce the potential indirect impacts to nesting/hatching sea turtles.
- For beachfront projects, replant and maintain native dune vegetation that is disturbed/removed to shield any light visible from the beach except if ESA Section 7 consultation with USFWS results in approval of light management in conjunction with dune vegetation loss.

- Before construction/demolition begins, conduct general wildlife and site-specific surveys for gopher tortoise burrows, eastern indigo snake potential refugia, roosting (bats), and nesting activity in suitable habitat and facilities with potential wildlife use. If wildlife, burrows, and/or nests were found in the project locations, implement protection measures as directed by 45 CES/CEIE and methodologies outlined in the *SLD 45 INRMP* (USAF 2020a).
- Conduct Florida scrub-jay, southeastern beach mice, and Audubon's crested caracara surveys within suitable habitat well in advance of project construction, and, if the species/nests were present, consultation with USFWS may be required to determine appropriate conservation measures.
- Adhere to *Standard Protection Measures for the Eastern Indigo Snake* (USFWS 2021b) and SLD 45 *Eastern Indigo Snake Protection/Education Plan* when conducting land disturbing activities.
- Conduct project activities outside of shorebird nesting season, when practicable; clear project sites only when ready to build to avoid creating a potential nesting site if left unattended for an extended period; and, if necessary, monitor project locations during the nesting season prior to clearing, demolition, or construction activities to ensure no active nests are present. If nesting and/or chicks were observed within or close to an active work site, including facility flat gravel roof tops, suspend work until active nesting is complete and coordinate with FWC and/or USFWS as required to determine nest buffers and other avoidance and minimization measures.

3.2.6.3.3 No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not occur and biological resources, including existing habitats and wildlife species distribution, would be maintained in their current states. Therefore, the No-Action Alternative would have no impacts on biological resources.

3.2.7 Compatible Land Use, Visual Resources, and Coastal Zone Management

3.2.7.1 Definition of the Resource/Regulatory Setting

3.2.7.1.1 Land Use

Land use is defined as the human usage of land resources for uses such as economic production, natural resources protection, residential, commercial, or industrial uses. Compatible land use is achieved when the Proposed Action fits within the land use patterns and land use management plans. Zoning, management plans, and policies regulate how land is used.

3.2.7.1.2 Visual Resources

Visual resources are any naturally occurring or manmade features that contribute to the aesthetic value of an area. Visual resources include buildings, sites, traditional cultural properties, and other natural or manmade landscape features that are visually important or have unique characteristics. Historical and Cultural Resources are detailed in **Section 3.2.5**. Natural landscape features include native upland and wetland habitats, the Atlantic Ocean coastline, and the BRL. Visual character refers to the overall visual makeup of the existing environment including lighting aspects. The ROI for light emission effects includes people, wildlife and land uses on or adjacent to CCSFS.

3.2.7.1.3 Coastal Zone Management

This resource area also includes the Coastal Zone Management Act (CZMA), enacted in 1972 and implemented by NOAA, encourages states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife using those habitats. CZMA program administration is delegated to states that develop state-specific guidelines and requirements. The Florida Coastal Management Program (FCMP) was approved by NOAA in 1981 and is codified as Florida Statutes, Chapter 380, Part II. The geography of Florida and the CZMA dictate that the entire state be designated as a Coastal Zone and be subject to the FCMP. The FCMP consists of a network of 24 Florida Statutes administered by eight state agencies and five Water Management Districts. Under provisions of the CZMA, any federal activity that has the potential to affect Florida's coastal resources is reviewed for consistency with the FCMP, which is administered by FDEP. The USSF CZMA Federal Consistency Determination for the Proposed Action is included as **Appendix D**. The consistency statement will be submitted to the Florida Clearinghouse as part of the Draft EA multi-agency review. The ROI for land use and visual resources includes CCSFS (with a focus on the locations of the proposed improvements evaluated within this EA) and adjacent sections of the Atlantic Ocean and BRL.

3.2.7.2 Affected Environment/ Existing Conditions

CCSFS encompasses approximately 16,200 acres , representing approximately two percent of Brevard County's total land area. Uses of the open water surrounding CCSFS include commercial fishing, marine recreation, and marine transportation. Within CCSFS, USSF designates its own land use and zoning regulations. Wharf facilities on CCSFS support multiple users, including NASA, the U.S. Navy, Department of the Air Force, USCG, and commercial space launch companies. The *CCSFS Installation Development Plan* (USAF 2017b) identified seven general land use classifications, which are listed in **Table 3-14** and displayed on **Figure 3-18**.

Table 3-14. Existing Land Use at CCSFS

Land Use Type	Typical Facilities
Administration	Headquarters, security operations, offices
Airfield Clearance & Pavement	Control tower, runway (Skid Strip) with aprons, overruns, and safety zones
Industrial Use	Base engineering, maintenance shops, warehouses, hangars, MSA, launch operations
Operations and Maintenance	MOC, laboratories, processing facilities, and maintenance shops
Open Space/Buffer Zone	Conservation area, buffer space
Outdoor Recreation	Parks and outdoor recreation facilities (e.g., running track and ball fields)

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FIGURE 3-18: CCSFS EXISTING INSTALLATION LAND USE (USAF 2017)

More specific land uses at CCSFS include airfield operations, launch operations, launch and range support, industrial area, port operations, and open space. The CCSFS Skid Strip is a Class B runway, 10,000 feet long and 200 feet wide. It is used to support Test and Evaluation operations as well as periodically for receiving launch and payload components for the launch missions. The launch operations area includes both inactive and active SLCs with support facilities. The launch and range support areas are in the central portion of CCSFS and are bisected by the Skid Strip. The industrial area is centrally located in the western portion of CCSFS, near the BRL, and currently contains a variety of administrative and range support services. A few formal recreation areas occur along the shorelines and near administrative areas of the installation. The port operations area includes facilities for military and commercial operations near the South Gate. Open space is dispersed throughout CCSFS and includes areas managed for the conservation of protected species and habitats (USAF 2020a).

Prescribed burning on CCSFS is required to meet environmental habitat management requirements for threatened and endangered species and to reduce wildfire risk. To meet these requirements, typically four to eight burn days are required per year on CCSFS. Burning to meet habitat goals and requirements can only be accomplished when fuel moistures and weather conditions are within acceptable ranges. Typically, the best conditions at CCSFS for prescribed burning occur during the February to June timeframe, but occasionally there are opportunities during other times of the year. Allowances for these burn days are made when scheduling launch days and payload movements when operations are most critical, as outlined in the Memorandum of Understanding between SLD 45, USFWS and KSC.

3.2.7.2.1 Visual Effects

The ROI for light emissions includes the Atlantic coastline adjacent to CCSFS due to sensitivity of nesting adult and emerging hatchling sea turtles to artificial lighting. 45 SWI 32-7001 provides guidance for all areas and facilities on CCSFS to protect sea turtles. **Section 3.2.6.2.7.3** provides additional detail on CCSFS light management commitments in compliance with Section 7 of the ESA.

3.2.7.2.2 Coastal Zones

The FCMP applies to activities occurring in or affecting the coastal zone. For planning purposes, a No Development Zone has been established in Brevard County and extends from the mean high-water level inland 75 feet. CCSFS has additional siting and facility design standards for construction that require new facilities to be set back at least 150 feet from the coast. All improvements within the Proposed Action would be more than 1,000 feet inland of the Atlantic shoreline.

3.2.7.3 Environmental Consequences

3.2.7.3.1 Analysis Approach

The land use impact assessment methodology determines the degree to which land use would be affected the Proposed Action. Significance of potential land use impacts is based on the level of land use sensitivity in affected areas.

An impact on land use would be significant if the Proposed Action

- Was inconsistent or noncompliant with applicable land use plans or policies.
- Precluded the viability of existing land use.
- Precluded continued use or occupation of an area.
- Was incompatible with land uses in the vicinity to the extent that public health or safety was threatened.

An impact on visual resources may be significant if the Proposed Action

- Resulted in light emissions that interfered with normal activities or affected the visual character of the area.
- Affected the importance, uniqueness, and aesthetic value of visual resources.
- Obstructed the views of visual resources.

An impact on coastal resources would be significant if the Proposed Action

- Was inconsistent with the relevant state coastal zone management plan(s).
- Substantially impacted a coastal barrier system or coral reef ecosystem.
- Caused an unacceptable risk to human safety or property.
- Caused adverse impacts to the coastal environment that cannot be satisfactorily mitigated.

3.2.7.3.2 Proposed Action

The improvements within the Proposed Action are consistent with current and future land uses as determined by USSF and documented in installation planning documents. The Proposed Action supports CCSFS's long-range facility development plan and the launch mission and would result in no or negligible adverse impacts on land use and visual/coastal resources, as described below.

Under the Proposed Action, approximately 415 acres of Open Space would be rezoned to Industrial and Administrative, which includes construction of administrative and launch support facilities. These areas were selected for rezoning based on an extensive planning process that incorporated the future mission requirements of SLD 45 and tenants and minimized conflicts with a variety of environmental constraints, including operational restrictions, natural and cultural resource protection areas, and security and safety considerations (See **Section 2.3** for a list of the constraints considered). Other resource areas related to Open Space (i.e., water, earth, and biological resources) are discussed in the appropriate resource areas within this EA.

Proposed facilities would not exceed three stories, and light management plans would be implemented as applicable to avoid adverse impacts to sea turtles (as discussed in **Section 3.2.6.3.2.3.8**). The Proposed Action does not include any coastal construction or seafloor disturbing activities and would be consistent with commonly occurring Atlantic Ocean maritime operations. It is anticipated that the Proposed Action would be consistent with the CZMA and FCMP (**Appendix D**).

3.2.7.3.2.1 Best Management Practices

The improvements within the Proposed Action would be reevaluated every five years to ensure their implementation would be compatible with all applicable planning districts and future planning areas.

3.2.7.3.3 No-Action Alternative

Under the No-Action Alternative, there would be no additional land use impacts beyond the scope of normal conditions and influences within the land use ROI. None of the proposed improvements and land use rezoning would occur and the existing land use designations at CCSFS would remain unchanged. Implementation of the No-Action Alternative does not follow the future planning recommendations as established by SLD 45; therefore, long-term impacts on operational efficiency and mission success would occur.

3.2.8 Infrastructure

3.2.8.1 Definition of the Resource/Regulatory Setting

For this EA, infrastructure includes utilities and transportation facilities. CCSFS utilities include drinking water, sanitary sewer, stormwater drainage, electric, natural gas, and communications. Transportation facilities include installation roadways, gates, and adjacent public roadways. A critical component of the Proposed Action's purpose and need is to upgrade the utility and transportation infrastructure at CCSFS. The ROI for infrastructure includes CCSFS and local traffic and utility networks.

EO 13990, *Climate Crisis: Efforts to Protect Public Health and Environment and Restore Science* provides guidance to federal agencies regarding sustainable use of natural resources and energy. It is the policy of the U.S. that agencies shall meet such statutory requirements related to energy and the environment in a manner that increases efficiency, optimizes performance, eliminates unnecessary use of resources, and protects the environment. In implementing this policy, each agency shall prioritize actions that reduce waste, cut costs, enhance the resilience of federal infrastructure and operations, and enable more effective accomplishment of its mission.

3.2.8.2 Affected Environment/ Existing Conditions

The description of each utility on CCSFS is provided below and focuses on existing infrastructure, current use, and any predefined capacity or limitations as set forth in permits or regulations.

3.2.8.2.1 Utilities

3.2.8.2.1.1 Water

Potable (drinking water) and non-potable water at CCSFS is provided and treated by the City of Cocoa municipal potable water distribution system. CCSFS potable water system operates under FDEP Potable Water System Number 3054140. Non-potable use includes hydrant flushing, fire protection, and launch-related demands for noise abatement, cooling, and shock wave attenuation associated with the launch deluge systems.

The City of Cocoa operates the Claude H. Dyal Water Treatment Plant that treats the raw water primarily from a Floridan aquifer wellfield located in east Orange County. Water from the Dyal Plant is transmitted to CCSFS via interconnects at the southern end of the system. The distribution system of CCSFS is also connected at the NASA Causeway and at the northern extreme of the system near SLC 41 since KSC also receives water from the same system. Additionally, the City has aquifer storage wells for storage during low usage and can also draw on the Taylor Creek Reservoir, a surface water storage facility. Various storage systems and secondary pump systems throughout CCSFS supply water needs for fire suppression, launch activities, and potable water (USAF 2017b).

3.2.8.2.1.2 Sanitary and Wastewater

The RWWTP accepts and treats both domestic and industrial wastewater; however, it is permitted as a Domestic Wastewater Treatment Facility (FDEP permit number: FL0102920) and must meet those treatment requirements and standards. The RWWTP was upgraded in 2000 to provide higher levels of treatment and reliability. The most recent permit issued for the RWWTP lists a permitted capacity of 0.8 million gallons per day. In 2018, 0.454 million gallons per day or 57% of the capacity was used. While the RWWTP is used by most CCSFS facilities, several areas and especially legacy SLCs, treat wastewater using septic tanks and drainfield systems, especially those along ICBM road. Deluge discharge water either discharges to ground following permitted water quality parameters or is sent to the RWWTP.

3.2.8.2.1.3 Stormwater Collection and Drainage

The stormwater drainage system at CCSFS was installed in the late 1950s and 1960s and is composed primarily of an open collection system, with some closed system collection. It is separate from the flow of wastewater in the sanitary sewer system. The open drainage system conveys stormwater runoff by overland flow (drainage ditches), gutters, channels, and swales, to a point of discharge or detention that provides treatment through percolation before discharge. The man-made canal (ditch) system discharges directly to the BRL. Newer stormwater systems are developed with wet or dry detention/retention swales that allow runoff to collect and percolate into the sandy soils of CCSFS. Wet ditches and stormwater ponds are also discussed with surface waters in **Section 3.2.2**.

3.2.8.2.1.4 Electrical

FPL provides power for CCSFS. FPL owns the electrical transmission, but CCSFS owns the distribution. FPL delivers electricity to CCSFS at 115 kilovolts, which is distributed throughout the installation at various reduced voltages. The CCSFS electrical distribution system includes three major subsystems: high-voltage, medium- voltage, and low-voltage. CCSFS has six substations with individual locations at the south end, the north end, and the Titan area. The newly constructed electrical substation on ICBM Road near SLC 11 has additional capacity available. FPL also recently completed enlarging and upgrading their South Cape Substation and are in the process of designing a new, larger upgraded substation for their North Cape Substation.

Historically, CCSFS electrical use represents only 0.4% of Brevard County’s demand. Electrical transmission lines served by FPL enter CCSFS at two locations: from the southwest boundary coming across the BRL into the south substation and the Titan substation. The two feeds can provide 59 megavolt-amperes to CCSFS, which exceeds current requirements. Electrical usage in 2015 was 140,352 megawatts/hour. The local electrical distribution system is maintained by CCSFS and provides medium-voltage distribution power to facilities including launch complexes. Running at 13.2 kilovolts, the medium-voltage distribution system is fed to the sites from Load Brake Switches (LBS) through a duct-bank system of conduit and manholes. On individual launch facilities, this medium-voltage power is stepped down through other LBS to the various low-voltage distribution transformers, which supply required power for the existing facilities (USAF 2017b).

3.2.8.2.1.5 Natural Gas

The overall capacity of the natural gas infrastructure meets current demands. Natural gas at CCSFS is privatized and is owned and operated by Florida City Gas. An 8-inch-diameter main branches from KSC onto the installation, making natural gas available to the industrial area and areas to the south.

Other gas distribution infrastructure at CCSFS includes miscellaneous gases for launch vehicle and payload ground processing. Liquefied gases are delivered by tanker trucks, buried pipelines (referred to as cross-country pipelines), and stand-alone pipeline facilities used within specific SLCs (USAF 2017b).

3.2.8.2.1.6 Communications

The communications system at CCSFS provides support for spacecraft processing, launch and tracking facilities, safety procedures, aircraft operations, and test data to a variety of customers. An extensive communications network consists of communication satellites, microwave links, high frequency, very-high frequency, and ultra-high frequency radio systems, and various landline links.

3.2.8.2.2 Transportation

CCSFS is approximately 170 miles south of Jacksonville, 50 miles east of Orlando, and 187 miles north of Miami. The general region can be accessed from north and south Florida via I-95 or US Highway (US) 1 and from the west via State Road (SR) 528. Access to CCSFS is controlled and can occur from the south through Gate 1 (South Gate) via SR 528, from KSC via NASA Parkway and the Max Brewer Memorial Parkway, and through gates along the north KSC/CCSFS boundary. The main on-site roadway on CCSFS is Phillips Parkway, which accommodates most of north-south traffic and connects with KSC to the north.

Available data indicate that roads and supporting structures (culverts, bridges, pavement) on CCSFS were constructed to meet FDOT standards. Most road pavement conditions on CCSFS were indexed as good or fair in a 2013 study; however, a section of Phillips Parkway between SLC 41 and SLC 39A on KSC was assigned an index condition of poor (AMEC 2013). While most surveyed culverts appeared to be in good condition, the condition of some older culverts could not be determined (AMEC 2013).

3.2.8.3 Environmental Consequences

3.2.8.3.1 Analysis Approach

The infrastructure analysis examined potential impacts to existing utility and transportation facilities that may result from the Proposed Action. The utility analysis focused on assessing the capacity of the existing utility system to accommodate increases or decreases in demand to the water distribution or supply, wastewater collection or treatment, stormwater management, and communications and electrical systems.

The transportation analysis focused on the potential for disruption or change in the existing level of service and safety. Transportation effects may arise from changes in traffic circulation, delays due to construction activity, maintenance of traffic, or changes in traffic volumes.

An impact on infrastructure would be significant if the Proposed Action

- Substantially affected the capacity of utility systems to maintain existing services.
- Resulted in a loss of utility service, stressed services, or a demand for services equal to or greater than planned availability.
- Caused roads with no history of capacity exceedance to operate at or above their full design capacity.

3.2.8.3.2 Proposed Action

Based on the analysis presented below, the Proposed Action would have an overall long-term, beneficial impact on the infrastructure at CCSFS, including utility and transportation facilities.

3.2.8.3.2.1.1 Utilities

It is anticipated that the Proposed Action would improve the current utility infrastructure. Proposed improvements include constructing a utility corridor along ICBM Road, potable water storage tanks, water main and chlorination system, wastewater collection lines, expanded capacity at the RWWTP, and utility upgrades along ICBM Road. Based on existing usage, and with the proposed upgrades, the CCSFS utility supply system would have enough capacity to supply the proposed administrative, warehouse, laboratory, testing and launch support facilities, as described in **Chapter 2**. Facilities, including the SLCs, along ICBM Road that currently have septic systems would tie into the proposed wastewater line. The RWWTP currently has capacity available to receive the limited amount of additional waste from these facilities.

New facilities would include stormwater management in engineering design plans consistent with the requirements of SJRWMD Rule 40C-4, FAC, which would be reviewed and approved before issuance of an ERP. Proposed stormwater management should not only be adequate for the additional facilities but also consider SLD 45 commitments to reduce TMDL and improve water quality in the BRL. Since this aspect of utilities is closely tied to Water Resources further discussion is included in **Section 3.2.2.3**.

Low Impact Development (LID) design concepts and utility-saving measures would be incorporated into the design for new construction projects and facility repair/renovations, including high-efficiency lighting upgrades, heating and cooling efficiency improvements, building automation and controls, water-efficient and low-flow fixtures, weather sealing, and replacement of windows and doors. Therefore, with the implementation of the BMPs in **Section 3.2.8.3.2.2**, no adverse impacts to the CCSFS utility systems are anticipated.

3.2.8.3.2.1.2 Transportation

The Proposed Action would result in an overall beneficial impact to the transportation infrastructure at CCSFS. The Proposed Action specifically includes improvements to major haul routes at CCSFS (**Section 2.1.4.1**). Additionally, improvements at the South Gate would improve traffic flow by reconfiguring the entry control point and increasing inspection capabilities.

The short-term, minor, direct, adverse impacts associated with the Proposed Action would include increased truck traffic associated with construction personnel and the delivery/removal of debris, equipment, and supplies; traffic detours; and changes in traffic patterns. Impacts related to construction activities would be temporary in nature, ending once projects are completed, and construction-related traffic would make up only a small portion of the total existing traffic volume in the area and at the installation. Therefore, with the implementation of the BMPs below, no long-term adverse impacts to the CCSFS transportation systems are anticipated.

3.2.8.3.2.2 Best Management Practices

To avoid and minimize temporary impacts to infrastructure during construction activities, the following BMPs would be implemented:

- Submit a CCSFS Work Clearance Form along with a Utility Locate/Excavation Permit prior to initiation of any site work/excavation.
- Schedule oversized vehicle transport to avoid peak-flow periods, generally from 6:00 A.M. to 9:00 A.M. and from 3:30 P.M. to 5:30 P.M.
- Stage heavy construction vehicles on the installation for the duration of the construction activities, when possible.

3.2.8.3.3 No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not occur, and no infrastructure improvements would occur. The existing utility and transportation facilities would be maintained in their current state. Implementing the No-Action alternative would result in sub-standard utilities, interruptions to mission goals, reduction in transportation network efficiency, increased traffic congestion, and overall decreased utility performance.

3.2.9 Health and Safety

3.2.9.1 Definition of the Resource/Regulatory Setting

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. The elements of an accident-prone environment include the presence of a hazard and an exposed population at risk of encountering the hazard. Numerous approaches are available to manage the operational environment to improve safety, including reducing the magnitude of a hazard or reducing the probability of encountering the hazard. The safety categories discussed in this analysis are construction and demolition safety and mission safety.

3.2.9.1.1 Construction and Demolition Safety

Construction site safety is largely a matter of adherence to regulatory requirements imposed for the benefit of employees and implementation of operational practices that reduce risk of illness, injury, death, and property damage. All contractors performing construction and demolition activities at CCSFS are responsible for following OSHA regulations (29 CFR 1926). These standards require work activities to be conducted without increasing safety risks to workers or the public.

For activities during which there is the potential for construction workers to encounter contamination from IRP sites, a health and safety plan should be prepared in accordance with OSHA requirements prior to commencement of construction activities. Workers performing soil-removal activities within IRP sites are required to have OSHA 40-hour Hazardous Waste, Operations, and Emergency Response (HAZWOPER) training. In addition to this training, supervisors are required to have an OSHA Site Supervisor certification. Should contamination be encountered, the handling, storage, transportation, and disposal activities would be conducted in accordance with applicable federal, state, and local regulations; AFMAN/AFI; and CCSFS programs and procedures.

3.2.9.1.2 Mission Safety

The objective of range safety is to ensure that the general public, launch-area personnel, surrounding launch complexes and personnel, and areas of overflight are compliant with USAF requirements and all public laws. The Space Systems Command Manual (SSCMAN) 91-710, *Range Safety User Requirements Manual*, establishes the safety program requirements for launch vehicles, payloads, ground support equipment, systems, and materials on USSF ranges.

Defense Explosives Safety Regulation (DESR) 6055.09_AFMAN 91-201, *Explosives Safety Standards*, are used to establish safe distances (i.e., ESQD arcs) from facilities with explosive materials storage (e.g., MSAs, fuel storage areas [FSAs], SLCs, and launch support facilities) to non-related facilities and roadways. Within ESQD arcs, development is either restricted or prohibited to maintain personnel safety and minimize the potential for damage in the event of an accident.

Accident Potential Zones (APZs), rectangular zones extending outward from the ends of active runways at military bases, delineate those areas recognized as having the greatest risk of aircraft mishaps, most of which occur during takeoff or landing. Airfield operation Clear Zones (CZs) are the areas closest to the end of the runway, which are considered the most hazardous areas. These areas must be kept free of aboveground structures.

3.2.9.2 Affected Environment/ Existing Conditions

Both natural and man-made environmental hazards may be present due to the varied activities that take place at CCSFS. Naturally occurring potential health and safety hazards include insects, alligators, snakes, climatic conditions, and lightning. Potential man-made health and safety hazards include construction, demolition, transportation, maintenance and repair activities, the creation of noisy environments, and vehicle launch/landing related activities. Extremely noisy environments can also mask verbal or mechanical warning signals such as sirens, bells, or horns. The ROI for the Proposed Action corresponds to the footprints of the proposed improvements where these activities would occur.

CCSFS is a secure military installation with access limited to military personnel, civilian employees/contractors, and approved visitors. Operations and maintenance activities conducted on the installation are performed in accordance with applicable CCSFS safety regulations, published Air Force Technical Orders, and standards prescribed by OSHA/AFI requirements. Adherence to industrial-type safety procedures and directives ensures safe working conditions.

Construction and operations at CCSFS are managed to ensure compliance with explosive safety requirements (DESR 6055.09_AFMAN 91-201). ESQD arcs cover over 9,000 acres of land at CCSFS, primarily around the launch pads, MSAs, FSAs, and hot cargo pads. These arcs may be permanent (e.g., arcs around MSAs/FSAs) or temporary during operations (e.g., launch complexes and support facilities). Incompatible development is restricted within the ESQD arc boundaries to reduce the safety risk and protect the mission requirements. **Figure 3-19** displays the ESQD arcs that were used in the *CCSFS DDP* (USSF 2022a) planning process; however, not all arcs shown have been formally approved by the Department of Defense Explosives Safety Board (DDESB).

The Skid Strip CZ extends 3,000 feet in length from the runway ends and is 3,000 feet wide centered on the runway centerline. Two APZs extend from the end of the CZ at 5,000- and 7,000- feet intervals. Each interval represents a reduced risk of aircraft mishap (**Figure 3-19**).

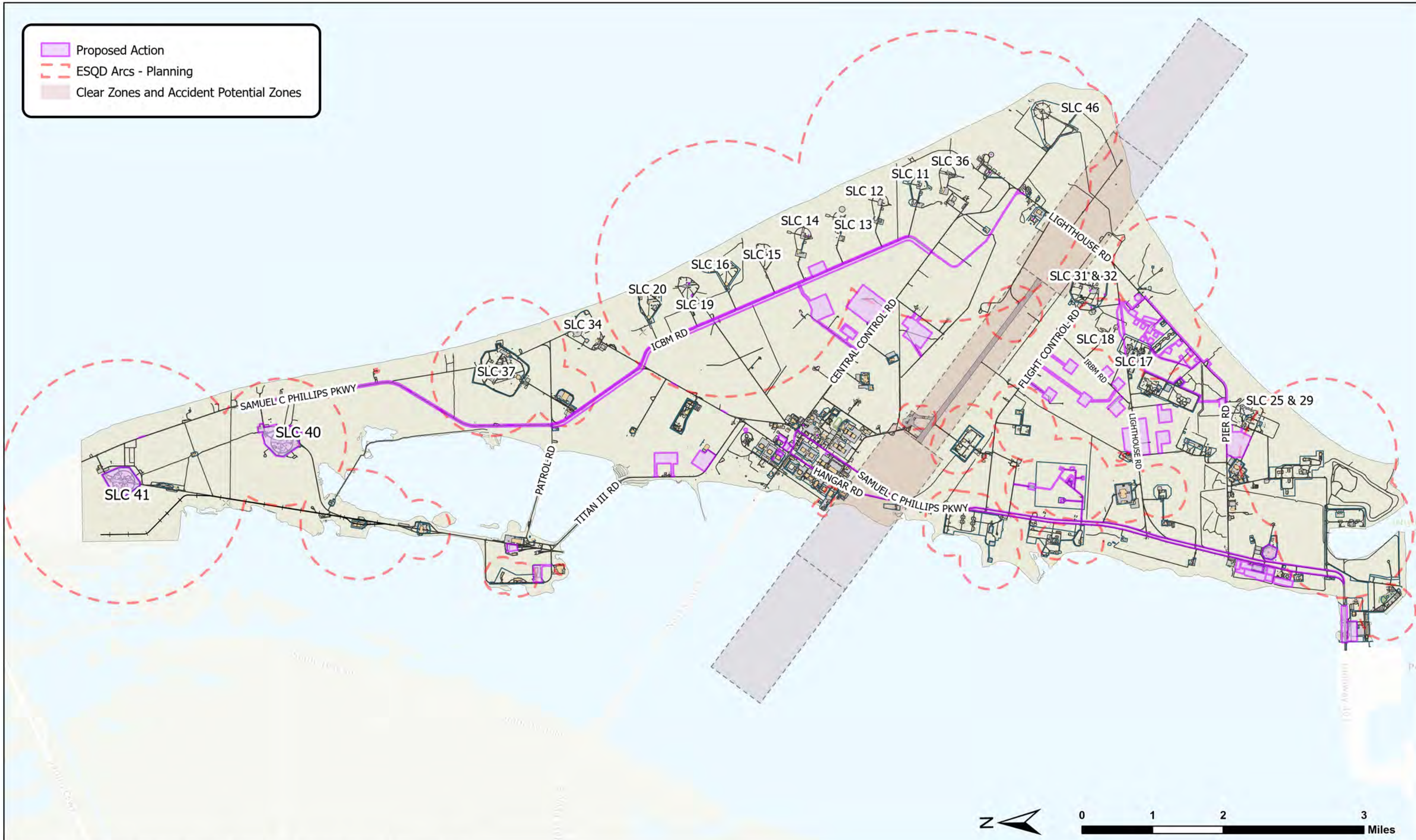

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FIGURE 3-19: SAFETY ZONES

3.2.9.3 Environmental Consequences

3.2.9.3.1 Analysis Approach

An increased risk for bodily injury, illness, death, or property damage from the Proposed Action would be considered an adverse impact on safety. An impact on health and safety would be significant if the Proposed Action

- Substantially increased risks associated with the safety of installation personnel, contractors, or the general public.
- Hindered the ability to respond to an emergency.
- Introduced a new health or safety risk for which CCSFS personnel are not prepared or do not have adequate management and response plans in place.

3.2.9.3.2 Proposed Action

The Proposed Action would result in an overall net benefit to human health and safety, despite short-term, minor, direct, adverse impacts during construction and demolition activities. The short-term risk associated with work performed by demolition and construction contractors would increase at CCSFS during the normal workday. Occupational health and safety hazards associated with construction of the proposed new facilities and demolition of the existing structures would include loud noise, heavy machinery, debris, electricity, and hazardous materials used or encountered during work. The Proposed Action would not pose new or unacceptable safety risks to installation personnel or activities at CCSFS.

All proposed payload processing facilities that would store, handle, or process ordnance items or propellants will require an approved Explosives Site Plan prior to construction. Similarly, all proposed payload processing facilities using toxic materials would have a Toxic Hazard Assessment and a Toxic Release Contingency Plan. The Toxic Hazard Assessment identifies the safety areas to be controlled during the storage, handling, and transfer of the toxic propellants. With the implementation of the BMPs listed in **Section 3.2.9.3.2.1**, no significant impacts to human health and safety during construction and demolition activities are anticipated.

The Proposed Action would enable SLD 45 to meet current and future mission objectives and conduct mission requirements in a safe operating environment. The following improvements in the Proposed Action would improve safety at CCSFS:

- Relocation of non-essential personnel outside of launch exclusionary safety zones.
- Installation of concrete duct banks around critical communication lines to avoid risks to worker and launch safety.
- Improvements at the South Gate to improve pedestrian and driver safety.
- Roadway widening and connectors to improve traffic flow and large vehicle movement.
- MSA consolidation away from high-traffic areas to expand storage capacity in accordance with DESR 6055.09_AFMAN 91-201.

3.2.9.3.2.1 Best Management Practices

To minimize occupational health and safety risks at CCSFS, the following BMPs would be implemented:

- Provide appropriate personal protective equipment (PPE) for workers and adhere to applicable OSHA standards and procedures, paying specific attention to night-time work if required.

- Develop and communicate a detailed phasing plan for all construction to include short and long-range scheduling, area of work, expected interferences, and scheduled critical periods.
- Clearly mark work areas with appropriate signage and secure against unauthorized entry.
- Conduct proposed construction and demolition activities in accordance with federal, state, and local regulations to minimize safety hazards and contact with hazardous materials, wastes, and substances.
- Notify FDEP at least 10 working days prior to facility demolition as required in 62-257 FAC.
- Clearly mark changes to traffic patterns using standard construction traffic control measures and communicate with installation personnel.
- Develop and implement a health and safety plan to further minimize potential impacts to health and safety of contractor employees. Ensure planning and mandatory training addresses not only typical construction related hazards, but also environmental hazards such as heat exhaustion and stroke, lightning strikes, insect and animal related hazards including diamond-back rattle snakes, alligators, wild boar, bobcat, and rabid animals. Identification of and the location of any diamond-back rattle snakes should be documented and relayed to 45 CES/CEIE personnel.
- Coordinate siting and construction plans with the CCSFS Safety Office before beginning construction.
- Restrict development within the Skid Strip CZs and APZs.
- Evaluate the height of proposed facilities near the Skid Strip to avoid conflicts with airfield operations or the imaginary surfaces of the runway, as described in UFC 3-260-01, *Airfield and Heliport Planning and Design*.
- Increase on-site safety professionals during high-intensity work periods, difficult projects, and night-time work.
- Review all ESQD criteria and regulations established by DoD and USAF Explosive Safety Standards used to establish safe distances from hazardous facilities to non-related facilities and roadways.

3.2.9.3.3 No-Action Alternative

Under the No-Action Alternative, proposed construction, demolition, and renovation activities would not occur. No immediate changes to safety and occupational conditions would occur. However, proposed safety improvements would also not occur under this alternative, which could result in long-term, adverse impacts on mission safety, personnel, and the environment.

3.2.10 Hazardous Materials and Wastes

3.2.10.1 Definition of the Resource/Regulatory Setting

The ROI for hazardous materials and wastes is defined as on and off-installation areas where hazardous materials would be encountered or utilized and where hazardous/solid wastes would be generated and disposed of (e.g., landfills).

3.2.10.1.1 Hazardous Materials and Waste

Hazardous material, waste or substances are generally associated with industrial activities. The technical meanings of these terms are defined below:

- ***Hazardous material****:* a substance or material that the Secretary of Transportation has determined can pose an unreasonable risk to health, safety, and property when transported in commerce, as defined in 49 CFR 171.8, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC 9601 et seq), and the Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq).

- ***Hazardous waste***: any solid, liquid, contained gaseous, or semisolid waste or any combination of wastes that either exhibit one or more hazardous characteristics (e.g., ignitable, corrosive, reactive, or toxic) or are listed in 40 CFR Part 261. These are also known as "characteristic wastes." USEPA has deemed certain solid wastes hazardous. These substances may be referred to as "listed wastes" and are regulated by RCRA.
- ***Hazardous substance:*** includes hazardous waste, HAPs, hazardous substances as defined under the CWA and Toxic Substance Control Act (TSCA) (15 USC 2601 et seq), and elements, compounds, mixtures, solutions, or substances listed in 40 CFR Part 302 that pose substantial harm to human health or environmental resources.

3.2.10.1.2 Per- and Polyfluoroalkyl Substances

Per- and polyfluoroalkyl substances (PFAS) are a large group of chemicals that have been widely used in industrial and consumer applications such as Teflon and fire-fighting foam. Examples include perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), and perfluorobutane sulfonic acid (PFBS). These chemicals have relatively recently attracted the interest of researchers, regulators, and the public due to their widespread occurrence and persistence in the environment. There is evidence that exposure to certain PFAS can lead to adverse effects in wildlife and humans. While some PFAS, such as PFOA and PFOS, have extensive amounts of human epidemiological, exposure, and toxicity data, there is little toxicity and exposure information for much of the other chemicals in the group that could be used to make informed decisions about their safety. PFAS represent several waste disposal challenges DoD-wide. Any impacted soil and groundwater must be treated onsite or properly tested/characterized for offsite disposal, which must be planned for during the project design and execution phases.

3.2.10.1.3 Asbestos and Lead-Based Paint

Asbestos Containing Material (ACM) may be present in buildings proposed for demolition or renovation. Asbestos was designated as a hazardous air pollutant in 1971, under the NESHAPs of the CAA. In 1982, the USEPA delegated primary authority for the implementation and enforcement of the Asbestos NESHAP to the State of Florida. FDEP administers the asbestos removal program under Chapter 62- 257, FAC. The Asbestos NESHAP has been adopted by reference in Section 62-204.800, FAC. OSHA also provides for worker protection for employees who work around or remediate ACM. Friable ACM, which can be pre-existing or generated during a demolition activity, refers to any material containing more than one percent asbestos that can be crumbled, pulverized, or reduced to powder when dry, by using hand pressure or similar mechanical pressure. Asbestos material is removed and isolated in accordance with AFI 32-1001. All friable asbestos must be encapsulated or removed, the site must be approved by FDEP, and the asbestos waste disposed of in an approved off-site landfill.

According to USEPA, facilities built before 1978 may contain lead-based paint (LBP) and these paints can chip or deteriorate creating dust that poses serious health risks to occupants and visitors. The lead abatement program is regulated under TSCA Sections 402 and 403. In 1978, the Consumer Product Safety Commission banned the use of paint containing more than 0.06% lead by weight on interior and exterior residential surfaces, toys, and furniture. LBP must be encapsulated or removed by a USEPA-certified contractor and disposed of in an approved off-site landfill.

3.2.10.1.4 Installation Restoration Program

The IRP is managed by the Air Force Civil Engineer Center (AFCEC) to identify, characterize, clean up, and restore sites contaminated with toxic and hazardous substances, low-level radioactive materials, petroleum products, or other pollutants and contaminants. The IRP has established a process to evaluate past disposal sites, control the migration of contaminants, identify potential hazards to human health and the environment, and remediate the sites.

3.2.10.1.5 Solid Waste

Solid wastes are those substances defined in 40 CFR 261.2. Subtitle D of RCRA and its amendments, sets national standards for the management of solid waste, including collection and storage and its subsequent burning, use as a fuel, or landfilling. AFMAN 32-7002 provides guidance for USSF installations to develop solid waste management plans that ensure regulatory compliance.

Specific hazardous material/waste laws and requirements related to the Proposed Action are summarized in **Table 3-15**.

Table 3-15. Summary of Hazardous Waste Regulations Requirements

Law or Rule	Permit/Action(s)	Requirement	Agency or Organization
Comprehensive Environmental Response, Compensation, and Liability Act (42 USC 9601 et seq)	The law authorizes actions that reduce or eliminate dangers associated with releases or threats of releases of hazardous substances at sites listed on USEPA's National Priorities List.	Provides a federal "Superfund" to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment.	USEPA
Resource Conservation and Recovery Act (42 USC 6901 et seq)	Solid Waste Management Units (SWMUs) are listed on the RCRA Corrective Action permit and activities follow the RCRA corrective process.	Control hazardous waste from generation to disposal. RCRA also sets forth a framework for the management of non-hazardous solid wastes.	FDEP/USEPA
Toxic Substances Control Act (15 USC 2601 et seq)	Before and after demolition, all friable asbestos must be encapsulated or removed, and the asbestos waste disposed of in an approved landfill. Lead-based paint and polychlorinated biphenyls (PCBs) must be managed at the installation in accordance with all applicable regulations.	Assess and regulate new commercial chemicals before they enter the market, chemicals already existing in 1976 that posed an "unreasonable risk to health or to the environment" (e.g., PCBs, lead, mercury, and radon), and distribution and use of these chemicals.	USEPA
Pollution Prevention Act (42 USC 13101 et seq)	Develop pollution prevention initiatives and plans.	Prevent or reduce the amount of pollution through cost-effective change in production, operation, and raw material used by industry and governmental agencies.	USEPA
Residential Property Renovation: State, Territorial and Tribal Program Authorization Guidance (40 CFR 745, Subpart E)	Lead-Based Paint Abatement Program regulations provide a framework for lead abatement, risk assessment and inspections.	Require those performing lead removal are to be trained and certified by USEPA or an authorized state. Training providers must be accredited and teach approved curricula.	USEPA
62- 257, FAC, *Asbestos Program*	FDEP administers the asbestos removal permitting program.	Sets standards and BMPs for removal and disposal of asbestos.	FDEP
62-204.800, FAC, *Federal Regulations Adopted by Reference*	State of Florida adopted asbestos NESHAP from USEPA	The State of Florida must maintain NESHAP set forth in the CAA.	FDEP

Law or Rule	Permit/Action(s)	Requirement	Agency or Organization
AFI 32-1001, *Civil Engineer Operation, Chapter 15*	Incorporate facility asbestos management principles and practices into all USAF programs	Manage asbestos-containing materials.	DoD
AFMAN 32-7002, *Environmental Compliance and Pollution Prevention, Chapter 7 Asbestos*	All construction contracts are required to comply with hazardous materials procedures and ensure that all recyclable material (e.g., concrete) is recycled and recycled quantities are reported by weight to SLD 45 Installation Management and 45 CES/CEIE.	Establish procedures and standards that govern management of hazardous materials throughout the Department of the Air Force.	DoD
62-701, FAC, *Solid Waste Facilities*	Solid waste management facilities must be permitted through FDEP. Solid waste must be stored, processed, and disposed of in accordance with regulations.	Regulate sludge from a waste treatment works, water supply treatment plant, and air pollution control facility; garbage, rubbish, refuse, and special waste; and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from domestic, industrial, commercial, mining, agricultural, or governmental operations.	FDEP
62-730, FAC, *Hazardous Waste*	All persons who own or operate a facility that treats, stores, or disposes of hazardous waste, must notify FDEP using Form 62-730.900(1)(b), "8700-12FL – Florida Notification of Regulated Waste Activity," with exception of small quantity generators as defined in under 40 CFR 260.10.	Regulate generators of hazardous waste.	FDEP

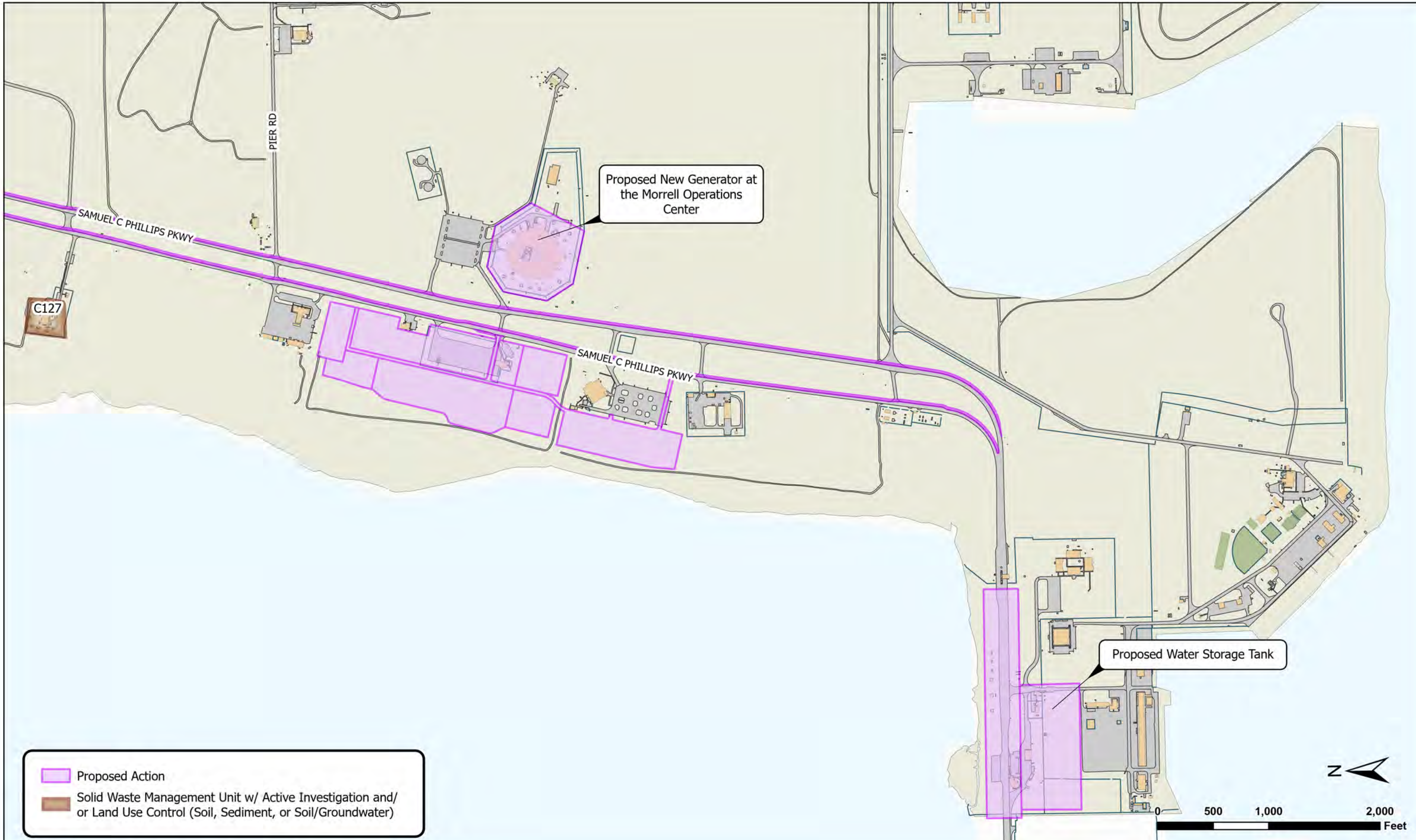
3.2.10.2 Affected Environment/ Existing Conditions

3.2.10.2.1 Hazardous Materials/Wastes

SLD 45 has developed a *Hazardous Waste Management Plan* (HWMP) (USAF 2020c) that provides a guide on the proper handling and storage of waste, petroleum products, and hazardous materials in accordance with 40 CFR 260 & 279 and 62-730, FAC.

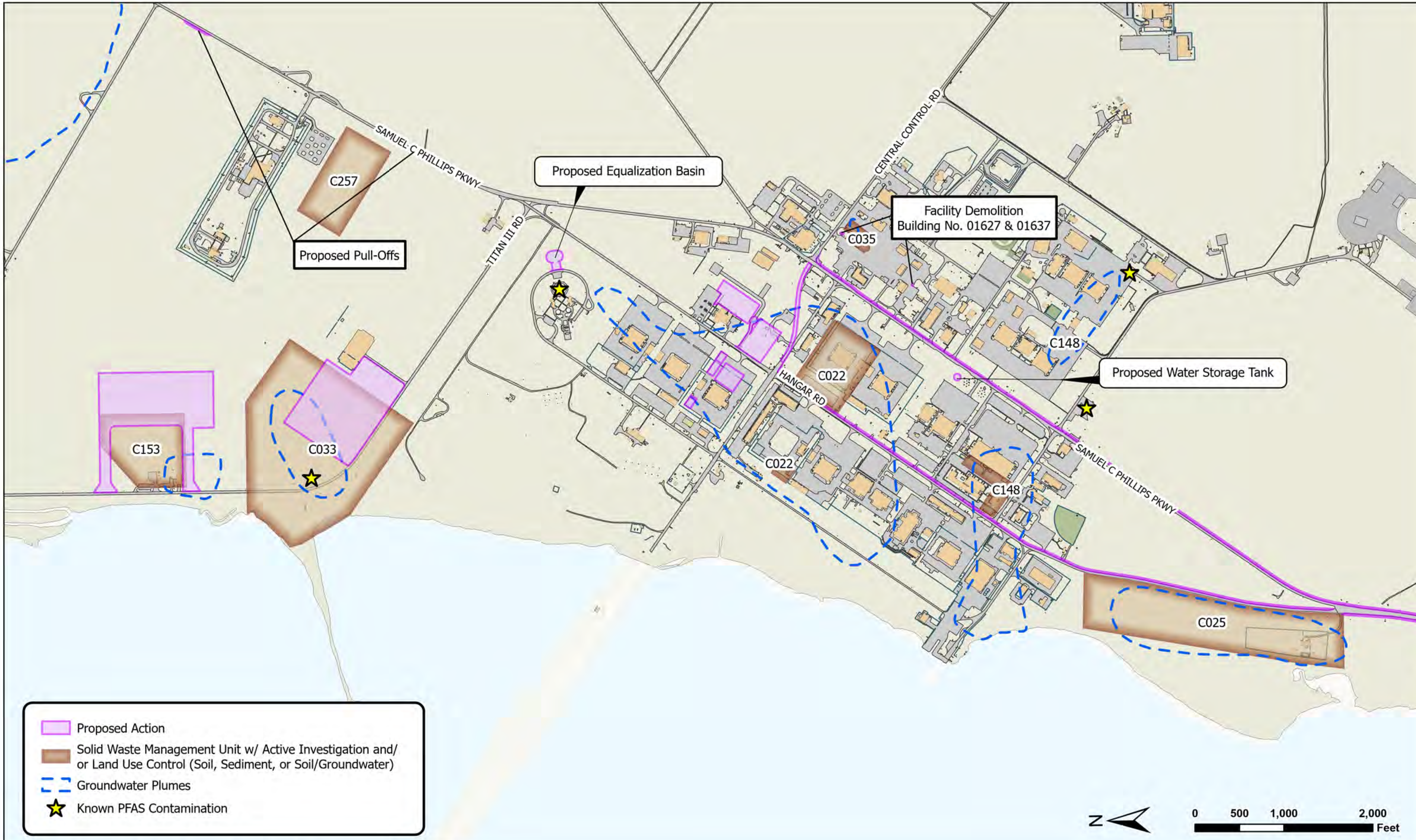
3.2.10.2.2 Per- and Polyfluoroalkyl Substances

A PFAS Site Investigation (SI) was conducted in 2017, which confirmed positive detections of PFAS in groundwater and limited areas in soil in excess of the Lifetime Health Advisory (70 parts per trillion) for PFOS/PFOA (**Figures 3-21 and 3-22**). A full Remedial Investigation is expected to begin in Fiscal Year 2023.



CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 3-20: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - HAZARDOUS MATERIALS - SOUTH GATE



CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 3-21: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - HAZARDOUS MATERIALS - INDUSTRIAL AREA

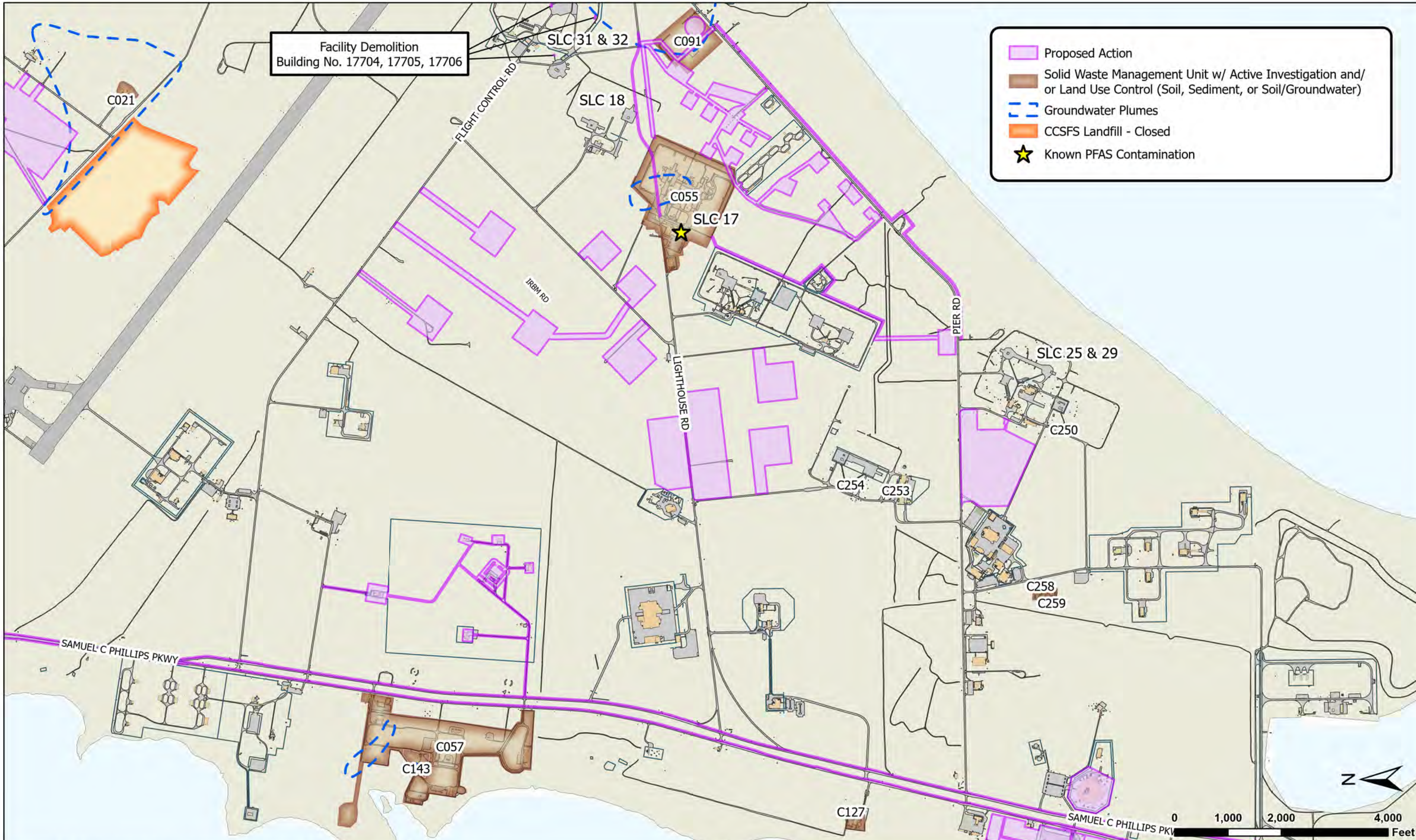


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FIGURE 3-22: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - HAZARDOUS MATERIALS - CENTRAL

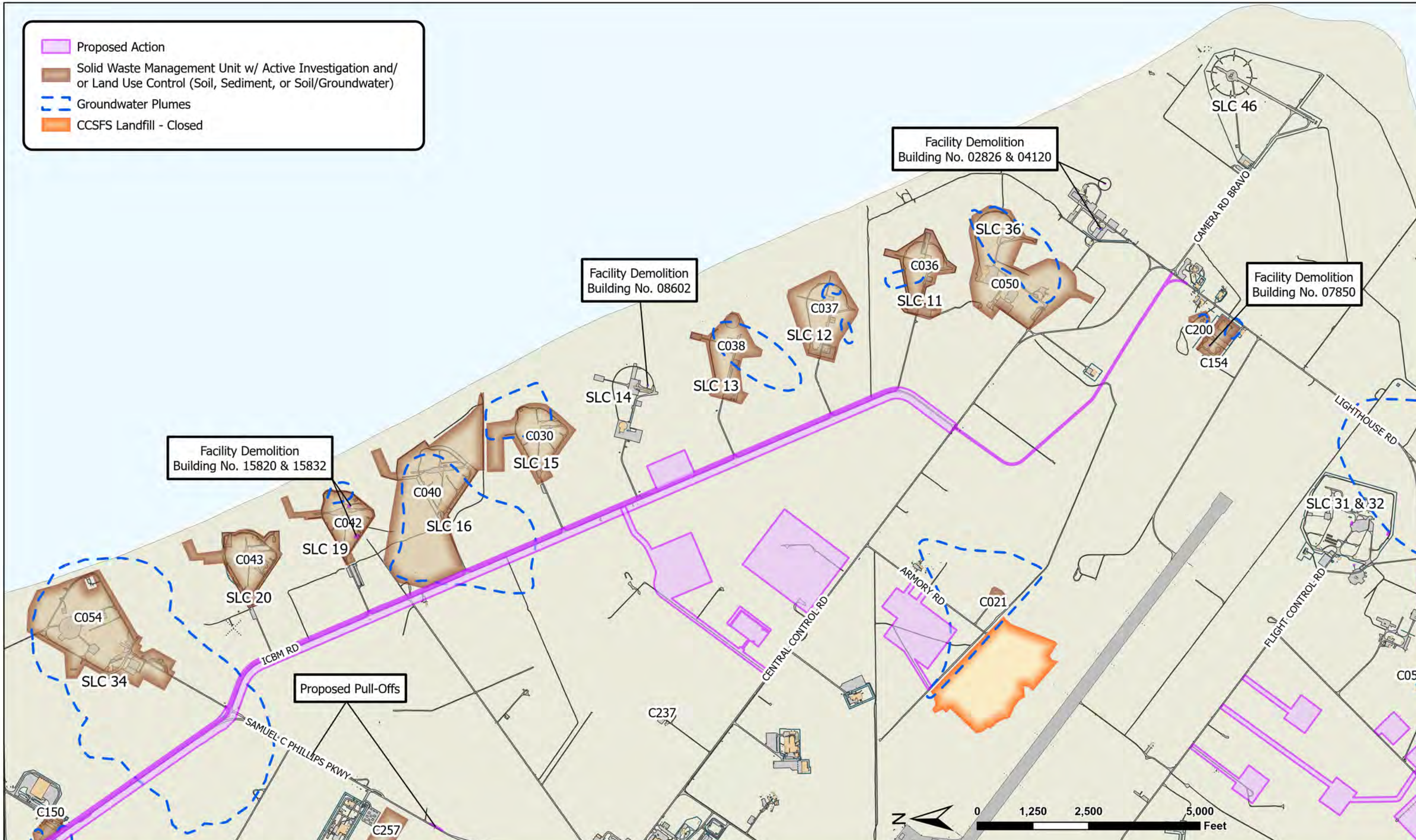

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FIGURE 3-23: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - HAZARDOUS MATERIALS - LAUNCH OPERATIONS SOUTH

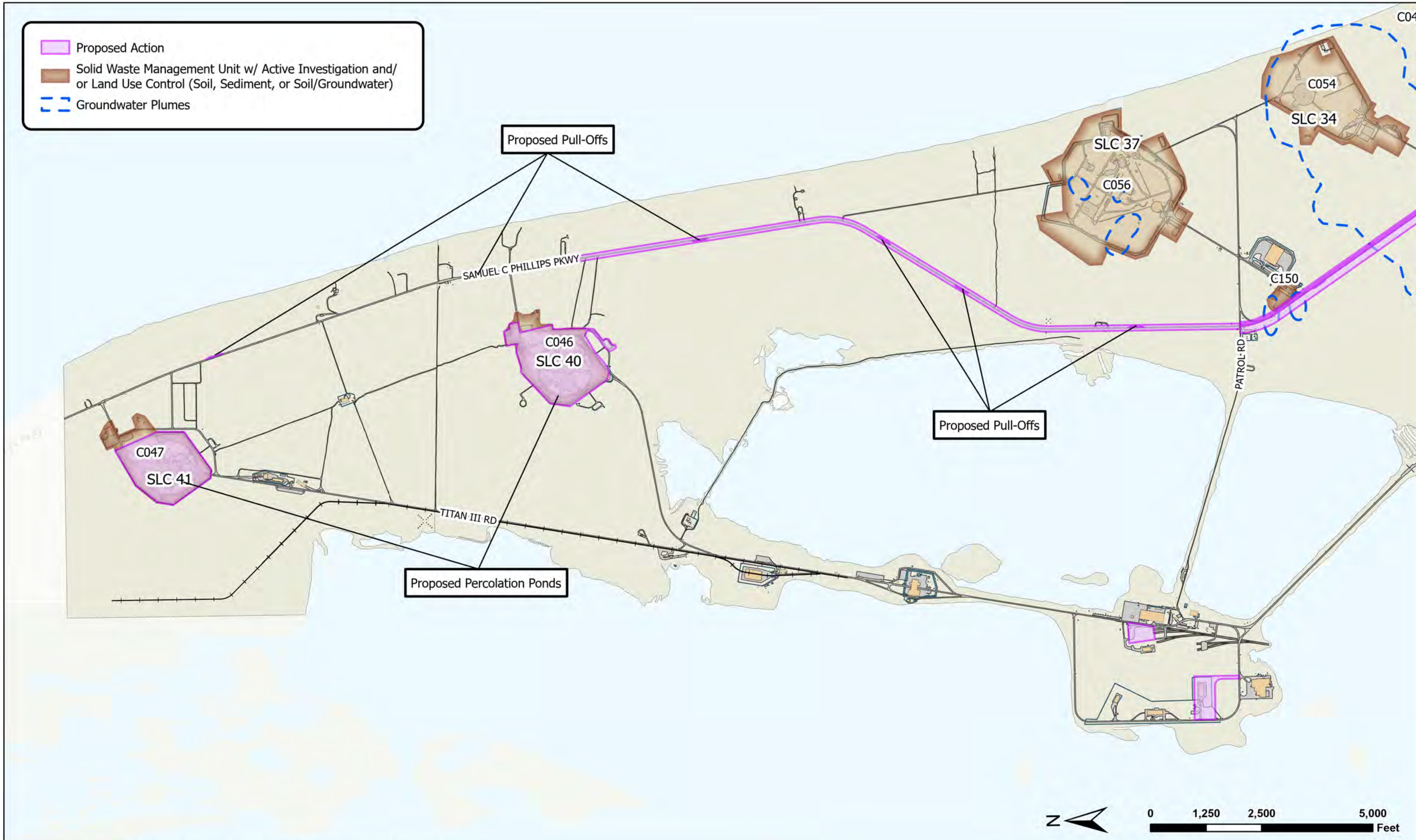

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FIGURE 3-24: CCSFS POTENTIAL ENVIRONMENTAL IMPACTS - HAZARDOUS MATERIALS - LAUNCH OPERATIONS NORTH

3.2.10.2.3 Asbestos and Lead-Based Paint

Since most buildings at CCSFS were constructed prior to the 1980s, facilities are assumed to contain ACM and LBPs. The removal and disposal of ACM and LBPs at CCSFS is conducted in accordance with federal, state, and local regulations. Demolition and renovation activities would require coordination with 45 CES/CEIE and FDEP. All material must be removed and properly disposed of at off-site facilities.

3.2.10.2.4 Installation Restoration Program

According to an SLD 45 update, prepared August 28, 2020, there are approximately 258 current or past Solid Waste Management Units (SWMUs) as part of the IRP at CCSFS. Of those there are approximately 213 SWMUs that are now listed as No Further Action (NFA), 10 that are active and under investigation, and 35 that have Long-Term Monitoring (LTM) and/or are under Land Use Controls (LUC) agreements. The SWMUs are listed on the CCSFS RCRA Corrective Action permit and activities follow the RCRA corrective process. Construction is not prohibited on or near CCSFS SWMUs; however, LUCs are established for sites where residual contamination is well-defined, remains in place, and may require special management practices should land disturbance be required. **Figures 3-20 through 3-24** display the locations of active SWMUs at CCSFS.

AFCEC IRP has established specific guidance to minimize spread of known contamination, comply with regulatory requirements, and protect personnel from safety and health hazards. **Table 3-16** summarizes the primary contaminants of concern in groundwater, sediment and soil for SWMUs that coincide with the Proposed Action. Fact Sheets for these SWMUs are included in **Appendix E**.

Table 3-16. Active Solid Waste Management Units (SWMUs)

SWMU Site ID	Groundwater Contaminants	Surface Water Contaminants	Soil Contaminants	Proposed Improvement within the SWMU
C021	Chlorinated solvents, 1,4-dioxane	Solvent residuals	None	Concrete duct bank
C022	Chlorinated solvents, 1,4-dioxane	Residual Chlorinated Solvents	Polynuclear Aromatic Hydrocarbon (PAHs)	Gas station/restaurant, Phillips Parkway widening, Concrete duct bank
C025	Manganese	None	Lead (Pb)	Concrete duct bank
C033*	Petroleum, Chlorinated Solvents, Polychlorinated biphenyl (PCBs), Metals, Industrial Waste Products, PFAS	Residual Chlorinated Solvents	Petroleum, Chlorinated Solvents, Pesticides, PCBs, Metals, Industrial Waste Products, PFAS	Launch Support Facility
C040	Chlorinated Solvents (Trichloroethylene, cis-1,2-Dichloroethene [DCE], Vinyl Chloride [VC]), and 1,4-dioxane	None	PCBs, PAHs	ICBM Road utility corridor
C042	Chlorinated Solvents	None	PCBs, PAHs, Arsenic.	Demolition
C046	None	None	PCBs	Percolation ponds Concrete duct bank
C047	None	None	PCBs, Arsenic, PAHs	Percolation ponds
C050	Chlorinated Solvents	None	PCBs	Concrete duct bank
C055*	Chlorinated Solvents (VC and DCE), PFAS, and 1,4-dioxane	None	PCB, Metals (Arsenic, Iron, Pb), PAHs	MSA consolidation, Lighthouse Road connector
C150	Chlorinated Solvents	None	PCBs	ICBM Road utility corridor
C153	Residual Chlorinated Solvents	None	PCBs	Launch Support Facility
C154	Residual Chlorinated Solvents	None	None	Demolition, Concrete duct bank
C200	VC	None	None	Concrete duct bank

*PFAS is not associated with specific regulatory units and a separate assessment is planned under CERCLA

3.2.10.2.5 Solid Waste

Solid waste, more commonly known as non-hazardous refuse, trash or garbage, consists of construction and demolition (C&D) debris and everyday items such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, and appliances. Non-hazardous solid waste generated at CCSFS is managed in compliance with the SLD 45 *Integrated Solid Waste Management Plan* (ISWMP) (USAF 2019b). General solid refuse at CCSFS is collected by a private contractor and disposed of off-site at a Brevard County landfill or other appropriate and permitted facilities. C&D items with mercury- or chromium-based paints, LBP not from residential units, and any PCB bulk waste with <50 ppm PCBs (recyclable) or >500 ppm PCBs (hazardous) are not accepted at Brevard County landfill facilities. SLD 45 also manages a recycling program for appropriate waste material from CCSFS sites.

3.2.10.3 Environmental Consequences

3.2.10.3.1 Analysis Approach

The potential impacts associated with hazardous materials/waste and solid waste depend on the toxicity, storage, use, transportation, and disposal of these substances, as well as how the Proposed Action would impact sites managed by the IRP. The threshold level of significance for hazardous materials, toxic substances, and hazardous/solid wastes is surpassed only if the storage, use, handling, or disposal of these substances substantially increases the risk to human health due to direct exposure, substantially increases the risk of environmental contamination, or violates applicable federal, state, DoD, and/or local regulations. For this analysis, a significant impact would occur if the Proposed Action

- Resulted in the use of hazardous materials that are highly toxic or have a potential to cause severe environmental damage.
- Generated hazardous/solid waste types or quantities that could not be accommodated by the current management system.
- Disturbed an existing IRP (or PFAS) site resulting in the potential release of hazardous constituents or an elevated safety risk to workers due to exposure to these constituents.

3.2.10.3.2 Proposed Action

The Proposed Action could have short-term, minor to moderate, direct, adverse impacts associated with hazardous materials/waste and solid waste. Based on the analysis presented below, and the implementation of BMPs (**Section 3.2.10.3.2.5**), the Proposed Action would have no significant impacts associated with hazardous materials and waste or pollution.

3.2.10.3.2.1 Hazardous Materials and Waste Management

The Proposed Action would require hazardous materials and waste management during the construction/renovation and operational phases. Petroleum products and other hazardous materials (e.g., paints and solvents) would be used during construction activities, and new facilities would require additional chemical storage. For all hazardous materials brought onto the installation, construction contractors would submit a Transient Contractor Worksheet, which would be submitted quarterly to the installation hazardous materials point-of-contact as required by USAF regulations. Materials would be stored in proper containers, which employ secondary containment BMPs necessary to prevent and limit accidental spills. All spills and accidental discharges of petroleum products, hazardous materials, or hazardous wastes would be reported and mitigated.

Emergency generators with integrated fuel storage tanks may be required for proposed new facilities. Design and management of new equipment would be completed in accordance with the applicable UFC and AFMAN/AFI. Operations would be completed in accordance with the CCSFS *Spill Prevention, Control, and Countermeasure Plan* (for petroleum, oil, and lubricant release), *CCSFS SWPPP* (USAF 2019d), the *SLD 45 HWMP* (USAF 2020c), and the BMPs listed in **Section 3.2.10.3.2.5**.

Hazardous and petroleum wastes would be generated in small quantities during construction and would include empty containers, spent solvents, waste paint and solvents, used oil, spill cleanup materials, and lead-acid batteries from construction equipment. These wastes would be stored in appropriate containers and with secondary containment BMPs in accordance the *SLD 45 HWMP* (USAF 2020c) and applicable federal and state regulations. To further protect the adjacent areas and waterways during construction, the construction contractor would be required to obtain a NPDES Construction Generic Permit and implement a SWPPP during construction.

Wastes that cannot be recycled would be disposed of by the contractor at licensed facilities as approved by the authoritative contracting officer. No changes to existing permits, hazardous waste generator status, or management are anticipated. Given these measures, no significant impacts are anticipated to or from hazardous materials.

3.2.10.3.2.2 Asbestos-Containing Material and Lead-based Paint

Due to the age of existing facilities, demolition and renovation activities would require coordination with SLD 45. ACM and LBP surveys would be required as part of the thorough inspection requirement for NESHAP prior to demolition. In coordination with SLD 45, the contractor would notify FDEP at least 10 working days prior to removal actions as required in 62-257 FAC. ACM and lead-containing wastes would be disposed of in accordance with federal regulations, including the NESHAP, TSCA, and OSHA. Transport and disposal documentation records of ACM and LBP, including signed manifests, would also be required. Implementation of these waste management requirements would minimize any potential adverse impacts resulting from ACM or LBP, and neither of these materials would be employed in new construction. Demolition of outdated facilities containing ACM and LBP would have a beneficial impact by removing contaminants from the installation. Given these measures and implementation of the BMPs listed in **Section 3.2.10.3.2.5**, no significant impacts are anticipated to or from ACM and LBP.

3.2.10.3.2.3 Installation Restoration Program Sites and Per- and Polyfluoroalkyl Substances

The Proposed Action has the potential to result in short-term, minor to moderate, direct, adverse impacts to ongoing remediation activities at IRP sites or result in worker exposure to contaminants during project implementation. An assessment of potential impacts to/from SWMUs was conducted based on an evaluation of SWMU locations, proposed activities, and existing LUCs. The results of this analysis are presented in **Table 3-17**.

Table 3-17. Impact Assessment of Proposed Projects Within or Adjacent to SWMUs

Improvement	SWMU Site ID	Impact Assessment
Utility corridor along ICBM Road/Phillips Parkway	C040, C150	Construction of the proposed utility corridor may impact the western edge of SWMUs C040 (groundwater/surface water/soil contamination) and C150 (groundwater contamination). Contact with soil and groundwater within SWMUs would require additional coordination and planning with IRP/FDEP/(45 CES/CEIE). All dewatering efforts would require controls to manage groundwater contamination.
Percolation Ponds at SLCs 40 and 41	C046, C047	Proposed construction of percolation ponds at SLCs 40 and 41 may impact C046 and C047 (soil contamination for both). Contact with soil within the SWMUs is anticipated and would require additional coordination and planning with IRP/FDEP/(45 CES/CEIE).
MSA Consolidation	C055	MSA consolidation may impact SWMU C055 (soil/groundwater/PFAS contamination). Contact with soil and groundwater within the SWMU would require additional coordination and planning with IRP/FDEP/(45 CES/CEIE). All dewatering efforts would require controls to manage groundwater contamination.
Concrete Duct Bank	C021, C022, C025, C046, C050, C154, C200	Installation of the concrete duct bank may impact several SWMUs. Contact with soil and groundwater within these SWMUs would require additional coordination and planning with IRP/FDEP/(45 CES/CEIE). All dewatering efforts would require controls to manage groundwater contamination.
Lighthouse Road Connector	C022	Construction of the roadway may impact SWMU C022 (soil/groundwater/surface water contamination). Contact with groundwater and soil would require additional coordination and planning with IRP/FDEP/(45 CES/CEIE). All dewatering efforts would require controls to manage groundwater contamination.
Phillips Parkway widening	C055	Construction of the roadway may impact SWMU C055 (soil/groundwater/PFAS contamination). Contact with soil and groundwater would require additional coordination and planning with IRP/FDEP/45 CES/CEIE. All dewatering efforts would require controls to manage groundwater contamination.
Restaurant and gas station	C022	Construction of the restaurant and gas station may impact to SWMU C022 (soil/groundwater/surface water contamination). Fuel storage tanks would be above ground to minimize contact with groundwater and soil; however, contact with soil and groundwater within the SWMU is anticipated and would require additional coordination and planning with IRP/FDEP/(45 CES/CEIE). All dewatering efforts would require controls to manage groundwater contamination.
Launch Support Facility	C033, C153	Proposed facility construction may impact SWMUs C033 (soil/groundwater/surface water/PFAS contamination) and C153 (groundwater contamination). Contact with soil and groundwater within these SWMUs would require additional coordination and planning with IRP/FDEP/(45 CES/CEIE). All dewatering efforts would require controls to manage groundwater contamination.
Facility Demolition	C042, C154	Proposed facility demolition may impact SWMUs C042 (soil/groundwater contamination) and C154 (groundwater contamination). Contact with soil and groundwater within these SWMUs would require additional coordination and planning with IRP/FDEP/(45 CES/CEIE). All dewatering efforts would require controls to manage groundwater contamination.

A formal construction waiver is not currently required for construction in active SWMUs. AFCEC and SLD 45 do require that reviews of excavation and/or construction siting and compatibility with environmental cleanup sites be conducted and documented in accordance with current EIAP processes as specified in AFI 32-1015. If an IRP site is the only feasible location for an excavation or construction project, LUCs would be evaluated and addressed through coordination and consultation with IRP during the entire project design and construction process to ensure appropriate mitigation of any impacts and continued protection of human health and the environment. If the site would be modified in such a way that a LUC no longer exists or is no longer protective, then the remedy in the IRP site's decision document would need to be revisited.

Contractors working within active IRP sites would be made aware of the presence and nature of known contaminants and LUCs specific to IRP sites as part of the SLD 45 construction design review and implementation process. Pursuant to FDEP guidance, any contractor working in or near IRP sites should communicate any questions that arise before and during field activities to SLD 45. Management of soil and groundwater encountered during construction, including testing, handling, and disposal procedures would be required in coordination with IRP, FDEP, and SLD 45 in accordance with CCSFS protocols and applicable environmental regulations.

Workers would be required to follow OSHA safety requirements during construction. The construction contractor would be responsible to fulfill its obligation under 29 CFR 1910.120, *Occupational Safety and Health Administration Standards, Hazardous Waste Operations and Emergency Response*, to address worker exposure to hazardous substances and proper management of soil and groundwater encountered during construction, including testing, handling, and disposal procedures.

Pursuant to 62-532.500(5), FAC, and SJRWMD requirements, the contractor should be aware of all monitoring wells, injection wells, extraction wells, sparge wells, and similar treatment facilities within each work area. If any of these wells were found within the construction and demolition area, they would need to be properly abandoned and reinstalled, as appropriate, as part of the project cost. The contractor shall submit an USAF Work Clearance Form and obtain permits from SJRWMD for any well abandonment/installation activities. Due to groundwater contamination at CCSFS, activities that require dewatering with surface water discharge may require testing/characterization and installing and maintaining groundwater treatment systems for contaminants of concern during dewatering operations. If groundwater produced is contaminated and does not meet surface water standards without treatment, dewatering cannot be authorized under the Generic Permit for Stormwater Discharge from Large and Small Construction Activities or the Generic Permit for Discharge of Groundwater from Dewatering Operations. These permits are only appropriate when surface water criteria will be met without treatment. If such activities were required by the Proposed Action, the contractor and USSF would consult with FDEP for other permitting requirements pursuant to rules for dewatering near contamination, including 62-302, FAC, *Surface Water Quality Standards*, 62-777, FAC, *Contaminant Cleanup Target Levels*, and 62-780, FAC, *Contaminated Site Cleanup Criteria*. Given the measures described above and by following the BMPs in Section **3.2.10.3.2.5**, no significant impacts to or from IRP sites are anticipated.

3.2.10.3.2.4 Solid Waste

The Proposed Action would result in short-term, moderate, direct, adverse impacts to solid waste through the generation of an estimated 49,000 tons C&D debris, including concrete and asphalt rubble and scrap materials. C&D debris would be disposed of at local/regional landfills selected by the contractor and approved by 45 CES. Construction activities would occur over multiple years, limiting the quantity of debris generated at any one time. The quantities and types of demolition debris expected to be generated from the Proposed Action are summarized in **Table 3-18** (estimates based on conventional construction methods, USEPA 2003).

Table 3-18. Proposed Action Estimated Solid Waste Production

Planning Goal/Improvement	Facility Construction (acres)	Pavement (acres)	Facility Demolition (acres)	Solid Waste (Tons)
Provide reliable infrastructure	**2.2**	**6.6**	**1.2**	**4,399**
New utility corridor	0	0	0	0
Potable water improvements	0	0	0	0
Wastewater improvements	0	0	0	0
Power improvements	0	0.25	0	2.4
Munitions storage consolidation	2.2	6.3	1.2	4,397
Reduce impacts to personnel	**15.3**	**47.7**	**9.4**	**34,245**
New facilities	15.3	47.7	9.4	34,245
Eliminate critical periods	**0**	**0**	**0**	**0**
Concrete duct bank	0	0	0	0
Improve logistics	**1.2**	**38.3**	**1.1**	**4,261**
Oversized-load haul routes	0	32	0	303
New gas station/restaurant	0.1	3.9	0.1	390
Support shops consolidation	1.0	0	1.0	3,536
South gate redesign	0.1	2.4	0	32
Expand developable areas	**27.9**	**77.1**	**0.8**	**6,119**
New launch support facilities	22.3	67.7	0.5	4,469
New engineering test facility	5.6	9.4	0	618
Stand-alone facility demolition	0	0	0.3	1,032
Grand Total	**46.6**	**169.7**	**12.5**	**49,024**

C&D debris would also be generated during reconstruction of paved surfaces (e.g., roads, building slabs, and sidewalks). Building materials, such as asphalt and concrete, would not be expected to generate significant waste, since they are produced in the needed quantities and can be recycled if the material or its placement does not meet specifications. For paved surfaces, C&D debris would most likely consist of wooden forms that could be recycled.

Uncontaminated soils excavated during construction activities would be stockpiled for construction and other uses on-site. Contaminated soils would be accepted on a per-project basis at landfill facilities based on the results of soil sampling performed in accordance with FDEP standard operating procedures. Construction site operations would generate other nonhazardous waste (e.g., food waste, office waste, and packaging materials). The quantity of this type of waste would be minor when compared to the C&D debris generated. The Proposed Action would not change the number of personnel or other activities that would alter the quantity of municipal solid waste compared to current levels. With the implementation of BMPs listed in **Section 3.2.10.3.2.5**, the Proposed Action would not significantly impact solid waste disposal facilities in the region.

3.2.10.3.2.5 Best Management Practices

The *SLD 45 HWMP* (USAF 2020c) includes procedures for the handling, storage, and disposal of hazardous materials. These programs and procedures are designed to prevent adverse impacts to the environment resulting from the use of hazardous materials and handling of hazardous waste. Examples of these procedures include safety and environmental awareness training for proper hazardous materials handling techniques and a comprehensive spill plan that establishes procedures to address spills and minimize spill impacts to the environment.

ACM and LBP surveys of affected structures would be conducted prior to demolition and renovation activities. Any ACM or LBP found would be remediated and disposed of in accordance with the *SLD 45 HWMP* (USAF 2020c) and in compliance with all applicable regulations.

For all projects within SWMUs, contractors would utilize PPE and limit exposure to soil or groundwater at these sites. Prior to disturbance of any potentially affected soils, contractors and the IRP Manager would coordinate with FDEP regarding the project and potential impacts. Before any work could commence, the potential presence of hazardous constituents would be communicated to workers. Work safety briefings would be implemented to protect worker health that include the distribution of material safety data sheets, safety data sheets, and discussion of safe work practices, such as the use of PPE. Intrusive work at or near the five PFAS sites should be coordinated with IRP and occur no closer than 500 feet since the extent of potential soil or groundwater contamination is not yet known.

Should soils need to be removed, transported, treated, and/or disposed, RCRA regulations would apply to the characterization, transportation, and disposal of this material. The contractor would be responsible for addressing the health and safety of its employees during construction and demolition activities in accordance with OSHA safety requirements pertaining to worker exposure (29 CFR 1910.120). This includes addressing worker exposure to hazardous substances and proper management of soil and groundwater encountered during construction, including testing, handling, and disposal procedures. Management of soil and groundwater during construction would be required under all applicable environmental regulations and in coordination with AFCEC IRP, FDEP, and 45 CES/CEIE. All construction contracts would be required to comply with the *SLD 45 ISWMP* (USAF 2019b) and AFMAN 32-7002.

To lessen the stress on area landfills, all recyclable material (e.g., concrete, asphalt, wood, and metals, etc.) would be recycled, and recycled quantities would be reported by weight to SLD 45 Installation Management and 45 CES/CEIE.

3.2.10.3.3 No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not be implemented. Existing conditions for hazardous materials, hazardous wastes, asbestos, LBP, SWMUs, and solid wastes would remain unchanged. Therefore, no impacts would occur under this alternative.

3.2.11 Socioeconomics

3.2.11.1 Definition of the Resource/Regulatory Setting

Socioeconomic resources are defined as the basic attributes associated with the human environment and generally include factors associated with population, housing, education, and economic activity. Economic activity is typically described in terms of employment, personal income, and regional industries. Changes to these fundamental components can influence other community resources, such as housing availability, utility capabilities, and public services.

Socioeconomic analyses involve economic and social elements such as population levels, workforce, and consumer activities. Factors that characterize the socioeconomic environment represent a composite of several interrelated and nonrelated attributes. Indicators of economic conditions for a geographic area can include demographics, median household income, employment, and housing data. Data on employment identifies employment by industry or trade and unemployment trends. Data on personal income in a region are used to compare the effects of any jobs created or lost as a result of the Proposed Action. Changes in demographic and economic conditions are typically accompanied by changes in other community components, such as housing availability, education, and the provision of installation and public services, which are also discussed in this section.

3.2.11.2 Affected Environment/ Existing Conditions

The ROI for socioeconomics includes the area around CCSFS, which includes the census tracts (CT) containing Cape Canaveral, Cocoa, Merritt Island, and Titusville. The ROI does not incorporate census tracts on CCSFS because there is not a resident population, instead, the ROI looks at neighboring census tracts. Population, race, age, and economic activity data for Brevard County, Florida and the U.S. are provided for further information and areas of comparison. Information pertaining to the existing social and economic characteristics of the ROI was gathered from data published by the 2020 National Census (U.S. Census Bureau 2020).

3.2.11.2.1 Population

Based on data from the U.S. Census Bureau, the estimated population of the ROI in 2020 was 93,679, which represents a 6.4% increase since 2010. This increase is lower than that in Brevard County (10.4%) and Florida (12.7%). **Table 3-19** presents the census tracts, ROI, county, state, and U.S. population trends.

Table 3-19. Population Trends

Geographic Area	2010 Census	Total Population (2020)	Change (+/-)	% Change
CT 602.01	5,862*	2,764	17	0.3%
CT 602.02		3,115		
CT 603.01	5,062*	2,063	-251	-5.0%
CT 603.02		2,748		
CT 604	4,163	4,276	113	2.6%
CT 605	4,609	5,023	414	8.2%
CT 606	5,103	5,476	373	6.8%
CT 607	3,232	3,618	386	10.7%
CT 610.01	4,382	5,531	1,149	20.8%
CT 610.02	3,176	3,390	214	6.3%
CT 611	5,983	6,248	265	4.2%
CT 612.01	6,650	8,439	1,789	21.2%
CT 612.02	3,870	3,958	88	2.2%
CT 621.06	3,271	3,396	125	3.7%
CT 621.12	3,113*	1,334	285	9.2%
CT 621.14		2,064		
CT 685.01	2,226	2,183	-43	-2.0%
CT 685.02	2,590	2,495	-95	-3.8%
CT 686.01	1,892	2,107	215	10.2%
CT 686.03	3,383*	1,516	321	9.5%
CT 686.04		2,188		
CT 691	4,568	4,536	-32	-0.71%
CT 698.01	3,520	3,621	101	2.7%
CT 699.03	11,393*	2,811	137	1.2%
CT 699.04		5,815		
CT 699.07		2,964		
ROI*	**88,048**	**93,679**	**5,631**	**6.4%**
Brevard County	543,376	606,679	63,236	10.4%
Florida	18,801,310	21,538,187	2,736,877	12.7%
U.S.	303,965,272	326,569,308	22,604,036	6.9%

* Census Tract boundaries were subdivided following the 2010 Census.
Source: U.S. Census Bureau (2020). *National Census*. Retrieved from https://data.census.gov/cedsci/ Age and Sex Data

3.2.11.2.2 Race and Ethnicity

Most of the population in the ROI, census tracts, county, and state identify as White. Minority populations include American Indian and Alaska Native, Asian, Black or African American, Hispanic or Latino, and Native Hawaiian and Other Pacific Islander. The 2020 race and ethnicity characteristics for the census tracts, ROI, county, state, and U.S. are summarized in **Table 3-20**.

Table 3-20. Population by Race and Ethnicity

Geographic Area	American Indian and Alaska Native	Asian	Black or African American	Hispanic or Latino	Native Hawaiian and Other Pacific Islander	White	Other Race	Two or More Races
CT 602.01	10	28	83	151	1	2,382	5	104
CT 602.02	17	78	214	251	-	2,372	13	170
CT 603.01	6	18	264	168	-	1,468	15	124
CT 603.02	21	30	154	139	2	2,284	11	107
CT 604	11	31	568	320	13	3,101	14	218
CT 605	21	46	445	409	2	3,830	18	252
CT 606	19	81	1,133	542	2	3,409	39	251
CT 607	9	19	1,790	332	1	1,234	16	217
CT 610.01	18	140	621	588	-	3,852	33	279
CT 610.02	10	46	211	400	3	2,500	10	210
CT 611	12	104	373	544	7	4,901	28	279
CT 612.01	24	264	642	900	13	6,174	32	390
CT 612.02	9	84	189	365	1	3,100	34	176
CT 621.06	5	39	148	281	5	2,750	18	150
CT 621.12	1	5	38	74	-	1,148	5	63
CT 621.14	11	15	93	157	6	1,646	7	129
CT 685.01	9	33	24	134	2	1,908	5	68
CT 685.02	11	32	57	154	1	2,115	20	105
CT 686.01	10	29	56	146	1	1,776	10	79
CT 686.03	8	30	58	143	-	1,180	11	86
CT 686.04	5	41	25	105	2	1,934	4	72
CT 691	15	126	70	323	3	3,763	26	210
CT 698.01	7	123	40	294	3	2,949	15	190
CT 699.03	15	43	21	188	4	2,380	17	143
CT 699.04	21	205	69	-	3	4,903	438	13
CT 699.07	-	88	99	195	3	2,415	2	162
ROI*	**305**	**1,778**	**7,485**	**7,303**	**78**	**71,474**	**846**	**4,247**
Brevard County	1,569	15,587	56,498	67,907	482	430,936	3,389	30,244
Florida	42,169	629,626	3,127,052	5,697,240	11,521	11,100,503	137,933	792,143
U.S.	2,251,699	19,618,719	39,940,338	62,080,044	622,018	191,697,647	1,689,833	13,548,983

Source: U.S. Census Bureau (2020). *QuickFacts Brevard County, Florida*. Retrieved from https://www.census.gov/quickfacts/fact/table/brevardcountyflorida/POP010220

3.2.11.2.3 Age and Gender

Within the ROI, 26.5% of the population is over the age of 65, which is higher than Brevard County (23.7%), Florida (20.5%), and the U.S. (16.0%). Elderly individuals are more likely to face specific challenges such as health care, social isolation, limited mobility, and fixed incomes. Age and gender data are summarized in **Table 3-21**.

Table 3-21. Age and Gender

Geographic Area	Under 18 Years	18-64 Years	65+ Years	Median Age	Gender	
					Male	Female
CT 602.01	11.9%	58.3%	29.8%	57	53.3%	46.7%
CT 602.02	21.0%	54.0%	24.9%	45	54.0%	46.0%
CT 603.01	10.3%	75.1%	14.5%	46	37.1%	62.9%
CT 603.02	11.9%	53.9%	34.1%	52	46.8%	53.2%
CT 604	17.3%	51.6%	31.1%	54	52.0%	48.0%
CT 605	16.4%	55.7%	27.8%	50	43.3%	56.7%
CT 606	11.2%	64.3%	24.5%	44	47.7%	52.3%
CT 607	24.9%	55.0%	20.2%	40	45.1%	54.9%
CT 610.01	15.8%	53.2%	30.9%	50	39.8%	60.2%
CT 610.02	19.1%	60.2%	20.7%	45	48.1%	51.9%
CT 611	24.2%	53.6%	22.2%	48	48.0%	52.0%
CT 612.01	21.0%	59.0%	20.0%	46	42.7%	57.3%
CT 612.02	11.7%	58.4%	29.9%	53	52.2%	47.8%
CT 621.06	18.5%	58.7%	22.7%	44	45.7%	54.3%
CT 621.12	20.1%	62.5%	17.5%	48	51.5%	48.5%
CT 621.14	11.8%	73.3%	14.9%	54	51.0%	49.0%
CT 685.01	6.1%	58.0%	35.9%	56	55.0%	45.0%
CT 685.02	8.4%	67.1%	24.5%	54	53.6%	46.4%
CT 686.01	2.7%	60.0%	37.3%	60	51.9%	48.1%
CT 686.03	13.5%	55.1%	31.4%	55	46.4%	53.6%
CT 686.04	1.6%	48.4%	50.0%	65	52.4%	47.6%
CT 691	16.8%	64.1%	19.2%	48	54.1%	45.9%
CT 698.01	12.8%	60.0%	27.2%	54	55.3%	44.7%
CT 699.03	13.4%	66.5%	20.1%	52	53.4%	46.6%
CT 699.04	16.4%	55.6%	28.0%	52.3	45.1%	54.9%
CT 699.07	15.5%	54.5%	30.0%	51	50.1%	49.9%
ROI*	**14.4%**	**59.1%**	**26.5%**	**51**	**49.1%**	**50.9%**
Brevard County	18.3%	58.0%	23.7%	47	48.9%	51.1%
Florida	19.9%	59.6%	20.5%	42	48.9%	51.1%
U.S.	22.4%	61.5%	16.0%	38	49.2%	50.8%

Source: US Census Bureau (2020). *National Census*. Retrieved from https://data.census.gov/cedsci/
*Data for the ROI was found by combining and averaging the census tract data.

3.2.11.2.4 Economic Activity (Employment and Earnings)

The total number of employed people in the civilian labor force in the ROI in 2020 was 41,488. The median household income in the ROI in 2020 was $59,931 (with U.S. dollars adjusted for inflation), with an unemployment rate of 5.9%. **Table 3-22** presents economic activity in the census tracts, ROI, county, state, and U.S.

Table 3-22. Economic Activity

Geographic Area	Population Age 16+	Population in Labor Force	Employed (civilian labor force)	Unemployment Rate	Median Household Income (dollars)
CT 602.01	2,290	1,113	1,052	5.5%	$65,000
CT 602.02	2,771	1,508	1,393	7.6%	$83,488
CT 603.01	2,157	1,463	1,334	8.8%	$48,920
CT 603.02	2,404	1,208	1,146	5.1%	$44,976
CT 604	3,444	1,488	1,399	6.0%	$38,442
CT 605	4,016	2,065	1,895	7.7%	$52,978
CT 606	4,377	2,375	2,132	10.2%	$47,091
CT 607	1,952	919	799	13.1%	$26,619
CT 610.01	4,624	2,319	2,123	8.5%	$47,961
CT 610.02	2,774	1,568	1,542	1.7%	$55,583
CT 611	4,650	2,565	2,473	3.6%	$63,375
CT 612.01	6,192	3,210	3,068	4.4%	$62,739
CT 612.02	2,999	1,470	1,366	6.8%	$75,232
CT 621.06	2,515	1,395	1,273	7.4%	$48,451
CT 621.12	1,039	639	580	9.2%	$70,893
CT 621.14	1,618	919	849	7.6%	$41,522
CT 685.01	2,217	1,172	1,164	0.7%	$59,583
CT 685.02	2,200	1,355	1,295	4.4%	$46,938
CT 686.01	2,193	1,135	1,058	6.8%	$52,229
CT 686.03	1,879	1,072	1,023	4.6%	$43,997
CT 686.04	2,097	905	905	0.0%	$64,963
CT 691	4,083	2,490	2,282	8.4%	$99,583
CT 698.01	3,404	2,027	1,995	1.6%	$88,542
CT 699.03	2,336	1,392	1,332	3.9%	$80,402
CT 699.04	4,964	2,642	2,353	4.5%	$95,809
CT 699.07	2,080	1,034	964	6.0%	$52,886
ROI	**77,275**	**41,448**	**38,795**	**5.9%***	**$59,931***
Brevard County	498,967	276,381	260,668	5.1%	$59,359
Florida	17,486,583	10,308,068	9,684,712	5.4%	$57,703
U.S.	261,649,873	165,902,838	155,888,980	5.4%	$64,994

Source: U.S. Census Bureau (2020). *National Census*. Retrieved from https://data.census.gov/cedsci/
*Data for the ROI was found by combining and averaging the census tract data.

3.2.11.3 Environmental Consequences

3.2.11.3.1 Analysis Approach

Socioeconomic impacts are assessed in terms of impacts on the local economy and related impacts on other socioeconomic resources (e.g., housing). The magnitude of potential impacts can vary greatly, depending on the location of the Proposed Action.

An impact with respect to the socioeconomic conditions would be significant if the Proposed Action

- Substantially changed the local or regional economy, employment, or business volume.
- Substantially changed the demand for housing, education, installation services, or public/social services due to population increases or decreases.

3.2.11.3.2 Proposed Action

The Proposed Action would result in both short- and long- term, direct and indirect, minor, beneficial impacts to the local economy and local communities within the ROI. Proposed construction, demolition, and renovation projects would stimulate the local economy through the employment of construction workers and the purchase of construction-related materials and other goods and services, as well as secondary purchases of goods and services.

In 2020, Brevard County had a civilian employed population of 274,748 people of which 16,958 were employed in the construction industry (U.S. Census Bureau 2020). It is expected that the local labor force would be sufficient to meet the demand for new jobs in construction and other industries without a migration of workers into the area. If construction workers contracted for the Proposed Action were obtained outside of the local or regional area, the temporary increase in the workforce during the construction phase would result in a temporary increase in local housing and lodging needs. Additionally, according to recently published U.S. Census estimates (2019), Brevard County has a housing vacancy rate of 17.2%. Given current housing vacancy rates, it is unlikely that temporary or permanent relocation of workers to Brevard County as a result of the Proposed Action would exceed or cause significant impacts to the local housing supply.

3.2.11.3.2.1 Best Management Practices

Socioeconomic factors would continually be evaluated during early project planning activities to avoid adverse impacts on the local economy and the community. Minimization efforts would include coordinating proposed activities with local governments and regional planning offices that may be affected by the Proposed Action.

3.2.11.3.3 No-Action Alternative

The No-Action Alternative would not result in any additional socioeconomic impacts. The proposed construction, demolition, and renovation projects would not occur, and there would be no associated expenditures that would provide short-term construction employment or generate additional indirect and induced income beyond the scope of normal conditions and influences within the ROI or Brevard County.

3.2.12 Environmental Justice

3.2.12.1 Definition of the Resource/Regulatory Setting

USEPA defines Environmental Justice as "the fair treatment and meaningful involvement of all people regardless of race, ethnicity, income, national origin, or education level, for development, implementation, and enforcement of environmental laws, regulations, and policies." EO 12898, *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations*, requires federal agencies to consider disproportionately high adverse effects on the human or environmental health to minority and low-income populations resulting from implementation of federal actions. *The Air Force Guide for Environmental Justice Analysis under the EIAP* (USAF 2020b) also provides guidance on how to fulfill the requirement for environmental justice analysis.

Title VI of the Civil Rights Act of 1964 prohibits discrimination based on race, color, or national origin in programs receiving federal assistance. EO 12898 requires each federal agency, to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, to achieve environmental justice as part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including interrelated social and economic effects, of its programs, policies, and activities on minority populations and low-income populations in the U.S.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (1997), states that each federal agency "(a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." The ROI for environmental justice is the same as that described for socioeconomics effects (**Section 3.2.11**).

3.2.12.2 Affected Environment/ Existing Conditions

3.2.12.2.1 Minority Populations

Within the ROI, the population in 2020 reporting to be a race other than white was 18.0% of the total, which is lower than Brevard County (26.2%), Florida (46.6%), and the U.S. (39.8%). The Hispanic or Latino population in the ROI (8.3%) is lower than the population in the county (11.2%), state (26.5%) and the U.S. (18.7%). **Table 3-23** identifies the percentage of minority populations for the census tracts, ROI, county, state, and U.S.

Table 3-23. Minority Populations by Percentage

Geographic Area	Total Population	% Minority	% Hispanic or Latino
CT 602.01	2,764	13.9%	5.5%
CT 602.02	3,115	9.5%	8.1%
CT 603.01	2,063	35.9%	8.1%
CT 603.02	2,748	9.2%	5.1%
CT 604	4,276	17.6%	7.5%
CT 605	5,023	23.7%	8.1%
CT 606	5,476	27.0%	9.9%
CT 607	3,618	67.9%	9.2%
CT 610.01	5,531	31.5%	10.6%
CT 610.02	3,390	15.9%	11.8%
CT 611	6,248	16.9%	8.7%
CT 612.01	8,439	24.7%	10.7%
CT 612.02	3,958	14.8%	9.2%
CT 621.06	3,396	17.7%	8.3%
CT 621.12	1,334	8.7%	5.5%
CT 621.14	2,064	10.3%	7.6%
CT 685.01	2,183	4.6%	6.1%
CT 685.02	2,495	11.0%	6.2%
CT 686.01	2,107	13.6%	6.9%
CT 686.03	1,516	14.7%	9.4%
CT 686.04	2,188	5.0%	4.8%
CT 691	4,536	14.4%	7.1%
CT 698.01	3,621	13.2%	8.1%
CT 699.03	2,811	11.9%	6.7%
CT 699.04	5,755	13.2%	3.4%
CT 699.07	2,964	15.3%	6.6%
ROI	**87,864**	**18.0%***	**8.3%***
Brevard County	60,6612	26.2%	11.2%
Florida	21,538,187	46.6%	26.5%
U.S.	331,449,281	39.8%	18.7%

Source: U.S. Census Bureau (2020). *National Census*. Retrieved from https://data.census.gov/cedsci/ Population by Race and Ethnicity Data
*Data for the ROI was found by combining and averaging the census tract data.

3.2.12.2.2 Low-Income Populations

For low-income demographic data collection, the U.S. Census Bureau provides data for families below poverty level, which was used to define the low-income populations evaluated in this EA (USAF 2020b). As summarized in **Table 3-24**, 12.0% of the ROI is living below the poverty level (with a range from 3.2% to 40.7%), which is slightly higher than the county (11.2%) but lower than the state (13.3%).

Table 3-24. Income Characteristics and Poverty Status

Geographic Area	Total Population	% Low-Income	% Minority
CT 602.01	2,546	3.2%	13.9%
CT 602.02	3,323	15.5%	9.5%
CT 603.01	2,390	16.0%	35.9%
CT 603.02	2,697	9.7%	9.2%
CT 604	3,822	13.6%	17.6%
CT 605	4,793	12.6%	23.7%
CT 606	4,877	14.0%	27.0%
CT 607	2,516	40.7%	67.9%
CT 610.01	5,420	8.8%	31.5%
CT 610.02	3,270	20.5%	15.9%
CT 611	5,825	5.5%	16.9%
CT 612.01	7,366	10.8%	24.7%
CT 612.02	3,313	9.1%	14.8%
CT 621.06	2,956	11.5%	17.7%
CT 621.12	1,271	10.9%	8.7%
CT 621.14	1,814	21.2%	10.3%
CT 685.01	2,310	6.4%	4.6%
CT 685.02	2,324	8.2%	11.0%
CT 686.01	2,253	7.9%	13.6%
CT 686.03	2,063	26.2%	14.7%
CT 686.04	2,131	6.0%	5.0%
CT 691	4,662	3.4%	14.4%
CT 698.01	3,805	3.8%	13.2%
CT 699.03	2,528	8.3%	11.9%
CT 699.04	5,652	4.5%	13.2%
CT 699.07	2,184	14.6%	15.3%
ROI	**88,111**	**12.0%***	**17.8%***
Brevard County	587,795	11.2%	26.2%
Florida	20,793,628	13.3%	46.6%
U.S.	318,564,128	12.8%	39.8%

Source: U.S. Census Bureau (2020). *National Census* https://data.census.gov/cedsci/ Population by Race and Ethnicity Data
*Data for the ROI was found by combining and averaging the census tract data.

3.2.12.3 Environmental Consequences

3.2.12.3.1 Analysis Approach

A significant impact to environmental justice would occur if any of the following were to result from the Proposed Action:

- A significant adverse impact to the natural or physical environment or to health that affected a minority or low-income population or children.

- A significant adverse environmental impact on minority or low-income populations or children that appreciably exceeded those on the general population or other comparison group.
- The risk or rate of environmental hazard exposure to a minority or low-income population was significant and exceeded those by the general population or other comparison group.
- A health or environmental effect occurred in a minority or low-income population affected by cumulative or multiple adverse exposures from environmental hazard.

3.2.12.3.2 Proposed Action

Implementation of the Proposed Action would occur entirely on CCSFS. Work areas would not be accessible to the public, and no residential neighborhoods are located on or near CCSFS. Thus, the Proposed Action would not disproportionately affect minority or low-income populations or children. Communities around CCSFS, including the environmental justice populations, may benefit from the Proposed Action through increased employment opportunities and positive economic gains in the form of increased wages and spending.

Implementation of the Proposed Action would have no impact on children or result in increased exposure of children to environmental health risks or safety. Activity on the installation would not differ substantially from that currently supported or that was supported in the past. Based on the assessment of existing conditions and analysis, proposed facility construction and operation would not significantly impact environmental justice populations.

3.2.12.3.2.1 Best Management Practices

Environmental justice principles apply to planning and programming activities, and early planning activities are a critical means to avoid disproportionately high and adverse effects in programs, policies, and activities. Minimization efforts would include coordinating proposed activities with emergency service providers, schools, and other community resources that may be affected by the Proposed Action.

3.2.12.3.3 No-Action Alternative

The No-Action Alternative would not impact environmental justice populations. The Proposed Action would not occur, and there would be no impacts to environmental justice populations beyond the scope of normal conditions. The No-Action Alternative would not provide potential job opportunities within the ROI or Brevard County.

3.2.13 Section 4(F) Properties

3.2.13.1 Definition of the Resource/Regulatory Setting

Section 4(f) properties are publicly owned lands including public parks, recreation areas, wildlife and waterfowl refuges, and public and private historic sites of national, state, and/or local significance. The term historic sites includes prehistoric and historic districts, sites, buildings, structures, or objects listed in, or eligible for listing in, the NRHP. Section 4(f) properties are protected under Section 4(f) of the DOT Act, codified and renumbered as 49 USC 303(c). The term use, as it relates to Section 4(f), denotes an adverse impact to, or occupancy of, a Section 4(f) property. There are three conditions under which use occurs:

- Permanent Incorporation—a Section 4(f) property is acquired outright for a transportation project
- Temporary Occupancy—a temporary use of property that is adverse in terms of Section 4(f)'s preservationist purpose

- Constructive Use—the proximity impacts of a project on a Section 4(f) property, even without acquisition of the property, are so great that the activities, features, and attributes of the property are substantially impaired.

Substantial impairment would occur when impacts to Section 4(f) lands are sufficiently serious that the value of the site in terms of its prior significance and enjoyment are substantially reduced or lost. The ROI for this resource area includes CCSFS, KSC, and the surrounding area that may be indirectly affected by the Proposed Action.

3.2.13.2 Affected Environment/ Existing Conditions

No designated 4(f) properties, including public parks, recreation areas, or wildlife refuges, exist within the boundaries of CCSFS. Although technically NRHP-listed sites are considered 4(f) property, most are generally not opened regularly to the public. Additionally, potential impacts to historic places are discussed in **Section 3.2.5**. Nearby 4(f) properties include MINWR and the Canaveral National Seashore to the north of CCSFS and Jetty Park and Port Canaveral to the south. Other public parks within approximately 15 miles from CCSFS include Kelly Park, KARS Park, Kings Park, and Manatee Cove Park.

SLC 39A, SLC 39B, the Crawlerway, and a portion of the KSC railroad track are listed on or eligible for listing on the NRHP, making them Section 4(f) properties. Additional Section 4(f) properties located at KSC further from CCSFS include the Vehicle Assembly Building, Launch Control Center, Headquarters Building, and Operations and Checkout Building (renamed the Neil Armstrong Building), all of which are listed on the NRHP (FAA 2020).

3.2.13.3 Environmental Consequences

3.2.13.3.1 Analysis Approach

An impact on Section 4(f) properties would be significant if the Proposed Action

- Involved more than a minimal physical use of a Section 4(f) property.
- Substantially impaired a Section 4(f) property by diminishing the activities, features, or attributes that contribute to its significance or enjoyment.

3.2.13.3.2 Proposed Action

Since there are no 4(f) properties at CCSFS, proposed construction/demolition activities and facility operations would not directly affect 4(f) properties. No indirect impacts (Consumptive Use) to surrounding 4(f) properties are anticipated as the Proposed Action would occur entirely within CCSFS.

3.2.13.3.3 No-Action Alternative

Under the No-Action Alternative, no Section 4(f) property impacts would occur.

3.2.14 Airspace

3.2.14.1 Definition of the Resource/Regulatory Setting

Airspace management considers how airspace is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation. Navigable airspace is airspace above the minimum altitudes of flight prescribed by regulations under 49 USC, Subtitle VII, Part A and includes airspace needed to ensure safety in the takeoff and landing of aircraft. The U.S. Congress has charged the Federal Aviation Administration (FAA) with administering this limited natural resource in the interest of the public as necessary to ensure aircraft safety and its efficient use (FAA 2020). FAA considers multiple and sometimes competing demands for airspace in relation to airport operations, federal airways, jet routes, military flight training activities, commercial space operations, and other special needs to determine how the National Airspace System (NAS) can be best structured to address all user requirements.

FAA designs and manages the NAS based on 14 CFR Part 71 and has designated four types of airspace within the U.S.: controlled, special use, other, and uncontrolled.

- Controlled airspace is a generic term that covers the different classifications of airspace and defined dimensions within which air traffic control service is provided in accordance with the airspace classification. Controlled airspace consists of five classes: A, B, C, D, and E.
- Special use airspace (SUA) is the designation for airspace in which certain activities must be confined, or where limitations may be imposed on aircraft operations that are not part of those activities. SUA usually consists of prohibited areas, restricted areas, warning areas, military operation areas, alert areas, and controlled firing areas.
- Other airspace is a general term referring to the majority of the remaining airspace. Examples include local airport advisory areas, military training routes, temporary flight restriction areas, parachute jump aircraft operations areas, published visual flight rules routes, terminal radar service areas, and national security areas.
- Uncontrolled airspace or Class G airspace is the portion of the airspace that has not been designated as Class A, B, C, D, or E.

3.2.14.2 Affected Environment / Existing Conditions

CCAFS has an airfield commonly referred to as the Skid Strip. The operational constraints at the Skid Strip include APZs, FAA height and lighting restrictions, tactical air navigation system approach restrictions, and airport imaginary surfaces. The airspace ROI includes the airspace associated with the Skid Strip that is controlled by the Department of the Air Force. The airspace surrounding launch trajectories and associated with any hazard areas is controlled primarily by Miami Air Route Traffic Control Center (ARTCC), Jacksonville ARTCC, and New York ARTCC.

3.2.14.3 Environmental Consequences

3.2.14.3.1 Analysis Approach

The significance of potential impacts to airspace management depends on the degree to which the Proposed Action would affect the structure, use, or management of the airspace environment. An impact on airspace would be significant if the Proposed Action

- Imposed major restrictions on air commerce opportunities.
- Substantially limited airspace access to a large number of users.
- Required modifications to air traffic control systems.

3.2.14.3.2 Proposed Action

The Proposed Action would not impact regional airspace. None of the proposed improvements involve changes to, or use of, airspace. No overall increase in the quantity of airspace operations is proposed, and no changes to existing air refueling tracks would occur. Existing scheduling coordination processes and procedures currently used to manage existing military airspace are well established by and in coordination with FAA and would not be modified as a result of the Proposed Action. None of the proposed improvements impose any major restrictions on air commerce opportunities, significantly limit access, or require any modifications to air traffic control systems. Therefore, implementation of the Proposed Action would not significantly impact regional airspace.

3.2.14.3.2.1 Best Management Practices

Contractors would coordinate with Airfield Operations prior to conducting work within the APZ or CZs and follow existing coordination procedures to access or cross the airfield as needed.

3.2.14.3.3 No-Action Alternative

If the No-Action Alternative were selected, airspace management associated with ongoing operations at CCSFS would remain as described above and no impact is anticipated.

4 CUMULATIVE EFFECTS

CEQ NEPA-implementing regulations define cumulative effects as effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.1(g)(3)). A cumulative impacts analysis normally encompasses geographic boundaries beyond the immediate area of the Proposed Action to capture any additional impacts.

4.1 PAST PRESENT AND REASONABLY FORESEEABLE ACTIONS

The assessment of cumulative effects begins with defining the scope of other project actions and the potential interrelationship with the Proposed Action. The scope of the analysis must consider other projects that coincide with the location and timetable of implementation of the Proposed Action. The ROI for cumulative impacts generally includes CCSFS, KSC, Port Canaveral, and surrounding municipalities (i.e., Cape Canaveral, Titusville, Cocoa, Merritt Island, Canaveral National Seashore, MINWR, and Brevard County, when appropriate). Physical impacts related to the Proposed Action would be largely confined to CCSFS, however some physical impacts may have a larger effect on a larger resource area (i.e., water quality or light impacts from construction of new facilities on marine sea turtles).

The following references were reviewed for present or future planned actions that could result in cumulative resource impacts when combined with Proposed Action:

- SLD 45 installation planning documents, including the *CCSFS DDP* (USSF 2022a), *PSFB DDP* (USSF 2022b), and *PSFB Installation Development EA* (USSF 2023)
- 2045 Long Range Transportation Plan for Space Coast Transportation Planning Organization (2020)
- Space Coast Transportation Planning Organization Transportation Improvement Program Fiscal Years 2022-2026 (2021, as amended)
- Brevard County Budget Office Capital Improvement Plan from 2020-2025 (2020)
- City of Cocoa Beach Adopted Annual Budget for Fiscal Year 2022 (2021)
- FDOT District Five 5-year Work Program (2021)
- Space Florida Cape Canaveral Spaceport Complex Master Plan, January 2017
- KSC Master Plan, 2012-2032 (2014)
- Port of Canaveral 30-Year Strategic Vision Plan 2017-2047 (2018)
- Environmental Assessment for Exploration Park North at the John F. Kennedy Space Center, Kennedy Space Center, Florida, August 2021
- Resilient Cape Canaveral: Storm Surge, Flooding, and Sea Level Rise, Sea Level Rise + Surge (2019)

Based on this review, **Table 4-1** lists past, present and reasonably foreseeable future projects on or near CCSFS and within the ROI.

1 **Table 4-1. Past, Present, and Reasonably Foreseeable Future Actions**

Project	Project Summary	Location	Relevance to Proposed Action	Interaction with Resources
Past/Present Actions				
Develop NOTU campus (U.S. NAVY)	Development of the NOTU campus on CCSFS	CCSFS	Existing conditions/activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Refurbish and reuse SLC 11 and SLC 36 (Blue Origin)	Construction and launch operations at SLCs 11 and 36: *EA for the Blue Origin Orbital Launch Site Construction at Launch Complex 11 and 36 Cape Canaveral Air Force Station (CCAFS), FL* December 2016	CCSFS	Existing conditions/activity would be in proximity to the Proposed Action	Air Quality, Water Resources, Noise, Soils, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Upgrade SLC 41 and nearby facilities for the Vulcan Centaur launch program (ULA)	Construction and launch operations at SLC 41: *EA for the United Launch Alliance Vulcan Centaur Program Space Launch Complex (SLC) 41 Cape Canaveral Air Force Station (CCAFS), FL,* June 2019	CCSFS	Existing conditions/activity would be in proximity to the Proposed Action	Air Quality, Noise, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes
Refurbish SLC 16 for Terran 1 launch program (Relativity)	Construction and launch operations at SLC 16: *EA Terran 1 Launch Program Cape Canaveral Air Force Station,* June 2020	CCSFS	Existing conditions/activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Refurbish and enhance existing SLC 20 and associated facilities (Space Florida)	Construction and launch operations at SLC 20: *EA for Space Florida's Reconstitution and Enhancement of Space Launch Complex (SLC) 20 Cape Canaveral Air Force Station (CCAFS), FL,* October 2020	CCSFS	Existing conditions/activity would be in proximity to the Proposed Action	Air Quality, Noise, Soils, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes

Project	Project Summary	Location	Relevance to Proposed Action	Interaction with Resources
Implement Falcon Program from SLC 39A and SLC 40 (SpaceX)	Construction and launch operations at SLCs 39A (KSC) and 40 (CCSFS): *EA and FONSI for SpaceX Falcon Launches at Kennedy Space Center and Cape Canaveral Air Force Station*, July 2020	CCSFS/ KSC	Existing conditions/activity would be in proximity to the Proposed Action	Air Quality, Noise, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes
Construct SLC 48 (NASA)	Construction and launch operations at SLC 48 for small-lift vehicles	KSC	Existing conditions/activity would be in proximity to the Proposed Action	Air Quality, Noise, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes
Refurbish SLC 39B to launch multiple vehicle types (NASA)	Construction and launch operations at SLC 39B, which supports NASA's Space Launch System	KSC	Existing conditions/activity would be in proximity to the Proposed Action	Air Quality, Noise, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Develop Exploration Park (Space Florida)	Construction of facilities at Exploration Park	KSC/ Merritt Island	Existing conditions/activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Construct Cruise Terminal Three (Canaveral Port Authority)	Construction and operation of the largest terminal (185,000 SF) at Port Canaveral with parking garage, completed in 2021	Port Canaveral	Existing conditions/activity would be in proximity to the Proposed Action	Infrastructure, Hazardous Materials and Wastes, Socioeconomics
Repair Cruise Terminals Five, Eight, & Ten (Canaveral Port Authority)	Repairs/upgrades moorings and facilities to accommodate larger cruise ships	Port Canaveral	Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Reconstruct Port Canaveral North Cargo Berth 3 Reconstruction(Canaveral Port Authority)	Reconstruction of berthing space to support cargo and space mission requirements	Port Canaveral	Existing conditions/activity would be in proximity to the Proposed Action	Water Resources, Biological Resources, Infrastructure, Hazardous Materials and Wastes, Socioeconomics
Future Actions				
Repair/ construct airfield infrastructure (USSF)	Repairs and new construction at Skid Strip, including paved overruns, administrative facility, hangar, and apron for future DoD mission	CCSFS	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics

Project	Project Summary	Location	Relevance to Proposed Action	Interaction with Resources
Refurbish SLC 16 for Terran R (Relativity)	New construction at SLC 16 to accommodate the Terran R launch vehicle	CCSFS	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Improve SLC 20 (north pad) (Space Florida)	Construction of multi-user launch pad at SLC 20	CCSFS	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Reactivation of SLC 13 (Phantom/ Vaya Space)	Refurbishment of existing, inactive SLC for Phantom/ Vaya Space launch operations	CCSFS	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Reactivation of SLC 14 (STOKE Space)	Refurbishment of existing, inactive SLC for STOKE Space launch operations	CCSFS	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Reactivation of SLC 15 (ABL Space Systems)	Refurbishment of existing, inactive SLC for ABL Space Systems launch operations	CCSFS	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Construct new SLC on CCSFS (USSF)	Construction of new SLC near SLC 47 to support future heavy-lift launch vehicle operations	CCSFS	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Refurbish SLC 39A (NASA)	Construction and launch Operations of Starship Superheavy at SLC 39A (NASA 2019)	KSC	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Construct new SLC on KSC (NASA)	Construction and launch operations at SLC 49 for the launch of heavy-lift vehicles	KSC	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics

Project	Project Summary	Location	Relevance to Proposed Action	Interaction with Resources
Improve shuttle landing facility (NASA)	Construction at the shuttle landing facility to support commercial spaceflight and, aviation testing, research, development, and training	KSC	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Increase future space launch cadence from CCSFS (USSF)	Evaluate and document potential environmental impacts of future increased space launch operations in accordance with NEPA	CCSFS	Activity would be in proximity to the Proposed Action	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Construct FPL solar farm (NASA)	Construction of a 500-acre solar farm north of the KSC Visitor Center	KSC	Activity would be in proximity to the Proposed Action Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics
Upgrade infrastructure and facilities at PSFB (USSF)	Installation Development to meet SLD 45 and tenant mission requirements	PSFB	Construction would overlap with Proposed Action implementation	Air Quality, Water Resources, Biological Resources, Infrastructure, Hazardous Materials and Wastes, Socioeconomics
Replace SR 401 Drawbridge (FDOT)	Evaluate alternatives to replace the drawbridge on SR 401 over the Canaveral Barge Canal	Port Canaveral	Activity would be in proximity to the Proposed Action Construction may overlap with Proposed Action implementation	Air Quality, Water Resources, Noise, Soils, Cultural Resources, Biological Resources, Infrastructure, Health and Safety, Hazardous Materials and Wastes, Socioeconomics

The planned actions summarized above were considered in conjunction with the Proposed Action and form the basis for the cumulative impact analysis. In accordance with the CEQ NEPA-implementing regulations, USSF analyzed the potential cumulative impacts on the resource areas discussed in **Chapter 3**.

For the scenarios under consideration to have a cumulatively significant impact on an environmental resource, two conditions must be met. First, the combined impacts of all identified past, present, and reasonably foreseeable actions, including the Proposed Action, must be significant. Significance of an impact is determined based on the potentially affected environment and degree of the effects (duration and quality) of the action as defined by 40 CFR 1501.3(b) and described in **Section 3.1**. Second, the Proposed Action must make a substantial contribution to that significant cumulative impact. It is anticipated that the reasonably foreseeable actions would proceed whether or not the Proposed Action was implemented. Under the No-Action Alternative, the Proposed Action would not occur and there would be no contribution to cumulative impacts within the ROI. Future federal actions, such as future launch operations and an increased CCSFS launch cadence, would be evaluated under separate analyses in accordance with NEPA and EIAP guidelines.

4.2 ASSESSMENT OF CUMULATIVE IMPACTS BY RESOURCE

4.2.1 Air Quality and Climate

The Proposed Action would result in short-term, moderate, direct, adverse impacts to air quality, largely constrained to the proposed construction period (2024-2030). The multi-year time frame anticipated for construction activities would correspond with other regional construction and development projects occurring in the ROI. However, construction-related and operational annual emissions associated with the Proposed Action are beneath the applicable CAA *de minimis* thresholds for all pollutants. Brevard County is in an attainment area. The operational emissions for the Proposed Action represent an extremely small percentage of the Brevard County regional emissions and would not cause an exceedance of any NAAQS.

The estimated GHG emissions from the construction or operational phases of the Proposed Action are not anticipated to contribute significantly to climate change, but any emission of GHGs represents an incremental increase in global GHG concentrations. The Department of the Air Force supports climate change initiatives globally, while preserving military operations, sustainability, and readiness, by working to reduce GHG emissions.

Increased cruise line, cargo shipping, and local traffic is also expected to increase local air emissions, including GHG emissions. These increases are not anticipated to change the attainment status of Brevard County. In addition, communities around CCSFS are developing sustainability plans to reduce GHG emissions and plan for more resilient development (Cape Canaveral 2019). Therefore, when considered with other past, present, and foreseeable future actions, the Proposed Action would not result in significant cumulative impacts to air quality.

4.2.2 Water Resources

The Proposed Action would result in short-term, minor to moderate, direct and indirect, adverse impacts to water resources; however, those impacts would not result in a permanent loss of function, threaten hydrologic characteristics, endanger public health, or violate laws. The Proposed Action would impact up to 12 to 21 acres of wetlands and surface waters and approximately 240 acres of the 100-year floodplain. During design and permitting, efforts would be made to minimize impacts to wetlands, surface waters, and floodplains to the greatest extent practicable, in compliance with EO 11990, EO 11988, EO 13690, and Section 404 of the CWA. Compensatory mitigation would be required for unavoidable impacts. BMPs and spill prevention measures would be used to prevent sedimentation and contamination of adjacent surface waters and wetlands.

Since much of CCSFS and coastal Brevard County is within the 100-year floodplain, alternatives for future development to avoid the 100-year floodplain will be limited. It is anticipated that future SLR scenarios would further restrict development alternatives outside of the floodplain. SLD 45 would continue to define alternative locations for construction outside of the 100-year floodplain unless no other practicable alternatives exist, in which case, measures to minimize harm to or within the floodplain would be implemented. Given the amount of development ongoing in Brevard County, other impacts to water resources are likely as well, although these impacts will be minimized through state and local building floodplain ordinances.

Increased construction on CCSFS and within the ROI would result in an increase in impervious surfaces that will require improved retention and stormwater treatment for the increased runoff. The Proposed Action would result in an increase of approximately 215 acres of impervious surface on CCSFS over the next decade. As a stakeholder in the BRL BMAP (FDEP 2021b), USSF is committed to meeting TMDL reduction allocations and improving water quality regionally. In addition, an ongoing Indian River Lagoon National Estuary Program (IRLNEP) and Economic Development Commission (EDC) feasibility study of wastewater treatment options will result in regional benefits to the BRL. On-going efforts at CCSFS, such as projects to reduce canal contributions to the BRL (USAF 2020d), are also focused on meeting and reducing TMDL impacts to water through treatment and water control.

Cumulative impacts to water resources could occur if concurrent projects inadequately addressed water resources in the ROI. Compliance with all state and federal regulations and implementation of proper management of materials and wastes would minimize impacts to water resources. Therefore, with the proper implementation of mitigation measures and BMPs and effective collaboration with other federal, state, and local agencies in the ROI, the Proposed Action, in conjunction with other past, present, or reasonably foreseeable projects, would result in less than significant cumulative impacts on water resources.

4.2.3 Noise and Noise-Compatible Land Use

Construction/demolition activities related to the Proposed Action would result in short-term, minor, direct, adverse impacts to the noise environment; however, no impacts are anticipated during facility operation. Proposed noise levels during construction are not expected to substantially change the noise contours currently experienced within the region of CCSFS. As a result, when considered with other past, present, and foreseeable future actions, the Proposed Action would not result in significant cumulative noise impacts.

4.2.4 Soils and Geological Resources

The Proposed Action may result in short-term, minor, direct, adverse impacts on soil during construction through increased erosion. None of the soils affected are considered as prime or unique farmland soils and all are locally or regionally common. Other construction activities in the region proposed by the county, city, or state governments, as well as commercial and private developers would also remove soils from biological productivity. All projects discussed (present and future) would be required to comply with USACE, FDEP, and SJRWMD permitting requirements. Under these permits, the implementation of BMPs as part of the Erosion, Sedimentation & Pollution Control Plan would be required. Current and future development and transportation improvement projects outside of CCSFS are required to follow local, state, and federal regulations and implement BMPs to minimize erosion.

USACE, local municipalities, Brevard County, and SLD 45 have ongoing beach renourishment projects along the Atlantic coast within the ROI. These projects have existing state and federal permits that minimize impacts to resources. The Proposed Action would not result in adverse impacts to coastal resources, violate existing renourishment permit conditions, or be collocated with renourishment projects; therefore, impacts to these resources are not anticipated. When considered with other past, present, and foreseeable future actions, the Proposed Action would not result in significant cumulative impacts to earth resources.

4.2.5 Historical and Cultural Resources

The Proposed Action is not anticipated to impact cultural resources. If any adverse effects were identified during project design, they would be resolved with the SHPO prior to construction, in accordance with the Section 106 process in the NHPA and the *SLD 45 ICRMP* (USAF 2020e). Similarly, federal actions listed in **Table 4-1** must comply with the Section 106 process in the NHPA. For example, current and future actions within the legacy SLCs may impact cultural resources; however, a mitigation plan would be developed and approved by the SHPO prior to implementation. State and local actions would follow cultural resource regulations (e.g., Chapter 267 F.S., revised 2022), which require adverse impacts to cultural or historical resources be resolved through coordination/consultation with the SHPO. When considered with other past, present, and foreseeable future actions, the Proposed Action is not expected to result in significant cumulative impacts on historical or cultural resources.

4.2.6 Biological Resources

The Proposed Action would result in short-term, moderate, direct and indirect, adverse impacts to biological resources during construction and long-term, minor, indirect, adverse impacts due to habitat loss and alteration.

The Proposed Action would clear approximately 415 acres of native habitats, including maritime hammock and oak scrub. In accordance with ESA Section 7, USSF determined that the Proposed Action ***may affect and is likely to adversely affect*** the Florida scrub-jay, eastern indigo snake, and southeastern beach mouse due to potential incidental take through injury/mortality or removal of habitat that may alter essential behaviors, such as breeding, feeding, or sheltering. USSF also determined that the Proposed Action ***may affect but is not likely to adversely affect*** Audubon's crested caracara, piping plover, red knot, roseate tern, wood stork, monarch butterfly, tricolored bat, and sea turtles (i.e., loggerhead, green, leatherback, hawksbill, and Kemp's Ridley sea turtles). USSF also determined that the following state-listed species may be impacted by the Proposed Action: Florida burrowing owl, black skimmer, least tern, snowy plover, little blue heron, reddish egret, roseate spoonbill, tricolored heron, Florida pine snake, gopher tortoise, and several species of bats; although, adverse impacts are not anticipated. With the implementation of an approved mitigation plan and BMPs, the Proposed Action would not jeopardize the continued existence of a species or adversely modify critical habitat, as described in **Section 3.2.6.3.2**.

Additional future habitat removal and wildlife disturbance on CCSFS and in the ROI is likely, however, there are no known state, local, or private actions that are reasonably certain to occur in the ROI that would result in effects that would jeopardize the continued existence of a species or result in an overall significant decrease in population diversity, abundance, or fitness for any species. Therefore, implementation of the Proposed Action in conjunction with other past, present, or reasonably foreseeable projects would not result in significant cumulative impacts to biological resources.

4.2.7 Compatible Land Use, Visual Resources, and Coastal Zone Management

The Proposed Action is consistent with current and future land uses as determined by USSF and would result in no or negligible adverse impacts on land use and visual/coastal resources. The future land use plan for CCSFS considers land use compatibility, facility consolidation, mission sustainability, quality of life, safety, and security. Areas selected for rezoning minimize conflicts with a variety of environmental constraints, including operational restrictions, natural and cultural resource protection areas, and security and safety considerations (**Section 2.3**). All operations at CCSFS must comply with Light Management Plans to minimize the amount of sky glow and avoid or minimize effects to nesting sea turtles. All future projects at CCSFS will have to comply with this lighting requirement. The Proposed Action is anticipated to be consistent with the FCMP. Therefore, the Proposed Action, when combined with other past, present, and reasonably foreseeable actions, would not contribute to adverse cumulative impacts on land use or visual and coastal resources.

4.2.8 Infrastructure

The Proposed Action would improve infrastructure at CCSFS to support current and future mission requirements. Short-term, minor, direct, adverse impacts to transportation may occur during construction; however, improved existing utility and transportation would provide a long-term beneficial impact. Proposed improvements would upgrade utilities to improve supply and capacity, establish haul routes to improve traffic flow and oversized vehicle movement, and harden infrastructure to protect critical communications lines. With the proposed improvements, the infrastructure at CCSFS would be adequate to support the Proposed Action and other mission requirements. USSF is committed to conservation and sustainable use of energy and natural resources; therefore, impacts to natural resources and energy supply would be negligible.

The amount of anticipated activity within the ROI would contribute to short-term, moderate, direct adverse impacts on transportation during construction. However, as various infrastructure improvements are implemented throughout the ROI, the transportation and utility infrastructure would improve in the long-term. Overall, no significant adverse cumulative impacts on infrastructure would be anticipated.

4.2.9 Health and Safety

Proposed construction-related activities could result in short-term, minor, direct, adverse impacts on health and safety (e.g., increased risk of slips, falls, and exposure to mechanical, electrical, vision, chemical, and natural hazards such as lightning, heat stroke, or animal bites). Construction workers could also encounter soil or groundwater contamination as a result of an IRP site or previously unknown soil or groundwater contamination. However, implementation of OSHA safety standards during these activities would minimize the potential for such impacts. With these protocols in place, health and safety risks from all planned projects would be reduced to acceptable levels. The removal of ACM and LBP and other proposed safety improvements would result in a long-term, beneficial impact on safety and occupational health for personnel at CCSFS.

Similar to all other hazardous operations at CCSFS, all proposed facilities with explosive or hazardous material storage, including those in the Proposed Action, would require ESQD arcs and exclusionary safety zones specific to the type and quantity of explosive material to minimize potential health and safety risks. Therefore, when considered with other past, present, and foreseeable future actions, the Proposed Action is not anticipated to significantly impact health and safety.

4.2.10 Hazardous Materials and Wastes

The Proposed Action could have short-term, minor to moderate, direct, adverse impacts associated with hazardous materials/waste and solid waste. Demolition and construction activities would increase the use and storage of hazardous materials (e.g., solvents, paints, adhesives, etc.) at CCSFS for a term of 5 to 10 years. Increases would be realized in terms of the quantity of fuel (gasoline and diesel) used during construction activities for these actions. Demolition would increase the amount of hazardous wastes generated, but these activities would last for less than 10 years and all wastes would be disposed of properly. Slight increases in current quantities and types of hazardous materials or wastes would be expected upon completion of the projects. Operations related to hazardous waste generation (e.g., used oil, used filters, and oily rags) would continue to be managed in accordance with the most recent *SLD 45 HWMP* (USAF 2020c) and all applicable federal, state, and local regulations.

Based upon the planned amount of development projects ongoing in Brevard County, especially at Port Canaveral and KSC, other hazardous waste and construction debris will be generated for the foreseeable future. It is expected that these wastes will also be disposed of in accordance with traditional means and under applicable regulations.

The Proposed Action would involve a substantial amount of demolition of existing structures, construction of new buildings and pavements, and potential remediation of contaminated sites. C&D debris is estimated to be over 50,000 tons for the Proposed Action and over 20,000 tons for proposed installation development at PSFB. Other actions in the ROI would also generate C&D debris. Current landfill capacity limitations and plans to open a new facility in Brevard County would be incorporated into demolition planning. Given the extended timeframe and gradual phasing of proposed improvements and planned actions, regional landfill capacity is expected to be adequate. No significant cumulative impacts are anticipated to solid waste.

The proposed improvements may impact the ongoing remediation activities at active SWMUs. Work within SWMUs must be coordinated with AFCEC IRP, FDEP, and 45 CES/CEIE, and any applicable LUCs would be evaluated to ensure continued protection of human health and the environment. Additionally, contractors are required to comply with all federal and state regulations regarding removal, handling, and disposal of ACM, LBP, and other hazardous waste. Land clearing and construction practices for foreseeable future actions are not expected to introduce hazardous materials and hazardous wastes into the environment.

Numerous types of hazardous materials are used to support the missions and general maintenance operations at CCSFS and KSC. Management of hazardous materials is the responsibility of each individual or organization and is regulated under RCRA (40 CFR 260-280) and Rule 62-730. Although releases of hazardous materials and wastes can occur in the environment, it is not expected that there would be substantial cumulative contamination issues as a result of the Proposed Action. Safeguards are in place to minimize the release of toxic chemicals in the environment, and rapid emergency response plans would ensure that accidental spills would be cleaned up quickly. As a result, the overall cumulative effect of the Proposed Action, when considered with past, present, and reasonably foreseeable future actions, to hazardous materials and waste is anticipated to be minor and less than significant.

4.2.11 Socioeconomics

The Proposed Action and other actions that would occur over the next five to 10 years would have short-term, minor to moderate, direct and indirect, beneficial effects in the ROI through the increased demand for construction workers and the procurement of goods and services. Construction-related expenditures would not be expected to generate long-term socioeconomic benefits. In the event that construction workers contracted for the Proposed Action were obtained outside of the local or regional area, the temporary increase in the workforce during the construction phase would result in a temporary increase in local housing and lodging needs.

The amount of new construction within the ROI over the next decade is expected to increase the demand for construction workers. In addition, the number of visitors viewing space launch operations is expected to increase, particularly as new, larger launch vehicles are brought on-line. Tourism associated with the cruise industry is also expected to increase hospitality spending around Port Canaveral. It is anticipated that the current and planned housing, hotels, restaurants, and public services in the ROI would support an increase in population. Therefore, when considered with other past, present, and foreseeable future actions, the Proposed Action is not anticipated to significantly impact socioeconomics.

4.2.12 Environmental Justice

Possible adverse effects from construction activities could include increased traffic and noise levels and decreased air quality and infrastructure capacity. These effects would be short-term, intermittent, and minor, and are not anticipated to disproportionately impact minority, low-income populations, or children. Therefore, the Proposed Action would not contribute to cumulative environmental justice impacts in the region.

4.2.13 Section 4(F) Properties

No designated Section 4(f) properties, including public parks, recreation areas, or wildlife refuges, occur within boundary of CCSFS. The nearest public park is Jetty Park in the City of Cape Canaveral.

Other public parks within an approximate 15-mile radius of the Proposed Action include Kelly Park, KARS Park, Kings Park, and Manatee Cove Park.

The Proposed Action would not impact 4(f) properties adjacent to CCSFS. Therefore, the Proposed Action would not substantially diminish the protected activities, features, or attributes of any Section 4(f) property, and thus would not result in a cumulative impairment of the properties.

4.2.14 Airspace

The Proposed Action would not impact regional airspace. None of the proposed improvements would impose any major restrictions on air commerce opportunities, significantly limit access, or require any modifications to air traffic control systems. Therefore, the Proposed Action, when considered with past, present, and reasonably foreseeable future actions, would not result in significant cumulative impacts on airspace.

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6 TRIBES AND AGENCIES CONTACTED

Table 6-1. Tribal Contacts

Tribe	Address	City	State	Zip Code
Miccosukee Tribe of Indians of Florida	Tamiami Station, PO Box 440021	Miami	FL	33144
Seminole Nation of Oklahoma	P.O. Box 1498	Wewoka	OK	74884
Seminole Tribe of Florida	30290 Josie Billie Highway, PMB 1004	Clewiston	FL	33440

Table 6-2. Agency Contacts

Agency	Address	City	State	Zip Code
Brevard County	Viera Government Center 2725 Judge Fran Jamieson Way Building A	Viera	FL	32940
City of Cape Canaveral	100 Polk Avenue	Cape Canaveral	FL	32920
City of Cocoa	65 Stone Street	Cocoa	FL	32922
City of Titusville	PO Box 2806	Titusville	FL	32781
East Central Florida Regional Planning Council	455 N. Garland Avenue, Fourth Floor	Orlando	FL	32801
Federal Aviation Administration	800 Independence Avenue SW Suite 325	Washington	DC	20591
Florida Department of Environmental Protection	3319 Maguire Boulevard	Orlando	FL	32803
FDEP Florida State Clearinghouse	2600 Blair Stone Road, MS 47	Tallahassee	FL	32399
Florida Department of Transportation	719 South Woodland Boulevard	DeLand	FL	32720
Florida Division of Historical Resources	Bureau of Historic Preservation 500 South Bronough Street	Tallahassee	FL	32399
Merritt Island National Wildlife Refuge	PO Box 2683	Titusville	FL	32781
National Aeronautics and Space Administration	Email correspondence			
National Marine Fisheries Service	Southeast Regional Office, 263 13th Avenue South	St. Petersburg	FL	33701
National Parks Service	Interior Region 2 Cultural Resources Division 100 Alabama Street SW, 1924 Building	Atlanta	GA	30303
National Parks Service Canaveral National Seashore	Canaveral National Seashore 212 S. Washington Avenue	Titusville	FL	32796
Space Coast Transportation Planning Organization	2725 Judge Fran Jamieson Way; Building B; Room 105 MS	Melbourne	FL	32940
Space Florida	505 Odyssey Way, Suite 300	Exploration Park	FL	32953
St. Johns River Water Management District	525 Community College Parkway, SE	Palm Bay	FL	32909
U.S. Army Corps of Engineers	Cocoa Permits Section, 400 High Point Drive Suite 600	Cocoa	FL	32926
U.S. Coast Guard	Email Correspondence			
U.S. Environmental Protection Agency Region 4	Sam Nunn Atlanta Federal Center	Atlanta	GA	30303
U.S. Fish and Wildlife Service	North Florida Ecological Services, 7915 Bay Meadows Way, Suite 200	Jacksonville	FL	32256
U.S. Navy	Email correspondence			

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29 CFR Part 1910 – Occupational Safety and Health Standards.

29 CFR Part 1926 – Safety and Health Regulations for Construction.

32 CFR Part 989 – Environmental Impact Analysis Process (EIAP).

33 CFR Part 323 – Permits for Discharges of Dredged Or Fill Materials Into Waters of the U.S.

33 CFR Part 328 –Definition of Waters of the United States

33 CFR Part 332 – Compensatory Mitigation for Losses of Aquatic Resources.

36 CFR. Part 60 et seq – National Register of Historic Places.

36 CFR Part 800 – Protection of Historic and Cultural Properties.

40 CFR Part 50 – National Primary and Secondary Ambient Air Quality Standards.

40 CFR Part 51 – Requirements for Preparation, Adoption, and Submittal of Implementation Plans.

40 CFR Part 52, Subpart K – Approval and Promulgation of Implementation Plans, Florida.

40 CFR Part 61 – National Emission Standards for Hazardous Air Pollutants.

40 CFR Part 63 – National Emission Standards for Hazardous Air Pollutants for Source Categories.

40 CFR Part 68 – Subpart G – Risk Management Plan

40 CFR Part 70 – State Operating Permit Programs.

40 CFR 81.310 – Florida – Section 107 Attainment Status Designations.

40 CFR Part 93, Subpart B – Determining Conformity of General Federal Actions to State or Federal Implementation Plans.

40 CFR Part 239-282 – Resource Conservation and Recovery Act

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40 CFR Part 261 – Identification and Listing of Hazardous Waste.

40 CFR Part 273 – Standards for Universal Wastes.

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16 USC 668-668c – Bald and Golden Eagle Protection Act.

16 USC 670 et seq – Sikes Act.

16 USC 703-712 – Migratory Bird Treaty Act.

16 USC 1361 et seq – Marine Mammal Protection Act.

16 USC 1451 et seq – Coastal Zone Management Act.

16 USC 1531 et seq – Endangered Species Act of 1973, as amended.

16 USC 1801 et seq – Magnuson-Stevens Fisher Conservation and Management Act.

16 USC 1802 – Definitions.

16 USC 3371-3378 – Lacey Act.

25 USC 3001 et seq – Native American Graves Protection and Repatriation Act.

29 USC 651 et seq – Occupational Safety and Health Act, as amended.

33 USC 403 – Rivers and Harbors Act of 1899, Section 10.

33 USC 1251-1387 – Clean Water Act.

33 USC 1341-1342 – Clean Water Act (Sections 401 and 402).

33 USC 1344 et seq – Clean Water Act (Section 404).

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42 USC 4321 et seq – National Environmental Policy Act of 1969, as amended.

42 USC 4901 – Noise Control Act of 1972.

42 USC 6901 et seq – Resource Conservation and Recovery Act, as amended.

42 USC 7401 et seq – Clean Air Act, as amended.

42 USC 7412 – Hazardous Air Pollutants.

42 USC 9601 et seq – Comprehensive Environmental Response, Compensation, and Liability Act.

42 USC 13101 et seq – Pollution Prevention Act of 1990.

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APPENDIX A

AGENCY COORDINATION AND PUBLIC INVOLVEMENT

A-1. SHPO Consultation

A-2. USFWS Consultation

A-3. State Clearinghouse Correspondence

A-4. Public Notification

(No Public Comments Received)

Notice of Intent

Ian Bartoszek, wildlife biologist and environmental science project manager for the Conservancy of Southwest Florida displays deer hooves found in a Burmese python. ANDREW WEST/THE NEWS-PRESS

Burmese python

Continued from Page 3A

glades," Moher said.

"So, is there a future where the western Everglades is silent? Imagine going out and there's no wildlife, no bird life because this apex predator is just devouring what is out there."

Something this size had to eat a lot of other animals to get that way, says Bartoszek, environmental science project manager for the Conservancy. "These are big-game hunters ... The last meal this animal had was a white-tailed deer – this is panther food."

Over the past 10 years, the Conservancy's team has removed 26,000 pounds of pythons – some 1,000 snakes – from 100 square miles. "But how many more are there?" Bartoszek asks. "Is that 10%? Is that one percent? We don't know (but) we're actively pulling them out and working with research partners to see if we can better get at that metric and move the science forward."

One innovative technique the team has developed: double-agent male pythons. Equipped with radio trackers, these bachelors go in search of females, and when they find one, the scientists swoop in for the capture.

This critter didn't give in without a fight. Biologist Ian Easterling recalls trying to hang on to her brick-sized head as she writhed, clubbing him in the eye with her tail – "It felt like a fist" – while sliming him with a foul-smelling defensive musk.

Once subdued and weighed, the team realized they had a new champion (the previous record female weighed 185 pounds).

Yet for all the ecosystem havoc they wreak, Bartoszek respects them. "It's a beautiful animal; they're very good at what they do."

And he fears pythons may not be the last invasive challenge the glades has to face.

"We have a vibrant pet trade (and) many ports of entry (and) a tropical and subtropical climate ... a perfect storm," Bartoszek says. "The question is now: What's next?"

Hostage-taking gunman was shot dead by Brevard police

Officers pursued man for three counties prior to his death

Tyler Vazquez
Florida Today
USA TODAY NETWORK – FLORIDA

GRANT — A Cocoa Beach gunman who took two women hostage and led law enforcement officers on a multi-county chase was shot dead by police early Sunday in south Brevard County, authorities said.

Kimbrough

The women, one of whom was shot and seriously wounded by the gunman, were rescued, Brevard County Sheriff Wayne Ivey said in a video posted to Facebook early Sunday.

"This guy picked the wrong place to pick a gunfight and he's no longer stealing oxygen on earth," Ivey said.

The incident began about 8 p.m. Saturday in Osceola County, where the pursuit began, according to the Brevard sheriff's office. The man, identified as 42-year-old Curtis Kimbrough of Cocoa Beach, led deputies into Brevard County and Indian River County on Interstate 95, Ivey said. The man shot at Indian River County sheriff's deputies before heading to Brevard, he said.

"He was even shooting out the window at our deputies," Ivey said.

The chase ended around midnight on U.S. 1 in Grant when one of the hostages was able to escape from Kimbrough's car. He then crashed in a wooded area near Old Dixie Highway and Foley Lane.

Kimbrough then took the other woman at gunpoint and ran into the woods, pursued by Brevard and Indian River deputies, as well as officers from the Sebastian Police.

A gunfight involving multiple officers and the gunman ensued, and Kimbrough was killed, Ivey said. None of the names of the law enforcement officers involved are currently being released, he said. No police officers were reported injured.

Of the two hostages, whose names were not disclosed, a 33-year-old woman was treated and released from the hospital while the 41-year-old woman who suffered a gunshot wound remains in the hospital in serious condition.

Ivey was accompanied in the Facebook video by Indian River County Sheriff Eric Flowers and Sebastian Police Chief Dan Acosta, who both spoke to the teamwork exhibited by police agencies involved.

The Brevard County deputies involved in the shooting were placed on administrative leave pending the outcome of an internal investigation, which is sheriff's office protocol for deputy-involved shootings.

COVID-19

Continued from Page 3A

weeks ago, from June 1 to June 7, there were 78 hospitalizations.

While the CDC did not update its weekly COVID-19 deaths database, last weeks update showed that there have been 2,006 COVID-19 related deaths in Brevard County.

Because hospitalization and case rates this past week remained elevated Brevard County is still a community of high COVID-19 transmission. The CDC calculates transmission levels through a combination of hospitalizations and case rates.

The CDC advises that in communities of high transmission, residents should mask-up indoors, vaccinate and take a COVID-19 test when feeling unwell.

Yet, just 68.5% of the eligible Space Coast population— those ages five and older— have been fully vaccinated.

Nationwide, 70.9% of eligible Americans have been fully vaccinated. There have been 86,512,787 COVID-19 cases and 1,010, deaths nationwide since the start of the pandemic.

Where to get vaccinated

The Florida Department of Health is offering COVID-19 vaccines at three sites.

- Viera clinic, at 2555 Judge Fran Jamieson Way.
- Melbourne clinic, 601 E. University Blvd.
- Titusville clinic, 611 N. Singleton Ave.

Residents also can get vaccinated at Omni Healthcare's offices, as well as at its walk-in vaccination clinic located in Suite 303 on the third floor of 1344 S. Apollo Blvd. in Melbourne, from 9 a.m. to 4 p.m. weekdays. Vaccinations also are available from 9 a.m. to noon in Suite 2C of Omni's 1344 S. Apollo Blvd. complex.

Amira Sweilem is the Data Reporter at FLORIDA TODAY. Contact Sweilem at 386-406-5648 or asweilem@floridatoday.com.

Gastropub

Continued from Page 3A

called Higher Purpose Holdings with no idea what restaurant might be involved. He was thrilled to learn the job was at 28 North.

"I had just eaten here," he said. "I was so impressed with the food and service."

Sous chef C.J. Hughes moved to the Space Coast about eight years ago and opened Too Cool Cafe in Indian Harbour Beach. He has also worked at Green Turtle Market.

Thursday morning, before the restaurant opened at 4 p.m., the staff gathered around a long table in the center of the dining room as Saybe and Hughes brought out creations for them to try.

They filled the table with dishes including:

Summer peach salad with grilled peaches, goat cheese mousse, red onion, candied pecans, crispy chorizo and honey champagne vinaigrette.

Duck birria tacos with shredded duck, griddled yellow corn tortilla, manchego cheese, green mango slaw, duck chile consommé, lime and cilantro.

Sweet potato chowdah with littleneck clams (still in the shell), sweet potato clam brodo, chive oil and micro greens; potato chip dusted tuna with charred sweet corn and hericovert succotash, wild mushroom ceviche and lime cilantro crema.

Guava-guajillo barbecue short rib with escabeche salad, grilled flatbread and micro cilantro.

With each dish came an explanation of how it was developed, how to pronounce it, ingredients it contained and how to alter it if a guest had allergies or a special diet.

The tortillas for the duck tacos are fried with some of the duck drippings to enhance the flavor. The chowdah — a nod to Hughes' New England background — is thickened with sweet potatoes instead of cream. The tempura king trumpet mushrooms are gluten free, but the tzatziki they're served with contains yogurt; leave that out, and the dish goes from vegetarian to vegan.

The process took three hours, and included wine and cocktail samples plus a shared box of treats from nearby Crumbl Cookies, leaving the staff sated and filled with firsthand knowledge about the new menu.

Saybe said he's happy with the diversity of the menu. His dishes have a strong Latin influence, while Hughes brings a fresh twist to New England classics.

Saybe created the short rib dish because his mother had a guava tree, and he's always wanted to do something interesting with guava. He perfected the duck tacos with the help of a chef friend in Texas.

Hughes' contributions to the new menu include the clam chowder, a lobster roll, the tuna and fish and chips.

"I try to do a lot of seafood dishes," he said. "I'm from Cape Cod. That's my specialty."

Saybe said he's especially excited about working with the 28 North staff.

"I'm constantly impressed by them," he said. "They all are exceptional at their jobs. I've never worked anywhere where the front of house was as involved and as knowledgeable."

The new summer menu at 28 North Gastropub at The Avenue Viera features duck birria tacos on griddled yellow corn tortillas with Manchego, green mango slaw, duck/chili consume, lime and cilantro.
SUZY FLEMING LEONARD/FLORIDA TODAY

28 North Gastropub is at 2250 Town Center Ave., The Avenue, Viera. Call 321-241-1159 or visit . Hours are 11 a.m.-8 p.m. Sunday, 4-9 p.m. Monday-Thursday, 4-11 p.m. Friday and noon-11 p.m. Saturday. 28northgastropub.com.

Suzy Fleming Leonard is a features journalist with more than three decades of experience. Reach her at sleonard@floridatoday.com. Find on Facebook: @SuzyFlemingLeonard or on Instagram: @SuzyLeonard

BCSO starts promotion for dog and cat adoptions

By Chris Bonanno
For Hometown News

BREVARD COUNTY — The Brevard County Sheriff's Office has recently started "Junny's Tender Site," named after BCSO bloodhound "Junny," that is designed to promote adoption from its Animal Services unit.

In actuality, "Junny's Tender Site," is actually a weekly posting on Saturdays to BCSO's Facebook pages of animals waiting to be adopted.

"While it may not be an actual app on your smartphone, this new weekly posting on our agency Facebook Pages is going to be profile pics of some beautiful dogs and cats that I promise will only make you 'swipe right!!,'" said Brevard County Sheriff Wayne Ivey in a posting announcing the new program. "The weekly post will tell you all you need to know about the pet that is waiting on you to rescue them, and take them to their new brand new family and home!! Information like... 'loves long walks on the beach,' plays well with others,' and 'I will take all the love you can give me,' will tell you everything you need to know to rush down to the Animal Care Center and four your 'furever date!!'"

For example, on Saturday night BCSO posted an image and description of Beatrice, a female 10-year-old mixed breed dog. Beside her photo were comments that included "I am dainty!," "I LOVE basking in the sun am a couch potato," "I am great with others and would love to find a home," and "I am spayed, microchipped and up to date on vaccinations."

Underneath Beatrice's photo informing those viewing the photo that they can "arrange a play date" by visiting the BCSO Animal Care Center, located at 5100 W. Eau Gallie Blvd. in Melbourne, or by calling 321-633-2024.

The photo was posted on Saturday night and more than four hours after it was posted, BCSO received 213 reactions and there were 45 shares of the Facebook post. The post was made simultaneously on Mr. Ivey's Facebook page as well, with 158 reaction and 35 shares of that post within a similar time frame.

Per *brevardsheriff.org*, their hours of operation are 11 a.m.-6 p.m. Monday through Saturday and noon-4 p.m. on Sunday. For more information on Junny's Tender Site, follow the BCSO on Facebook.

Calendar

From page 2

and the second Saturday of each month, to follow the Warbird Museum will again be having our Fly-in/Drive-in Breakfast. A chef-prepared breakfast will be served from 8:00-10:00 a.m. The cost will be $12 including breakfast and admission to the museum. Any questions, please email David Shores, PR Director Valiant Air Command Warbird Air Museum, at David.Shores@valiantaircommand.com

Saturday, July 16

Christmas in July Craft Fair: u Our Lady of Grace Church, located at 300 Malabar Road will host "Christmas in July" Craft Fair from 10 a.m. to 3 p.m on Saturday, July 16. Over 50 vendors offering something for everyone. Come do your Christmas shopping early.

Tuesday, July 19

Free Kidz Christian Paint Party: On Tues. July 19th, (sign up by July 10th) is a free Kidz Christian Paint Party at the Terry Center, located at 501 Ocean Avenue in Melbourne Beach. Seats are limited to 20 for ages 7-12. Event will take place at 11:00 a.m. Families meet Anne the Artist! Finger food provided. Kidz only Party begins and ends 12:45 p.m. Must call Pat to reserve your child a seat no later than July 10 b as space is limited and the event is free. To reserve spot or more information, call Pat at (321 722-9117). Event is sponsored by Community Chapel of Melbourne Beach.

Sunday, July 24

Indoor/Outdoor Craft Fair: The Greater Palm Bay Senior Activity Center, located at 1275 Culver Dr NE in Palm Bay, will hold an indoor/outdoor craft fair at selected dates throughout the year from March to December of 2022. You can find almost anything with the wide variety of vendors from in and around Palm Bay. There could be wood crafts, jewelry, hand crafted items, direct sales businesses, clothing, wreaths, soaps, lotions, candles, and sweet treats. We also have specialized services and businesses. Food trucks are located outside and inside you can find homemade treats, cakes, breads and more. Family friendly, ATM onsite, Free Parking. They are always looking to add new vendors and food trucks. Please email Sylvia at marketing@gpbsc.net for details on pricing/scheduling. For more information, call (321) 724-1338.

See CALENDAR, page 6

PUBLIC NOTICE

FOR THE POTENTIAL IMPACT TO FLOODPLAIN/WETLANDS AT CAPE CANAVERAL SPACE FORCE STATION, FLORIDA

The United States Space Force (USSF) is preparing an environmental assessment (EA) in compliance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with multiple infrastructure improvements (Proposed Action) at Cape Canaveral Space Force Station (CCSFS). The purpose of the Proposed Action is to enable USSF to meet anticipated commercial space launch industry needs and ensure mission essential functions for the Department of Defense.

At this early stage of EA preparation, the Proposed Action includes construction of new facilities and infrastructure and renovation/modernization, consolidation, and demolition of existing assets to maximize mission capabilities. This Proposed Action is subject to requirements and objectives of Executive Order (EO) 11990, *Protection of Wetlands*, EO 11988, *Floodplain Management*, and EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*, as the proposed infrastructure improvements could potentially impact wetlands and occur within the 100-year floodplain. There are no practicable alternatives outside of floodplains and wetlands. Impacts would be minimized to the greatest practicable extent. Mitigation would be provided for unavoidable impacts to ensure no net loss of wetland or floodplain function in accordance with federal and state regulations.

Pursuant to EO 11990, EO 11988, EO 13690, and Air Force Instruction 32-7064, USSF requests advance public comment to determine if there are any public concerns regarding the Proposed Action's potential to impact floodplains and wetlands. The Proposed Action will be analyzed in the forthcoming EA, which the public will have the opportunity to review and provide comment when the Draft EA is released. Comments may be submitted to Ms. Taylor Janise, 45 CES/CEIE, 1224 Jupiter Street, Mail Stop 9125, Patrick Space Force Base, Florida 32925 or via email at taylor.janise.1@spaceforce.mil. Comments will be accepted for 30 days from the publication of this notice.

A-5. Stakeholder Early Notice and Comments

Example early notice letter sent to agencies listed in Section 6 of this EA.

DEPARTMENT OF THE AIR FORCE
UNITED STATES SPACE FORCE
SPACE LAUNCH DELTA 45

July 5, 2022

Mr. Michael Blaylock
Chief, Environmental Conservation, Patrick Space Force Base
United States Space Force, Space Launch Delta 45
1224 Jupiter Street, Mail Stop 9125
Patrick Space Force Base FL 32925

Mr. Chris Stahl
Clearinghouse Coordinator
Office of Intergovernmental Programs
Department of Environmental Protection
3900 Commonwealth Blvd, Mail Station 47
Tallahassee FL 32399

Dear Mr. Stahl

The United States Space Force (USSF) is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with multiple infrastructure improvements (Proposed Action) at Cape Canaveral Space Force Station (CCSFS) that would enable USSF to meet emergent and expanding commercial space launch industry needs and ensure future mission essential functions for the Department of Defense (DoD). A location map (Figure 1) is attached for your reference. The Proposed Action is needed because the current infrastructure at CCSFS has been identified as a limiting factor in executing the space launch mission. The Proposed Action would include construction of new facilities and infrastructure and renovation/modernization, consolidation, and demolition of existing assets to maximize mission capabilities and support an increased space launch cadence from CCSFS.

The Proposed Action is further defined based on the five priority planning goals identified in the CCSFS *Installation Development Plan*:

- ***Provide reliable infrastructure capable of supporting increased launch cadence*** – Infrastructure improvements would include expanding a utility corridor; providing increased resiliency and redundancy for water, power, and communications systems; consolidating the munitions storage areas; and modernizing the wharf facility in the CCSFS industrial area.
- ***Reduce impacts to personnel and equipment from launch operations*** – Infrastructure improvements would include constructing and renovating facilities to relocate non-essential personnel and equipment out of launch evacuation zones.

- ***Eliminate critical periods*** – Infrastructure improvements would encase existing communication lines in concrete duct bank to reduce/eliminate existing single points of failure and the need for critical periods. Currently, critical periods are established before and during critical mission operations. During these periods (ranging from eight to 24 hours), many activities, including ground disturbance and utility maintenance, are restricted to ensure no critical infrastructure is damaged.
- ***Improve base logistics capacity*** – Infrastructure improvements would establish designated haul routes and improve traffic flow, consolidate similar functions, and modernize the CCSFS South Gate to support more efficient operation at CCSFS.
- ***Expand developable areas in support of space launch*** – Infrastructure improvements would construct new launch support and launch operations facilities in a manner that maximizes development opportunities while considering environmental and operational constraints.

The EA will assess the potential environmental impacts that would result from the Proposed Action as well as the No-Action Alternative, which reflects the status quo, as a baseline for comparison of potential effects from the Proposed Action. The cumulative effects associated with Proposed Action will also be examined when combined with past, present, and future (reasonably foreseeable) actions.

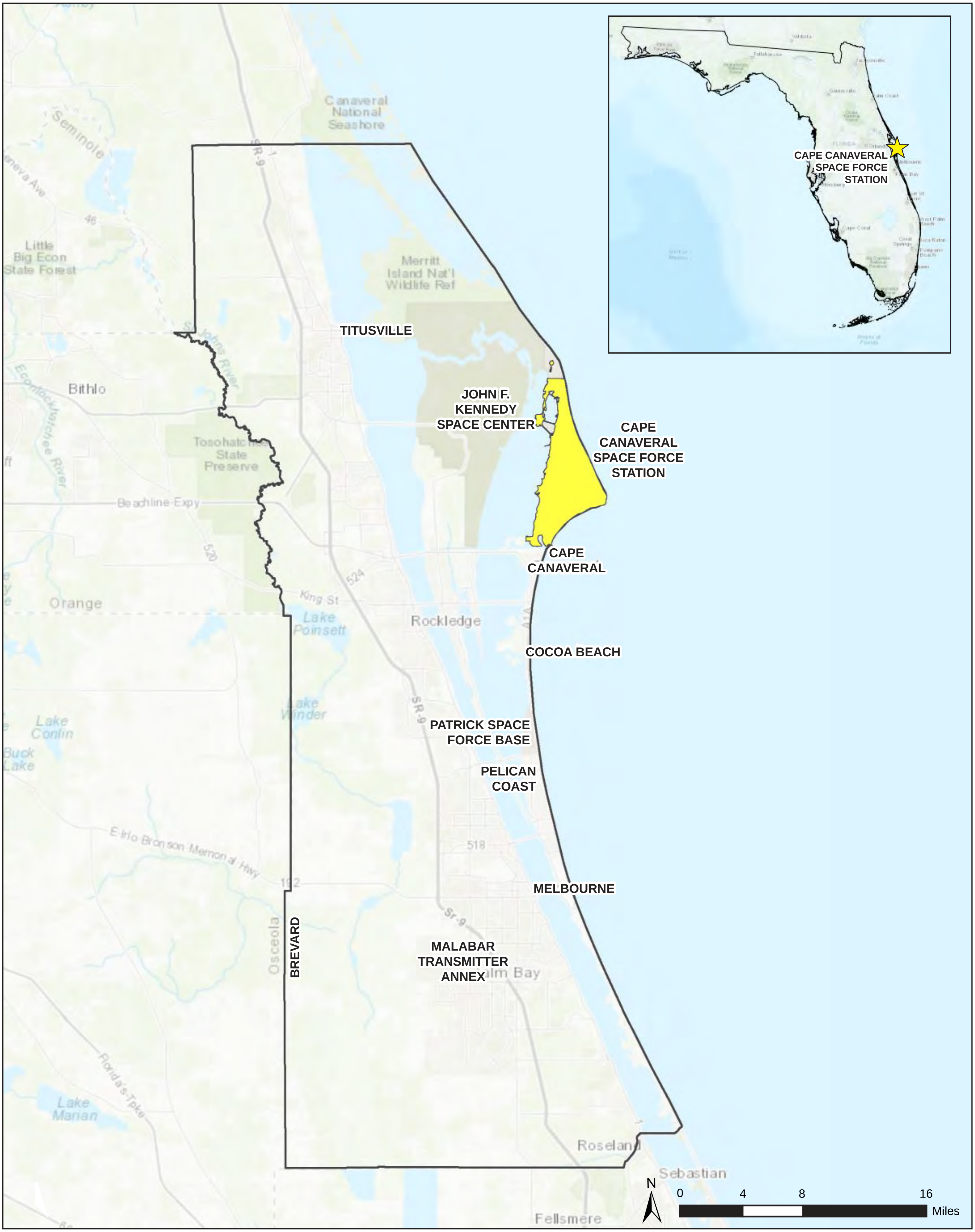
USSF is the lead federal agency and is preparing this EA in accordance with the National Environmental Policy Act (NEPA) of 1969, 42 United States Code, the Council on Environmental Quality regulations that implement NEPA procedures, 40 Code of Federal Regulations (CFR), and the United States Air Force (USAF) Environmental Impact Analysis Process (EIAP) Regulations at 32 CFR 989. The purpose of a NEPA analysis is to ensure full disclosure and consideration of environmental information in federal agency decision making. Due to jurisdiction and special expertise related to the Proposed Action, the National Aeronautics and Space Administration (NASA), Federal Aviation Administration (FAA), United States Navy, and United States Coast Guard (USCG) are cooperating agencies in the development of the EA.

As part of the USAF EIAP, we request your input on the Proposed Action and assistance in identifying any potential areas of environmental impact to be assessed in this analysis. If you have any specific items of interest about this proposal, please contact Ms. Taylor Janise at taylor.janise.1@spaceforce.mil or via mail at Taylor Janise, 45 CES/CEIE, 1224 Jupiter Street, Mail Stop 9125, Patrick Space Force Base, Florida 32925 within 30 days of receipt of this letter. Thank you in advance for your assistance in this effort.

Sincerely

MICHAEL BLAYLOCK, GS-13
Chief, Environmental Conservation

Attachment:
Figure 1. Location Map



CAPE CANAVERAL SPACE FORCE STATION EA

FIGURE 1: LOCATION OF CCSFS

Agency Comments/Coordination

CITY OF
CAPE CANAVERAL
P.O. Box 326 • 100 Polk Avenue • Cape Canaveral, FL 32920-0326
(321) 868-1220 • www.cityofcapecanaveral.org

September 2, 2022

Cape Canaveral Space Force Station *Installation Development Plan* Comment

Mr. Michael Blaylock
DEPARTMENT OF THE AIR FORCE
UNITED STATES SPACE FORCE
SPACE LAUNCH DELTA 45
Chief, Environmental Conservation, Patrick Space Force Base
United States Space Force, Space Launch Delta 45
1224 Jupiter Street, Mail Stop 9125
Patrick Space Force Base FL 32925

Dear Mr. Blaylock,

On behalf of the City of Cape Canaveral (City), I am writing to provide a comment to your recent letter sent to my office on July 12, 2022 requesting comment in regards to various near-term improvements, developments, and demolitions throughout the Cape Canaveral Space Force Station (CCSFS). After reviewing each of the letter's five priority-planning goals identified in the CCSFS *Installation Development Plan*, we have no comments or concerns on bullet points one through four, and we only have comment on the fifth bullet point:

- *Expand developable areas in support of space launch* – Infrastructure improvements would construct new launch support and launch operations facilities in a manner that maximizes development opportunities while considering environmental and operational constraints.

Our comment on this point provides an opportunity for ecological benefit, economic development, education, and livability in the Space Coast of Florida. The success of this effort will result from a shared vision among partners, and as such, the City would like to request collaboration from CCSFS.

Cape Canaveral is immensely proud of the services provided by the US military and its branches, including the US Space Force. We are especially proud to serve as a home base for critical Space Force supply chain activities, contractors, and workforce housing, providing a front row seat for thousands as they witness spectacular launches alongside this new generation of space travel, technology, and national defense. As such, the City values future-readiness and has taken steps to ensure the resilience of our community moving forward.

September 2, 2022

Cape Canaveral Space Force Station *Installation Development Plan* Comment

In August of 2019, City Council accepted a report entitled *Resilient Cape Canaveral* (Report). The Report, authored by the East Central Florida Regional Planning Council (ECFRPC), examines the impacts of sea level rise and flooding on the City's most critical infrastructure. The Report indicates that the City, as a barrier island community, can expect significant impacts to its built and natural environments as early as the 2030s and could see significant economic losses by 2100 without timely mitigation and adaptation.

Using findings from the Report, the City prepared and adopted the *Resilient Cape Canaveral Action Plan* (Plan) in June 2021. The Plan guides City policy-makers to prepare our community for weather and climate-related hazards. Actionable items are broken down into eight (8) Action Categories covering the most important municipal operations. The *"Storm Readiness and Sea Level Rise"* category specifically calls for the City to construct stormwater parks to alleviate flooding issues, treat runoff before it enters the Indian River Lagoon (IRL), and provide protected natural habitat for native species.

With funds from NOAA's Sea Grant College Program and Office of Coastal Management, the City collaborated with experts from Florida Sea Grant, Stetson University, and the ECFRPC to better detail current and future flood risks within our community. These efforts have led to the identification of key undeveloped parcels that are ideal for creating a series of stormwater parks, internally termed an "Environmental Innovation Corridor." Development of such a corridor would serve as a replicable model to innovative stormwater parks for flood resilience and improved water quality, as well as enhance the overall quality of life for residents, workers, and visitors.

We are all painfully aware that our IRL ecosystem has recently shown declining water quality, including several harmful algal blooms and fish kills. While Cape Canaveral and its citizens are committed to doing our part to help restore the IRL, we recognize that we have limited local resources to realize our vision of an Environmental Innovation Corridor. As the longstanding home for innovation associated with our nation's space programs, this project provides a unique opportunity to demonstrate advanced, nature-based technologies for both flood mitigation, sustained water quality improvements, designated land conservation, and any associated potential mitigation credits.

Currently, the City has identified 2-3 privately owned parcels within its jurisdiction that are appropriate for the Environmental Innovation Corridor concept. At this time, City Staff are investigating numerous land-acquisition and concept-design funding sources and are confident in acquiring partial to substantial funding for the parcels. We believe the development of the Environmental Innovation Corridor should be of special interest to the CCSFS, as it provides local long-term flood mitigation potential in addition to eco-recreational space, enhanced walkability, and other community amenities for Space Force service members and Cape Canaveral civilians. Moreover, we are confident that collaboration amongst committed partners will yield a demonstration project that other communities can utilize in order to work towards the restoration of our treasured IRL ecosystem.

September 2, 2022

Cape Canaveral Space Force Station *Installation Development Plan* Comment

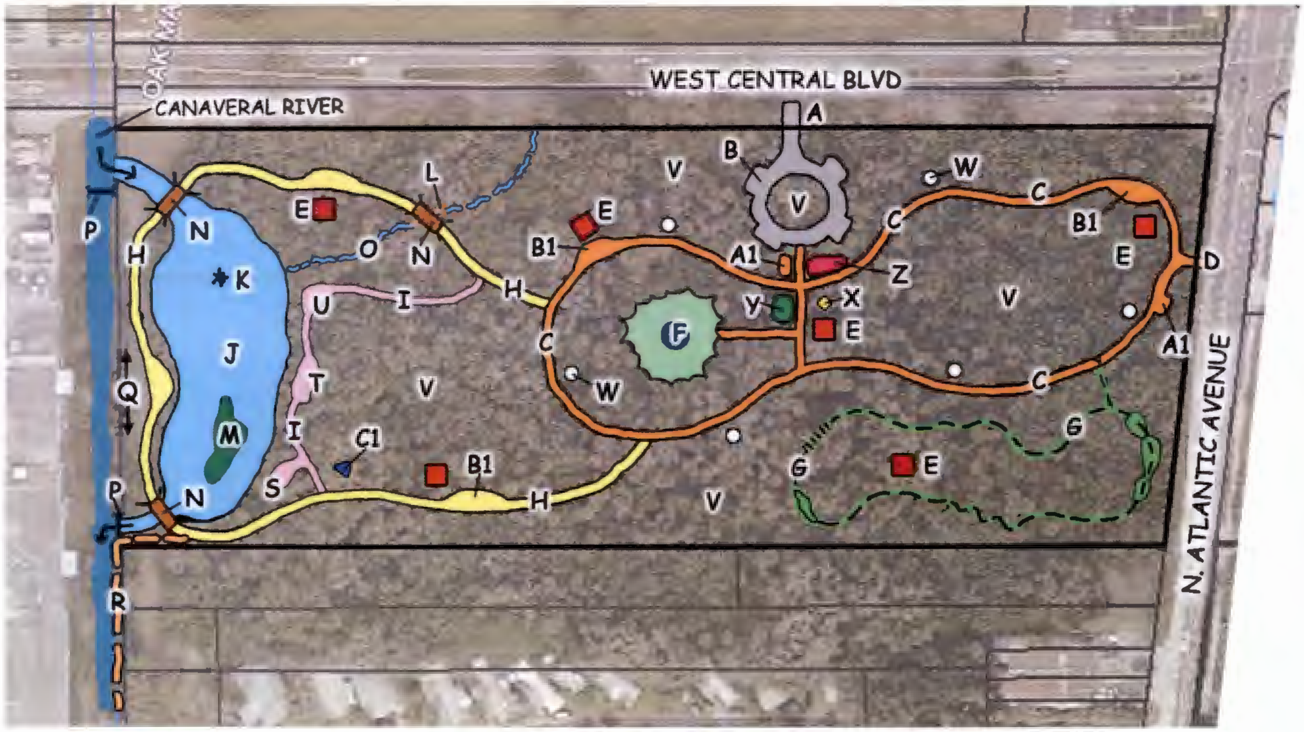
Based on the language of the fifth priority-planning goal, it appears your project(s) may require mitigation. As such, City Staff asks your presence at a meeting to discuss and explore mutually beneficial opportunities for mitigation credits via partnership on land acquisition of the aforementioned properties. Nature-based redevelopment of these properties would include passive recreational amenities in a natural preserve setting on designated conservation land. Importantly, the development would include the construction of stormwater retention systems capable of pre-treating a large quantity of stormwater run-off before it gets to the conveyance system. This will have an immediate, direct and positive ecological impact on water quality discharge to the lagoon by the natural removal of harmful phosphorus and nitrogen.

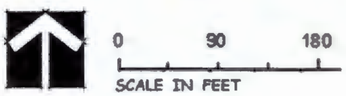
We appreciate your time in reading and attention to this comment. We also thank you for your honorable service to the country.

Sincerely,

Todd Morley
City Manager
City of Cape Canaveral
100 Polk Avenue – PO Box 326
Cape Canaveral, Florida 32920
(321) 868-1205

Attachments: Exhibit #1, Urban Forest Park Design Concept
Exhibit #2, Thurm Stormwater Park Design Concept
Exhibit #3, Parks Corridor Overview





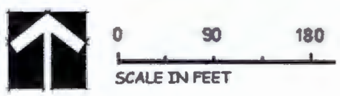
LEGEND

A. Vehicular entry
B. Parking area (12 cars)
C. Eastern exercise trail loop
D. Bike/pedestrian entry
E. Covered shelter (Typ.)
F. Environmental pavilion/ gathering space
G. Nature bicycle course

LEGEND (cont.)

H. Western trail loop
I. Natural trail
J. Stormwater pond
K. Solar pond fountain
L. Rock waterfall
M. Habitat island
N. Trail bridge
O. Stormwater stream
P. Diversion weir
Q. Maintenance access
R. Corridor trail access
S. Photo blind area
T. Wildlife observation area
U. Bermed garden
V. Existing tree canopy to remain (Typ.)
W. Exercise station (Typ.)
X. Drinking fountain
Y. Community garden
Z. Butterfly garden
A1. Bike rack
B1. Trail widening area (Typ.)
C1. Osprey nest

Exhibit #1
Urban Forest Park Design Concept - City of Cape Canaveral



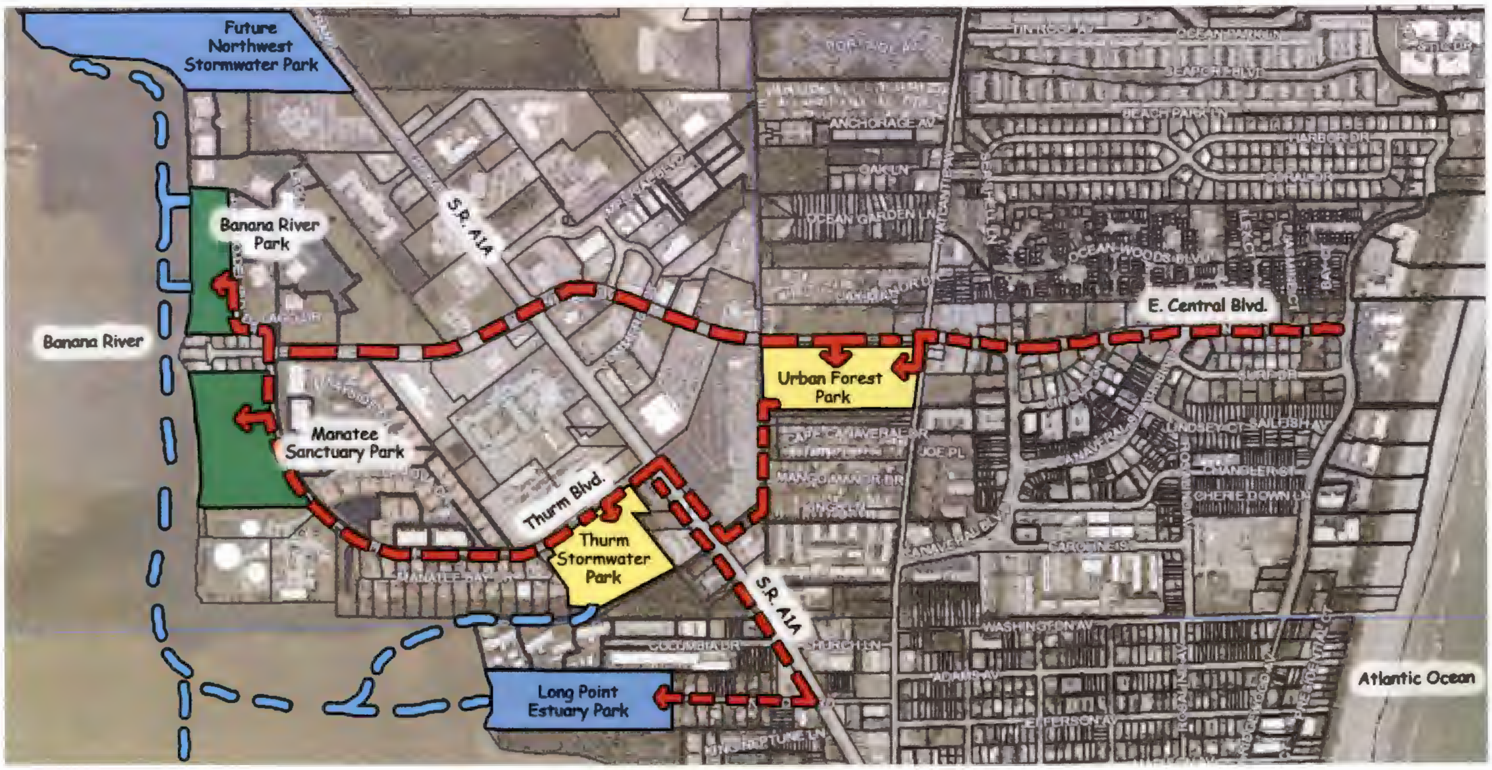
LEGEND

A. Vehicular entry
B. Parking area (12 cars)
C. Bike/pedestrian entry
D. Long loop exercise trail
E. Short loop exercise trail

LEGEND (Cont.)

F. Environmental pavilion
G. Stormwater pond
H. Habitat island
I. Solar pond fountain
J. Trail bridge
K. Kayak dock
L. Kayak launch
M. Kayak storage
N. Covered shelter (Typ.)
O. Wildlife observation area (Typ.)
P. Exercise station (Typ.)
Q. Bike rack
R. Landscape berm (Typ.)
S. Kiosk
T. Community garden
U. Drinking fountain (Typ.)
V. Butterfly garden (Typ.)
W. Canal
X. Control weir
Y. Osprey nest
Z. Corridor community bike trail

Exhibit #2
Thurm Stormwater Park Design Concept - City of Cape Canaveral



CITY INTERCONNECTED PARKS

Proposed

1. Urban Forest
2. Thurm Stormwater
3. Long Point Estuary
4. Manatee Sanctuary
5. Banana River
6. Northwest Stormwater

LEGEND

Bike/walking trail

City waterway trail

Exhibit #3
Parks Corridor Overview - City of Cape Canaveral

From: State_Clearinghouse <State.Clearinghouse@dep.state.fl.us>
Sent: Thursday, August 4, 2022 9:30 AM
To: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C; State_Clearinghouse
Cc: BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE; Maria Bazemore
Subject: RE: Eastern Range Planning And Infrastructure Environmental Assessment Coordination Letter for Cape Canaveral Space Force Station, FL

With such general project descriptions I can only say at this time that some of the proposed projects will need some sort of permitting and/or coordination with state agencies during their construction. As you develop your EA please contact Cindy Stafford Cindy.Stafford@FloridaDEP.gov with DEP's Central District office for assistance in determining any permitting requirements associated with the various proposed infrastructure improvements. Additionally, the following contacts are for other pertinent state agencies who may aid in your project and document development: FWC 'FWC Conservation Planning Services' FWCConservationPlanningServices@myfwc.com , St Johns River Water Management District - Steve Fitzgibbons sfitzgibbons@sjrwmd.com & the State Historical Preservation Office timothy.parsons@dos.myflorida.com.

Chris Stahl

Chris Stahl, Coordinator
Florida State Clearinghouse
Florida Department of Environmental Protection
3900 Commonwealth Blvd., M.S. 47
Tallahassee, FL 32399-2400
ph. (850) 717-9076
State.Clearinghouse@floridadep.gov

From: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Sent: Wednesday, August 3, 2022 3:37 PM
To: Stahl, Chris <Chris.Stahl@FloridaDEP.gov>; State_Clearinghouse <State.Clearinghouse@dep.state.fl.us>
Cc: BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE <michael.blaylock.4@spaceforce.mil>; Maria Bazemore <MBazemore@drmp.com>
Subject: Eastern Range Planning And Infrastructure Environmental Assessment Coordination Letter for Cape Canaveral Space Force Station, FL
Importance: High

Good afternoon,

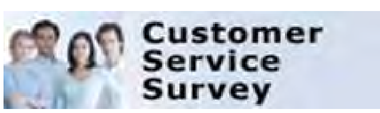
The United States Space Force (USSF) is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with multiple infrastructure improvements (Proposed Action) at Cape Canaveral Space Force Station (CCSFS), Florida, that would enable USSF to meet emergent and expanding commercial space launch industry needs and ensure future mission essential functions for the Department of Defense (DoD). The Proposed Action would include construction of new facilities and infrastructure and renovation/modernization, consolidation, and demolition of existing assets to maximize mission capabilities and support an increased space launch cadence from CCSFS. The full Description of the Proposed Action and Alternatives (DOPAA) is available upon request.

As part of the USAF Environmental Impact Analysis Process, we request your input on the Proposed Action and assistance in identifying any potential areas of environmental impact to be assessed in this analysis. If you have any specific items of interest about this proposal, please contact Ms. Taylor Janise at taylor.janise.1@spaceforce.mil, (321) 853-6638, or via mail at Taylor Janise, 45 CES/CEIE, 1224 Jupiter Street, Mail Stop 9125, Patrick Space Force Base, Florida 32925 within 30 days of receipt of this letter.

Thank you in advance for your assistance with this effort.

v/r

Taylor Janise
CCSFS NEPA Program Manager
45 CES/CEIE
CP: 979-429-1221
DSN: 467-6638
COMM: 321-853-6638



From: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Sent: Wednesday, August 17, 2022 2:11 PM
To: Brenda Defoe-Surprenant
Cc: Maria Bazemore; BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE
Subject: RE: RE: Eastern Range Planning And Infrastructure Environmental Assessment Coordination Letter for Cape Canaveral Space Force Station, FL

Good afternoon,

Thank you for your inputs we look forward to coordinating with you as the EA progresses.

v/r

Taylor Janise
CCSFS NEPA Program Manager
45 CES/CEIE
CP: 979-429-1221
DSN: 467-6638
COMM: 321-853-6638

From: Brenda Defoe-Surprenant <BDefoe-Surprenant@ecfrpc.org>
Sent: Wednesday, August 10, 2022 3:27 PM
To: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Subject: [URL Verdict: Unknown][Non-DoD Source] RE: Eastern Range Planning And Infrastructure Environmental Assessment Coordination Letter for Cape Canaveral Space Force Station, FL

Ms. Janise, thank you for your email.

At this time we do not have any comment on the Environmental Impact Analysis, but would like to highlight a specific item of interest. Recently, the ECFRPC completed a vulnerability assessment for Brevard County. A number of regional critical facilities, including the Cape Canaveral Space Force Station (CCSFS) were identified as being impacted by sea level rise. As the Proposed Action moves forward, we would like to provide the document above in regard to identifying any potential areas of impact and offer assistance should you need it in the future.

Thank you for your time and consideration.

Brenda Defoe-Surprenant
Director of Planning
East Central Florida Regional Planning Council
455 N Garland Ave. Orlando, FL 32801
407-245-0300 ext. 336
bdefoe-surprenant@ecfrpc.org
www.ecfrpc.org

From: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Sent: Friday, September 2, 2022 1:08 PM
To: White, Douglas
Cc: Dean, Kenneth; Buskey, Traci P.; BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE; FISHER, LAURIE B NH-03 USSF SSC 45 CES/CEIE; Maria Bazemore
Subject: RE: EPA Comments on the Letter of Intent to Prepare an Environmental Assessment for Multiple Infrastructure Improvements at Cape Canaveral Space Force Station, Brevard County, Florida

Thank you for your comments. We look forward to coordinating with you as we progress with this EA.

v/r

Taylor Janise
CCSFS NEPA Program Manager
45 CES/CEIE
CP: 979-429-1221
DSN: 467-6638
COMM: 321-853-6638

From: White, Douglas <White.Douglas@epa.gov>
Sent: Thursday, September 1, 2022 2:57 PM
To: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Cc: Dean, Kenneth <Dean.William-Kenneth@epa.gov>; Buskey, Traci P. <Buskey.Traci@epa.gov>
Subject: [Non-DoD Source] EPA Comments on the Letter of Intent to Prepare an Environmental Assessment for Multiple Infrastructure Improvements at Cape Canaveral Space Force Station, Brevard County, Florida

Ms. Taylor Janise
45 CES/CEIE
1224 Jupiter Street, Mail Stop 9125
Patrick Space Force Base
Florida, 32925
(321) 853-6638
(taylor.janise.1@spaceforce.mil)

Re: EPA Comments on the Letter of Intent to Prepare an Environmental Assessment for Multiple Infrastructure Improvements at Cape Canaveral Space Force Station, Brevard County, Florida

Dear Ms. Janise:

The U. S. Environmental Protection Agency (EPA) has reviewed the referenced document in accordance with Section 309 of the Clean Air Act and Section 102(2)(C) of the National Environmental Policy Act (NEPA). According to the letter, dated July 12, 2022, the United

States Space Force (USSF) is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with multiple infrastructure improvements (Proposed Action) at Cape Canaveral Space Force Station (CCSFS) in Brevard County, Florida. The infrastructure improvements would enable USSF to meet emergent and expanding commercial space launch industry needs and ensure future mission essential functions for the Department of Defense.

The Proposed Action would include construction of new facilities and infrastructure and renovation/modernization, consolidation, and demolition of existing assets to maximize mission capabilities and support an increased space launch cadence from CCSFS. Under the Proposed Action, USSF would proceed with the implementation of an installation development plan that identifies construction projects including a hardened utility corridor for water, power, and communications systems; munitions storage; wharf modernization; facility repair; road construction; and construction of new launch support and operations facilities.

Based on the EPA's review of available information, the following comments are provided for your consideration.

(1) Air Quality and Climate Change: The Proposed Action is located in Brevard County, Florida which is in attainment with the National Ambient Air Quality Standards. The EPA recommends using tools such as the Air Conformity Applicability Model to determine if, and to what extent, the Proposed Action will produce emissions that contribute toward exceeding local air emissions permits, or otherwise impact air quality or human health. Facility construction and operational activities such as storage tanks, fueling operations, and consumption of maintenance materials containing volatile organic compounds should be accounted for by the appropriate air emissions model. The EPA recommends controlling fugitive dust emissions and implementing measures to reduce diesel emissions, such as switching to cleaner fuels, retrofitting current equipment with emission reduction technologies, repowering older equipment with modern engines, replacing older vehicles, and reducing idling through operator training and contracting policies. The EPA also recommends quantification of greenhouse gas emissions resulting from construction and operation of proposed projects, and analysis of resulting social impacts due to climate change, be conducted by the EA.

(2) Wetlands and Streams: CCSFS is located on developed land between the Banana River and the Atlantic Ocean with onsite wetlands and ditches that flow to the Banana River. The EPA recommends that design proposals and construction avoid impacting Waters of the United States (WOTUS) to the maximum extent practicable by locating permanent infrastructure and temporary construction measures away from WOTUS and respective buffers. WOTUS should be delineated, and coordination with the U.S Army Corps of Engineers should be made where proposed activities might enter or affect WOTUS. Mitigation may be required where impacts to WOTUS cannot be avoided. Flood zone and flood inundation maps should be used to help ensure proposed activities do not take place in floodplains except where alternatives are not practicable.

(3) Stormwater Management: Soil disturbance in support of the Proposed Action may necessitate issuance of construction stormwater permits before construction projects can begin. Coverage under a statewide National Pollutant Discharge Elimination System (NPDES) construction stormwater general permit will be needed if the project disturbs one acre or more of contiguous land. The EPA encourages implementing best management practices during and after construction to minimize stormwater impacts on the streams. The EPA recommends that erosion control and sediment control measures be implemented in accordance with the State's NPDES construction general permit requirements, and that the measures be addressed during the design and construction phases of the project. The EPA also encourages the CCSFS to consider using a variety of stormwater management practices often referred to as "green infrastructure" or "low impact development" practices to comply with Section 438 of the Energy Independence and Security Act of 2007.

(4) Hazardous Materials and Containment: For the protection of WOTUS, critical habitats, and as required by the Clean Water Act, the EPA recommends the use of secondary containment where storage and handling of Petroleum, Oils, and Lubricants (POL) will take place, including maintenance bays and storage sites of single wall POL tanks. Where secondary containment is not directly practicable, spill ponds and oil water separators should be constructed downstream of POL related activities. Construction and operation in support of the Proposed Action should ensure that Resource Conservation and Recovery Act regulated solid wastes are disposed of in accordance with federal regulations. The Department of Defense Installation Restoration Program (IRP) and state IRP databases should be consulted prior to construction. Details of relevant contaminated and land-use-restricted sites should be included in the EA.

(5) Biological Resources: Critical habitat for Loggerhead Sea Turtles and West Indian Manatees exists in the waters on both sides of CCSFS. The EPA principally defers to the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (FWS) regarding compliance with the Marine Mammal Protection Act and Endangered Species Act. The EPA, therefore, recommends the CCSFS coordinate early with the NMFS and the FWS. The EPA further recommends that the conservation measures identified by the NMFS and the FWS be included in the EA.

(6) Environmental Justice: Executive Order 12898 directs federal agencies to identify and address the disproportionately high and adverse human health on environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. In accordance with the Executive Order, the EPA recommends that the environmental document identify and address any disproportionate impacts on minority and low-income populations. The Environmental Justice Interagency Working Group *Promising Practices for EJ Methodologies in NEPA Reviews* (*Promising Practices)*, dated March 2016, provides guiding principles agencies can consider in identifying disproportionately high and adverse impacts on minority and low-income populations.

The EPA strongly encourages the use of EJScreen (https://www.epa.gov/ejscreen), EPA's nationally consistent environmental justice screening and mapping tool, when conducting environmental justice scoping efforts. The tool provides information on environmental and socioeconomic indicators as well as pollution sources, health disparities, critical service gaps, and climate change data. The tool can help identify potential community vulnerabilities by calculating EJ Indexes and displaying other environmental and socioeconomic information in color-coded maps and standard data reports (e.g., pollution sources, health disparities, critical service gaps, climate change data). EJScreen is a useful first step in highlighting locations that may be candidates for further analysis. For purposes of NEPA review, a project is considered to be in an area of potential EJ concern when an EJScreen analysis for the impacted area shows one or more of the twelve EJ Indexes at or above the 80th percentile in the nation and/or state. An area may also warrant additional review if other information suggests the potential for EJ concerns. An EJScreen analysis which does not reveal the potential for EJ concerns should not be interpreted to mean that there are definitively no EJ concerns present.

(7) Energy Efficiency and Recycling: The EPA recommends the use of sustainable building practices that maximize energy and water conservation, and the use of renewable energy including solar power for supplemental electricity and lighting for infrastructure, airfields, and buildings that may be constructed. Implementation of renewable energy sources and operational efficiency measures should be included in climate change analysis. The CCSFS should consult the appropriate federal agencies (https://www.energy.gov/eere/femp/sustainable-federal-buildings) for energy conservation requirements. Efforts should be made to reuse and divert recyclable materials such as concrete, steel, and asphalt away from landfills.

Thank you for the opportunity to provide comments on the Proposed Action. Upon completion of the draft EA, please submit an electronic version of the draft EA to the EPA for review. If you have any questions regarding the EPA's comments, please contact me by phone at 404-562-8586, or via email at White.Douglas@epa.gov.

Douglas White
U.S. Environmental Protection Agency / Region 4
Strategic Programs Office / NEPA Section
61 Forsyth Street, SW
Atlanta, GA 30303-8960
404-562-8586

From: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Sent: Thursday, August 18, 2022 5:11 PM
To: Kneifl, Kristen R
Cc: Long, Eva (FAA); Waldbuesser, Cinda; Maria Bazemore; BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE
Subject: RE: NEPA for CCSFS Range of the Future Planning

Good afternoon,

Thank you, we appreciate your participation. We will continue to coordinate with you as we develop the EA.

v/r

Taylor Janise
CCSFS NEPA Program Manager
45 CES/CEIE
CP: 979-429-1221
DSN: 467-6638
COMM: 321-853-6638

From: Kneifl, Kristen R <Kristen_Kneifl@nps.gov>
Sent: Thursday, August 18, 2022 9:36 AM
To: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Cc: Long, Eva (FAA) <Eva.Long@faa.gov>; Waldbuesser, Cinda <Cinda_Waldbuesser@nps.gov>
Subject: [Non-DoD Source] NEPA for CCSFS Range of the Future Planning

Good Morning,
Thank you for the opportunity to review CCSFS EA. Canaveral National Seashore does not have any comments.
Kristen

Kristen Kneifl
Canaveral National Seashore
Resource Management Specialist
212 S. Washington Avenue
Titusville, Fl 32796
321-267-1110 ext 14
321-403-5680 (cell)

RON DESANTIS
Governor

CORD BYRD
Secretary of State

Mr. Michael A. Blaylock
Chief, Environmental Conservation
45 CES/CEIE-C
1224 Jupiter Street
Patrick SFB, Florida 32925-3343

August 31, 2022

RE: DHR Project File No.: 2022-5456
Proposed Environmental Assessment (EA) to Evaluate Potential Environmental Impacts Associated with Multiple Infrastructure Improvements at Cape Canaveral Space Force Station
Cape Canaveral Space Force Base, Brevard County

Mr. Blaylock:

The Florida State Historic Preservation Officer reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places.* The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended and *36 CFR Part 800: Protection of Historic Properties*.

A review of the Florida Master Site File and our records indicated that there are a number of historic resources recorded in the project area. The environmental assessment will need to address the potential effects on cultural resources. We look forward to receiving the draft document and coordinating with your agency regarding cultural resources that may be impacted by this project.

If you have any questions, please contact Scott Edwards, Historic Preservationist, by electronic mail *scott.edwards@dos.myflorida.com*, or at 850.245.6333 or 800.847.7278.

Sincerely,

Kelly L Chase
For

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

From: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Sent: Wednesday, August 17, 2022 8:23 AM
To: Steve Szabo
Cc: BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE; Maria Bazemore; Pete Eggert
Subject: RE: Eastern Range Planning And Infrastructure Environmental Assessment Coordination Letter for Cape Canaveral Space Force Station, FL

Good morning Steve,

You and Pete should be receiving a DoD Safe link via email shortly with the Final DOPAA.

Thank you for your participation.

v/r

Taylor Janise
CCSFS NEPA Program Manager
45 CES/CEIE
CP: 979-429-1221
DSN: 467-6638
COMM: 321-853-6638

From: Steve Szabo <SSzabo@spaceflorida.gov>
Sent: Tuesday, August 16, 2022 3:58 PM
To: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Cc: BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE <michael.blaylock.4@spaceforce.mil>; Maria Bazemore <MBazemore@drmp.com>; Pete Eggert <PEggert@spaceflorida.gov>
Subject: [Non-DoD Source] RE: Eastern Range Planning And Infrastructure Environmental Assessment Coordination Letter for Cape Canaveral Space Force Station, FL

Hello Taylor. Sorry for the slow response. Space Florida requests the full DOPAA and we look forward to contributing.

Thanks,

Steve Szabo, P.E.
VP, Spaceport Planning & Development
Space Florida
321-961-0868
sszabo@spaceflorida.gov

From: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Sent: Thursday, August 4, 2022 10:40 AM
To: Steve Szabo <SSzabo@spaceflorida.gov>
Cc: BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE <michael.blaylock.4@spaceforce.mil>; Maria

Bazemore <MBazemore@drmp.com>; Pete Eggert <PEggert@spaceflorida.gov>
Subject: Eastern Range Planning And Infrastructure Environmental Assessment Coordination Letter for Cape Canaveral Space Force Station, FL
Importance: High

Good morning,

The United States Space Force (USSF) is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with multiple infrastructure improvements (Proposed Action) at Cape Canaveral Space Force Station (CCSFS), Florida, that would enable USSF to meet emergent and expanding commercial space launch industry needs and ensure future mission essential functions for the Department of Defense (DoD). The Proposed Action would include construction of new facilities and infrastructure and renovation/modernization, consolidation, and demolition of existing assets to maximize mission capabilities and support an increased space launch cadence from CCSFS. The full Description of the Proposed Action and Alternatives (DOPAA) is available upon request.

As part of the USAF Environmental Impact Analysis Process, we request your input on the Proposed Action and assistance in identifying any potential areas of environmental impact to be assessed in this analysis. If you have any specific items of interest about this proposal, please contact Ms. Taylor Janise at taylor.janise.1@spaceforce.mil, (321) 853-6638, or via mail at Taylor Janise, 45 CES/CEIE, 1224 Jupiter Street, Mail Stop 9125, Patrick Space Force Base, Florida 32925 within 30 days of receipt of this letter.

Thank you in advance for your assistance with this effort.

v/r

Taylor Janise
CCSFS NEPA Program Manager
45 CES/CEIE
CP: 979-429-1221
DSN: 467-6638
COMM: 321-853-6638

From: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Sent: Tuesday, August 30, 2022 9:29 AM
To: Conroy, Brandon J CIV USARMY CESAJ (USA)
Cc: BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE; Maria Bazemore
Subject: RE: Eastern Range Planning And Infrastructure Environmental Assessment Coordination Letter for Cape Canaveral Space Force Station

Good morning,

Thank you fore reaching out. You should be receiving a DoD Safe email shortly, click on the link and enter the claim password provided in that email to download the DOPAA.

Please let me know if you have any issues downloading or have any questions.

Thank you for your participation, we look forward to receiving any comments the USACE may have.

v/r

Taylor Janise
CCSFS NEPA Program Manager
45 CES/CEIE
CP: 979-429-1221
DSN: 467-6638
COMM: 321-853-6638

From: Conroy, Brandon J CIV USARMY CESAJ (USA) <Brandon.J.Conroy@usace.army.mil>
Sent: Monday, August 29, 2022 4:30 PM
To: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Subject: RE: Eastern Range Planning And Infrastructure Environmental Assessment Coordination Letter for Cape Canaveral Space Force Station

Hello Ms. Janise,

I was forwarded your message by my supervisor so am reaching out to participate in the EA development. Seems like I will need a copy of the DOPAA as a starting point and once I've had a look perhaps we could have a chat or you can include me in any upcoming meetings that may be scheduled. Looking forward to working with you.

Regards,
Brandon J. Conroy, Ph.D.
Biologist & Senior Project Manager
Cocoa Permits Section
400 High Point Drive, Suite 600
Cocoa, Florida 32926

Office: 321-504-3771, x 0011
Mobile: 321-370-8694

From: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Sent: Monday, August 15, 2022 9:17 AM
To: Palmer, John C CIV USARMY CESAJ (USA) <John.Palmer@usace.army.mil>
Cc: BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE <michael.blaylock.4@spaceforce.mil>; Maria Bazemore <MBazemore@drmp.com>
Subject: Eastern Range Planning And Infrastructure Environmental Assessment Coordination Letter for Cape Canaveral Space Force Station
Importance: High

Good morning,

The United States Space Force (USSF) is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with multiple infrastructure improvements (Proposed Action) at Cape Canaveral Space Force Station (CCSFS), Florida, that would enable USSF to meet emergent and expanding commercial space launch industry needs and ensure future mission essential functions for the Department of Defense (DoD). The Proposed Action would include construction of new facilities and infrastructure and renovation/modernization, consolidation, and demolition of existing assets to maximize mission capabilities and support an increased space launch cadence from CCSFS. The full Description of the Proposed Action and Alternatives (DOPAA) is available upon request.

As part of the USAF EIAP, we request your input on the Proposed Action and assistance in identifying any potential areas of environmental impact to be assessed in this analysis. If you have any specific items of interest about this proposal, please contact Ms. Taylor Janise at taylor.janise.1@spaceforce.mil, (321) 853-6638, or via mail at Taylor Janise, 45 CES/CEIE, 1224 Jupiter Street, Mail Stop 9125, Patrick Space Force Base, Florida 32925 within 30 days of receipt of this letter.

Thank you in advance for your assistance with this effort.

v/r

Taylor Janise
CCSFS NEPA Program Manager
45 CES/CEIE
CP: 979-429-1221
DSN: 467-6638
COMM: 321-853-6638

Example early notice letter sent to tribal contacts listed in Section 6 of this EA.

DEPARTMENT OF THE AIR FORCE
UNITED STATES SPACE FORCE
SPACE LAUNCH DELTA 45

July 5, 2022

Mr. Michael Blaylock
Chief, Environmental Conservation, Patrick Space Force Base
United States Space Force, Space Launch Delta 45
1224 Jupiter Street, Mail Stop 9125
Patrick Space Force Base FL 32925

Mr. Ben Yahola
Tribal Historic Preservation Officer
Seminole Nation of Oklahoma
P.O. Box 1498
Wewoka OK 74884

Dear Mr. Yahola

The United States Space Force (USSF) is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with multiple infrastructure improvements (Proposed Action) at Cape Canaveral Space Force Station (CCSFS) that would enable USSF to meet emergent and expanding commercial space launch industry needs and ensure future mission essential functions for the Department of Defense (DoD). A location map (Figure 1) is attached for your reference. The Proposed Action is needed because the current infrastructure at CCSFS has been identified as a limiting factor in executing the space launch mission. The Proposed Action would include construction of new facilities and infrastructure and renovation/modernization, consolidation, and demolition of existing assets to maximize mission capabilities and support an increased space launch cadence from CCSFS.

The Proposed Action is further defined based on the five priority planning goals identified in the CCSFS *Installation Development Plan*:

- ***Provide reliable infrastructure capable of supporting increased launch cadence*** – Infrastructure improvements would include expanding a utility corridor; providing increased resiliency and redundancy for water, power, and communications systems; consolidating the munitions storage areas; and modernizing the wharf facility in the CCSFS industrial area.
- ***Reduce impacts to personnel and equipment from launch operations*** – Infrastructure improvements would include constructing and renovating facilities to relocate non-essential personnel and equipment out of launch evacuation zones.
- ***Eliminate critical periods*** – Infrastructure improvements would encase existing communication lines in concrete duct bank to reduce/eliminate existing single points of failure and the need for critical periods. Currently, critical periods are established before

and during critical mission operations. During these periods (ranging from eight to 24 hours), many activities (e.g., ground disturbance and utility maintenance) are restricted to ensure no critical infrastructure is damaged.

- ***Improve base logistics capacity*** – Infrastructure improvements would establish designated haul routes and improve traffic flow, consolidate similar functions, and modernize the CCSFS South Gate to support more efficient operation at CCSFS.
- ***Expand developable areas in support of space launch*** – Infrastructure improvements would construct new launch support and launch operations facilities in a manner that maximizes development opportunities while considering environmental and operational constraints.

The EA will assess the potential environmental impacts that would result from the Proposed Action as well as the No-Action Alternative, which reflects the status quo, as a baseline for comparison of potential effects from the Proposed Action. The cumulative effects associated with Proposed Action will also be examined when combined with past, present, and future (reasonably foreseeable) actions.

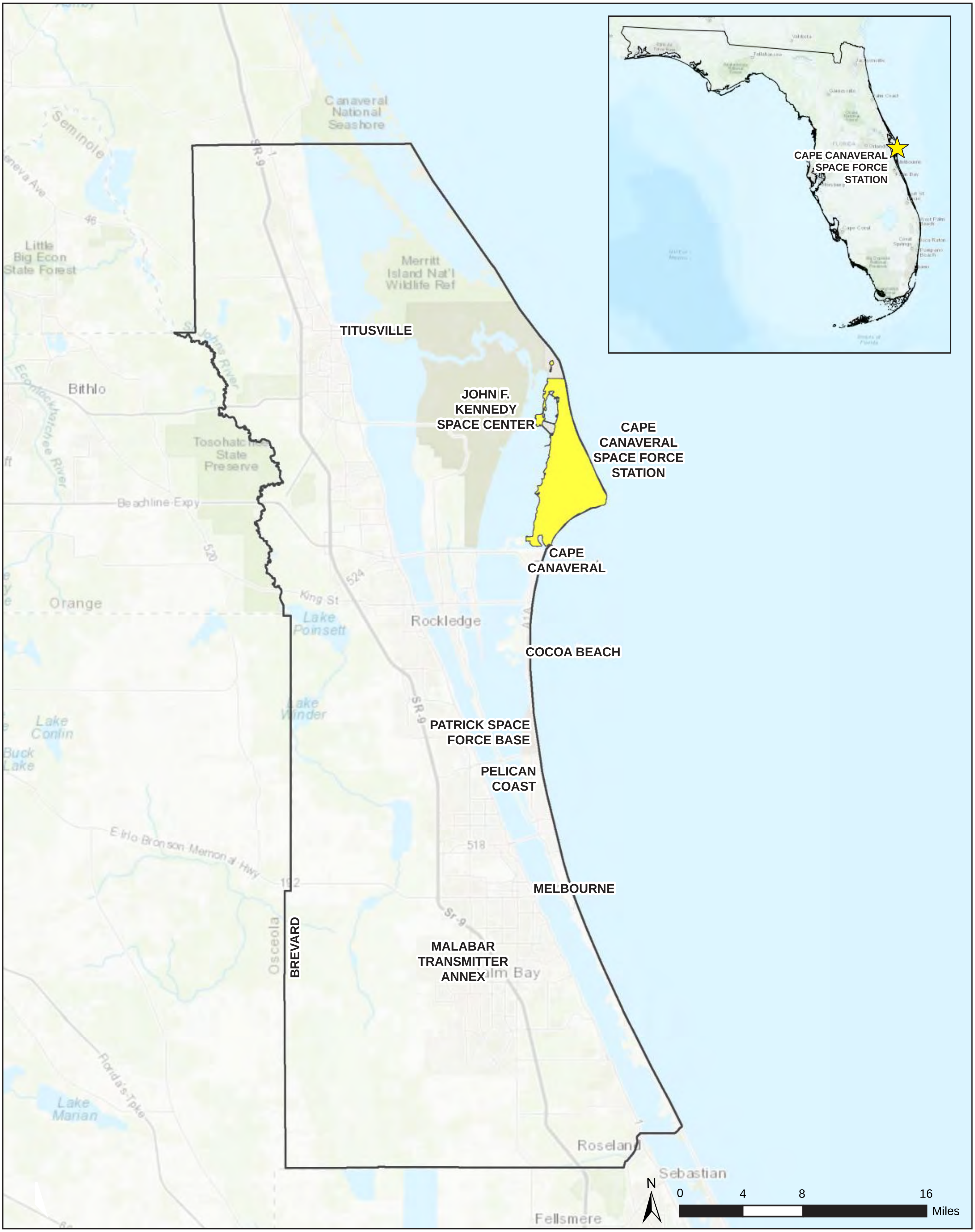
Per Section 306108 of the National Historic Preservation Act (NHPA) and its implementing regulations at 36 Code of Federal Regulations (CFR) Part 800, the USSF is engaging early with tribal governments as the lead federal agency. In accordance with NHPA, USSF would like to initiate government-to-government consultation regarding the proposed infrastructure improvements at CCSFS. Due to jurisdiction and special expertise related to the Proposed Action, the National Aeronautics and Space Administration (NASA), Federal Aviation Administration (FAA), United States Navy, and United States Coast Guard (USCG) are cooperating agencies in the development of the EA.

USSF requests your input on the Proposed Action and assistance in identifying any potential areas of environmental impact to be assessed in this analysis. Additionally, please advise if this undertaking might adversely affect any historic properties of religious and cultural significance to the Seminole Tribe of Oklahoma. If you have any specific items of interest about this proposal, please contact Ms. Taylor Janise at taylor.janise.1@spaceforce.mil or via mail at Taylor Janise, 45 CES/CEIE, 1224 Jupiter Street, Mail Stop 9125, Patrick Space Force Base, Florida 32925 within 30 days of receipt of this letter. Thank you in advance for your assistance in this effort.

Sincerely

MICHAEL BLAYLOCK, GS-13
Chief, Environmental Conservation

Attachment:
Figure 1. Location Map



CAPE CANAVERAL SPACE FORCE STATION EA
FIGURE 1: LOCATION OF CCSFS

Tribal Comments/Coordination

From: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Sent: Monday, August 22, 2022 2:54 PM
To: Ben Yahola
Cc: PENDERS, THOMAS E NH-03 USSF SSC 45 CES/CEIE; BLAYLOCK, MICHAEL A NH-03 USSF HQSF 45 CES/CEIE; Maria Bazemore
Subject: RE: [URL Verdict: Unknown][Non-DoD Source] Proposed Action Cape Canaveral Space Force Station

Good afternoon,

Thank you for your participation, we appreciate your concurrence and will continue to coordinate with you as requested.

v/r

Taylor Janise
CCSFS NEPA Program Manager
45 CES/CEIE
CP: 979-429-1221
DSN: 467-6638
COMM: 321-853-6638

From: Ben Yahola <yahola.b@sno-nsn.gov>
Sent: Monday, August 22, 2022 2:41 PM
To: JANISE, TAYLOR M CIV USSF HQSF 45 CES/CEIE-C <taylor.janise.1@spaceforce.mil>
Subject: [URL Verdict: Unknown][Non-DoD Source] Proposed Action Cape Canaveral Space Force Station

Greetings from Seminole Nation of Oklahoma,

This letter of response regarding request to review cultural site assessment is being provided by the Federally-Recognized Tribe Seminole Nation of Oklahoma's Historic Preservation Office. After reviewing the information provided, we wish you success for the proposed action.
Due to the historic presence of our people in the project area, if inadvertent discoveries of human remains and related Native American Graves Protection and Repatriation Act, (NAGPRA) items occur in areas of existing or prior development. We request all work cease and the Seminole Nation of Oklahoma, and other appropriate agencies be immediately notified. It is the duty of the agency official to "acknowledge that Indian tribes and Native Hawaiian organizations possess special expertise in assessing the eligibility of historic properties that may possess religious and cultural significance to them."

Thank you,

Ben Yahola
SNO THPO

A-6. Stakeholder Notice of Availability and Comments

Example notice of Draft EA availability letter sent to agencies listed in Section 6 of this EA.

Agency Comments/Coordination

Example notice of Draft EA availability letter sent to tribal contacts listed in Section 6 of this EA.

Tribal Comments/Coordination

A-7. Cooperating Agency Agreements

DEPARTMENT OF THE NAVY
DIRECTOR STRATEGIC SYSTEMS PROGRAMS
1250 10TH STREET SE, SUITE 3600
WASHINGTON NAVY YARD, DC 20374-5127

IN REPLY REFER TO
16452
Ser SP20/071922002
06 Sep 2022

From: Director, Strategic Systems Programs
To: Commander, United States Space Force

Subj: COOPERATING AGENCY FOR ENVIRONMENTAL ASSESSMENT FOR SPACE LAUNCH INFRASTRUCTURE IMPROVEMENTS AT CAPE CANAVERAL SPACE FORCE STATION

Ref: (a) OPNAV M-5090.1

Encl: (1) Cooperating Agency Request - EA for Space Launch Infrastructure Improvements at Cape Canaveral Space Force Station dtd 18 Feb 2022

1. In accordance with Navy National Environmental Policy Act (NEPA) implementing policy, reference (a), U.S. Navy Strategic Systems Programs (SSP) accepts the U.S. Space Force request to participate as a cooperating agency in the preparation of an Environmental Assessment for Space Launch Infrastructure Improvements at Cape Canaveral Space Force Station as outlined in enclosure (1).

2. As a cooperating agency, SSP understands our role and pledges personnel resources to support specifically, but not limited to, the following:

a. Developing information and preparing analyses on issues for which the Navy has special expertise;

b. Making staff support available to enhance interdisciplinary review capability and provide specific comments; and

c. Provide review and comments within the timelines prescribed in the program milestone schedule.

3. The points of contact for this effort are Ms. Jamiyo Mack, SSP Environmental Program Manager, (202) 451-3616, jamiyo.mack@ssp.navy.mil and Mr. William Schaal, Head, NOTU Support Services and Planning Division, (321) 853-3344, william.schaal@ssp.navy.mil.

CROLEY.PATRICK.A.1166821092
Digitally signed by CROLEY.PATRICK.A.1166821092
Date: 2022.09.06 16:10:49 -04'00'

P. A. CROLEY
By direction

Subj: COOPERATING AGENCY FOR ENVIRONMENTAL ASSESSMENT FOR SPACE LAUNCH INFRASTRUCTURE IMPROVEMENTS AT CAPE CANAVERAL SPACE FORCE STATION

Copy to:
SPP10

Blind Copy to:
SPLe
SP25
SP1604

APPENDIX B

AIR QUALITY

Air Quality

This appendix presents an overview of the Clean Air Act (CAA) and Florida Department of Environmental Protection (FDEP) Air Permitting and Compliance and Enforcement sections and their requirements, as well as calculations, including the assumptions used for the air quality analyses presented in the Environmental Assessment (EA).

B-1 Air Quality Program Overview

The U.S. Environmental Protection Agency (USEPA) sets National Ambient Air Quality Standards (NAAQS) in order to protect the public health and environmental welfare under CAA of 1990. The USEPA has identified the following six criteria air pollutants for which NAAQS are applicable: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), and sulfur dioxide (SO_2). USEPA calls these "criteria" air pollutants because it sets standards for information regarding their effects of health or welfare. As part of these criteria, it established two standards: Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The CAA gives the states the authority or establish air quality rules and regulations that must be equivalent to, or more stringent than, the federal program. In 2020, the State of Florida repealed sections of the Florida Administrative Code (FAC) Chapter 62-204, *Air Pollution Control*, which outlines the general provisions for air pollution control in the state. However, FAC Chapter 62-204.800 was modified and the State of Florida adopted all federal regulations, and FDEP is still responsible for administering the air quality program in the state. In addition, the FDEP was required by USEPA to update Florida State Implementation Plan. In July 2021, the USEPA approved FDEP's State Implementation Plan (SIP) for attaining and maintaining compliance with NAAQS under 40 CFR Part 52, Subpart K-Florida. The State of Florida has adopted the federal NAAQS as shown in Table C -1. Based on measured ambient air pollutant concentrations, the USEPA designates areas of the United States as having air quality better than the NAAQS (attainment), worse than the NAAQS (nonattainment), and unclassifiable. The areas that cannot be classified (on the basis of available information) as meeting or not meeting the NAAQS for a particular pollutant are "unclassifiable" and are treated as attainment areas until proven otherwise. Attainment areas can be further classified as "maintenance" areas, which are areas previously classified as nonattainment areas but where air pollutant concentrations have been successfully reduced to below the standard. Maintenance areas are subject to special maintenance plans and must operate under some of the nonattainment area plans to ensure compliance with the NAAQS. Brevard County is in attainment for all criteria pollutants.

The CAA requires that each state develop a SIP that sets forth the provision that will be imposed within the jurisdictional boundary of the state. The SIP provides the means for implementation, maintenance, and enforcement measures needed to attain and maintain the NAAQS within each state, and it also includes control measures, emissions limitations, and other provisions required to attain and maintain the NAAQS. The purpose of the SIP is to provide a control strategy that result in attainment and maintenance of the NAAQS and demonstrate that progress is being made in attaining the standards in each nonattainment areas.

A general conformity analysis is required to be conducted for areas designated as nonattainment or maintenance of the NAAQS if the action's direct and indirect emissions have a potential to emit one or more of the six criteria pollutants at or above concentrations standards shown in Table B-1.

Table B-1: Federal Air Quality Standards

Pollutant		Primary/Secondary Standards	Averaging Time	Level
Carbon Monoxide (CO)		Primary	1 Hour	35 ppm
			8 Hours	9 ppm
Lead (Pb)		Primary/Secondary	Rolling 3 Month Average	0.15 µg/m3
Nitrogen Dioxide (NO_2)		Primary	1 Hour	100 ppb
		Secondary	1 Year	53 ppb
Ozone (O_3)		Primary/Secondary	8 Hours	0.070 ppm
Particle Pollution (PM)	$PM_{2.5}$	Primary	1 Year	12.0 µg/m^3
		Secondary	1 Year	15.0 µg/m^3
		Primary/Secondary	24 Hours	35 µg/m^3
	PM_{10}	Primary/Secondary	24 Hours	150 µg/m^3
Sulfur Dioxide (SO2)		Primary	1 Hour	75 ppb
		Secondary	3 Hours	0.5 ppb

Source: https://www.epa.gov/criteria-air-pollutants/naaqs-table
Notes: ppb: parts per billion by volume
ppm: parts per million by volume
µg/m3: micrograms per cubic meter

In attainment areas, major new or modified stationary sources of air emissions on and in the area are subject to Prevention of Significant Deterioration (PSD) review to ensure that these sources are constructed without causing significant adverse deterioration of the clean air within an area. A major new source is defined as one that has the potential to emit any pollutant regulated under the CAA in amounts equal to or exceeding specific major source thresholds, that is, 250 tons/year (25 tons/year for lead) based on the source's industrial category. A major modification is a physical change or change in the method of operation at an existing major source that causes a significant "net emissions increase" at that source of any regulated pollutant.

B-2 Regulatory Comparison

The CAA Section 176(c), General Conformity, requires federal agencies to demonstrate that their proposed activities would conform to the applicable SIP for attainment of the NAAQS. General conformity applies only to nonattainment and maintenance areas. If the emissions from a federal action proposed in a nonattainment area exceed annual *de minimis* thresholds identified in the rule, a formal conformity determination is required of that action. The thresholds are more restrictive as the severity of the nonattainment status of the region increases. The ROI for the air quality analysis, Brevard County, is in attainment for all criteria pollutants. (40 CFR 81.310 – Florida).

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: CAPE CANAVERAL AFS
State: Florida
County(s): Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Environmental Assessment for Eastern Range Planning and Infrastructure Development at Cape Canaveral Space Force Station

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2024

e. Action Description:

The Proposed Action would include construction of new facilities and infrastructure and renovation/modernization, consolidation, and demolition of existing assets to maximize mission capabilities. The Proposed Action is defined based on five planning goals identified in the CCSFS IDP to meet mission requirements

• Provide reliable infrastructure – Infrastructure improvements would enhance the existing infrastructure (e.g., potable water, wastewater, power, and communications). Outdated facilities would be modernized to meet mission requirements.
• Reduce impacts to personnel and equipment from launch operations – Infrastructure improvements would relocate personnel out of launch exclusionary safety zones.
• Eliminate critical periods on the ER – Infrastructure improvements would provide additional redundancy and reduce/eliminate the need for critical periods. Currently, critical periods are established before and during critical mission operations. During these periods, the Range is "locked" and many activities, including maintenance, are restricted to ensure no critical infrastructure is damaged.
• Improve base logistics capacity – Infrastructure improvements would support more efficient operations at CCSFS with a focus on consolidating similar functions and modernizing the transportation network.
• Expand developable areas – Infrastructure improvements would maximize developable areas while considering environmental and operational constraints.

f. Point of Contact:
Name: William Brady Hart
Title: Environmental Scientist
Organization: DRMP, Inc.
Email: bhart@drmp.com
Phone Number: 407-896-0594

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

The action's net emissions for every year through achieving steady state were compared against the Insignificance Indicator and are summarized below.

Analysis Summary:

2024

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	9.048	250	No
NOx	20.958	250	No
CO	26.135	250	No
SOx	0.058	250	No
PM 10	219.907	250	No
PM 2.5	0.905	250	No
Pb	0.000	25	No
NH3	0.016	250	No
CO2e	5829.2		

2025

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	4.427	250	No
NOx	20.486	250	No
CO	29.186	250	No
SOx	0.066	250	No
PM 10	129.452	250	No
PM 2.5	0.863	250	No
Pb	0.000	25	No
NH3	0.016	250	No
CO2e	6436.0		

2026

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	6.433	250	No
NOx	21.272	250	No
CO	27.663	250	No
SOx	0.065	250	No
PM 10	219.922	250	No
PM 2.5	0.871	250	No
Pb	0.000	25	No
NH3	0.016	250	No
CO2e	6413.1		

2027

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	6.082	250	No
NOx	16.780	250	No
CO	22.221	250	No
SOx	0.051	250	No
PM 10	246.201	250	No
PM 2.5	0.693	250	No
Pb	0.000	25	No
NH3	0.015	250	No
CO2e	5086.9		

2028

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	8.149	250	No
NOx	20.079	250	No
CO	26.761	250	No
SOx	0.062	250	No
PM 10	242.852	250	No
PM 2.5	0.801	250	No
Pb	0.000	25	No
NH3	0.018	250	No
CO2e	6190.4		

2029

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	9.317	250	No
NOx	12.277	250	No
CO	16.223	250	No
SOx	0.037	250	No
PM 10	177.691	250	No
PM 2.5	0.487	250	No
Pb	0.000	25	No
NH3	0.015	250	No
CO2e	3811.5		

2030

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.962	250	No
NOx	14.309	250	No
CO	11.859	250	No
SOx	0.271	250	No
PM 10	1.220	250	No
PM 2.5	1.220	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	16213.0		

2031 - (Steady State)

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.962	250	No
NOx	14.309	250	No
CO	11.859	250	No
SOx	0.271	250	No
PM 10	1.220	250	No
PM 2.5	1.220	250	No
Pb	0.000	25	No
NH3	0.000	250	No
CO2e	16213.0		

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality.Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs.No further air assessment is needed.

William Brady Hart, Environmental Scientist

03-20-2023
DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: CAPE CANAVERAL AFS
State: Florida
County(s): Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Environmental Assessment for Eastern Range Planning and Infrastructure Development at Cape Canaveral Space Force Station (CCSFS)

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2024

- Action Purpose and Need:
The purpose of the Proposed Action is to enable the United States Space Force (USSF) to meet Departement of Defense (DoD) and tenant mission requirements by improving, modernizing, and expanding the infrastructure at CCSFS as described in the CCSFS District Development Plan.

As identified in the CCSFS planning process, the Proposed Action is needed because the current infrastructure at CCSFS lacks the capability and capacity to support USSF and tenant mission requirements. Most facilities and systems on CCSFS date back to the 1950s/1960s and have been reconfigured several times throughout the intervening decades to support various missions. Outdated legacy facilities have been re-purposed for current needs, but they do not provide the state-of-the-art capabilities that are required to achieve mission success. In addition, the current geographical layout of operations at CCSFS and the existing transportation network create inefficiencies, including mandatory evacuations and excess travel for personnel, which expose base operations to disruption, delays, and increased costs.

- Action Description:
The Proposed Action would include construction of new facilities and infrastructure and renovation/modernization, consolidation, and demolition of existing assets to maximize mission capabilities. The Proposed Action is defined based on five planning goals indentified in the CCSFS IDP to meet mission requirements

• Provide reliable infrastructure – Infrastructure improvements would enhance the existing infrastructure (e.g., potable water, wastewater, power, and communications). Outdated facilities would be modernized to meet mission requirements.
• Reduce impacts to personnel and equipment from launch operations – Infrastructure improvements would relocate personnel out of launch exclusionary safety zones.
• Eliminate critical periods on the ER – Infrastructure improvements would provide additional redundancy and reduce/eliminate the need for critical periods. Currently, critical periods are established before and during critical mission operations. During these periods, the Range is “locked” and many activities, including maintenance, are restricted to ensure no critical infrastructure is damaged.
• Improve base logistics capacity – Infrastructure improvements would support more efficient operations at CCSFS with a focus on consolidating similar functions and modernizing the transportation network.
• Expand developable areas – Infrastructure improvements would maximize developable areas while considering environmental and operational constraints.

- Point of Contact
Name: William Brady Hart
Title: Environmental Scientist
Organization: DRMP, Inc.
Email: bhart@drmp.com
Phone Number: 407-896-0594

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	1-W1: Potable Water Resiliency - Storage Tanks
3.	Construction / Demolition	1-WW1: Wastewater Resiliency - WWTP Equalization Basin
4.	Construction / Demolition	1-WW3: Wastewater Resiliency - Perc Ponds
5.	Construction / Demolition	1-P2: Power Resiliency - MOC Generator
6.	Construction / Demolition	1-MSA: MSA - Munitions Storage Area
7.	Construction / Demolition	2-Admin1: Admin/Lab/Warehouse - Admin Campus South
8.	Construction / Demolition	2-Admin2: Admin/Lab/Warehouse - Lighthouse
9.	Construction / Demolition	2-Admin3: Admin/Lab/Warehouse - IRBM
10.	Construction / Demolition	3-DuctBank: Concrete Duct Bank
11.	Construction / Demolition	4-Transport1: Haul Routes - NASA/Central Control Rd Connector
12.	Construction / Demolition	4-Transport2: Haul Routes - South Phillips Pkwy Widening
13.	Construction / Demolition	4-Transport3: Haul Routes - Pulloffs
14.	Construction / Demolition	4-Transport4: Haul Routes - Lighthouse Rd Connector
15.	Construction / Demolition	4-Transport5: Haul Routes - ICBM Rd/Lighthouse Rd Connector
16.	Construction / Demolition	4-Transport6: Haul Routes - ICBM/Phillips Pkwy Widening
17.	Construction / Demolition	4-Gas: Gas Station/Restaurant
18.	Tanks	Proposed Fueling Station Tanks
19.	Tanks	Proposed Fueling Station Tanks
20.	Tanks	Proposed Fueling Station Tanks
21.	Tanks	Proposed Fueling Station Tanks
22.	Construction / Demolition	4-Shops: Shop Consolidation
23.	Construction / Demolition	4-SouthGate1: South Gate - Reconfigure Entry Control Point
24.	Construction / Demolition	4-SouthGate2: South Gate - Truck Inspection Facility
25.	Construction / Demolition	5-LSF1: Launch Support Facilities - Skid Strip North
26.	Construction / Demolition	5-LSF2: Launch Support Facilities - Central Control
27.	Construction / Demolition	5-LSF3: Launch Support Facilities - Azusa Road 1
28.	Construction / Demolition	5-LSF4: Launch Support Facilities - Azusa Road 2
29.	Construction / Demolition	5-LSF5: Launch Support Facilities - ICBM Road
30.	Construction / Demolition	5-LSF6: Launch Support Facilities - Flight Control Road
31.	Construction / Demolition	5-LSF7: Launch Support Facilities - MSA 5
32.	Construction / Demolition	5-LSF8: Launch Support Facilities - Titan III East
33.	Construction / Demolition	5LSF9: Launch Support Facilities - Titan III West
34.	Construction / Demolition	5-ETF: NOTU Engineering Test Facility
35.	Construction / Demolition	5-Demo: Facility Demolition
36.	Construction / Demolition	1-Utility: Utility Corridor along ICBM Road
37.	Heating	New Facility Heating
38.	Emergency Generator	New Facility Emergency Generator

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: Brevard

Regulatory Area(s): NOT IN A REGULATORY AREA

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- Activity Title: 1-W1: Potable Water Resiliency - Storage Tanks

- Activity Description:
A 750,000-gallon potable water storage tank would be constructed on a grassy, 0.25-acre site located east of the CCSFS South Gate, and a 400,000-gallon water tank would be constructed on a 0.25-acre, site in the industrial area. Improvements would include chlorination, recirculation, and necessary piping to integrate the tanks into the existing system.

- Activity Start Date
Start Month: 1
Start Month: 2025

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2025

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.368255
SO_x	0.007628
NO_x	1.822405
CO	2.889041
PM 10	1.401613

Pollutant	Total Emissions (TONs)
PM 2.5	0.065800
Pb	0.000000
NH_3	0.001075
CO_2e	732.1

2.1 Site Grading Phase

2.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 6
Number of Days: 0

2.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 21780
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6

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Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

2.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Trenching/Excavating Phase

2.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

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- Phase Duration
Number of Month: 12
Number of Days: 0

2.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 300
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

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- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

2.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 1-WW1: Wastewater Resiliency - WWTP Equalization Basin

- Activity Description:
An additional 100,000-gallon equalization basin would be constructed on a one-acre, previously cleared, grassy site adjacent to the existing equalization basin at the Regional Wastewater Treatment Plant (RWWTP). Improvements would include construction of approximately 1,000 SF of impervious area (i.e., access drive and walkway), installation of two new submersible pumps and repair of related plant components to tie the new equalization basin into the existing system.

- Activity Start Date
Start Month: 1
Start Month: 2025

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2025

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.539069
SO_x	0.010067
NO_x	2.743137
CO	4.319668
PM 10	2.744338

Pollutant	Total Emissions (TONs)
PM 2.5	0.108525
Pb	0.000000
NH_3	0.002329
CO_2e	966.1

3.1 Site Grading Phase

3.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1

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Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 6
Number of Days: 0

3.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 43560
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								

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	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

3.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3.2 Trenching/Excavating Phase

3.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 12
Number of Days: 0

3.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 300
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

3.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3.3 Paving Phase

3.3.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 12
Number of Days: 0

3.3.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 1000

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- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.3.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

3.3.4 Paving Phase Formula(s)

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- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 1-WW3: Wastewater Resiliency - Perc Ponds

- Activity Description:
A percolation pond, approximately two acres in size, would be constructed within the developed footprint of both SLC 41 and SLC 40 to treat/store launch-related deluge and washdown water.

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.132991
SO_x	0.002460
NO_x	0.742924
CO	0.881582
PM 10	5.228260

Pollutant	Total Emissions (TONs)
PM 2.5	0.028260
Pb	0.000000
NH_3	0.000358
CO_2e	244.6

4.1 Site Grading Phase

4.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 6
Number of Days: 0

4.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 87120
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings

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Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

4.1.4 Site Grading Phase Formula(s)

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- Fugitive Dust Emissions per Phase
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 1-P2: Power Resiliency - MOC Generator

- Activity Description:
A 1.5-megawatt/480-volt emergency generator and 2000-amp automatic transfer switch would be installed at the MOC. Improvements would also include an above-ground storage tank for 500 gallons of fuel, new concrete pads, grounding, conduit, and conductors. Approximately 0.25 acres of impervious area would be added on a previously cleared, grassy site adjacent to the MOC.

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.171122
SO_x	0.002440
NO_x	0.920967
CO	1.430792
PM 10	0.042729

Pollutant	Total Emissions (TONs)
PM 2.5	0.042729
Pb	0.000000
NH_3	0.001258
CO_2e	234.1

5.1 Paving Phase

5.1.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

5.1.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 10890

- Paving Default Settings

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Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.1.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.578	000.008	000.613	005.086	000.009	000.008		000.034	00391.932
LDGT	000.823	000.010	001.060	008.566	000.010	000.009		000.034	00522.586
HDGV	001.597	000.016	002.785	026.982	000.023	000.020		000.046	00814.010
LDDV	000.216	000.004	000.307	004.001	000.006	000.006		000.008	00402.372
LDDT	000.537	000.006	000.822	008.176	000.008	000.008		000.008	00626.077
HDDV	000.762	000.015	007.639	002.810	000.395	000.363		000.028	01633.017
MC	003.190	000.008	000.648	014.785	000.027	000.024		000.048	00392.026

5.1.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 1-MSA: MSA - Munitions Storage Area

- Activity Description:

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New, modernized, and consolidated munitions storage magazines would be constructed adjacent to the current MSA 3 location. The new MSA complex would require clearing approximately 48 acres (50-foot clear zone around each magazine, 30-foot clear zone on each side of access roads, 30-foot clear zone on each side of the perimeter fence), with an estimated 12.25 acres of new impervious area. Within the MSA, site improvements would include 15 new buildings, weather tower, new access roads, roadway improvements (gravel to asphaltic concrete), additional parking, security measures, and operational space for assigned personnel to perform administrative functions such as inventory control, access control, and training. MSA 2 and MSA 5 would be demolished and returned to green space for future development compatible with land use planning goals.

- Activity Start Date
Start Month: 1
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.077671
SO_x	0.018650
NO_x	6.103009
CO	8.149740
PM 10	88.755804

Pollutant	Total Emissions (TONs)
PM 2.5	0.244671
Pb	0.000000
NH_3	0.005741
CO_2e	1881.0

6.1 Demolition Phase

6.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

6.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 52840
Height of Building to be demolished (ft): 10

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

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- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

6.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6.2 Site Grading Phase

6.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

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Number of Month: 6
Number of Days: 0

6.2.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1481040
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45

Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

6.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6.3 Building Construction Phase

6.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

6.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 273200
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	7
Forklifts Composite	2	7
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

6.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

6.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

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CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6.4 Paving Phase

6.4.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

6.4.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 260410

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

6.4.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2-Admin1: Admin/Lab/Warehouse - Admin Campus South

- Activity Description:
Administration facilities would be constructed on a 36-acre site west of Phillips Parkway near the existing SLD 45 headquarters facility. Administrative offices and support services, including the fitness center and pool, running track, dining hall, quick-service restaurant, and convenience store, would be relocated to this new administrative campus. Site improvements would include approximately 20 acres of facilities, access roads, parking, curbing, sidewalks, and other impervious areas. An estimated 16 acres would be cleared for stormwater management, lawns, and other pervious areas. Area and safety lighting would be provided. Administrative functions and personnel would be relocated from facilities 1645, 1704, 1708, 1711, 44410, 44440, 55150, 60600, 60650, 60701, and 60740. The following facilities would be demolished: 1645, 1704, 1708, 1711, 44410, 60600, and 60701, and the remaining facilities would be available for reallocation.

- Activity Start Date
Start Month: 1
Start Month: 2027

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- Activity End Date
Indefinite: False
End Month: 12
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	2.846185
SO_x	0.019999
NO_x	6.603480
CO	8.922789
PM 10	94.320325

Pollutant	Total Emissions (TONs)
PM 2.5	0.263118
Pb	0.000000
NH_3	0.007524
CO_2e	2055.4

7.1 Demolition Phase

7.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

7.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 217566
Height of Building to be demolished (ft): 10

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

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- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

7.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (0.00042 * BA * BH) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)

0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7.2 Site Grading Phase

7.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 6
Number of Days: 0

7.2.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1568160
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

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- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574

LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

7.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7.3 Building Construction Phase

7.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

7.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 145000
Height of Building (ft): 30
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

7.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

7.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7.4 Architectural Coatings Phase

7.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

7.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 145000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

7.4.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

7.5 Paving Phase

7.5.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

7.5.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 726200

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	8
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.5.3 Paving Phase Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

7.5.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

8. Construction / Demolition

8.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2-Admin2: Admin/Lab/Warehouse - Lighthouse

- Activity Description:
Shop, laboratory, and warehouse facilities would be constructed on four sites, totaling 63 acres, along Lighthouse Road between the Eastern Processing Facility (EPF) and the Air Force Space and Missile Museum. Facilities include a storage and warehouse buildings totaling 225,000 SF, shop/laboratory buildings totaling 95,000 SF, and two 50,000-SF administration and storage facilities. Construction would include approximately 33 acres of impervious improvements (e.g., facilities, access roads, parking, and sidewalks) and 30 acres of pervious improvements (e.g., lawns, stormwater management, and clear zones). Area and safety lighting would be provided. Shop, laboratory, and warehouse functions would be relocated from facilities 1604, 1611, 1612, 1621, 1708, 1711, 1739, 1744, 1759, 49505, 49535, 49536, 49750, 54814, 54820, 54935, and 60701. The

following facilities would be demolished: 1604, 1611, 1612, 1621, 1708, 1711, 1744, 1759, 49505, 49535, 49536, 49750, 54814, and 60701, and the remaining facilities would be available for reallocation.

- Activity Start Date
Start Month: 1
Start Month: 2029

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	4.012449
SO_x	0.023965
NO_x	8.070138
CO	10.147234
PM 10	164.522303

Pollutant	Total Emissions (TONs)
PM 2.5	0.318264
Pb	0.000000
NH_3	0.010493
CO_2e	2527.5

8.1 Demolition Phase

8.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 12
Number of Days: 0

8.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 192127
Height of Building to be demolished (ft): 10

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

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	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

8.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

8.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD}$ = (0.00042 * BA * BH) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

8.2 Site Grading Phase

8.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 6
Number of Days: 0

8.2.2 Site Grading Phase Assumptions

- General Site Grading Information

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Area of Site to be Graded (ft^2): 2744280
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	2	8
Other Construction Equipment Composite	2	8
Rollers Composite	1	8
Rubber Tired Dozers Composite	2	8
Scrapers Composite	4	8
Tractors/Loaders/Backhoes Composite	2	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

8.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rollers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0409	0.0007	0.2500	0.3762	0.0122	0.0122	0.0036	67.123
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

8.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

8.3 Building Construction Phase

8.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 12
Number of Days: 0

8.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 225000
Height of Building (ft): 40
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	7
Forklifts Composite	2	7
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

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- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

8.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

8.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

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- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

8.4 Architectural Coatings Phase

8.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 12
Number of Days: 0

8.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 225000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

8.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

8.4.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

8.5 Paving Phase

8.5.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 12
Number of Days: 0

8.5.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 1212480

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	8
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

8.5.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rollers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0409	0.0007	0.2500	0.3762	0.0122	0.0122	0.0036	67.123
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

8.5.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 2-Admin3: Admin/Lab/Warehouse - IRBM

- Activity Description:

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Two 25,000-SF facilities and supporting infrastructure would be constructed on two five-acre undeveloped sites east of IRBM Road and one 50,000-SF facility and supporting infrastructure would be constructed on 10 acres to the west. Among the three sites, approximately ten acres would contain impervious improvements and ten acres would be reserved for pervious improvements.

- Activity Start Date
Start Month: 1
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	2.050596
SO_x	0.016182
NO_x	5.309324
CO	6.881743
PM 10	52.217598

Pollutant	Total Emissions (TONs)
PM 2.5	0.217462
Pb	0.000000
NH_3	0.004677
CO_2e	1629.7

9.1 Site Grading Phase

9.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 6
Number of Days: 0

9.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 871200
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	3	8

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- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

9.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

9.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)

20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

9.2 Building Construction Phase

9.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

9.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 95000
Height of Building (ft): 25
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

9.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

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Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

9.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = BA * BH * (0.42 / 1000) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

9.3 Architectural Coatings Phase

9.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

9.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 95000

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Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

9.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

9.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
VMT_{WT} = (1 * WT * PA) / 800

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

9.4 Paving Phase

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

9.4.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

9.4.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 340600

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

9.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60

Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

9.4.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

10. Construction / Demolition

10.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 3-DuctBank: Concrete Duct Bank

- Activity Description:
Approximately 12 miles of existing telecommunication lines would be replaced and placed inside concrete-encased duct bank. The duct bank would be constructed adjacent to existing, unprotected duct bank and direct-buried telecommunications lines. New cabling would be installed and connected to existing switches. Additional site improvements would include grading, drainage, and site restoration.

- Activity Start Date
Start Month: 1
Start Month: 2025

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2025

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.235264
SO_x	0.005168
NO_x	1.079481
CO	2.007460

Pollutant	Total Emissions (TONs)
PM 2.5	0.037540
Pb	0.000000
NH_3	0.000717
CO_2e	487.5

PM 10	22.728449			

10.1 Trenching/Excavating Phase

10.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 12
Number of Days: 0

10.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 190080
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

10.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e

LDGV	000.578	000.008	000.613	005.086	000.009	000.008		000.034	00391.932
LDGT	000.823	000.010	001.060	008.566	000.010	000.009		000.034	00522.586
HDGV	001.597	000.016	002.785	026.982	000.023	000.020		000.046	00814.010
LDDV	000.216	000.004	000.307	004.001	000.006	000.006		000.008	00402.372
LDDT	000.537	000.006	000.822	008.176	000.008	000.008		000.008	00626.077
HDDV	000.762	000.015	007.639	002.810	000.395	000.363		000.028	01633.017
MC	003.190	000.008	000.648	014.785	000.027	000.024		000.048	00392.026

10.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

11. Construction / Demolition

11.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 4-Transport1: Haul Routes - NASA/Central Control Rd Connector

- Activity Description:
A new 0.25-mile roadway would be constructed to connect NASA Causeway to Central Control Road within the CCSFS industrial area. NASA Parkway East would be realigned to the north through a previously developed, 1.75-acre, vacant lot between Hangar Road and Phillips Parkway. This roadway connector would include two 12-foot lanes with four-foot shoulders.

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.363593
SO_x	0.005647
NO_x	2.006733
CO	2.756832
PM 10	2.611897

Pollutant	Total Emissions (TONs)
PM 2.5	0.090683
Pb	0.000000
NH_3	0.001805
CO_2e	553.6

11.1 Site Grading Phase

11.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

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- Phase Duration
Number of Month: 6
Number of Days: 0

11.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 42240
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

11.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

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- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

11.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

11.2 Paving Phase

11.2.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

11.2.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 42240

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	1	8
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

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	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

11.2.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

11.2.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

12. Construction / Demolition

12.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 4-Transport2: Haul Routes - South Phillips Pkwy Widening

- Activity Description:
Phillips Parkway would be widened from a four-lane divided roadway to a six-lane divided roadway from the CCSFS South Gate to just south of the industrial area, a distance of approximately eight miles. A lane would also be added to Hangar Road from its intersection with NASA Causeway to the merge with Phillips Parkway. All proposed lanes would be 12-feet wide with four-foot shoulders. Proposed improvements, including additional pavement and stormwater management facilities, would be constructed on approximately 50 acres adjacent to Philips Parkway and Hangar Road.

- Activity Start Date
Start Month: 1
Start Month: 2025

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- Activity End Date
Indefinite: False
End Month: 12
End Month: 2025

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.756356
SO_x	0.012021
NO_x	4.061276
CO	4.979374
PM 10	54.780322

Pollutant	Total Emissions (TONs)
PM 2.5	0.180294
Pb	0.000000
NH_3	0.002090
CO_2e	1201.3

12.1 Site Grading Phase

12.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 6
Number of Days: 0

12.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 914760
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

12.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

12.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

12.2 Paving Phase

12.2.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration

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Number of Month: 12
Number of Days: 0

12.2.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 914760

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	8
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

12.2.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

12.2.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

13. Construction / Demolition

13.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 4-Transport3: Haul Routes - Pulloffs

- Activity Description:
Ten 4,000-SF, paved passenger vehicle pullovers/refuge areas, totaling 1.5 acres, would be constructed along the north and southbound lanes of Phillips Parkway from the intersection with Titan III Road to SLC 41

- Activity Start Date
Start Month: 1
Start Month: 2025

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2025

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.363570
SO_x	0.005647
NO_x	2.006715
CO	2.756819
PM 10	2.567011

Pollutant	Total Emissions (TONs)
PM 2.5	0.090683
Pb	0.000000
NH_3	0.001805
CO_2e	553.6

13.1 Site Grading Phase

13.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

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- Phase Duration
Number of Month: 6
Number of Days: 0

13.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 41488
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

13.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

13.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

13.2 Paving Phase

13.2.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 12
Number of Days: 0

13.2.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 41488

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	1	8
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

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- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

13.2.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

13.2.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_P = (2.62 * PA) / 43560

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

14. Construction / Demolition

14.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 4-Transport4: Haul Routes - Lighthouse Rd Connector

- Activity Description:
A new 0.70-mile road would be constructed to connect Lighthouse Road through SLC 17 and SLC 18. This roadway connector would include two 12-foot lanes with four-foot shoulders, totaling 4.25-acres, generally within the legacy Lighthouse Road corridor.

- Activity Start Date
Start Month: 1
Start Month: 2025

- Activity End Date

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Indefinite: False
End Month: 12
End Month: 2025

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.442581
SO_x	0.006854
NO_x	2.448851
CO	3.332092
PM 10	11.160569

Pollutant	Total Emissions (TONs)
PM 2.5	0.110565
Pb	0.000000
NH_3	0.002099
CO_2e	673.2

14.1 Site Grading Phase

14.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 6
Number of Days: 0

14.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 185130
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	2	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

14.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

14.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

14.2 Paving Phase

14.2.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 12
Number of Days: 0

14.2.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 118272

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

14.2.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

14.2.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

15. Construction / Demolition

15.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 4-Transport5: Haul Routes - ICBM Rd/Lighthouse Rd Connector

- Activity Description:
A new 1.25-mile road would be constructed to connect ICBM Road to Lighthouse Road and Camera Road Bravo. This roadway connector would include two 12-foot lanes with four-foot shoulders and would extend from the intersection of ICBM and Central Control Road to the Lighthouse Road and Camera Road Bravo intersection. Proposed improvements, including additional pavement and stormwater management facilities, would be constructed on approximately 7.75 acres of undeveloped forested land.

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.465831
SO_x	0.007352
NO_x	2.520762
CO	3.504875
PM 10	20.263574

Pollutant	Total Emissions (TONs)
PM 2.5	0.113568
Pb	0.000000
NH_3	0.002129
CO_2e	719.3

15.1 Site Grading Phase

15.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 6
Number of Days: 0

15.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 337590
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

15.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999

HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

15.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

15.2 Paving Phase

15.2.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

15.2.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 211200

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

15.2.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

15.2.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre ($(43560\ ft2 / acre)^2$ / acre)

16. Construction / Demolition

16.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 4-Transport6: Haul Routes - ICBM/Phillips Pkwy Widening

- Activity Description:
Phillips Parkway and ICBM Road would be widened from the New Glenn Substation to Delta Substation, a distance of approximately four miles. The northbound lane of Phillips Parkway and ICBM Road would be widened to the east. The widening would consist of one 12-foot lane with a four-foot shoulder. Proposed improvements, including additional pavement and stormwater management facilities, would be constructed on approximately 24.25 acres adjacent to ICBM Road and Phillips Parkway

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2027

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.729226
SO_x	0.012084
NO_x	3.997251
CO	5.021813
PM 10	63.220956

Pollutant	Total Emissions (TONs)
PM 2.5	0.170954
Pb	0.000000
NH_3	0.002532
CO_2e	1194.9

16.1 Site Grading Phase

16.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 6
Number of Days: 0

16.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1056330
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

16.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

16.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

16.2 Paving Phase

16.2.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

16.2.2 Paving Phase Assumptions

- General Paving Information

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Paving Area (ft^2): 71438

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

16.2.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106

LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

16.2.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

17. Construction / Demolition

17.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 4-Gas: Gas Station/Restaurant

- Activity Description:
A fueling station would be constructed adjacent to the existing cafeteria (Building 01748) within the CCSFS industrial area. The existing cafeteria would be renovated to include a convenience store with exterior access to the fueling area. An existing access road from Hanger Road would be improved to accommodate higher traffic volumes. The fueling station would consist of four fueling pumps, underground fuel storage, canopy, service bays and waiting area, car wash, and ingress/egress/parking. A quick-service restaurant, with access driveways and parking, would be constructed adjacent to the fueling station on a vacant lot at the corner of NASA Parkway and Hangar Road. The proposed fueling station and restaurant would be constructed on a five-acre, improved, vacant site with approximately four acres of new impervious improvements including facilities, access roads, parking, curbing, and sidewalks. The remaining one acre would consist of pervious improvements (e.g., stormwater management and green space). Area and safety lighting would be provided.

- Activity Start Date
Start Month: 1
Start Month: 2029

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.560434
SO_x	0.008614
NO_x	2.831300
CO	3.995554
PM 10	13.122768

Pollutant	Total Emissions (TONs)
PM 2.5	0.122762
Pb	0.000000
NH_3	0.002662
CO_2e	842.6

17.1 Site Grading Phase

17.1.1 Site Grading Phase Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 6
Number of Days: 0

17.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 217800
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	2	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

17.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**

Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

17.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

17.2 Building Construction Phase

17.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 12
Number of Days: 0

17.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Commercial or Retail
Area of Building (ft^2): 3000
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

17.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

17.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.32 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.32 / 1000): Conversion Factor ft^3 to trips (0.32 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.05 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.05 / 1000): Conversion Factor ft^3 to trips (0.05 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

17.3 Architectural Coatings Phase

17.3.1 Architectural Coatings Phase Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 12
Number of Days: 0

17.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 3000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

17.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

17.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

17.4 Paving Phase

17.4.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 12
Number of Days: 0

17.4.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 171240

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	50.00	50.00	0	0	0	0	0

17.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

17.4.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_P = (2.62 * PA) / 43560

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

18. Tanks

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Proposed Fueling Station Tanks

- Activity Description:
The fueling station would consists of four fueling pumps and fuel storage

- Activity Start Date
Start Month: 1
Start Year: 2029

- Activity End Date
Indefinite: No
End Month: 12

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End Year: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.837039
SO_x	0.000000
NO_x	0.000000
CO	0.000000
PM 10	0.000000

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	0.0

18.2 Tanks Assumptions

- Chemical

Chemical Name: Gasoline (RVP 7.8)
Chemical Category: Petroleum Distillates
Chemical Density: 5.6
Vapor Molecular Weight (lb/lb-mole): 68
Stock Vapor Density (lb/ft^3): 0.0440124760613575
Vapor Pressure: 3.5721
Vapor Space Expansion Factor (dimensionless): 0.068

- Tank

Type of Tank: Horizontal Tank
Tank Length (ft): 30
Tank Diameter (ft): 12
Annual Net Throughput (gallon/year): 25000

18.3 Tank Formula(s)

- Vapor Space Volume

VSV = (PI / 4) * D^2 * L / 2

VSV: Vapor Space Volume (ft^3)
PI: PI Math Constant
D^2: Tank Diameter (ft)
L: Tank Length (ft)
2: Convertion Factor (Vapor Space Volume is assumed to be one-half of the tank volume)

- Vented Vapor Saturation Factor

VVSF = 1 / (1 + (0.053 * VP * L / 2))

VVSF: Vented Vapor Saturation Factor (dimensionless)
0.053: Constant
VP: Vapor Pressure (psia)
L: Tank Length (ft)

- Standing Storage Loss per Year

SSL_{VOC} = 365 * VSV * SVD * VSEF * VVSF / 2000

SSL_{VOC}: Standing Storage Loss Emissions (TONs)
365: Number of Daily Events in a Year (Constant)
VSV: Vapor Space Volume (ft^3)
SVD: Stock Vapor Density (lb/ft^3)
VSEF: Vapor Space Expansion Factor (dimensionless)
VVSF: Vented Vapor Saturation Factor (dimensionless)

2000: Conversion Factor pounds to tons

- Number of Turnovers per Year
NT = (7.48 * ANT) / ((PI / 4.0) * D * L)

NT: Number of Turnovers per Year
7.48: Constant
ANT: Annual Net Throughput
PI: PI Math Constant
D^2: Tank Diameter (ft)
L: Tank Length (ft)

- Working Loss Turnover (Saturation) Factor per Year
WLSF = (18 + NT) / (6 * NT)

WLSF: Working Loss Turnover (Saturation) Factor per Year
18: Constant
NT: Number of Turnovers per Year
6: Constant

- Working Loss per Year
WL_{VOC} = 0.0010 * VMW * VP * ANT * WLSF / 2000

0.0010: Constant
VMW: Vapor Molecular Weight (lb/lb-mole)
VP: Vapor Pressure (psia)
ANT: Annual Net Throughput
WLSF: Working Loss Turnover (Saturation) Factor
2000: Conversion Factor pounds to tons

19. Tanks

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Proposed Fueling Station Tanks

- Activity Description:
The fueling station would consists of four fueling pumps and fuel storage

- Activity Start Date
Start Month: 1
Start Year: 2029

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2029

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.837039
SO_x	0.000000
NO_x	0.000000
CO	0.000000
PM 10	0.000000

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	0.0

19.2 Tanks Assumptions

- Chemical

Chemical Name: Gasoline (RVP 7.8)
Chemical Category: Petroleum Distillates
Chemical Density: 5.6
Vapor Molecular Weight (lb/lb-mole): 68
Stock Vapor Density (lb/ft^3): 0.0440124760613575
Vapor Pressure: 3.5721
Vapor Space Expansion Factor (dimensionless): 0.068

- Tank

Type of Tank: Horizontal Tank
Tank Length (ft): 30
Tank Diameter (ft): 12
Annual Net Throughput (gallon/year): 25000

19.3 Tank Formula(s)

- Vapor Space Volume

VSV = (PI / 4) * D^2 * L / 2

VSV: Vapor Space Volume (ft^3)
PI: PI Math Constant
D^2: Tank Diameter (ft)
L: Tank Length (ft)
2: Convertion Factor (Vapor Space Volume is assumed to be one-half of the tank volume)

- Vented Vapor Saturation Factor

VVSF = 1 / (1 + (0.053 * VP * L / 2))

VVSF: Vented Vapor Saturation Factor (dimensionless)
0.053: Constant
VP: Vapor Pressure (psia)
L: Tank Length (ft)

- Standing Storage Loss per Year

SSL_{VOC} = 365 * VSV * SVD * VSEF * VVSF / 2000

SSL_{VOC}: Standing Storage Loss Emissions (TONs)
365: Number of Daily Events in a Year (Constant)
VSV: Vapor Space Volume (ft^3)
SVD: Stock Vapor Density (lb/ft^3)
VSEF: Vapor Space Expansion Factor (dimensionless)
VVSF: Vented Vapor Saturation Factor (dimensionless)
2000: Conversion Factor pounds to tons

- Number of Turnovers per Year
NT = (7.48 * ANT) / ((PI / 4.0) * D * L)

NT: Number of Turnovers per Year
7.48: Constant
ANT: Annual Net Throughput
PI: PI Math Constant
D^2: Tank Diameter (ft)
L: Tank Length (ft)

- Working Loss Turnover (Saturation) Factor per Year
WLSF = (18 + NT) / (6 * NT)

WLSF: Working Loss Turnover (Saturation) Factor per Year
18: Constant
NT: Number of Turnovers per Year
6: Constant

- Working Loss per Year
WL_{VOC} = 0.0010 * VMW * VP * ANT * WLSF / 2000

0.0010: Constant
VMW: Vapor Molecular Weight (lb/lb-mole)
VP: Vapor Pressure (psia)
ANT: Annual Net Throughput
WLSF: Working Loss Turnover (Saturation) Factor
2000: Conversion Factor pounds to tons

20. Tanks

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Proposed Fueling Station Tanks

- Activity Description:
The fueling station would consists of four fueling pumps and fuel storage

- Activity Start Date
Start Month: 1
Start Year: 2029

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)	Pollutant	Total Emissions (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

VOC	0.837039
SO_x	0.000000
NO_x	0.000000
CO	0.000000
PM 10	0.000000

PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	0.0

20.2 Tanks Assumptions

- Chemical

Chemical Name: Gasoline (RVP 7.8)
Chemical Category: Petroleum Distillates
Chemical Density: 5.6
Vapor Molecular Weight (lb/lb-mole): 68
Stock Vapor Density (lb/ft^3): 0.0440124760613575
Vapor Pressure: 3.5721
Vapor Space Expansion Factor (dimensionless): 0.068

- Tank

Type of Tank: Horizontal Tank
Tank Length (ft): 30
Tank Diameter (ft): 12
Annual Net Throughput (gallon/year): 25000

20.3 Tank Formula(s)

- Vapor Space Volume

VSV = (PI / 4) * D^2 * L / 2

VSV: Vapor Space Volume (ft^3)
PI: PI Math Constant
D^2: Tank Diameter (ft)
L: Tank Length (ft)
2: Convertion Factor (Vapor Space Volume is assumed to be one-half of the tank volume)

- Vented Vapor Saturation Factor

VVSF = 1 / (1 + (0.053 * VP * L / 2))

VVSF: Vented Vapor Saturation Factor (dimensionless)
0.053: Constant
VP: Vapor Pressure (psia)
L: Tank Length (ft)

- Standing Storage Loss per Year

SSL_{VOC} = 365 * VSV * SVD * VSEF * VVSF / 2000

SSL_{VOC}: Standing Storage Loss Emissions (TONs)
365: Number of Daily Events in a Year (Constant)
VSV: Vapor Space Volume (ft^3)
SVD: Stock Vapor Density (lb/ft^3)
VSEF: Vapor Space Expansion Factor (dimensionless)
VVSF: Vented Vapor Saturation Factor (dimensionless)
2000: Conversion Factor pounds to tons

- Number of Turnovers per Year

NT = (7.48 * ANT) / ((PI / 4.0) * D * L)

NT: Number of Turnovers per Year
7.48: Constant
ANT: Annual Net Throughput
PI: PI Math Constant
D^2: Tank Diameter (ft)
L: Tank Length (ft)

- Working Loss Turnover (Saturation) Factor per Year
WLSF = (18 + NT) / (6 * NT)

WLSF: Working Loss Turnover (Saturation) Factor per Year
18: Constant
NT: Number of Turnovers per Year
6: Constant

- Working Loss per Year
WL_{VOC} = 0.0010 * VMW * VP * ANT * WLSF / 2000

0.0010: Constant
VMW: Vapor Molecular Weight (lb/lb-mole)
VP: Vapor Pressure (psia)
ANT: Annual Net Throughput
WLSF: Working Loss Turnover (Saturation) Factor
2000: Conversion Factor pounds to tons

21. Tanks

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Proposed Fueling Station Tanks

- Activity Description:
The fueling station would consists of four fueling pumps and fuel storage

- Activity Start Date
Start Month: 1
Start Year: 2029

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.837039
SO_x	0.000000

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

NO_x	0.000000
CO	0.000000
PM 10	0.000000

NH_3	0.000000
CO_2e	0.0

21.2 Tanks Assumptions

- Chemical

Chemical Name: Gasoline (RVP 7.8)
Chemical Category: Petroleum Distillates
Chemical Density: 5.6
Vapor Molecular Weight (lb/lb-mole): 68
Stock Vapor Density (lb/ft^3): 0.0440124760613575
Vapor Pressure: 3.5721
Vapor Space Expansion Factor (dimensionless): 0.068

- Tank

Type of Tank: Horizontal Tank
Tank Length (ft): 30
Tank Diameter (ft): 12
Annual Net Throughput (gallon/year): 25000

21.3 Tank Formula(s)

- Vapor Space Volume

VSV = (PI / 4) * D^2 * L / 2

VSV: Vapor Space Volume (ft^3)
PI: PI Math Constant
D^2: Tank Diameter (ft)
L: Tank Length (ft)
2: Convertion Factor (Vapor Space Volume is assumed to be one-half of the tank volume)

- Vented Vapor Saturation Factor

VVSF = 1 / (1 + (0.053 * VP * L / 2))

VVSF: Vented Vapor Saturation Factor (dimensionless)
0.053: Constant
VP: Vapor Pressure (psia)
L: Tank Length (ft)

- Standing Storage Loss per Year

SSL_{VOC} = 365 * VSV * SVD * VSEF * VVSF / 2000

SSL_{VOC}: Standing Storage Loss Emissions (TONs)
365: Number of Daily Events in a Year (Constant)
VSV: Vapor Space Volume (ft^3)
SVD: Stock Vapor Density (lb/ft^3)
VSEF: Vapor Space Expansion Factor (dimensionless)
VVSF: Vented Vapor Saturation Factor (dimensionless)
2000: Conversion Factor pounds to tons

- Number of Turnovers per Year

NT = (7.48 * ANT) / ((PI / 4.0) * D * L)

NT: Number of Turnovers per Year

7.48: Constant
ANT: Annual Net Throughput
PI: PI Math Constant
D^2: Tank Diameter (ft)
L: Tank Length (ft)

- Working Loss Turnover (Saturation) Factor per Year
WLSF = (18 + NT) / (6 * NT)

WLSF: Working Loss Turnover (Saturation) Factor per Year
18: Constant
NT: Number of Turnovers per Year
6: Constant

- Working Loss per Year
WL_{VOC} = 0.0010 * VMW * VP * ANT * WLSF / 2000

0.0010: Constant
VMW: Vapor Molecular Weight (lb/lb-mole)
VP: Vapor Pressure (psia)
ANT: Annual Net Throughput
WLSF: Working Loss Turnover (Saturation) Factor
2000: Conversion Factor pounds to tons

22. Construction / Demolition

22.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 4-Shops: Shop Consolidation

- Activity Description:
A Consolidated Base Support Complex would be constructed on a 5.75-acre site within the existing impervious parking area around Hangar N (Building 01728), located in the industrial area. The complex would consist of four buildings: one maintenance shop (30,000 SF) east of Hanger N and three maintenance or storage facilities (5,000 SF each) along the northeastern edge of the paved area. Multiple civil engineering base support maintenance shops and a storage facility would be consolidated at this location including the Crane Rigging Shop (Building 01635), Generator Shop (Building 44625), Pest Operations (Building 44633), Searchlight Shop (Building 44636), Electric Shop and Supply (Building 49816), and the Heavy Equipment Shop (Building 49835). Following consolidation, the existing buildings would be demolished. No clearing or additional impervious areas would be required.

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2026

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.872922
SO_x	0.006531
NO_x	2.055186
CO	3.217516
PM 10	0.164824

Pollutant	Total Emissions (TONs)
PM 2.5	0.070287
Pb	0.000000
NH_3	0.002551
CO_2e	641.8

22.1 Demolition Phase

22.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

22.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 45000
Height of Building to be demolished (ft): 10

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

22.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

22.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

22.2 Building Construction Phase

22.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

22.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 45000
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day

Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

22.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498

MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

22.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)

BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

22.3 Architectural Coatings Phase

22.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

22.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 45000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

22.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

22.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

23. Construction / Demolition

23.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 4-SouthGate1: South Gate - Reconfigure Entry Control Point

- Activity Description:
Phillips Parkway leading to the South Gate of CCSFS would be reconfigured to support 24/7 operations and improve security measures. Approximately 1,600 feet of Phillips Parkway would be reconstructed to a traffic-calming configuration. Improvements would occur within a 5.5-acre site along the existing roadway corridor between Building 01068 (Pass and Identification Building) and the CCSFS South Gate.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.443235
SO_x	0.006399
NO_x	2.518626
CO	3.101424
PM 10	16.477433

Pollutant	Total Emissions (TONs)
PM 2.5	0.122941
Pb	0.000000
NH_3	0.001433
CO_2e	635.6

23.1 Site Grading Phase

23.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 6
Number of Days: 0

23.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 274000
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	2	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	50.00	50.00	0	0	0	0	0

23.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

23.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)

$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

23.2 Paving Phase

23.2.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

23.2.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 274000

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

23.2.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

23.2.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_P = (2.62 * PA) / 43560

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

24. Construction / Demolition

24.1 General Information & Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 4-SouthGate2: South Gate - Truck Inspection Facility

- Activity Description:
Two new inspection bays would be added to the existing truck inspection facility (Building 91923). The addition would be constructed on a previously developed, vacant, three-acre site south of the existing vehicle inspection facility. Approximately 2.5 acres of the site would contain impervious improvements, including the new bays, access roads, parking/queuing area, curbing, and sidewalks. A half-acre would be reserved for pervious improvements such as clear zones, lawns, and stormwater management. Area and safety lighting would be provided.

- Activity Start Date
Start Month: 1
Start Month: 2025

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2025

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.442289
SO_x	0.006853
NO_x	2.448629
CO	3.331937
PM 10	7.910564

Pollutant	Total Emissions (TONs)
PM 2.5	0.110561
Pb	0.000000
NH_3	0.002096
CO_2e	673.1

24.1 Site Grading Phase

24.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 6
Number of Days: 0

24.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 130680
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	2	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

24.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

24.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

24.2 Paving Phase

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

24.2.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 12
Number of Days: 0

24.2.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 108900

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

24.2.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

24.2.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

25. Construction / Demolition

25.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 5-LSF1: Launch Support Facilities - Skid Strip North

- Activity Description:
A 120,000-SF facility would be constructed on a 31-acre undeveloped site north of the CCSFS runway and directly adjacent to the west side of Armory Road. Approximately 18 acres would contain impervious improvements and 13 acres would be reserved for pervious improvements.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	2.427831
SO_x	0.016476
NO_x	5.896835
CO	7.133328
PM 10	80.854691

Pollutant	Total Emissions (TONs)
PM 2.5	0.254515
Pb	0.000000
NH_3	0.004119
CO_2e	1645.9

25.1 Site Grading Phase

25.1.1 Site Grading Phase Timeline Assumptions

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- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 6
Number of Days: 0

25.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1350360
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

25.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0584	0.0013	0.2523	0.5090	0.0100	0.0100	0.0052	119.71
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90

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Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1564	0.0026	0.9241	0.7301	0.0368	0.0368	0.0141	262.83
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

25.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

25.2 Building Construction Phase

25.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

25.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 120000
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6

Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

25.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

25.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)

(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

25.3 Architectural Coatings Phase

25.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

25.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 120000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

25.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

25.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

25.4 Paving Phase

25.4.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

25.4.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 664080

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8

Paving Equipment Composite	2	8
Rollers Composite	2	6

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

25.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0584	0.0013	0.2523	0.5090	0.0100	0.0100	0.0052	119.71
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1564	0.0026	0.9241	0.7301	0.0368	0.0368	0.0141	262.83
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

25.4.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

26. Construction / Demolition

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

26.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 5-LSF2: Launch Support Facilities - Central Control

- Activity Description:
• A 130,000-SF facility would be constructed on a 50-acre undeveloped site north of Central Control Road, between Armory Road and Azusa Road. Approximately 17 acres would contain impervious improvements and 33 acres would be reserved for pervious improvements.

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	2.669384
SO_x	0.019411
NO_x	6.505036
CO	7.835381
PM 10	130.269534

Pollutant	Total Emissions (TONs)
PM 2.5	0.269446
Pb	0.000000
NH_3	0.004337
CO_2e	1945.0

26.1 Site Grading Phase

26.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 6
Number of Days: 0

26.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 2178000
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	2	8
Other Construction Equipment Composite	2	8
Rubber Tired Dozers Composite	2	8
Scrapers Composite	4	8
Tractors/Loaders/Backhoes Composite	2	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

26.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

26.1.4 Site Grading Phase Formula(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

26.2 Building Construction Phase

26.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

26.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 130000
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	0	0	0	0	0	100.00	0

26.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

26.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

26.3 Architectural Coatings Phase

26.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

26.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 130000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

26.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

26.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)

BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

26.4 Paving Phase

26.4.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

26.4.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 610520

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	8
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

26.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89

Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

26.4.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

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- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

27. Construction / Demolition

27.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 5-LSF3: Launch Support Facilities - Azusa Road 1

- Activity Description:
Three facilities, totaling 100,000-SF, would be constructed on a 22-acre undeveloped site south of an improved and extended Azusa Road, between ICBM Road and Central Control Road. Approximately ten acres would contain impervious improvements and twelve acres would be reserved for pervious improvements. The improved and extended Azusa Road would be constructed on 11 acres between Central Control Road and ICBM Road, with approximately four acres of impervious improvements, of which one acre is the existing road.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)	Pollutant	Total Emissions (TONs)

VOC	2.158866
SO_x	0.016090
NO_x	5.698636
CO	6.915584
PM 10	83.443373

PM 2.5	0.243219
Pb	0.000000
NH_3	0.003942
CO_2e	1602.9

27.1 Site Grading Phase

27.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 6
Number of Days: 0

27.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1393920
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

27.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0584	0.0013	0.2523	0.5090	0.0100	0.0100	0.0052	119.71
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1564	0.0026	0.9241	0.7301	0.0368	0.0368	0.0141	262.83
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

27.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

27.2 Building Construction Phase

27.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

27.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 100000

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Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

27.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

27.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
VMT_{VT} = BA * BH * (0.38 / 1000) * HT

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

27.3 Architectural Coatings Phase

27.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

27.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 100000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

27.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

27.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
VMT_{WT} = (1 * WT * PA) / 800

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

27.4 Paving Phase

27.4.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

27.4.2 Paving Phase Assumptions

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- General Paving Information
Paving Area (ft^2): 466280

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

27.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0584	0.0013	0.2523	0.5090	0.0100	0.0100	0.0052	119.71
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1564	0.0026	0.9241	0.7301	0.0368	0.0368	0.0141	262.83
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631

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HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

27.4.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

28. Construction / Demolition

28.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 5-LSF4: Launch Support Facilities - Azusa Road 2

- Activity Description:
A 50,000-SF facility would be constructed on a 15-acre undeveloped site south of the Azusa Road, east of Central Control Road. Approximately six acres would contain impervious improvements and nine acres would be reserved for pervious improvements.

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.438081
SO_x	0.014490
NO_x	4.749355
CO	6.346584
PM 10	39.194242

Pollutant	Total Emissions (TONs)
PM 2.5	0.194209
Pb	0.000000
NH_3	0.004024
CO_2e	1425.6

28.1 Site Grading Phase

28.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 6
Number of Days: 0

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28.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft^2): 653400
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	2	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

28.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

28.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

28.2 Building Construction Phase

28.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

28.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 50000
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

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- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

28.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

28.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment

WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

28.3 Architectural Coatings Phase

28.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

28.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 50000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

28.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

28.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
VMT_{WT} = (1 * WT * PA) / 800

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)

WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

28.4 Paving Phase

28.4.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

28.4.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 211360

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

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- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

28.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

28.4.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_P = (2.62 * PA) / 43560

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

29. Construction / Demolition

29.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

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- Activity Title: 5-LSF5: Launch Support Facilities - ICBM Road

- Activity Description:
Two 25,000-SF facilities and supporting infrastructure would be constructed on a 10-acre undeveloped site east of ICBM Road. Approximately five acres would contain impervious improvements and five acres would be reserved for pervious improvements.

- Activity Start Date
Start Month: 1
Start Month: 2025

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2025

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.279629
SO_x	0.011766
NO_x	3.875095
CO	5.569746
PM 10	26.159462

Pollutant	Total Emissions (TONs)
PM 2.5	0.159430
Pb	0.000000
NH_3	0.003831
CO_2e	1149.1

29.1 Site Grading Phase

29.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 6
Number of Days: 0

29.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 435600
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8

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Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

29.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

29.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)

ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

29.2 Building Construction Phase

29.2.1 Building Construction Phase Timeline Assumptions

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- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 12
Number of Days: 0

29.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 50000
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

29.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

29.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = BA * BH * (0.42 / 1000) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
VMT_{VT} = BA * BH * (0.38 / 1000) * HT

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

29.3 Architectural Coatings Phase

29.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 12
Number of Days: 0

29.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 50000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

29.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

29.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
VMT_{WT} = (1 * WT * PA) / 800

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

29.4 Paving Phase

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29.4.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration
Number of Month: 12
Number of Days: 0

29.4.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 167800

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

29.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60

Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

29.4.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre ($43560\ ft2 / acre)^2$ / acre)

30. Construction / Demolition

30.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 5-LSF6: Launch Support Facilities - Flight Control Road

- Activity Description:
Three 40,000-SF facilities, supporting infrastructure, and access road connections would be constructed on a 34-acre undeveloped site south of Flight Control Road and west of IRBM Road. Approximately eight acres would contain impervious improvements and 26 acres would be reserved for pervious improvements.

- Activity Start Date
Start Month: 1
Start Month: 2027

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	2.334972
SO_x	0.016094
NO_x	5.258494
CO	6.846092
PM 10	88.616635

Pollutant	Total Emissions (TONs)
PM 2.5	0.216565
Pb	0.000000
NH_3	0.003977
CO_2e	1602.4

30.1 Site Grading Phase

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30.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 6
Number of Days: 0

30.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1481040
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

30.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70

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Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

30.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

30.2 Building Construction Phase

30.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

30.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 120000
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

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Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

30.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574

LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

30.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

30.3 Architectural Coatings Phase

30.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

30.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 120000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

30.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999

HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

30.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

30.4 Paving Phase

30.4.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2027

- Phase Duration
Number of Month: 12
Number of Days: 0

30.4.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 228480

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

30.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

30.4.4 Paving Phase Formula(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_P = (2.62 * PA) / 43560

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

31. Construction / Demolition

31.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 5-LSF7: Launch Support Facilities - MSA 5

- Activity Description:
Six facilities, totaling approximately 100,000 SF, and supporting infrastructure would be constructed on the site of MSA 5 along the east side of Phillips Parkway, south of Mission Control Road. Proposed facilities would be constructed following the demolition and relocation of MSA 5. Because this site is located within threatened and endangered species habitat, all new construction would be limited to currently developed/cleared areas.

- Activity Start Date
Start Month: 1
Start Month: 2029

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2029

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.396057
SO_x	0.004452
NO_x	1.375861
CO	2.079970
PM 10	0.046295

Pollutant	Total Emissions (TONs)
PM 2.5	0.046242
Pb	0.000000
NH_3	0.001998
CO_2e	441.4

31.1 Building Construction Phase

31.1.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 12
Number of Days: 0

31.1.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 100000
Height of Building (ft): 10

Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

31.1.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

31.1.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
VMT_{VT} = BA * BH * (0.38 / 1000) * HT

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

31.2 Architectural Coatings Phase

31.2.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2029

- Phase Duration
Number of Month: 12
Number of Days: 0

31.2.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 100000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

31.2.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

31.2.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

32. Construction / Demolition

32.1 General Information & Timeline Assumptions

- Activity Location

County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 5-LSF8: Launch Support Facilities - Titan III East

- Activity Description:

Four facilities, totaling 180,000 SF, supporting infrastructure, and access road connections would be constructed on two 17-acre undeveloped sites along the east side of Titan III Road, near the industrial area.

Approximately 23 acres would contain new impervious improvements and nine acres would be reserved for pervious improvements.

- Activity Start Date
Start Month: 1
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	3.078975
SO_x	0.016525
NO_x	5.467730
CO	7.080802
PM 10	88.627196

Pollutant	Total Emissions (TONs)
PM 2.5	0.227075
Pb	0.000000
NH_3	0.004509
CO_2e	1659.1

32.1 Site Grading Phase

32.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 6
Number of Days: 0

32.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1481040
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

32.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

32.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)

WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

32.2 Building Construction Phase

32.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

32.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 180000
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

32.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

32.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

32.3 Architectural Coatings Phase

32.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

32.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 180000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

32.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

32.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

32.4 Paving Phase

32.4.1 Paving Phase Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

32.4.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 821880

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	8
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

32.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

32.4.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre $(43560\ ft2\ /\ acre)^2$ / acre)

33. Construction / Demolition

33.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 5LSF9: Launch Support Facilities - Titan III West

- Activity Description:
Two facilities, totaling 120,000 SF, supporting infrastructure, and access road connections would be constructed on two sites (14 acres total) west of the Titan III Road causeway. Most of this area has been previously cleared and existing parking and access drives would be reused. Building 70659 (22,983 SF), which is currently vacant, and the surrounding facilities/pavement (approximately 43,503 SF) would be demolished.

- Activity Start Date
Start Month: 1
Start Month: 2028

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2028

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.941483
SO_x	0.010239
NO_x	3.199294
CO	4.648352
PM 10	13.251896

Pollutant	Total Emissions (TONs)
PM 2.5	0.112192
Pb	0.000000
NH_3	0.003492
CO_2e	1020.6

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33.1 Demolition Phase

33.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

33.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 66486
Height of Building to be demolished (ft): 10

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

33.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

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Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

33.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (0.00042 * BA * BH) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

33.2 Site Grading Phase

33.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 6
Number of Days: 0

33.2.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 217800
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Tractors/Loaders/Backhoes Composite	2	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

33.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

33.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment

WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

33.3 Building Construction Phase

33.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

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33.3.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft^2): 120000
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

33.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057

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Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

33.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

33.4 Architectural Coatings Phase

33.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration
Number of Month: 12
Number of Days: 0

33.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 120000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

33.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

33.4.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

33.5 Paving Phase

33.5.1 Paving Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2028

- Phase Duration

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Number of Month: 12
Number of Days: 0

33.5.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 0

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

33.5.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498

MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

33.5.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

34. Construction / Demolition

34.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 5-ETF: NOTU Engineering Test Facility

- Activity Description:
An Engineering Test Facility (ETF), including office and laboratories (245,000 SF), would be constructed on a 37-acre site south of Pier Road to support DoD research, development, and testing requirements. Site improvements would include security fencing, utilities, landscaping, stormwater management, and approximately 405,000 SF of parking, roadways, and sidewalks.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	3.896544
SO_x	0.017258
NO_x	6.104396
CO	7.825990
PM 10	39.078498

Pollutant	Total Emissions (TONs)
PM 2.5	0.256146
Pb	0.000000
NH_3	0.005406
CO_2e	1736.2

34.1 Demolition Phase

34.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

34.1.2 Demolition Phase Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- General Demolition Information

Area of Building to be demolished (ft^2): 11914
Height of Building to be demolished (ft): 10

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

34.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0357	0.0006	0.2608	0.3715	0.0109	0.0109	0.0032	58.544
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

34.1.4 Demolition Phase Formula(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards ($1\ yd^3 / 27\ ft^3$)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

34.2 Site Grading Phase

34.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 6
Number of Days: 0

34.2.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 650000
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	2	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

34.2.3 Site Grading Phase Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0584	0.0013	0.2523	0.5090	0.0100	0.0100	0.0052	119.71
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1564	0.0026	0.9241	0.7301	0.0368	0.0368	0.0141	262.83
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

34.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

34.3 Building Construction Phase

34.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

34.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 245000
Height of Building (ft): 10
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	7
Forklifts Composite	2	7
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

34.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0715	0.0013	0.4600	0.3758	0.0161	0.0161	0.0064	128.78
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0246	0.0006	0.0973	0.2146	0.0029	0.0029	0.0022	54.451
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0303	0.0006	0.2464	0.2674	0.0091	0.0091	0.0027	61.061
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0227	0.0003	0.1427	0.1752	0.0059	0.0059	0.0020	25.653

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- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

34.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = BA * BH * (0.42 / 1000) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

34.4 Architectural Coatings Phase

34.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

34.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 245000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

34.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

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	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

34.4.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
VMT_{WT} = (1 * WT * PA) / 800

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

34.5 Paving Phase

34.5.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12
Number of Days: 0

34.5.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 405000

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

34.5.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0584	0.0013	0.2523	0.5090	0.0100	0.0100	0.0052	119.71
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0714	0.0014	0.3708	0.5706	0.0167	0.0167	0.0064	132.90
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0461	0.0012	0.2243	0.3477	0.0079	0.0079	0.0041	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1564	0.0026	0.9241	0.7301	0.0368	0.0368	0.0141	262.83
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620

LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263
HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

34.5.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

35. Construction / Demolition

35.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 5-Demo: Facility Demolition

- Activity Description:
Facilities that no longer meet mission requirements and/or have deteriorated beyond repair would be demolished. Facilities prioritized for demolition are based on existing condition. Salvageable materials would be recycled, and unsalvageable materials would be disposed of properly. Utility lines, where present, would be isolated, cut, and capped, and the building sites would be backfilled/stabilized and graded for drainage. Where compatible with the CCSFS planning goals, impervious areas would be returned to open space and would be available for future development.

- Activity Start Date
Start Month: 1
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.121092
SO_x	0.002105
NO_x	0.739646
CO	1.158367
PM 10	0.053045

Pollutant	Total Emissions (TONs)
PM 2.5	0.028006
Pb	0.000000
NH_3	0.000756
CO_2e	208.6

35.1 Demolition Phase

35.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 12

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Number of Days: 0

35.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 11914
Height of Building to be demolished (ft): 10

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

35.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0357	0.0006	0.2608	0.3715	0.0109	0.0109	0.0032	58.544
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1747	0.0024	1.1695	0.6834	0.0454	0.0454	0.0157	239.47
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0348	0.0007	0.1980	0.3589	0.0068	0.0068	0.0031	66.875

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.227	000.002	000.112	003.995	000.003	000.003		000.024	00326.033
LDGT	000.249	000.003	000.200	004.463	000.005	000.004		000.026	00420.631
HDGV	001.020	000.006	000.905	015.294	000.024	000.021		000.052	00940.955
LDDV	000.055	000.001	000.084	003.818	000.002	000.002		000.008	00335.620
LDDT	000.064	000.001	000.127	002.601	000.003	000.003		000.008	00381.263

HDDV	000.117	000.004	002.489	001.691	000.053	000.049		000.032	01275.703
MC	003.044	000.003	000.569	012.909	000.024	000.021		000.052	00386.988

35.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD}$ = (0.00042 * BA * BH) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

36. Construction / Demolition

36.1 General Information & Timeline Assumptions

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: 1-Utility: Utility Corridor along ICBM Road

- Activity Description:
A utility corridor would be constructed along ICBM Road and Samuel C. Phillips Parkway (Phillips Parkway) with connections to SLCs 13, 14, 15, 16, 19, 20, and 34. The corridor would cover approximately 300 acres, extending 150 feet from the edge of pavement along both sides of ICBM Road and Phillips Parkway, beginning at SLC 36 and the New Glenn Substation and continuing north to the installation boundary (7.15 miles). Portions of the corridor contain existing utilities; however, up to approximately 150 acres of vegetation would be cleared for new construction. Utilities within the corridor would include power, potable water, wastewater, and communications. Approximately 34 Florida Power and Light (FPL) poles and transmission lines would be relocated 50 feet to the west within the proposed utility corridor.

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.489732
SO_x	0.008887
NO_x	2.691700
CO	3.119733
PM 10	22.189503

Pollutant	Total Emissions (TONs)
PM 2.5	0.105022
Pb	0.000000
NH_3	0.000985
CO_2e	883.2

36.1 Site Grading Phase

36.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 6
Number of Days: 0

36.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 370000
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rollers Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

36.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60

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Rollers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0409	0.0007	0.2500	0.3762	0.0122	0.0122	0.0036	67.123
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.217	000.002	000.097	003.798	000.003	000.003		000.024	00318.106
LDGT	000.234	000.003	000.176	004.231	000.004	000.004		000.026	00412.011
HDGV	000.995	000.006	000.827	014.430	000.023	000.021		000.052	00945.995
LDDV	000.053	000.001	000.078	003.752	000.003	000.002		000.008	00323.574
LDDT	000.060	000.001	000.117	002.519	000.003	000.003		000.008	00374.999
HDDV	000.103	000.004	002.324	001.630	000.044	000.041		000.032	01247.498
MC	003.040	000.003	000.567	012.758	000.024	000.021		000.052	00387.105

36.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

37. Heating

37.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: New Facility Heating

- Activity Description:
Facility heating post-construction

- Activity Start Date
Start Month: 1
Start Year: 2030

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.735769
SO_x	0.080266

Pollutant	Emissions Per Year (TONs)
PM 2.5	1.016699
Pb	0.000000

NO_x	13.377617
CO	11.237198
PM 10	1.016699

NH_3	0.000000
CO_2e	16105.3

37.2 Heating Assumptions

- Heating
Heating Calculation Type: Heat Energy Requirement Method

- Heat Energy Requirement Method
Area of floorspace to be heated (ft^2): 2198200
Type of fuel: Natural Gas
Type of boiler/furnace: Commercial/Institutional (0.3 - 9.9 MMBtu/hr)
Heat Value (MMBtu/ft^3): 0.00105
Energy Intensity (MMBtu/ft^2): 0.1278

- Default Settings Used: Yes

- Boiler/Furnace Usage
Operating Time Per Year (hours): 900 (default)

37.3 Heating Emission Factor(s)

- Heating Emission Factors (lb/1000000 scf)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
5.5	0.6	100	84	7.6	7.6			120390

37.4 Heating Formula(s)

- Heating Fuel Consumption ft^3 per Year
FC_{HER}= HA * EI / HV / 1000000

FC_{HER}: Fuel Consumption for Heat Energy Requirement Method
HA: Area of floorspace to be heated (ft^2)
EI: Energy Intensity Requirement (MMBtu/ft^2)
HV: Heat Value (MMBTU/ft^3)
1000000: Conversion Factor

- Heating Emissions per Year
HE_{POL}= FC * EF_{POL} / 2000

HE_{POL}: Heating Emission Emissions (TONs)
FC: Fuel Consumption
EF_{POL}: Emission Factor for Pollutant
2000: Conversion Factor pounds to tons

38. Emergency Generator

38.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

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County: Brevard
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: New Facility Emergency Generator

- Activity Description:
Emergency generator post-construction

- Activity Start Date
Start Month: 1
Start Year: 2030

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.225990
SO_x	0.190350
NO_x	0.931500
CO	0.622080
PM 10	0.203310

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.203310
Pb	0.000000
NH_3	0.000000
CO_2e	107.7

38.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 40

- Default Settings Used: Yes

- Emergency Generators Consumption
Emergency Generator's Horsepower: 135 (default)
Average Operating Hours Per Year (hours): 30 (default)

38.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

38.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

APPENDIX C

SCRUB AND MARITIME HAMMOCK COMMUNITY DESCRIPTIONS

Scrub

The dominant vegetative community within Cape Canaveral Space Force Station (CCSFS) is scrub, which can be further classified into coastal oak, oak, or rosemary scrub (USAF 2020). Scrub is a community composed of evergreen shrubs, with or without a canopy of pines, and is found on dry, acid, sandy ridges. Characteristic species of this upland community include Florida rosemary (*Ceratiola ericoides*), sand pine (*Pinus clausa*), shrubby oaks – myrtle oak (*Quercus myrtifolia*), sand live oak (*Q. geminata*), and Chapman's oak (*Q. chapmanii*) -- plus rusty lyonia (*Lyonia ferruginea*) and saw palmetto (*Serenoa repens*). (FNAI 2010). The scrub community is found on the oldest dune ridges in the west side of CCSFS.

Historically, stands with a short fire return interval maintained an evergreen oak canopy and saw palmetto understory while stands that had a less frequent fire return interval maintained a sand pine overstory. Well-drained sites generally have more of the shrubby evergreen oak component while moister sites tend to be dominated by saw palmetto. Coastal scrub stands are important as they serve as habitat for a variety of rare and endangered species including the Florida scrub jay (*Aphelocoma coerulescens*), southeastern beach mouse (*Peromyscus polionotus niveiventris*), eastern indigo snake (*Drymarchon couperi*), and gopher tortoise (*Gopherus polyphemus*). Rare plant species found in clearings in scrub habitat within CCSFS include brownhair snoutbean (*Rhynchosia cinerea*), Curtiss' milkweed (*Asclepias curtissii*), nodding pinweed (*Lechea cernua*), and coastal dune sandmat (*Chamaesyce cumulicola*).

Natural wildfires are believed to have maintained scrub communities as a low, open habitat suitable for these species. Exclusion of fire in these communities eliminates open sandy areas and can lead to succession from low scrub to xeric hammock (Veno 1976). Prescribed burning is highly recommended for wildlife habitat management in southern forests, especially those considered fire sub-climax communities. The proper size, frequency and time of burn are critical to the successful use of fire in managing wildlife habitat and maintaining biodiversity. The USFWS service recommends a fire return interval of every 6 to 12 years (USFWS 1999). When prescribed fire is not a viable option due to safety and mission constraints, mechanical treatments may be used to reduce the height of vegetation prior to conducting prescribed burns to reduce flame height and fire intensity.

During the preparation of the *CCSFS District Development Plan* (USSF 2022), a corridor of scrub habitat was identified to restrict development in these areas, promote species movement, and focus habitat restoration activities. Compensatory mitigation would be provided for unavoidable impacts for to scrub habitat as determined through Section 7 consultation with the United States Fish and Wildlife Service (USFWS).

Maritime Hammock

As defined by the Florida Natural Areas Inventory (FNAI), maritime hammock is a coastal upland habitat type predominantly consisting of evergreen hardwood forest growing on relict coastal dunes. Species composition changes from north to south with temperate species dominating from the Georgia border to Cape Canaveral and tropical species increasingly prevalent south of Cape Canaveral. Cape Canaveral is a unique geographic location because of the transition from temperate to tropical biomes, and therefore includes representative plant species of both. Temperate maritime hammock consists of a dense canopy dominated by live oak (*Quercus virginiana*), cabbage palm (*Sabal palmetto*), red bay (*Persea borbonia)*, and pignut hickory (*Carya glabra*) with a shrub/sub-canopy layer of red cedar (*Juniperus virginiana*), tough bully (*Sideroxylon tenax*), wax myrtle (*Myrica cerifera*), and saw palmetto (*Serenoa repens*). Tropical maritime hammock includes gumbo limbo (*Bursera simaruba*), false mastic (*Sideroxylon foetidissimum*), strangler fig (*Ficus aurea*), seagrape (*Coccoloba uvifera*), and Spanish stopper (*Eugenia foetida*) with tropical shrub layer of myrsine (*Rapanea punctata*), Simpson's stopper (*Myrcianthes fragrans*), marlberry (*Ardisia escallonioides*), and wild coffee (*Psychotria nervosa*) (FNAI 2010). Maritime hammock at CCSFS is found along the western perimeter adjacent to the Banana River/Indian River Lagoon, and in areas northeast and southeast of the Skid Strip.

Temperate and tropical maritime hammocks serve as crucial resting and foraging areas for songbirds on their fall and spring migrations to and from the tropics. Migratory bird surveys accomplished at CCSFS in 1998 and again in 2007-2009 found that during spring migration and winter surveys the largest number of migratory birds (Neotropical and Nearctic) were found within the sizeable areas of maritime hammock including a substantial variety and abundance of warbler species. In the 2007-2009 surveys there was also significant use by ovenbirds (*Seiurus aurocapilla*), American redstarts (*Setophaga ruticilla*), eastern phoebes (*Sayornis phoebe*), chuck-will widows (*Antrostomus carolinensis*), common nighthawks (*Chordeiles minor*), scarlet tanagers (*Piranga olivacea*), and gray kingbirds (*Tyrannus dominicensis*). This more recent survey data also noted resident woodpeckers were predominately in maritime hammock, and red-bellied and pileated woodpeckers (*Melanerpes carolinus* and *Dryocopus pileatus*)could be extirpated from CCSFS if this habitat type disappears (SpecPro 2007 and 2009).

Maritime hammock should remain intact as much as possible for migratory bird stopovers to alleviate impacts to species already in jeopardy due to loss of resting, foraging and breeding habitat as well as loss of energy reserves with longer, unanticipated migration paths required to find suitable habitat. Additionally, maritime hammock forests and scrub communities are a critical element in carbon sequestration and storage as Florida forests are known to store millions of tons of carbon a year with offset of annual greenhouse gas emissions by 13% in the U.S. (Maggard et al 2017). Proposed development in the *CCSFS District Development Plan* (USSF 2022) weighed the importance of threatened and endangered species and migratory bird habitat and accepted some loss of forests to reduce overall habitat fragmentation, increase wildlife corridors and work towards sustaining biodiversity and habitat resilience.

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APPENDIX D

COASTAL ZONE MANAGEMENT CONSISTENCY DETERMINATION

Appendix D

COASTAL ZONE MANAGEMENT CONSISTENCY DETERMINATION

According to Section 307 of the Coastal Zone Management Act (CZMA), federal projects that affect land uses, water uses, or coastal resources in a state's coastal zone must be consistent, to the maximum extent practicable, with the enforceable policies of that state's federally approved coastal zone management plan. The Florida Coastal Management Program (FCMP) is based on a network of state agencies implementing 24 enforceable policies (statutory authorities) that protect and enhance Florida's natural, cultural, and economic coastal resources. The Florida Department of Environmental Protection (FDEP) implements the FCMP and makes the state's final consistency determination, which will either agree or disagree with the applicant's own consistency determination.

It is anticipated that the Proposed Action would be consistent with the CZMA and FCMP. Table D-1 provides a summary of the 24 enforceable policies and the Proposed Action's consistency with each policy.

Table D-1. Coastal Zone Management Consistency Determination
Environmental Assessment for Eastern Range Planning and Infrastructure Development, Cape Canaveral Space Force Station (CCSFS), Florida

Florida Statute	Legal Scope	Consistency Evaluation
Chapter 161 *Beach and Shore Preservation*	Authorizes the Bureau of Beaches and Coastal Systems within FDEP jurisdiction to regulate construction on or seaward of the state's beaches.	The Proposed Action would not adversely affect beach and shore management, specifically as it pertains to the Coastal Construction Permit Program, the Coastal Construction Control Line (CCCL) Program, and the Coastal Zone Protection Program. The Proposed Action would not occur seaward of the CCCL.
Chapter 163, Part II *Growth Policy; County and Municipal Planning; Land Development Regulation*	Requires local governments to prepare, adopt, and implement comprehensive plans that encourage the most appropriate use of land and natural resources in a manner consistent with the public interest.	The Proposed Action would occur entirely within CCSFS and, therefore, would not affect municipal or county government comprehensive plans.
Chapter 186 *State and Regional Planning*	Details state level planning requirements. Requires the development of special statewide plans governing water use, land development, and transportation	As part of the National Environmental Policy Act (NEPA) process, the Proposed Action has been coordinated with federal, state, and local governments and agencies, including the FDEP State Clearinghouse, for compatibility with state and regional planning.
Chapter 252 *Emergency Management*	Provides for planning and implementation of the state's response to, efforts to recover from, and the mitigation of natural and man-made disasters.	The Proposed Action would occur entirely within CCSFS and would not have an effect on the ability of the state to respond to or recover from natural or manmade disasters.
Chapter 253 *State Lands*	Addresses the state's administration of public lands and property of this state and provides direction regarding the acquisition, disposal, and management of all state lands.	No state lands would be disturbed during the construction, renovation, infrastructure construction, or demolition and, therefore, would not be affected.
Chapter 258 *State Parks and Preserves*	Addresses administration and management of state parks and preserves.	The Proposed Action would not directly impact state parks, recreational areas or preserves. Secondary or indirect impacts to environmental or social resources related to the Proposed Action are not anticipated to be significant. Opportunity for recreation on state lands would not be affected.

Florida Statute	Legal Scope	Consistency Evaluation
Chapter 259 *Land Acquisition for Conservation or Recreation*	Authorizes acquisition of environmentally endangered lands and outdoor recreation lands.	The Proposed Action would occur entirely within CCSFS and would not have an effect on the acquisition of environmentally endangered or outdoor recreation lands.
Chapter 260 *Recreational Trails System*	Authorizes acquisition of land to create a recreational trails system and to facilitate management of the system.	The Proposed Action would occur entirely within CCSFS and would impact the acquisition of land to create a recreational trails system.
Chapter 267 *Historical Resources*	Addresses management and preservation of the state's archaeological and historical resources.	The Proposed Action is not anticipated to adversely affect historical or cultural resources of the State of Florida. Section 106 of the National Historic Preservation Act (NHPA) consultation with the Florida SHPO is ongoing. Any mitigation measures identified during the consultation.
Chapter 288 *Commercial Development and Capital Improvements*	Provides the framework for promoting and developing the general business, trade, and tourism components of the state economy.	The Proposed Action would occur entirely on an active military installation with limited access to the public and limited or no implications for or effect on general business, trade, and tourism components of the state economy.
Chapter 334 *Transportation Administration*	Addresses the state's policy concerning transportation administration.	The Proposed Action would not have an impact on the state's transportation administration policies.
Chapter 339 *Transportation Finance and Planning*	Addresses the finance and planning needs of the state's transportation system.	The Proposed Action would not have an effect on the finance and planning needs of the state's transportation system.
Chapter 373 *Water Resources*	Addresses the state's policy concerning water resources.	The Proposed Action could have negligible to minor impacts on surface waters and groundwater. Short-term, indirect, negligible impacts from soil disturbance could create non-point source water pollution; however, best management practices (BMPs) would be utilized to reduce the chance of impacts on surface water resources. The Proposed Action could impact up to 240 acres of floodplains and could decrease the beneficial values that floodplains provide; however, all impacts occur entirely within CCSFS and would result in negligible to minor impacts on floodplains. During the design and permitting phase of the project, measures would be implemented to avoid/minimize floodplain impacts, and mitigation would be provided for unavoidable floodplain impacts. The Proposed Action could impact up to 20 acres of wetlands and up to 1 acre of other surface waters. During the design and permitting phase of the project measures would be implemented to avoid/minimize impacts to wetlands and other surface waters and, through coordination with the United States Army Corps of Engineers (USACE) and the St. Johns River Water Management District (SJRWMD), appropriate mitigation will be identified to offset unavoidable impacts. Overall, there would be no significant impacts on water resources as a result of the Proposed Action.

Florida Statute	Legal Scope	Consistency Evaluation
Chapter 375 *Outdoor Recreation and Conservation Lands*	Develops outdoor recreation plans to document recreational supply/demand, describe current recreational opportunities, estimate need for additional opportunities, and propose means to meet the identified needs.	The Proposed Action occurs entirely within CCSFS and would not impact the state's development or evaluation of multipurpose outdoor recreation plans.
Chapter 376 *Pollutant Discharge Prevention and Removal*	Regulates transfer, storage, and transportation of pollutants, and cleanup of pollutant discharges.	CCSFS currently maintains a stormwater discharge permit from FDEP. The Proposed Action would implement project-specific BMPs in accordance with this existing or modified permit conditions. In addition, the contractor for each project would be required to prepare a *Spill Prevention, Control, and Countermeasure Plan* documenting measures to prevent accidental release of petroleum, oil, and lubricants to the environment and, should they occur, the corrective action to minimize environmental impacts. The Proposed Action would not alter the types of hazardous and other regulated materials used at Patrick SFB (e.g., cleaning solvents, lubricants). No involvement with or impact to hazardous materials or wastes is anticipated. The Proposed Action would not involve the transfer of pollutants between vessels; between onshore facilities and vessels; between offshore facilities and vessels; or between terminal facilities within jurisdiction of the state and state waters.
Chapter 377 *Energy Resources*	Addresses regulation, planning, and development of energy resources of the state.	Implementation of the Proposed Action would not cause unsupportable demands on available natural resources or energy supplies, and the construction and operation of the Proposed Action would not require nonrenewable resources.

Florida Statute	Legal Scope	Consistency Evaluation
Chapter 379 *Fish and Wildlife Conservation*	Addresses management and protection of fish and wildlife in the state.	The Proposed Action would have impacts on vegetation potentially utilized by wildlife. Undeveloped uplands and wetlands/other surface waters provide habitat to wildlife species. However, the small number of individuals that may be impacted from the implementation of the Proposed Action would not appreciably reduce the overall population of wildlife species found known to occur within the region. It is anticipated that the Proposed Action would “may adversely affect” the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake. The Action “may affect but is not likely to adversely affect” several other federally and state listed species. Mitigation for incidental take would be provided, and BMPs would be implemented as determined through Section 7 consultation. Coordination with the 45th Civil Engineer Squadron Environmental Office (45 CES/CEIE) would be required during the design and permitting phase of each improvement within the Proposed Action to ensure compliance with the *Integrated Natural Resources Management Plan* (INRMP) and federal and state agency guidelines. Lighting systems would be designed to avoid or reduce illumination effects on sea turtles in accordance with USFWS guidelines and coordination with 45 CES/CEIE would be required prior to any ground disturbing activities. If any gopher tortoise burrows cannot be avoided by 25 feet, the tortoises would be relocated in accordance with the current INRMP. If gopher tortoises are in close proximity to the construction site, silt fencing or some other type of barrier would be erected to keep tortoises from moving into the construction area after surveys have been completed.
Chapter 380 *Land and Water Management*	Establishes land and water management policies to guide and coordinate local decisions relating to growth and development.	The Proposed Action would be consistent with local land and water management plans. The improvements within the Proposed Action are subject to federal and state permit, stormwater, and environmental regulations and will require coordination with and authorization from the USACE, FDEP and SJRWMD.
Chapter 381 *Public Health, General Provision*	Establishes public policy concerning the state’s public health system.	The Proposed Action does not involve the construction of an onsite sewage treatment and disposal system. Construction activities associated with the Proposed Action is governed by regulations established by the AFIs and the Occupational Safety and Health Administration (OSHA). No appreciable change in the type, quantity, or disposal of solid wastes is expected. The Proposed Action would not impact public policy or management in regard to sanitation, communicable diseases, or public health.
Chapter 388 *Mosquito Control*	Addresses mosquito control efforts in the state.	The Proposed Action would not affect local mosquito control efforts or contribute to increased propagation of mosquitos.

Florida Statute	Legal Scope	Consistency Evaluation
Chapter 403 *Environmental Control*	Establishes public policy concerning environmental control in the state.	The Proposed Action would include project-specific BMPs and pollution prevention measures for the construction and operation of each project. The Proposed Action is not expected to exceed applicable state water quality standards or have substantial and long-term water quality impacts. Air pollutant emissions associated with the construction of the Proposed Action would not exceed federal or state significance thresholds or cause exceedances of air quality standards. Changes to the long-term air emissions resulting from the Proposed Action are expected to be negligible. Construction and operational wastes would be collected, transported, recycled, and disposed of in compliance with applicable federal, state, and local regulations. USSF would obtain and comply with all applicable permits as required by law.
Chapter 553 *Building Construction Standard*	Provides a mechanism for the uniform adoption, updating, amendment, interpretation, and enforcement of a single, unified state building code, to be called the Florida Building Code. Obtain a permit from the appropriate enforcing agency.	The Proposed Action would not affect the Building Construction Standards of the State of Florida. USSF would obtain and comply with all applicable permits as required by law.
Chapter 582 *Soil and Water Conservation*	Provides for the control and prevention of soil erosion.	Prior to construction of each project within the Proposed Action, a project-specific Stormwater pollution prevention plan (SWPPP) would be developed and followed, and project-specific BMPs addressing erosion and sediment controls would be implemented to minimize impact to soils and water quality. The Proposed Action would be consistent with the current characteristic features of the area and landscape and would not result in any changes to land use. The Proposed Action would not affect soils or farmland within a Soil and Water Conservation District and would not convert prime farmland.
Chapter 597 *Aquaculture*	Establishes public policy concerning the cultivation of aquatic organisms.	The Proposed Action has no activities related to the cultivation of marine species in the Study Area. The Proposed Action activities would not affect aquaculture.
Source: Florida Statutes, as identified in table.		

APPENDIX E

SOLID WASTE MANAGEMENT UNIT FACT SHEETS

UNITED STATES AIR FORCE
45TH SPACE WING

Fact Sheet For: **ORDNANCE SUPPORT FACILITY, FACILITY 1381, SWMU NO. C021**
INSTALLATION RESTORATION PROGRAM– SITE DP032
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **MONITORED NATURAL ATTENUATION ON PLUME; OPERATION AND MONITORING ON PLUME CONTOLR SYSTEM; MAINTENANCE OF GROUNDWATER LAND USE CONTROLS**

Site History: Solid Waste Management Unit (SWMU) No. C021, Facility 1381, is located in the center of Cape Canaveral Air Force Station (CCAFS) southeast of Armory Road (see site map, below). Facility 1381 was constructed in 1958. The site was initially identified due to the former presence of an acid neutralization pit. Waste industrial solvents and other products were reportedly disposed of by discharging them into the acid neutralization pit on-site. Since 1979, the site has been used by the United States Coast Guard as an Ordnance Support Facility.

Environmental Media and Contaminants:

Groundwater: Residual industrial solvents were identified as contaminants of concern in groundwater. Detected concentrations were significantly above appropriate screening values. The solvent plume emanating from the site covers over 100 acres. Robust source treatment was undertaken in 2006.

Soil: No contaminants were detected in soil at concentrations that pose a risk to human health or the environment.

Surface Water: Solvent residuals were detected at low levels in the canal to the southwest. As an Interim Measure (IM), aerators were installed in the canal to treat contaminants discharging from the groundwater to the canal. The electrical in-canal system was replaced with a passive interceptor basin in 2013, which exerts hydraulic control to prevent groundwater contamination from reaching the canal.

Sediment: No contaminants were detected in sediment at concentrations that pose a risk to human health or the environment.

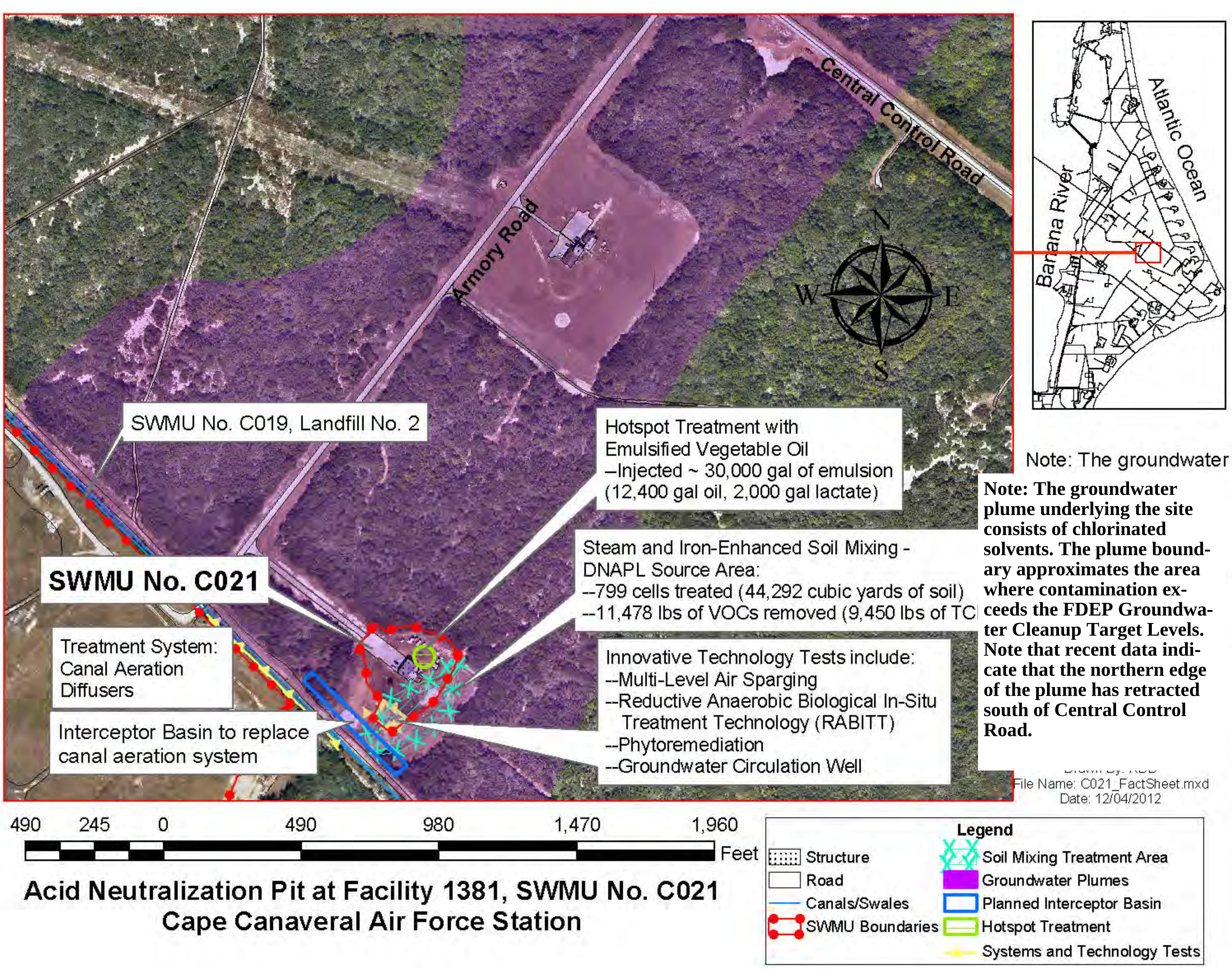
Corrective Action Summary: In accordance with the Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) was completed for the site in 1993. A Site Investigation (SI) was then completed in 1995. Based on the results of the PA and SI, a RCRA Facility Investigation (RFI) was conducted to fully evaluate the nature and extent of contamination at the site and to assess the human health and ecological risk posed by site contaminants. The RFI was completed in 1998 and recommended that a Corrective Measures Study (CMS) be completed to determine the appropriate remedy for groundwater. Over the site's early history, various innovative technologies were tested there to evaluate their effectiveness on high-concentrations of chlorinated solvents.

The CMS determined that chlorinated solvent source material in the subsurface was causing the groundwater contamination and recommended that a large diameter auger be employed to homogenize the subsurface, while injecting steam and iron to treat the "Dense NonAqueous Phase Liquid" (DNAPL). Concurrently with the CMS, an Interim Measure was conducted to install an aeration system in the adjacent canal, treating any contaminated groundwater that might discharge there and preventing downgradient migration of contamination to the Banana River. The Statement of Basis for the Facility 1381 remedy was finalized and released for public review during August 2005, then formalized in a fall 2005 permit modification. The remedy was identified as source treatment (steam and iron-enhanced soil mixing), continued surface water protective measures, and long term monitored natural attenuation and land use controls.

The Corrective Measures Design (CMD) was finalized in June 2005. The steam and iron-enhanced soil mixing remedy was implemented from June 2006 to June 2007, treating 44,292 cubic yards of soil and removing over 11,478 pounds of volatile organic compounds. After five years, no significant rebound was observed in the treated area. One area of DNAPL that was outside the soil mixing treatment area was treated in 2013 by injecting emulsified vegetable oil (EVO), which both sequesters the contamination and provides a carbon source for enhanced bioremediation. Following the EVO treatment, one persistent area remained with elevated vinyl chloride, but recent data indicates that it may be attenuating. A basin was constructed in 2013 between the source area and the canal to hydraulically prevent contaminant discharge to the canal. This system replaced the former electrical in-canal aeration system.

Site-wide 1,4-dioxane sampling was performed in 2011, including wells from the 1381 monitoring network and wells from the compliance monitoring network for the adjacent landfill. Of samples collected, elevated concentrations were identified at 8 locations. Several of these were more in proximity to the landfill than to Facility 1381. 1,4-dioxane sampling at several locations was integrated into the monitoring program at Facility 1381.

Future Actions: Monitored natural attenuation (MNA) is being performed plume-wide on remaining groundwater contamination. Groundwater land use controls will be maintained until groundwater concentrations are within acceptable regulatory limits. Plume controls in the interceptor basin will be maintained and monitored until the groundwater plume no longer impacts the local surface water. As MNA continues, future assessment may be considered to evaluate any remaining hotspots, ensure adequate well network coverage as the plume retracts, and determine a schedule/process for sundowning the interceptor basin. The recent Optimization Report and Five Year Review contained optimization recommendations. Among other recommendations, an update to the Statement of Basis was identified. A draft was prepared under the Performance-Based Remediation contract, but never formally initiated with FDEP.



Fact sheets are a summary provided for convenience. They are not intended as definitive documentation of official status. The Contractor is solely responsible for reviewing all available government furnished information and forming their independent, professional conclusions/interpretations of site conditions and requirements to achieve the Performance Objectives of this contract within Period of Performance specified for each site.

IRP Process Flow Chart

SWMU No. C021 (Facility 1381, Acid Neutralization Pit, CCAFS)

1992	Preliminary Assessment (RCRA Facility Assessment)	
1993	Site Investigation (Confirmation Sampling)	
1995	RCRA Facility Investigation	Interim Measure (Tank Removal); Innovative Technology* (Multi-Level Air Sparging Demo); Innovative Technology* (Phytoremediation)
1998	Corrective Measures Study	Innovative Technology* (Groundwater Circulation Well); Innovative Technology* (Reductive Anaerobic Biological In-Situ Treatment Technology); Interim Measure In-Canal Aeration Diffusers
2002	Statement of Basis	
	Corrective Measure Design	
2005	Corrective Measure Implementation	
2007 – 2098	Land Use Controls Monitored Natural Attenuation on Remaining Groundwater Plume Plume Control System Operation	Interim Measure Passive Interceptor Basin; Interim Measure Vegetable Oil Hotspot Treatment

*Innovative Technologies are routinely tested at IRP sites to determine if they can be used to effectively remediate contamination. If successful, these technologies may be left in place or taken full-scale at the testing site. Technologies that prove successful may be exported to similar 45 SW Sites and other Sites across the country. Innovative Technology Tests are usually funded by outside research entities, rather than the IRP.

Upper left: Front of Facility 1381, during years of Coast Guard occupancy.
Upper right: Construction of passive interceptor basin (2012).
Lower right: Aeration diffusers in canal southwest of Facility 1381.
Lower left: Soil mixing equipment at Fac 1381 (approx 2007). Rear of building can be seen at left in photo.

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UNITED STATES AIR FORCE
45th SPACE WING

Fact Sheet For: **HANGAR K, FACILITY 60425, SWMU NO. C022**
INSTALLATION RESTORATION PROGRAM– SITE DP035
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **TREAMENT BASIN OPERATION, MAINTENANCE AND MONITORING; MONITORED NATURAL ATTENUATION ON PLUME**

Site History: Solid Waste Management Unit (SWMU) No. C022, the Hangar K Area, is located in the Cape Canaveral Air Force Station (CCAFS) Industrial Area (see site map, below). The hangar was constructed in 1957 for launch-support activities such as fabrication, maintenance, repair, painting, and parts cleaning. Chemicals known to have been used or stored there include trichloroethane (TCA), trichloroethene (TCE), isopropyl alcohol (IPA), methanol, freon, paints and thinners, acetone, metal cleaning solutions, and phosphoric acid. These compounds were utilized both inside and outside the hangar. Currently the hangar is used to support critical launch-related operations by a base tenant.

Environmental Media and Contamination

Groundwater: Contaminants detected in the groundwater include industrial solvents and 1,4-dioxane. The detected concentrations of these contaminants are significantly above appropriate screening values. The solvent plume in groundwater covers over 100 acres. A robust source treatment action was undertaken in 2010.

Soil: A dry well at the site was removed with associated soil. Soil containing polynuclear aromatic hydrocarbons (PAHs) was later removed from drainage swales. Land use controls are srequired due to residual PAH contamination between residential and industrial cleanup levels.

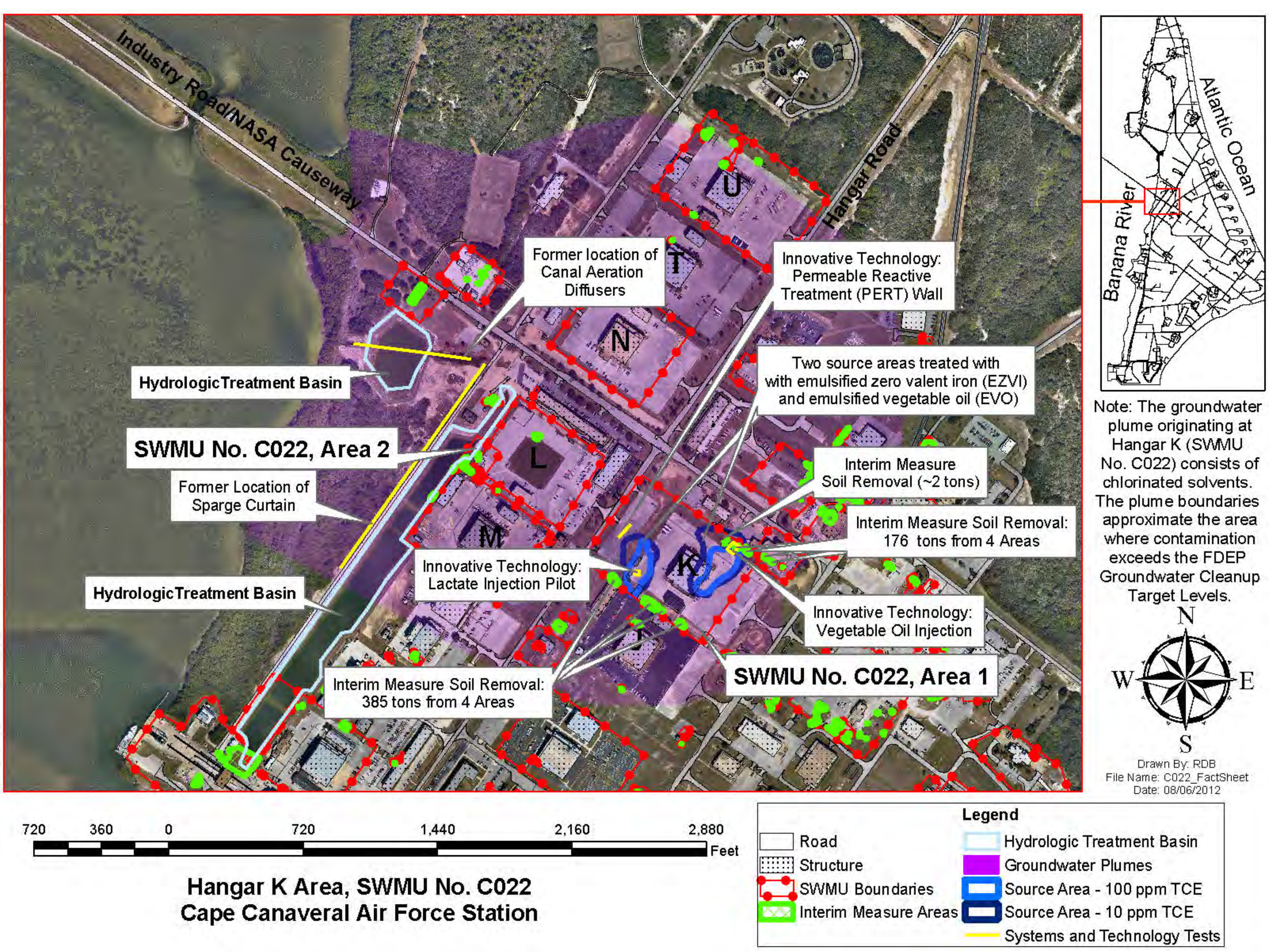
Surface Water and Sediments: Contaminants associated with residual industrial solvents were detected in surface water in the downgradient Facility 1798 canal, due to discharges from the Hangar K plume. Electrically-powered in-canal aeration diffusers and an air sparge curtain were installed to control downgradient migration in the late 1990s. Both systems were replaced with more sustainable passive hydrologic treatment basins in 2010.

Corrective Action Summary: In accordance with the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) was completed in 1993. A Site Investigation (SI) was then completed in 1995. Based on the results of the PA and SI, a RCRA Facility Investigation (RFI) was conducted to fully evaluate the nature and extent of contamination at the site and to assess the human health and ecological risk posed by site contaminants. The RFI was completed in 1998 and included a risk assessment and an intrinsic remediation treatability study. Several Interim Measures (IMs) have been implemented to date. Two soil IMs were conducted in 1996 in order to address contamination associated with a former solvent underground storage tank and a dry well. An additional IM was completed in early 2010 to remove remaining contaminated soils, leaving the site safer for industrial re-use from a soil perspective. Land use controls have been implemented to prevent residential re-use and ensure that residual soil contamination remains on-site and does not impact workers.

In the late 1990s, a biosparge system and aeration diffusers were installed adjacent to Facility 1798 in order to halt the migration of contaminated groundwater from the groundwater plume into the 1798 canal and toward the Banana River. As of 2010, these systems were replaced with two "passive hydrologic treatment basins" that exert broader hydraulic control, provide increased protection to the lagoon, and ensure that there are no adverse impacts from plume discharge to surface water. Maintenance and performance monitoring on the basin system is on-going.

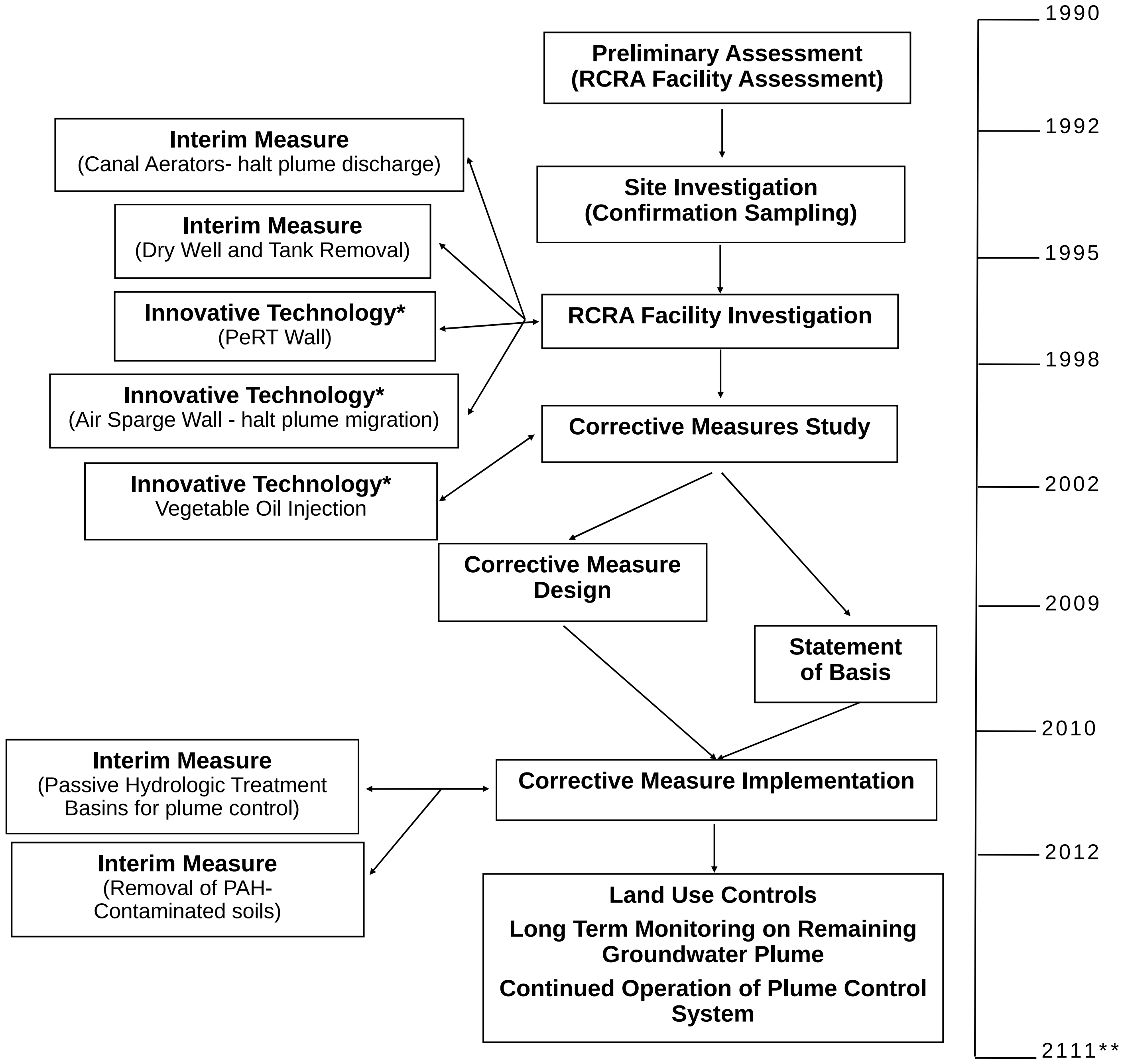
The Corrective Measures Study (CMS) completed in 2002 recommended co-solvent extraction in order to address the two chlorinated solvent source areas at the site. During design, safety and implementability issues were identified, eliminating the potential cleanup technology. Follow-up design work focused on collecting additional site data to assist with selection of an alternate cleanup technology under a performance-based contract. This cleanup contract was awarded in 2009. A bioremediation remedy was identified, including injection of emulsified zero valent iron (EZVI) and emulsified vegetable oil (EVO) into the source areas. A Statement of Basis (SB) for this remedy was completed in 2010. The remedy identified in the SB included source treatment (enhanced bioremediation), continued surface water protective measures, long term monitored natural attenuation, and land use controls. Two rounds of injections at both solvent source areas have been completed: October 2010 through January 2011 and December 2011 through February 2012. Performance monitoring was completed, followed by an on-going monitored natural attenuation program. In 2016, a limited subset of wells were sampled for 1,4-dioxane. The wells with concentrations in excess of the regulatory standard were added to the monitoring program.

Future Actions: Performance monitoring and maintenance around the basins is on-going, with monitored natural attenuation on the entire plume. Monitoring and additional assessment data may be used to determine the need for additional treatment in the future. Long term site management activities include operation of the plume control system (Hydrologic Treatment Basins), monitoring of residual groundwater contamination, and maintenance of land use controls. These actions will be required until residual contamination is removed or naturally attenuates to an acceptable regulatory level. The recent Optimization Report and Five Year Review included optimization recommendations. Among other recommendations, an update to the Statement of Basis was identified. A draft was prepared under the Performance-Based Remediation contract, but never formally initiated with FDEP. As MNA continues, other assessment may be considered to evaluate remaining hotspots or data gaps and to determine whether other future treatment may be warranted.



IRP Process Flow Chart

SWMU No. C022 (Hangar K Area, CCAFS)



*Innovative Technologies are routinely tested at IRP sites to determine if they can be used to effectively remediate contamination. If successful, these technologies may be left in place or taken full-scale at the testing site. Technologies that prove successful may be exported to similar 45 SW Sites and other Sites across the country. Innovative Technology Tests are usually funded by outside research entities, rather than the IRP.

**Groundwater model prepared during CMS estimated that even with >90% source removal, it would still take over 200 years for residual groundwater plume to naturally attenuate. Re-evaluated during recent five year review, using post-treatment performance data, indicates a significant reduction.

<u>Upper left</u>: Construction of primary treatment basin— a pond of approximately 12 acres, located just west of CCAFS Industrial Area (approx 2010).

<u>Bottom left</u>: Sparge wall was located behind guard rail on Scrub Jay Road. It was removed in 2010 upon completion of treatment basins.

<u>Bottom right</u>: EZVI injection in Hangar K solvent source area (approx 2011)

Fact sheets are a summary provided for convenience. They are not intended as definitive documentation of official status. The Contractor is solely responsible for reviewing all available government furnished information and forming their independent, professional conclusions/interpretations of site conditions and requirements to achieve the Performance Objectives of this contract within Period of Performance specified for each site.

UNITED STATES AIR FORCE
45TH SPACE WING

Fact Sheet For: **LANDFILL NO. 1, SWMU NO. C025**
INSTALLATION RESTORATION PROGRAM– SITE LF018
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **LONG TERM MONITORING IN PROGRESS WITH LAND USE CONTROLS FOR GROUNDWATER AND SOIL**

Site History: Solid Waste Management Unit (SWMU) No. C025 or Landfill No. 1 was a landfill used between the 1950 and 1969 for the disposal of general base refuse including office, cafeteria, and industrial materials . The site is located on the west side of Cape Canaveral Air Force Station (CCAFS) south of the industrial area (See site map, below). Industrial wastes disposed at the site may have included motor oil, paint shop wastes, waste solvents, transformer fluid filters, pesticide containers, asbestos, and other drummed wastes. Wastes were either buried in pits or incinerated in a large burn pit. The burn pit was backfilled with dredge materials from the Banana River following termination of disposal activities. Laboratory animals used for radiological testing were reportedly buried at the landfill. For many years, the southern portion of the site contained the Base salvage yard, with the rest of the site occupied by vegetation. The Base salvage yard was closed in 2018 and house-keeping activities are on-going in the area to ensure that all material associated with salvage activities is removed from the area.

Environmental Media and Contaminants:

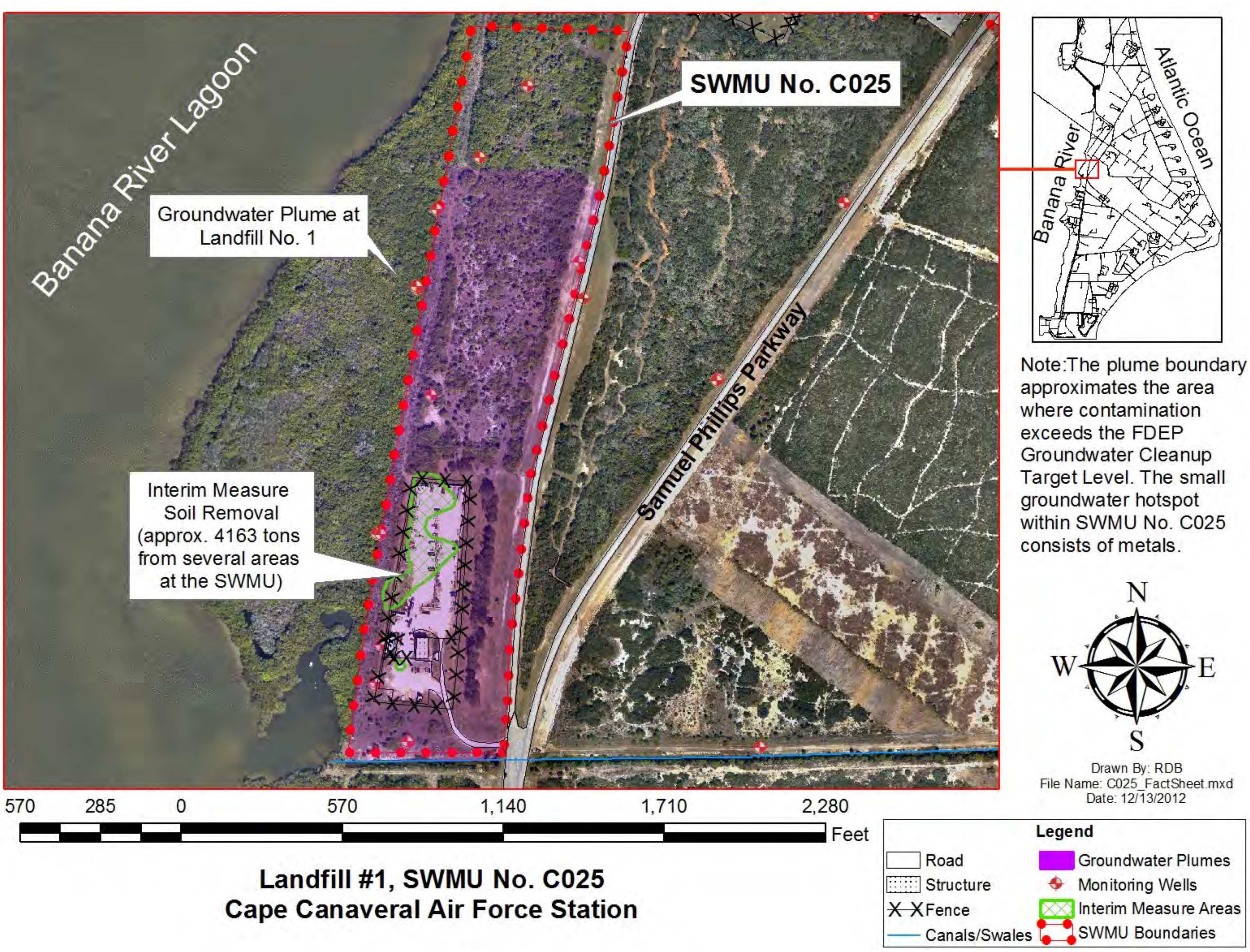
Groundwater: Contaminants identified at the site included low levels of solvents and metals (arsenic and manganese). A Long Term Monitoring (LTM) program was instituted to monitor and assess the natural degradation of groundwater contaminant levels. As of 2007, manganese was the only remaining contaminant of concern that still exceeded the cleanup level.

Soil: No contaminants were detected in soil at concentrations that exceed screening values.

Corrective Action Summary: In accordance with the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA), a Phase I Records Search was conducted in 1984, followed by a Confirmation/Quantification Study in 1988. These investigations concluded that additional sampling and investigation were warranted. Remedial Investigation/Feasibility Study (RI/FS) activities were conducted from 1988 to 1998. This included an evaluation of the nature and extent of contamination, a human health risk assessment, an ecological risk assessment, an evaluation of remedial alternatives, and selection of the best final site remedy**.** The RI/FS report concluded that site-related constituents in groundwater may pose risk to human health. LTM of groundwater was recommended and is currently on-going. Additionally, land use controls have been instituted in order to restrict ground-water use and to ensure that the integrity of the landfill is maintained. A Statement of Basis documenting the remedy decision for Landfill No. 1 was finalized in 2002. The land use control requirements were documented in the accompanying Land Use Controls Implementation Plan. In 2010, the site switched from an annual monitoring schedule to a five year monitoring schedule. Manganese was the only remaining contaminant of concern, and it only exceeded cleanup levels in a single well. The Florida Department of Environmental Protection and the Air Force agreed to a five year monitoring schedule, given the lack of significant groundwater contamination, with additional wells and monitoring constituents incorporate in order provide a better overall tool for assessing the integrity and status of the landfill. In 2015, the monitoring program included metals, pesticide, and volatile organic compound (VOCs) analysis from all site wells. The 2020 event will be limited to metals and VOCs, based on lack of pesticide detection in 2015.

In 2018, when the Defense Logistics Agency (DLA) vacated the facility on the site that had previously been used as a Defense Re-Utilization and Marketing Office (DRMO), a walk-down indicated that their material storage and recycling efforts had left paint chips and lead from shielding in the former DRMO storage lot, which was located on the southern part of SWMU No. C025. A removal action was performed to address these house-keeping issues. Following a limited surface scrape, additional lead-contaminated soil was still determined to be present and additional soil removal and assessment is on-going. This is separate from normal monitoring and management of SWMU No. C025 and is being funded by the DLA under a stand-alone contract.

Future Actions: Based on findings from the RI/FS completed at Landfill No. 1, no further action was recommended for soil and sediment, and LTM was recommended for groundwater. The LTM program is currently on-going and land use controls are being maintained in order to restrict contact with groundwater and maintain the integrity of the landfill. Periodic monitoring with LUC enforcement will continue as long as landfill debris exists in the subsurface at Landfill No. 1. The recent Optimization Report and Five Year Review included optimization recommendations.



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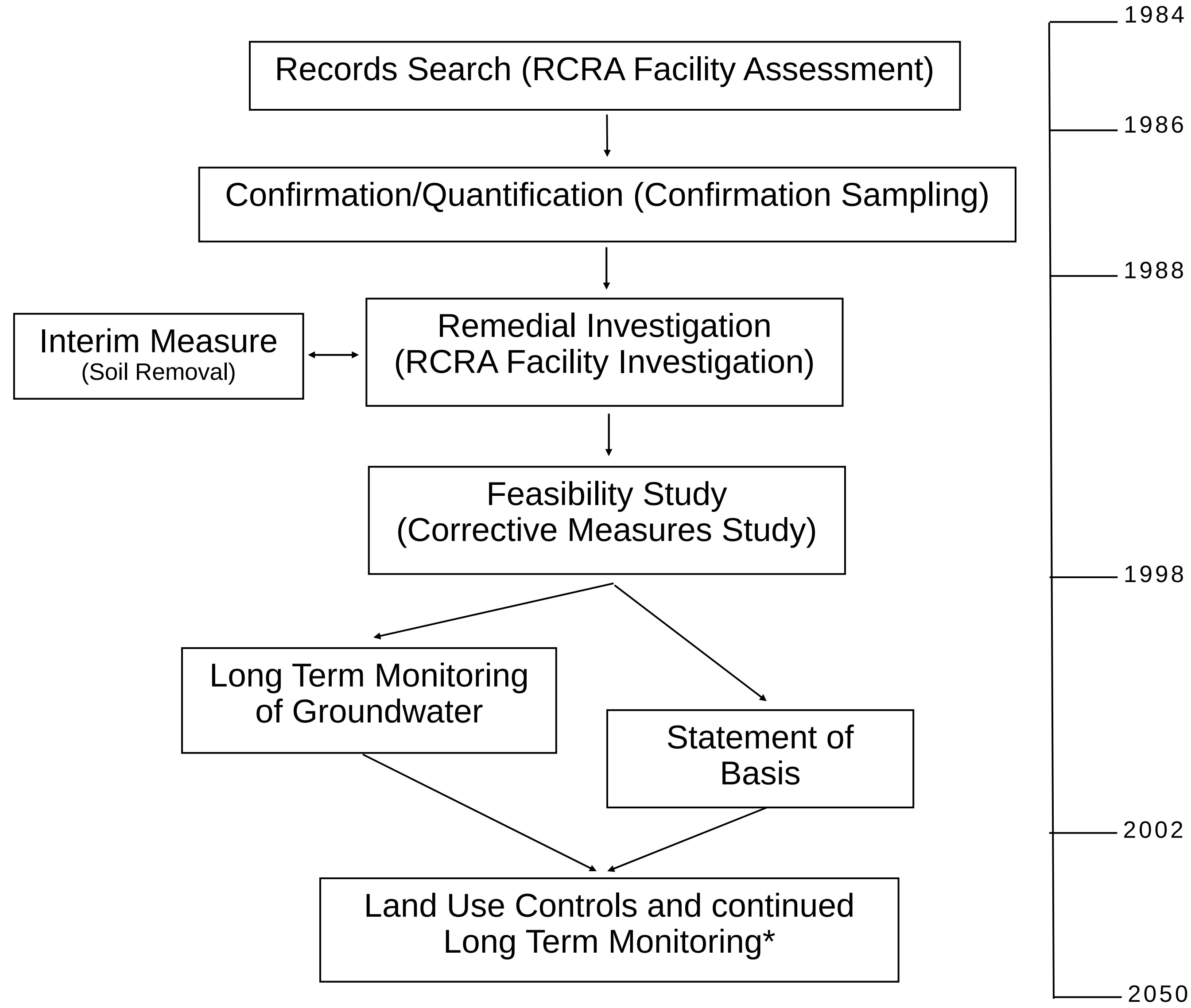
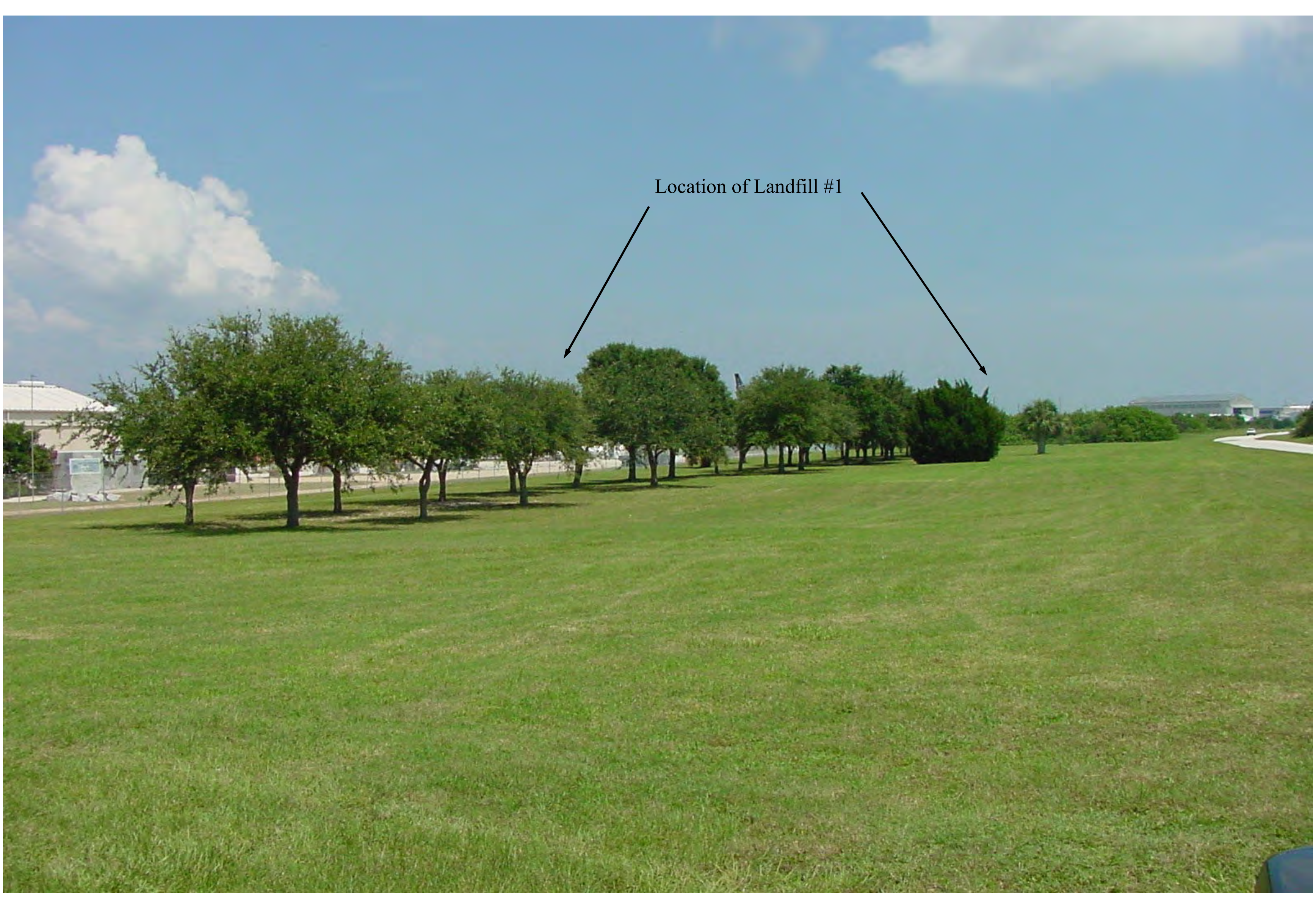
IRP Process Flow Chart

SWMU No. C025 (Landfill #1, CCAFS)



*Long Term Monitoring of groundwater was implemented immediately following the Remedial Investigation/Feasibility Study, based on the recommendations in the RI/FS. This monitoring is included in the Statement of Basis as part of the "final remedy" for the Site.



This photo was taken from the driveway to the DRMO facility (west of Phillips Parkway), facing north. The entire area shown is the former landfill.

UNITED STATES AIR FORCE
45TH SPACE WING

Fact Sheet For: **FIRE TRAINING AREA NO. 2, SWMU NO. C033**
INSTALLATION RESTORATION PROGRAM– SITE FT017
CAPE CANAVERAL AIR FORCE STATION

Current Status: **OPERATION OF HORIZONTAL/VERTICAL AIR SPARGING SYSTEM (HVASS), LONG TERM MONITORING, AND MAINTENANCE OF SOIL/ GROUNDWATER LAND USE CONTROLS; PERFLUORINATED COMPOUNDS ARE PRESENT IN SOIL AND GROUNDWATER**

Site History: Solid Waste Management Unit (SWMU) No. C033, Installation Restoration Program (IRP) Site FT017, was used as a firefighter training area from 1965 to 1985. The site is located on the west side of Cape Canaveral Air Force Station (CCAFS) north of the Industrial Area (see the site map, below). Over the years, various amounts of fuels and solvents were used in the training exercises. The fuels were poured into an earthen depression on site and allowed to pool prior to ignition and subsequent extinguishing.

Environmental Media and Contaminants:

Groundwater: Constituents identified in the groundwater include: petroleum, industrial solvents, polychlorinated biphenyls (PCBs), metals and other industrial waste products. A long term monitoring (LTM)/monitored natural attenuation (MNA) program has been implemented to monitor and assess the natural degradation of groundwater contaminants. Pefluorinated compounds (PFOS/PFOA) are present in groundwater.

Surface Water: Contaminants detected in surface water adjacent to the site include residual industrial solvents. A Horizontal/Vertical Air Sparge System has been installed between the site and the Banana River Lagoon (BRL) to prevent contaminants from reaching the Lagoon.

Sediment: No constituents have been detected in the sediment at concentrations that pose a risk to human health or the environment.

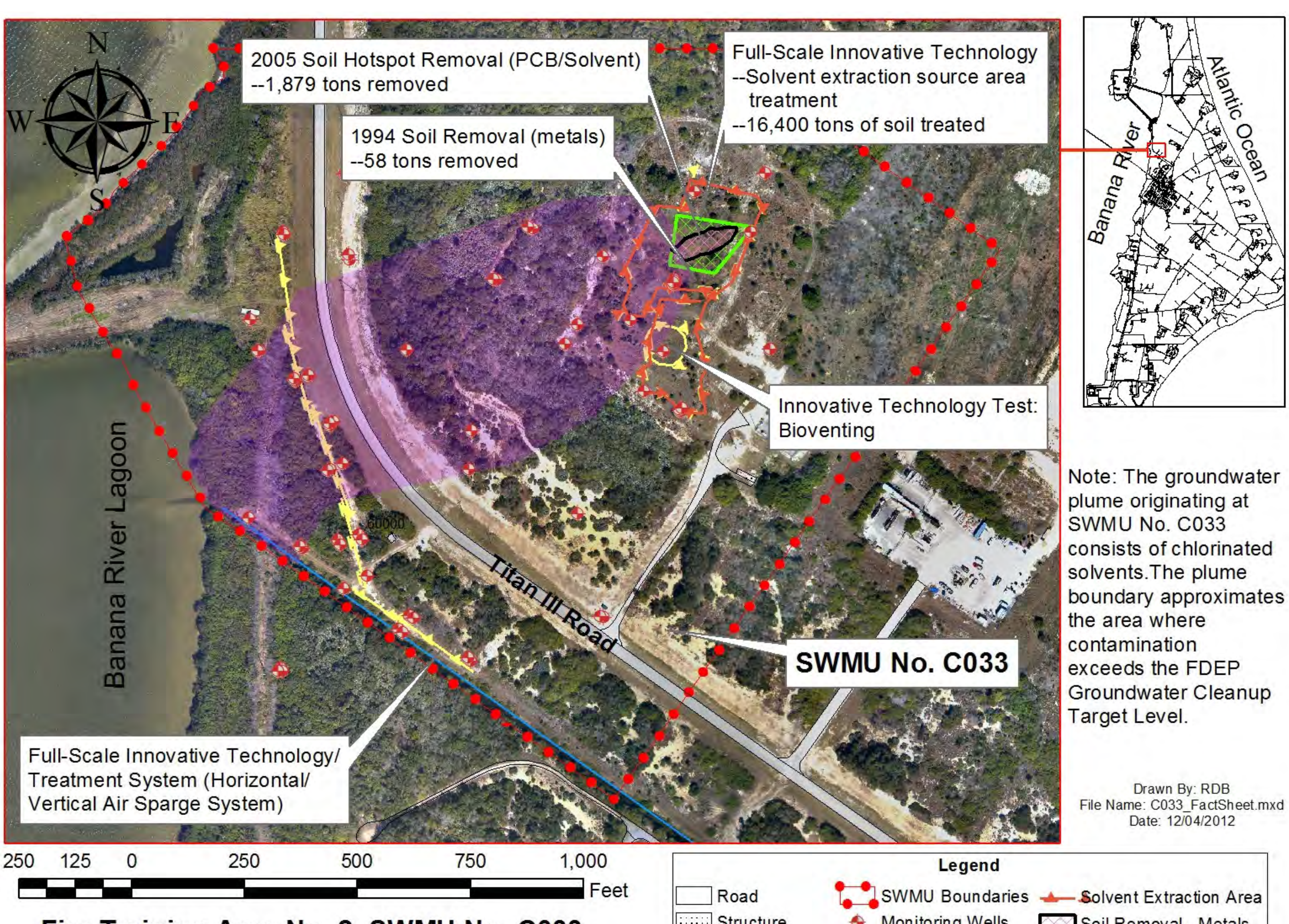
Soil: Soil at the site contained petroleum wastes, residual industrial solvents, pesticides, PCBs, metals, and other industrial waste products. Several Interim Measures (IMs) have been implemented to treat or remove contaminated soils, eliminating the potential human health and ecological risks posed by soil exposure. PFOS/PFOA are present in soil.

Corrective Action Summary: In accordance with the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA), a Phase I Records Search was conducted in 1984, followed by a Confirmation/Quantification Study in 1987. Based on these investigations, a RCRA Facility Investigation (RFI)/ Corrective Measures Study (CMS) was completed at the site in 1999. During the course of the RFI/CMS, several IMs were implemented to address petroleum and solvent contamination in groundwater and PCBs, metals, and solvents in soil. In 1994, gopher tortoises on the site were relocated from an area impacted by metals and 58 tons of metal-contaminated soil was then excavated. A solvent extraction system to treat soils on-site was installed in 1997. Prior to this, bioventing was tested as a possible remedial solution. That IM was completed in May 1999 and resulted in the treatment of 16,358 tons of soil. A Horizontal Air Sparging System was installed in December 1996. Over the years, multiple horizontal legs have failed and been replaced with vertical sparge points. Monitored natural attenuation (MNA) studies have also been performed to determine whether site conditions would facilitate natural degradation of groundwater and soil contamination. The final RFI/CMS recommended MNA of the groundwater plume, long term operation and monitoring of the HVASS to ensure the plume does not impact nearby surface water, and land use controls (LUCs) on groundwater. Continued monitoring indicated a residual groundwater "hotspot" at the site contributing to continued elevated contaminant concentrations in groundwater. The area was excavated in 2005 in order to minimize the continued source of groundwater contamination. The Statement of Basis to document the final remedy at FT017 was issued in 2006. The Land Use Control Implementation Plan issued shortly thereafter formally documented the LUCs at the site.

In 2011, site-wide sampling was completed for 1,4-dioxane, which was detected less than the Groundwater Cleanup Target Level in a single well.

Preliminary Assessment and Site Investigation efforts between 2011 and 2017 identified PFOS/PFOA in groundwater at the site at levels exceeding the EPA drinking water "lifetime health advisory"; however, groundwater at the site is not employed as a drinking water source. The Air Force is currently running a PFOS/PFOA technology test at the site, to test the effectiveness of several substrates at binding PFOS/PFOA in soil. No other investigation or remedial efforts are planned for PFOS/ PFOA until a definitive regulatory driver is established for environmental media.

Future Actions: Currently, the HVASS is being maintained and monitored; groundwater and surface water are being monitored to assess the natural degradation of groundwater contaminants; and LUCs are being maintained to ensure that contaminant residuals do not cause any adverse impact on human health or the environment. The HVASS will be operated until a suitable replacement is implemented or the contaminant plume no longer has the potential to impact the BRL. Monitoring will continue and LUCs will be maintained until groundwater contaminant concentrations no longer exceed Florida Groundwater Contaminants Cleanup Target Levels. The recent Optimization Report and Five Year Review included optimization recommendations. Additional PFOS/PFOA assessment are planned under CERCLA on a stand-alone contract and are being prioritized against sites across the Air Force inventory.



Fire Training Area No. 2, SWMU No. C033
Cape Canaveral Air Force Station

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IRP Process Flow Chart

SWMU No. C033 (Firefighter Training Area No. 2, CCAFS)

Known Legacy Contaminants

PFOS/PFOA

1984

Interim Measure (Soil Removal/Tortoise Relocation)

Phase I Records Search (RCRA Facility Assessment)

Innovative Technology* (Bioventing)

1986

Phase II, Stage 1 Confirmation/Quantification (Confirmation Sampling)

Interim Measure (Source Removal – On-Site Soil Washing)

1988

Innovative Technology* (Natural Attenuation Study/Tests)

RCRA Facility Investigation

Innovative Technology* [Horizontal Air Sparge System (HASS)]

Corrective Measures Study

1999

Interim Measure (“Hotspot” Soil Removal)

Operation and Monitoring of HVASS/ Long Term Monitoring of Groundwater**

Statement of Basis

2006

2011

Preliminary Assessment/ Site Inspection

Innovative Technology* (In Situ Binding)

2018

Land Use Controls
Continued Long Term Monitoring**
Operation and Maintenance of HVASS

Remedial Investigation (timeframe to be determined)

2122

*Innovative Technologies are routinely tested at IRP sites to determine if they can be used to effectively remediate contamination. If successful, these technologies may be left in place or taken full-scale at the testing site. Technologies that prove successful may be exported to similar 45 SW Sites and other Sites across the country. Such tests are usually funded by outside research entities, rather than the IRP.

**LTM/MNA of groundwater was implemented immediately following the Corrective Measures Study (CMS), based on its recommendations. This monitoring was included in the Statement of Basis as part of the “final remedy” for the Site. It will continue until all contaminant levels are below the relevant screening criteria for 2 consecutive rounds of sampling. The HASS will be maintained and operated until there is no more danger that the groundwater plume could discharge into the Banana River.

Left: The grassy area in this photo was cleaned up as part of the solvent extraction Interim Measure. This photo was taken from the road leading into FT017 facing north, shortly after the cleanup.

Below: More recent photo of solvent extraction treatment area (2012), taken from terminus of site access road, facing northwest.

Far Left: Sparge system components.

Near Left: Sparge system equipment building and equipment.

UNITED STATES AIR FORCE
45TH SPACE WING

Fact Sheet For: **SPACE LAUNCH COMPLEX 16, FACILITY 13112, SWMU NO. C040**
INSTALLATION RESTORATION PROGRAM– SITE DP006
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **SOLVENT SOURCE AREA CHARACTERIZATION; FUTURE REMDIATION PLANNED; MONITORING ON PLUME CONTINUES AND LAND USE CONTROLS ARE MAINTAINED ON SOIL AND GROUNDWATER**

Site History: Solid Waste Management Unit (SWMU) No. C040, abandoned Space Launch Complex 16 (SLC-16), is located on the east side of Cape Canaveral Air Force Station (CCAFS) adjacent to the Atlantic Ocean (see site map, below). The site was built in the late 1950s for launch operations. It is suspected that materials used on-site, such as rocket fuels and solvents, may also have been released to the environment.

Environmental Media and Contaminants:

Groundwater: Low-level contaminants initially identified in groundwater included residual industrial solvents. In the late 1990s, a Long Term Monitoring (LTM) program was initiated to document natural degradation. Subsequent discovery of a previously-unknown solvent source area (2009) re-opened assessment and necessitated a more aggressive remedial approach. The primary contaminants of concern at this site include TCE, cis-1,2-DCE, vinyl chloride, and 1,4-dioxane.

Surface Water: No contaminants in surface water were detected at concentrations that pose a significant risk to human health or the environment.

Sediment: Contaminants identified in sediment included metals, polychlorinated biphenyls (PCBs), petroleum products and other industrial waste products; however, an Interim Measure (IM) was implemented in 1996 to remove contaminated sediments and soils from the SLC-16 deluge basin.

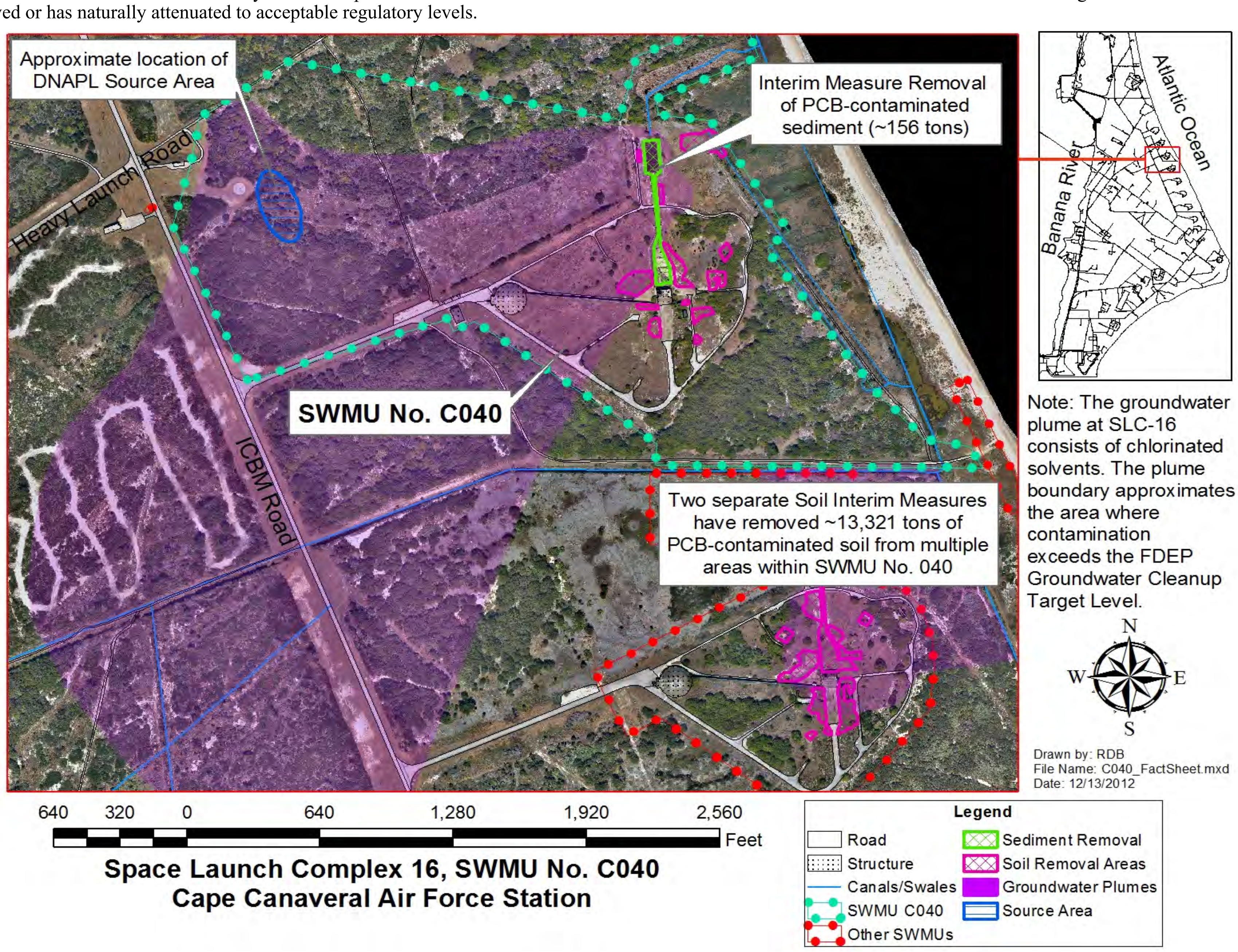
Soil: Contaminants identified in site soil include metals, PCBs, and petroleum and industrial products. A 1999 IM removed soil contamination down to industrial re-use levels. Subsequently, additional PCB contamination exceeding industrial standards was identified in other areas of the site. An additional IM was completed to address those soils. Remaining soil residuals in excess of residential standards include PCBs and polynuclear aromatic hydrocarbons (PAHs).

Corrective Action Summary: In accordance with the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) was completed in 1992 and concluded that sampling and analysis activities were warranted at the site. A Site Investigation (SI) was then completed in 1996. Based on the PA and SI, a RCRA Facility Investigation (RFI) was initiated in order to fully evaluate the nature and extent of contamination at the site and to assess the risk posed to human health and the environment by site contaminants. During the course of investigation, two IMs were conducted to remove contaminated soils and sediments from the site. Following completion of these activities, the RFI Report concluded that remaining soils might pose a significant human health risk only under a residential scenario. Therefore, land use controls (LUCs) were implemented to ensure that the site remains industrial in nature. A LTM/Monitored Natural Attenuation (MNA) program was initiated to monitor the natural degradation of remaining low-level solvent residuals in ground-water. A Statement of Basis (SB) summarizing the remedy decision for monitoring with LUCs was finalized and approved.

Subsequently, routine sampling prior to a proposed construction project identified additional PCB contamination in soil areas not previously sampled. An IM to remove the impacted soils was completed in 2005-06. Upon completion of that action, remaining soils are once again safe under all but residential land use scenarios. As such, LUCs restricting residential uses of SLC-16 will continue to be maintained. An additional IM was performed in 2012-2013 to pump water out of deep "actuator pits" in the launch structure, treat the water, decontaminate the pits, and fill and seal the pits.

After almost 10 years of LTM, groundwater concentrations were largely unchanged. The initial Five Year Review at the site (2008) recommended additional ground-water assessment in the previously unassessed intermediate zone. Subsequent groundwater assessment results from the 2009-2010 timeframe discovered a previously unidentified solvent source area between SLC-16 and SLC-19, near ICBM Road, along with a large groundwater plume. The area previously identified for LTM was actually just the shallow edge of the plume. In 2012, additional investigation of the dense non-aqueous phase liquid (DNAPL) source area was conducted, along with a widespread assessment to identify the extent of plume boundaries. The 2013 Five Year Review concluded that given the presence of a TCE source area, MNA is no longer an effective remedy. The SWMU boundary was expanded to include the source area. In 2014-2016 a Corrective Measure Study (CMS) was performed to complete characterization of the TCE source area and evaluate potential remedial activities. Due to the horizontal and vertical extent of the source area, a combination remedy was selected with components including shallow air sparging, intermediate steam and iron-enhanced soil mixing and deep emulsified vegetable oil injection. Additional high resolution site characterization using laser fluorescence to identify DNAPL was initiated in 2020. Documentation is pending. Under a performance-based contract, the remedy selected in the CMS may be changed, with appropriate documentation. Remedy finalization and implementation is expected to begin in the early 2020s. A draft (internal) modified SB was prepared along with the CMS, but never formalized. Since the implementing contractor has an opportunity to re-evaluate the proposed treatment technologies, a modified SB will not be formalized until the implementing contract is in place. In the interim, periodic monitoring was conducted.

Future Actions: The site's Statement of Basis will be modified/re-issued to document the new source area and planned remedy. Source treatment is required. Following this treatment under the Corrective Measures Implementation (CMI) phase, MNA is an anticipated continued requirement on the residual contamination in the source area and plume-wide. LUCs have been implemented in order to restrict groundwater use and to ensure that the site does not become a residential area. These controls will ensure that contaminant residuals do not cause any adverse impacts to human health or the environment and will be maintained until all residual soil and groundwater contamination is removed or has naturally attenuated to acceptable regulatory levels.



IRP Process Flow Chart

SWMU No. C040 (Space Launch Complex 16, CCAFS)

1990

Preliminary Assessment (RCRA Facility Assessment)

1992

Site Investigation (Confirmation Sampling)

1995

Interim Measure (Removal of Contaminated Sediment from Deluge Basin)

RCRA Facility Investigation

Interim Measure (Remove Contaminated Soil)

2001

Long Term Monitoring

Statement of Basis

2002

Interim Measure (Remove Contaminated Soil)

Land Use Controls/Monitored Natural Attenuation

2009

Source Area Identified

Continued Land Use Controls

Source Area/Plume Characterization

2012

Continued Land Use Controls & Interim Monitoring

Investigation/Corrective Measures Study

2021

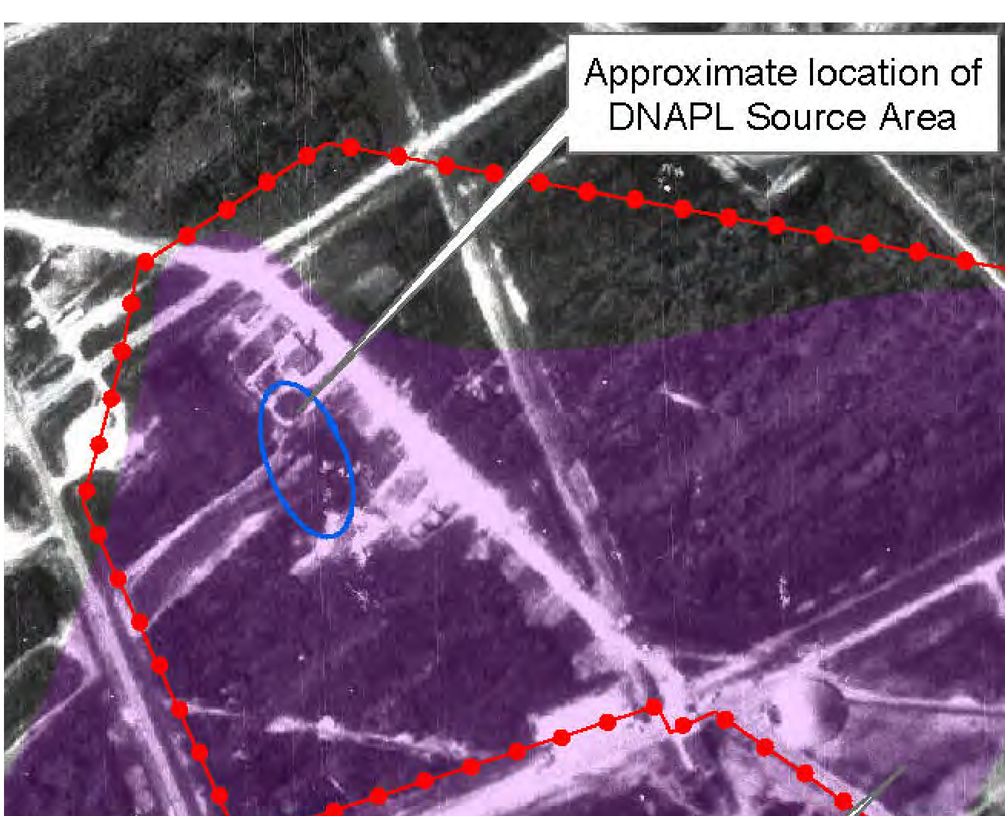
Statement of Basis Modification

Corrective Measures Implementation

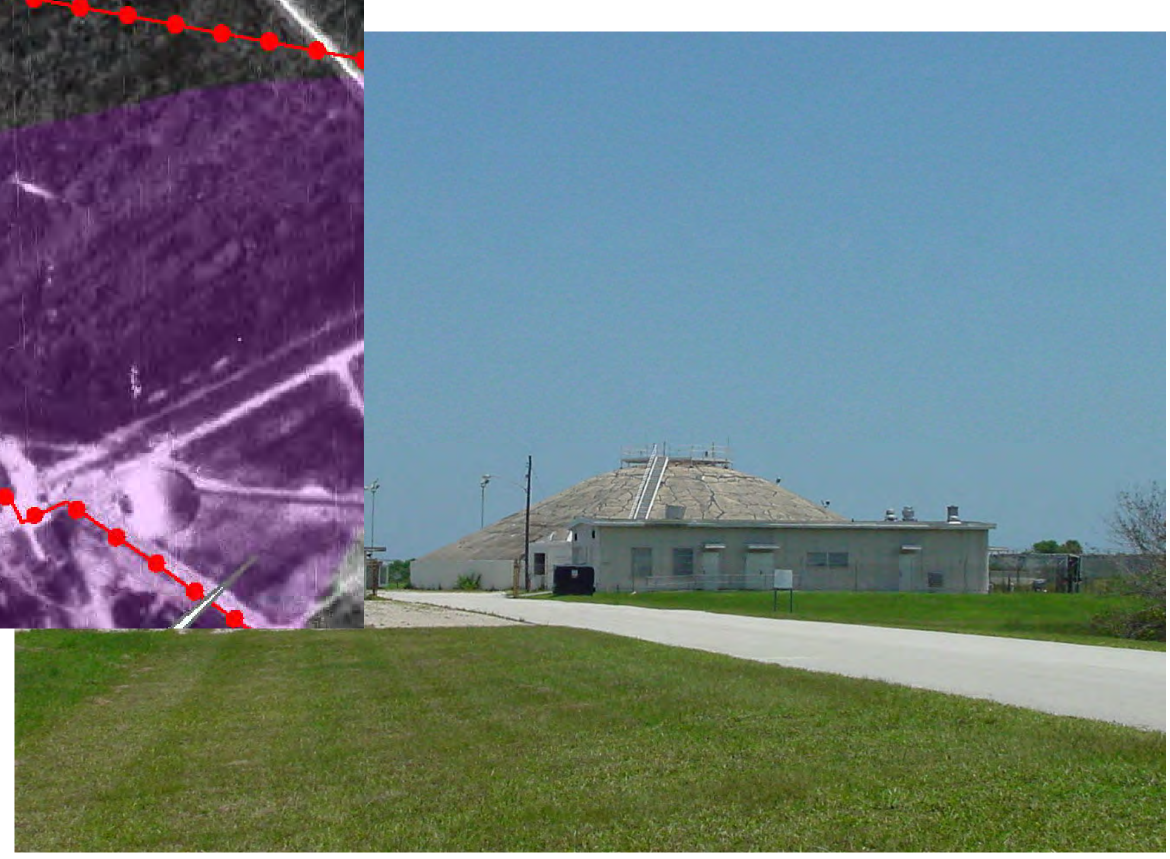
2030

Monitored Natural Attenuation/ Land Use Controls (soil and groundwater)

2320



Below: The blockhouse and support buildings at SLC-16. Taken from the access road leading to SLC-16, facing east.
Left: 1960s-era aerial photo showing unknown facilities in the area where the TCE source area was recently identified. Base records do not document the existence of these facilities. Purpose and operations are unknown.



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UNITED STATES AIR FORCE
45TH SPACE WING

Fact Sheet For: **SPACE LAUNCH COMPLEX 19, FACILITY 1573, SWMU NO. 042**
INSTALLATION RESTORATION PROGRAM– SITE DP008
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **MAINTENANCE OF LAND USE CONTROLS ON SOIL AND GROUNDWATER; MONITORED NATURAL ATTENUATION FOR VINYL CHLORIDE**

Site History: Solid Waste Management Unit (SWMU) No. 042, abandoned Space Launch Complex 19 (SLC-19), is located on the east side of Cape Canaveral Air Station (CCAFS) adjacent to the Atlantic Ocean (See site map, below). The site was built in the late 1950s for Titan launch operations. Approximately 27 launches occurred between 1959 and 1966. Materials used at the site to support rocket launches, including petroleum products and residual industrial solvents, may have been disposed or spilled there. This facility is not currently utilized.

Environmental Media and Contaminants:

Groundwater: Groundwater contaminants included residual industrial solvents at concentrations above appropriate screening values. A Long Term Monitoring (LTM) program was instituted to the monitor natural degradation of groundwater contamination. The program was concluded in 2002 with an approved recommendation for No Further Action on groundwater. Additional assessment in 2009 identified a small area of remaining contamination that was integrated into the monitoring program for nearby SLC-16 (SWMU C040).

Surface Water: No contaminants were detected in the surface water at concentrations that pose a risk to human health or the environment.

Sediment: Metals and semivolatile organic compounds were detected at concentrations that exceeded sediment screening values; however, an Interim Measure (IM) was conducted in 1996 in order to remove the contaminated sediments.

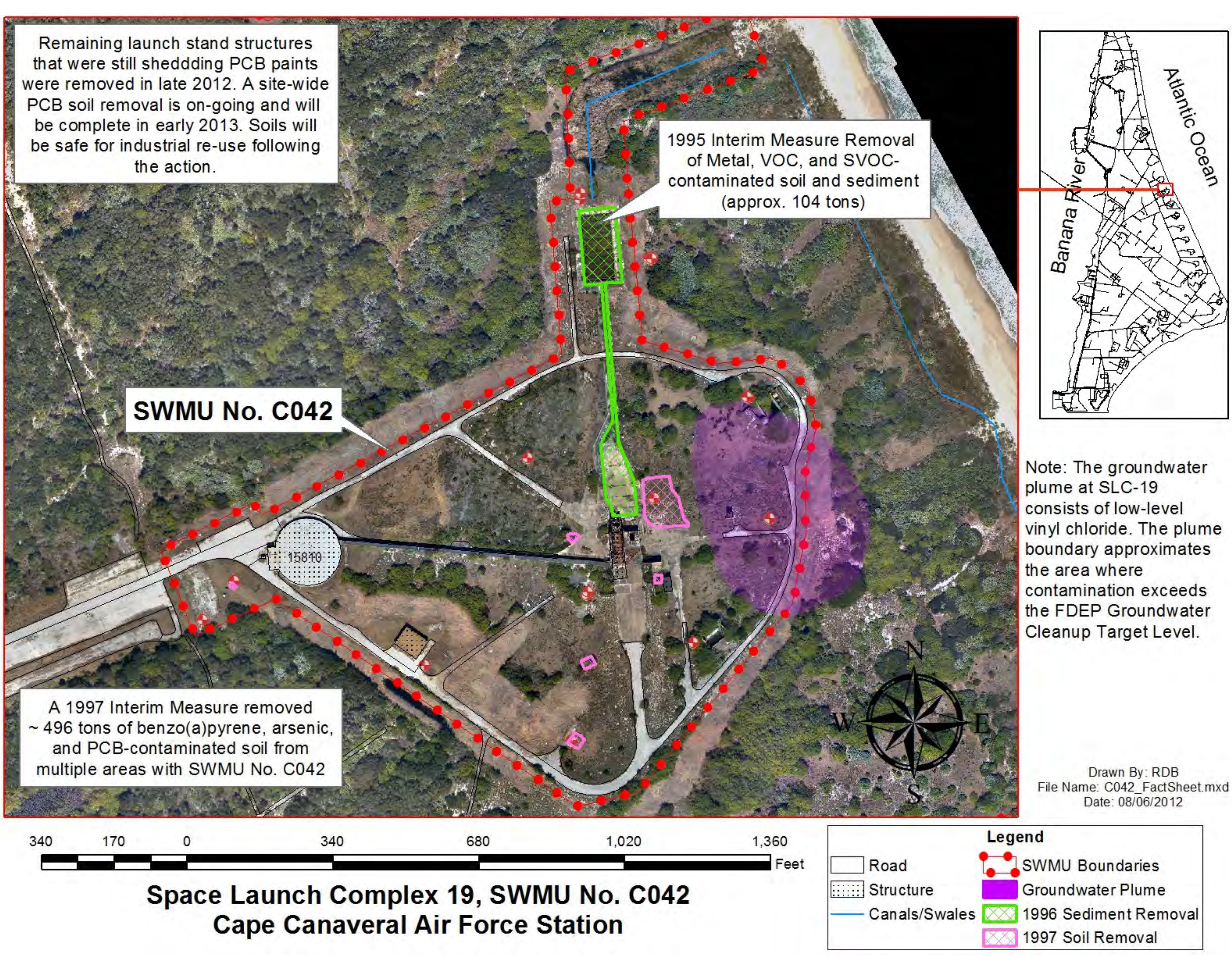
Soil: Polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), and arsenic were detected in soil at concentrations above screening values. An IM was implemented in 1997 to excavate and remove contaminated soils from throughout the site. Based on this action, the site's final remedy dictated land use controls to ensure that contaminant residuals in soil do not cause adverse impacts on human health or the environment. Since that time, paint on remnant launch structures was identified as an on-going source of PCB soil contamination. An additional removal action was complete by early 2013 to remove decaying launch structure and soils, leaving the site safe for industrial re-use.

Corrective Action Summary: In accordance with the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) was completed in 1992 and concluded that sampling and analysis activities were warranted at the site. A Site Investigation (SI) was then conducted between 1992 and 1995. Based on the results of the PA and SI, a RCRA Facility Investigation (RFI) was initiated in order to fully evaluate the nature and extent of contamination at the site and to assess the human health and ecological risk posed by site contaminants. Based on the RFI Report, remaining soils require land use controls (LUCs) to prevent residential site usage. Additionally, the RFI recommended LTM on residual solvents in groundwater. A program of LTM and LUCs was initiated shortly after the RFI. A Statement of Basis summarizing the remedy decision for LTM and LUCs has been finalized and approved. The land use control requirements are documented in the accompanying Land Use Controls Implementation Plan. Since initiation of the LTM program, subsequent rounds of sampling indicated declining contaminant concentrations in groundwater. Based on this data, No Further Action on groundwater was recommended and approved in 2002.

In the years since remedy selection, it was determined that historical paint formulations used on launch structures often contained PCBs and heavy metals. Samples from the remnant launch structures at SLC-19 confirmed the presence of PCB and lead-laden paint. The metal structures and their coatings were continuing to deteriorate. Following delineation in 2008, an IM in 2013 removed the remains of the painted metal launch erector along with soils containing PCBs in excess of industrial re-use standards. Also in 2013, the water was pumped out of the large actuator pits and the pits were inspected. The equipment in the pits precludes full closure, but the pits appear to be water-tight; the water in the pits did not indicate significant contamination.

In addition to re-iterating the need for launch structure mitigation and soil removal (which was completed as described above), the first Five Year Review at SLC-19 in 2008 also recommended that additional assessment of intermediate groundwater be undertaken. This zone was under-assessed by the RFI and was found to retard significant quantities of contamination at other sites. Low level vinyl chloride was identified in a small area. Rather than re-opening a stand-alone monitoring program at SLC-19, the well has area was added to the monitoring program at nearby SLC-16. While additional assessment and remedial action planning is underway at SLC-16, the SLC-19 groundwater monitoring data has been documented separately. When SLC-16 is eventually back in a routine monitoring program, the SLC-19 well may be folded back into that program.

Future Actions: Remaining soil at the site safe for industrial use and is managed under a land use control program. Monitoring will continue in the limited area at SLC-19 with low-level solvent contamination until concentrations attenuate to acceptable regulatory levels. LUCs will continue to be maintained until all residual soil and groundwater contamination is removed to residential cleanup standards or has naturally attenuated to acceptable regulatory levels. The recent Optimization Report and Five Year Review included optimization recommendations.



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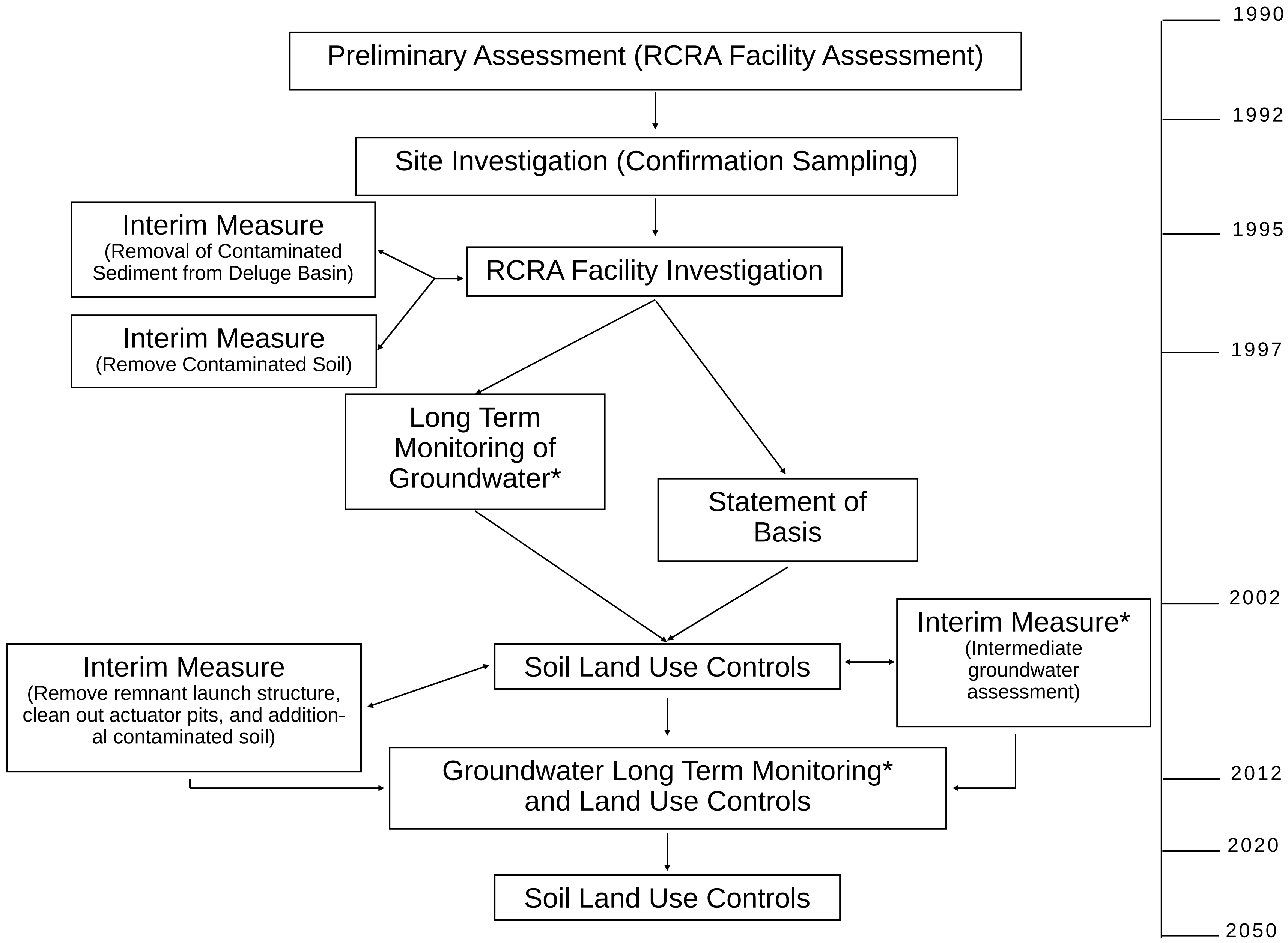
IRP Process Flow Chart

SWMU No. C042 (Space Launch Complex 19, CCAFS)



*Long Term Monitoring of groundwater was implemented immediately following the RCRA Facility Investigation (RFI), based on the recommendations in the RFI. This monitoring is included in the Statement of Basis as part of the "final remedy" for the Site. LTM was carried out until all contaminant levels were below the relevant screening criteria for 2 consecutive rounds of sampling. The intermediate groundwater assessment IM identified one additional well with low-level vinyl chloride. That well has been incorporated into the monitoring program at nearby SLC-16; monitoring will continue until all contaminant levels are once again below relevant screening criteria for 2 consecutive rounds of sampling

Left: Remaining painted launch structure (on top of launch stand) during demolition and removal (Nov 2012).
Below: Same part of launch stand following removal of the painted structures (Dec 2012).

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UNITED STATES AIR FORCE
45TH SPACE WING

Fact Sheet For: **SPACE LAUNCH COMPLEX 40, FACILITY 47105 , SWMU NO. C046**
INSTALLATION RESTORATION PROGRAM– SITE DP023
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **MAINTENANCE OF LAND USE CONTROLS ON SOIL**

Site History: Solid Waste Management Unit (SWMU) No. C046 is Space Launch Complex 40 (SLC-40). SLC-40 is located on the northwest side of Cape Canaveral Air Force Station (CCAFS) adjacent to the Atlantic Ocean (see site map, below). Historically, it is suspected that materials, such as petroleum products and solvents, used to support launch activities may have been released or spilled on-site. It has also been established that historical paint formulations used on launch structures included polychlorinated biphenyls (PCBs) and lead. Routine sand blasting activities following launches dispersed the PCBs and lead throughout site surface soils.

The site was previously used to support the United States Air Force Titan Program. The Titan program was completed in 2005 and the complex was deactivated. Deactivation included remediation of soil inside the fenceline to industrial standards. After deactivation was complete, the complex was reactivated in support of the Space-X Falcon program. .

Environmental Media and Contaminants:

Groundwater: Contaminants identified in excess of groundwater screening values at the site included manganese and iron. A Long Term Monitoring (LTM) program was implemented in order to monitor contaminant levels over time. Following monitoring, No Further Action on groundwater was approved by regulatory agencies late in 2002.

Surface Water: No contaminants have been detected in surface water at concentrations that pose a risk to human health or the environment.

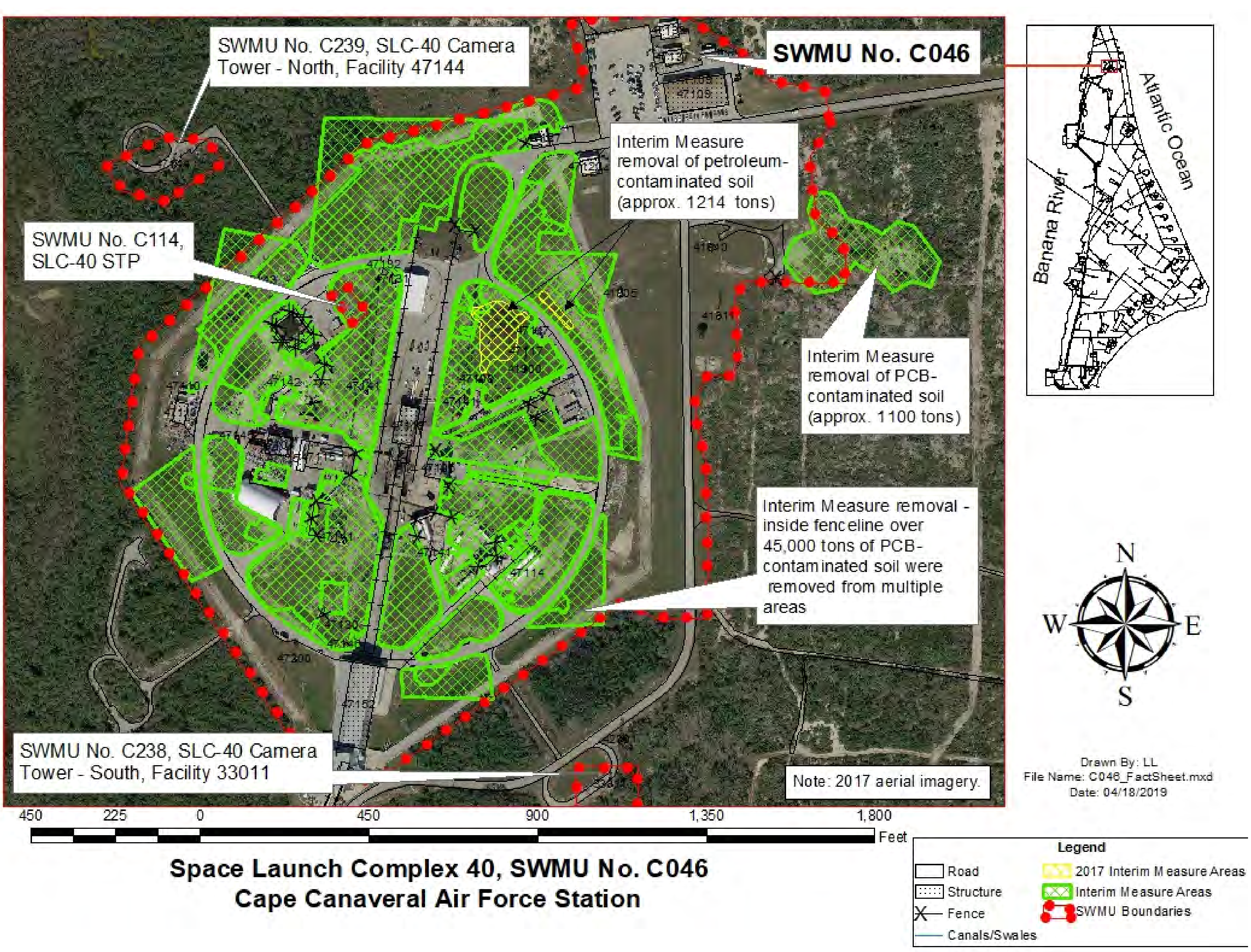
Sediment: No contaminants have been detected in sediment at concentrations that pose a risk to human health or the environment.

Soil: PCBs were identified in site soils at concentrations that exceed appropriate screening values. An Interim Measure (IM) was performed in 2000 to remove contaminated soils outside the facility fenceline at SLC-40. Removal of contaminated soils from within the fenced area was delayed due to concern that removal activities might impact the Titan mission. The additional removal action was completed in 2006-2007, as part of the Titan program's deactivation process, to remove soils where concentrations exceeded industrial re-use standards. Due to the SpaceX launch mis-hap in 2016, SpaceX remediated soil in the area of a hydraulic oil release. Related additional assessment is on-going.

Corrective Action Summary: In accordance with the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) was completed for the site in 1992. A Site Investigation (SI) was then completed in 1995. Based on the PA and SI, a RCRA Facility Investigation (RFI) was initiated in order to evaluate the nature and extent of contamination at the site and to assess the human health and ecological risk posed by site contaminants. During the course of the RFI, an IM was conducted to remove PCB-contaminated soils located outside the facility fenceline. Based on the RFI, LTM of groundwater was initiated due to metals that exceeded screening values. Late in 2002, the regulatory agencies approved a "No Further Action" recommendation for groundwater at SLC-40 based on consistent and satisfactory declines in metals concentrations. Due to safety and potential mission impacts, removal of the PCB-contaminated soils located inside the facility fenceline was deferred until after deactivation. Land use controls were implemented to ensure that site workers were not adversely impacted by the remaining PCB-contaminated soils. SLC-40 was deactivated in 2005 and a soil removal action inside the fenceline was implemented as part of the deactivation process. Initial delineation activities identified several areas of soils where PCB concentrations exceeded 50 milligrams per kilogram (mg/kg). These soils were removed early in 2006, as documented in the June 2006 IM Report. A larger removal action was completed in 2007 to excavate all remaining soils where PCB concentrations exceed 2.6 mg/kg [the current FDEP Industrial Soil Cleanup Target Level (SCTL)]. Land use controls (LUCs) continued to be maintained due to residual PCB concentrations in soil between residential and industrial cleanup standards.

In 2016, a mis-hap during SpaceX engine testing caused an explosion at the site. Hydraulic fluid released from a ruptured tank was a known concern. Impacts from rocket propellant (RP-1) were a potential concern. In May 2017, source removal activities were performed to fully remediate the area impacted by hydraulic fluid. Additional assessment initiated in 2018/2019 on other areas of the site to determine whether broader impacts exist from RP-1. No other concerns were identified and the report is pending finalization.

Future Actions: The Air Force continues to maintain LUCs on soil to ensure that PCB contaminant residuals do not cause adverse impacts to human health or the environment. These LUCs will be maintained until all residual soil contamination is removed or has naturally attenuated to acceptable levels. Under the terms of their lease, SpaceX is responsible for assessment and remediation of any impacts created by their activities.



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IRP Process Flow Chart

SWMU No. C046 (Space Launch Complex 40, CCAFS)

- 1990 — RCRA Facility Assessment
- 1992 — Confirmation Sampling
- 1995 — RCRA Facility Investigation
- 1998 — Corrective Measures Study ↔ Interim Measure (Remove Contaminated Soil Outside Facility Fenceline)
- 1999 — Statement of Basis
- 2001 — Long Term Monitoring/ Land Use Controls (Groundwater) → No Further Action (Groundwater)**
- 2002 — Corrective Measure Implementation* (Soil Removal)
- 2007 — Land Use Controls (Soil)
- 2016 — 2016 LAUNCH MIS-HAP: SPACEX assessment/remediation process
- 2050

* Note groundwater Long Term Monitoring for several metals was required as part of the final remedy. However, based on several rounds of monitoring data, "No Further Action" was approved on groundwater in 2002.

Above left shows launch structure at time of deactivation (2005). Photos at right are of soil removal conducted during deactivation process (2006-2007). Currently, photography at the site is restricted due to the secure nature of the launch complex.

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UNITED STATES AIR FORCE
45TH SPACE WING

Fact Sheet For: **SPACE LAUNCH COMPLEX 041, FACILITY 29102, SWMU NO. C047**
INSTALLATION RESTORATION PROGRAM– SITE DP024
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **MAINTENANCE OF SOIL LAND USE CONTROLS**

Site History: Solid Waste Management Unit (SWMU) No. C047, Space Launch Complex 41 (SLC-41), is located on the northwest side of Cape Canaveral Air Force Station (CCAFS) adjacent to the Atlantic Ocean (See site map, below). It is suspected that materials used at the site to support rocket launches, including petroleum products and residual industrial solvents, may have been disposed or spilled on-site. It has also been established that historical paint formulations used on launch structures included Polychlorinated biphenyls (PCBs) and lead. Routine sand blasting activities following launches dispersed the PCBs and lead throughout site surface soils.

This facility was formerly used as a United States Air Force Titan launch complex until its deactivation in 1999. Shortly thereafter, SLC-41 was reactivated under the Lockheed Martin Atlas V Evolved Expendable Launch Vehicle (EELV) program.

Environmental Media and Contaminants:

Groundwater: No contaminants have been detected in groundwater at concentrations that pose a risk to human health or the environment.

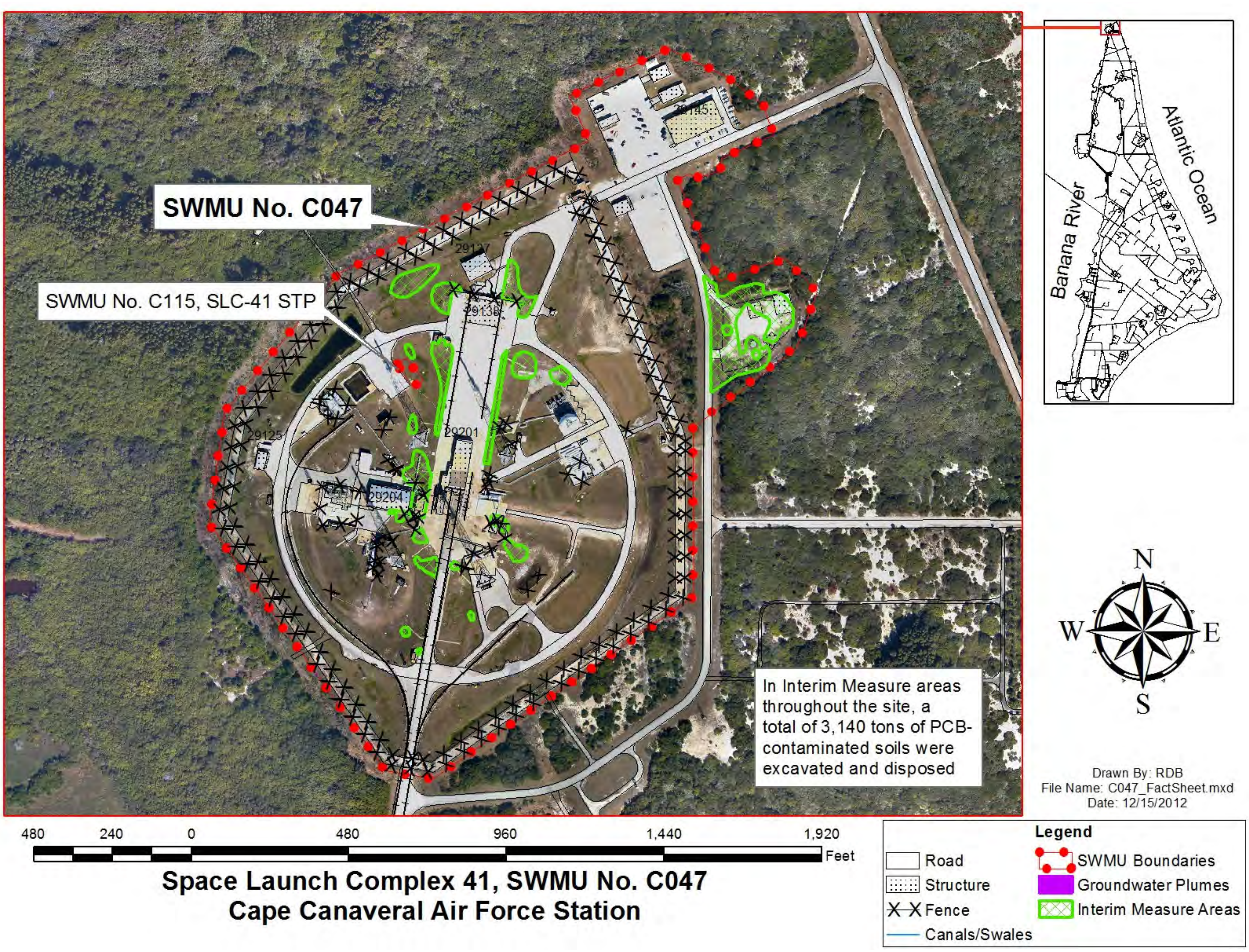
Surface Water: No contaminants have been detected in surface water at concentrations that pose a risk to human health or the environment.

Sediment: No contaminants have been detected in sediment at concentrations that pose a risk to human health or the environment.

Soil: Constituents identified in site soil included polychlorinated biphenyls (PCBs), arsenic, and a polynuclear aromatic hydrocarbon (PAH). An Interim Measure (IM) was performed to excavate and remove those soils that posed a potential risk to industrial workers.

Corrective Action Summary: In accordance with the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) was completed for the site in 1992. A Site Investigation (SI) was then completed in 1995. Based on the PA and SI, a RCRA Facility Investigation (RFI) was initiated in order to fully evaluate the nature and extent of contamination and to assess the human health and ecological risk posed by site contaminants. An IM was conducted in 1999 to remove PCB-contaminated soils from the site. The purpose of the IM was to remove those soils that might pose a risk to industrial workers on an active launch complex. A cleanup level for PCBs in soil (17 mg/kg) was specifically developed for an active launch complex with rigorous dig controls and active security. Additional cleanup will be required if the complex is deactivated and current controls that prevent soil disturbance and exposure are no longer in effect. The RFI report issued in January 2000 recommended that land use controls (LUCs) be implemented to ensure that conditions remain protective of workers and that land use remains industrial. A Statement of Basis summarizing the soil LUC remedy decision has been finalized and approved. The LUC requirements are documented in the accompanying LUC Implementation Plan. LUCs continue to be maintained.

Future Actions: Based on the recommendations of the RFI, LUCs have been implemented to ensure that the site remains a controlled industrial setting. These LUCs will ensure that contaminant residuals do not cause any adverse impacts to human health or the environment and will be maintained until all residual soil contamination is removed or has naturally attenuated to acceptable regulatory levels.



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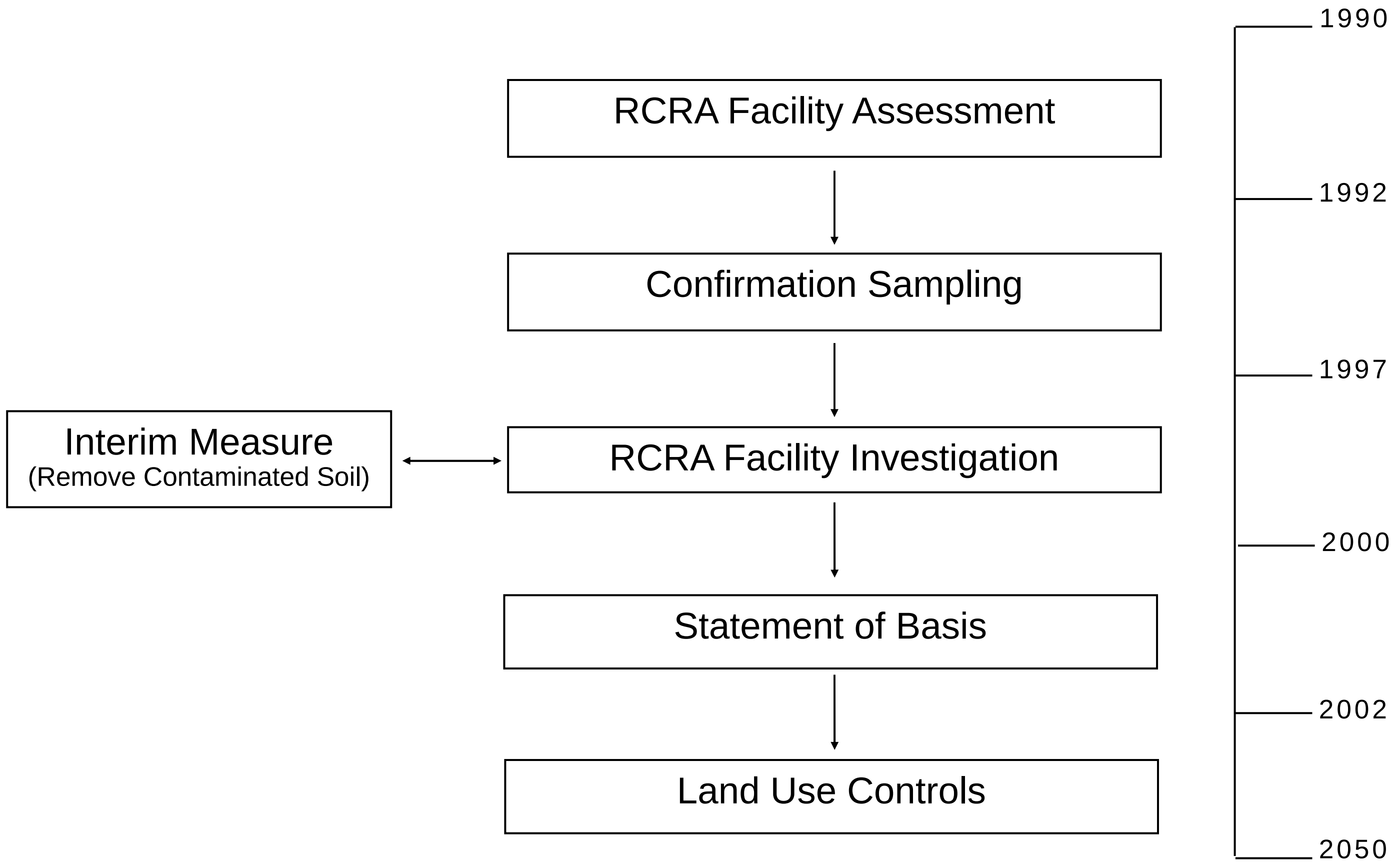
IRP Process Flow Chart
SWMU No. C047 (Space Launch Complex 41, CCAFS)



This historical photo shows an IM area at SLC-41. The area lies to the east of the fenced portion of the launch complex. This area was used for storage during reactivation of the launch complex under the EELV program. This photo was taken from the bypass road, near SLC-41, facing east.

UNITED STATES AIR FORCE
45^{TH} SPACE WING

Fact Sheet For: **SPACE LAUNCH COMPLEX 36, FACILITY 5501, SWMU NO. C050**
INSTALLATION RESTORATION PROGRAM– SITE DP043
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **LONG TERM MONITORING/MONITORED NATURAL ATTENUATION IN PROGRESS; LAND USE CONTROLS BEING MAINTAINED**

Site History: Solid Waste Management Unit (SWMU) No. C050, Space Launch Complex 36 (SLC-36), consists of two launch pads located off Central Control Road (see site map, below) on Cape Canaveral Air Force Station (CCAFS). Constructed in 1962, the pads supported the Atlas rocket program until deactivation in 2005. Over 144 launches occurred over the complex's history. Historically, it is suspected that materials used at the site to support rocket launches, including petroleum products and residual industrial solvents, may have been released or spilled on-site. It has also been established that historical paint formulations used on launch structures included polychlorinated biphenyls (PCBs) and lead. Routine sand blasting activities following launches dispersed the PCBs and lead throughout site surface soils.

Following deactivation in 2005, many of the launch structures were demolished. In 2015, Blue Origin leased the facility, along with part of neighboring SLC-11, to construct the New Glenn launch facility. Construction activities began in approximately 2017.

Environmental Media and Contaminants:

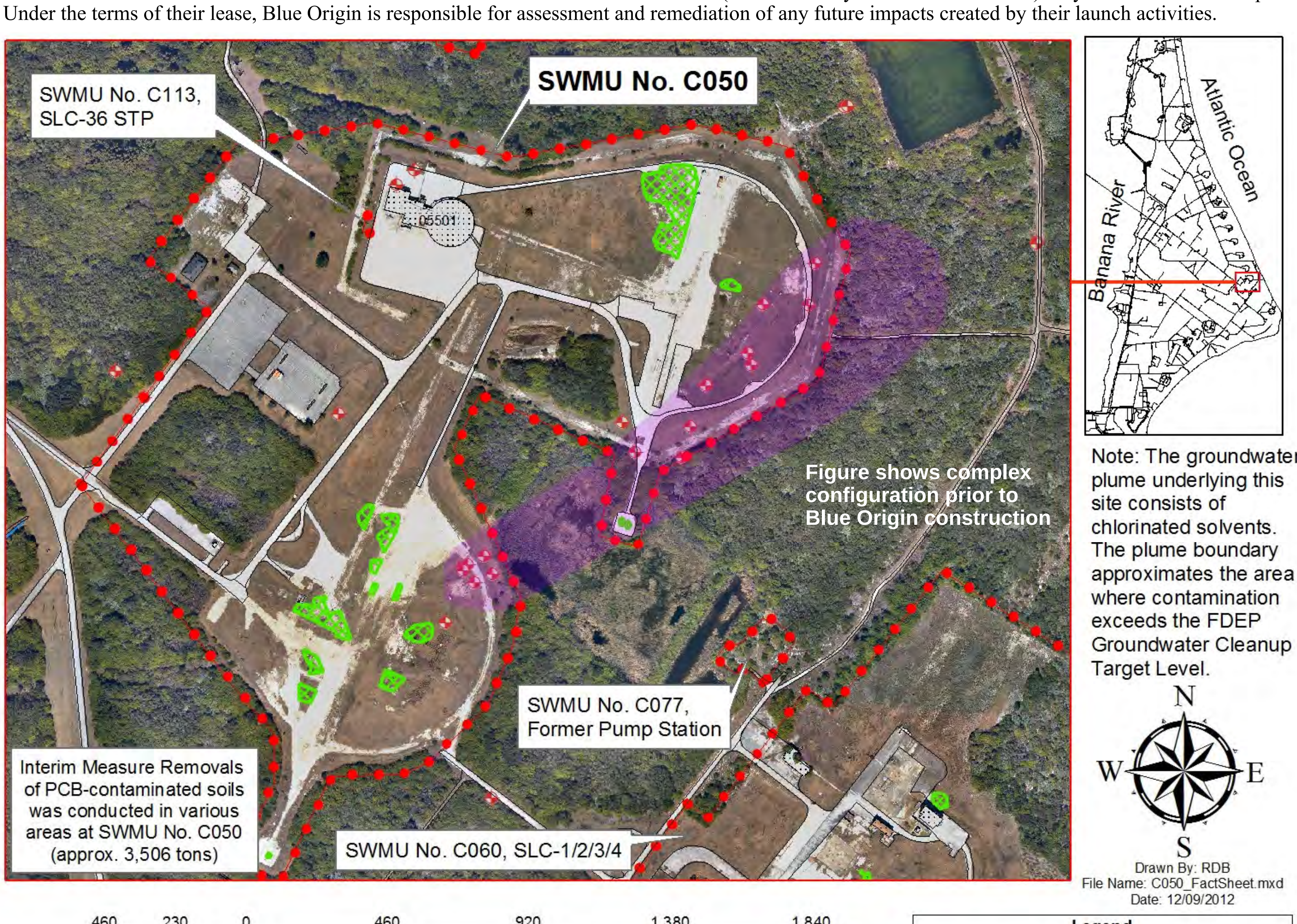
Groundwater: Solvents were found to be present at levels that exceed screening values. A Long Term Monitoring (LTM)/Monitored Natural Attenuation (MNA) program has been implemented in order to track the natural degradation of groundwater contaminants over time.

Soil: PCBs present at elevated levels in the soil at SLC-36. An Interim Measure (IM) was performed in 2001 to remove contaminated soils to a site-specific standard (50 parts per million [ppm]) deemed to be protective of human health within the fence line of an active launch complex. Mission and safety considerations at active complexes, combined with high levels of security, access restrictions, and limitations on digging, dictated that this higher cleanup criteria would be protective as long the complex was active. When the complex was deactivated, an additional IM removed remaining soils that exceeded industrial cleanup standards. Upon completion of this action, remaining soils pose a health risk only under residential conditions. Controls have been implemented to ensure that the site remains industrial. Extensive coordination was performed with Blue Origin to ensure proper handling and management of soil during recent construction activities.

Corrective Action Summary: In accordance with the Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) was completed on this site in May 1990, followed by a Site Investigation (SI) in November 1990. Based on the PA and SI, a RCRA Facility Investigation (RFI) was initiated in order to fully evaluate the nature and extent of contamination at the site and to assess the human health and ecological risk posed by site contamination. Following the RFI, a Corrective Measures Study (CMS) was completed to determine the most appropriate remedy for the site. The CMS recommended that LTM be conducted on groundwater, that a soil removal be completed to reduce risk, and that land use controls (LUCs) be instituted due to residual soil and groundwater contamination. A Statement of Basis summarizing the remedy decision was finalized and approved. The LUC requirements were documented in the accompanying LUC Implementation Plan. In 2001, the initial soil removal was completed to make the site safe for aerospace workers at an active launch. In 2005, a follow-on IM was completed to remediate soils down to the level identified by FDEP as safe for all industrial re-use scenarios. Groundwater monitoring was initiated and land use controls were implemented to ensure the protection of human health. With concurrence from the Florida Department of Environmental Protection, the monitoring program was put on hold while Blue Origin construction activities proceeded, due to the need to abandon many of wells. Once construction is complete, the wells will be re-installed by the construction contractor and monitoring will re-commence. Construction activities were closely coordinated between Blue Origin, the Air Force, and FDEP.

During 2016, select wells were sampled for 1,4-dioxane. No concerns were identified.

Future Actions: Per the approved remedy, LTM/MNA will be conducted until groundwater contaminant concentrations no longer exceed Florida Groundwater Cleanup Target Levels. LUCs will be maintained on both soil and groundwater to ensure that contaminant residuals do not cause any adverse impacts to human health or the environment. These LUCs will be maintained until all residual soil and groundwater contamination is removed or has naturally attenuated to acceptable regulatory levels. The recent Optimization Report and Five Year Review included optimization recommendations. As MNA continues, other assessment may be considered to evaluate remaining hotspots, data gaps, or changes as a result of recent dewatering. An update to the Statement of Basis drafted under the Performance-Based Remediation contract (never formally initiated with FDEP) may warrant future completion. Under the terms of their lease, Blue Origin is responsible for assessment and remediation of any future impacts created by their launch activities.



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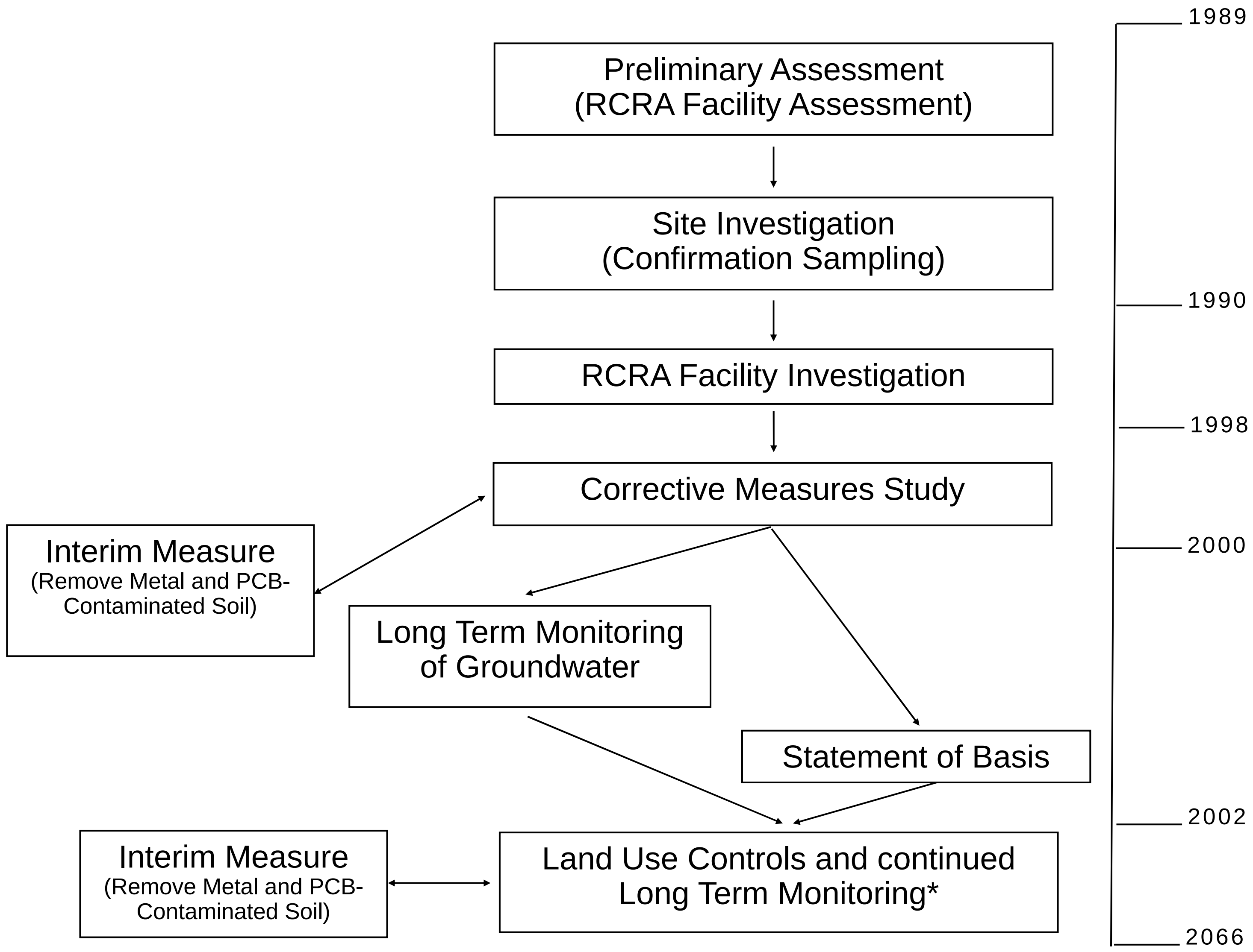
IRP Process Flow Chart

SWMU No. C050 (Space Launch Complex 36, CCAFS)



*Long Term Monitoring of groundwater was implemented immediately following the Corrective Measures Study (CMS), based on the recommendations in the CMS. This monitoring will be included in the Statement of Basis as part of the “final remedy” for the Site (this document will be drafted following completion of the IM. LTM will be carried out until all contaminant levels are below the relevant screening criteria for 2 consecutive rounds of sampling.

Below: Photo shows the launch tower at SLC-36B prior to its demolition in June 2007. Photo was taken on Central Control Road facing southeast.
At left: Photo shows conditions at SLC-36B prior to initiation of Blue Origin construction activities. Pad was demolished shortly after deactivation in 2005

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UNITED STATES AIR FORCE
45TH SPACE WING

Fact Sheet For: **SPACE LAUNCH COMPLEX 17, FACILITY 28401, SWMU NO. C055**
INSTALLATION RESTORATION PROGRAM– SITE DP064
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **MONITORED NATURAL ATTENUATION WITH LAND USE CONTROLS ON-GOING;**
PERFLUORINATED COMPOUNDS ARE PRESENT IN GROUNDWATER

Site History: Solid Waste Management Unit (SWMU) No. C055, Space Launch Complex 17 (SLC-17), is located (see site map, below) approximately 0.5 miles west of the Atlantic Ocean and 1.5 miles east of the Banana River on Cape Canaveral Air Force Station (CCAFS). The complex was built to support the Thor ballistic missile program in 1956 and supported a series of Thor-derived vehicles. From the 1960s through 2011, SLC-17 was devoted to the Delta launch program. Upon final "flyout" of the Delta program, the complex deactivation process commenced. Both launch towers were demolished in May 2018 and additional demolition has been on-going.

Launch-related activities such as cleaning, maintenance, fueling, and waste storage have occurred over the site's lengthy operational history. The potential contaminants resulting from these activities include industrial solvents used for engine flushes, petroleum products, and metals from paint sandblasting activities. Historical paint formulations used on launch structures included polychlorinated biphenyls (PCBs) and lead. Routine sand blasting activities following launches dispersed the PCBs and lead throughout site surface soils. These coatings are no longer used at the site and are not present on any remaining launch structures.

Environmental Media and Contaminants:

Groundwater: Residual solvents were detected in groundwater at concentrations exceeding screening values. A monitored natural attenuation (MNA) program was implemented to track and assess the natural degradation of groundwater contaminants. Injections to enhance attenuation were performed in 2012. The site's primary contaminants of concern (COC) include vinyl chloride and 1,4-dioxane. Pefluorinated compounds (PFOS/PFOA) are present in groundwater.

Soil: Metals, polynuclear aromatic hydrocarbons (PAHs), and PCBs were detected in soil at concentrations that exceeded screening values. Removal actions have been completed to remove contaminated soils located both inside and outside the secure fence line. Land Use Controls (LUCs) have been implemented to ensure that the residual soil contamination does not cause any adverse impact on human health or the environment. Remaining residual contamination between residential and industrial levels include arsenic, iron, lead, PCBs, and PAHs.

Surface Water/Sediment: No contaminants were identified in surface water or sediment at levels that pose a risk to human health or the environment.

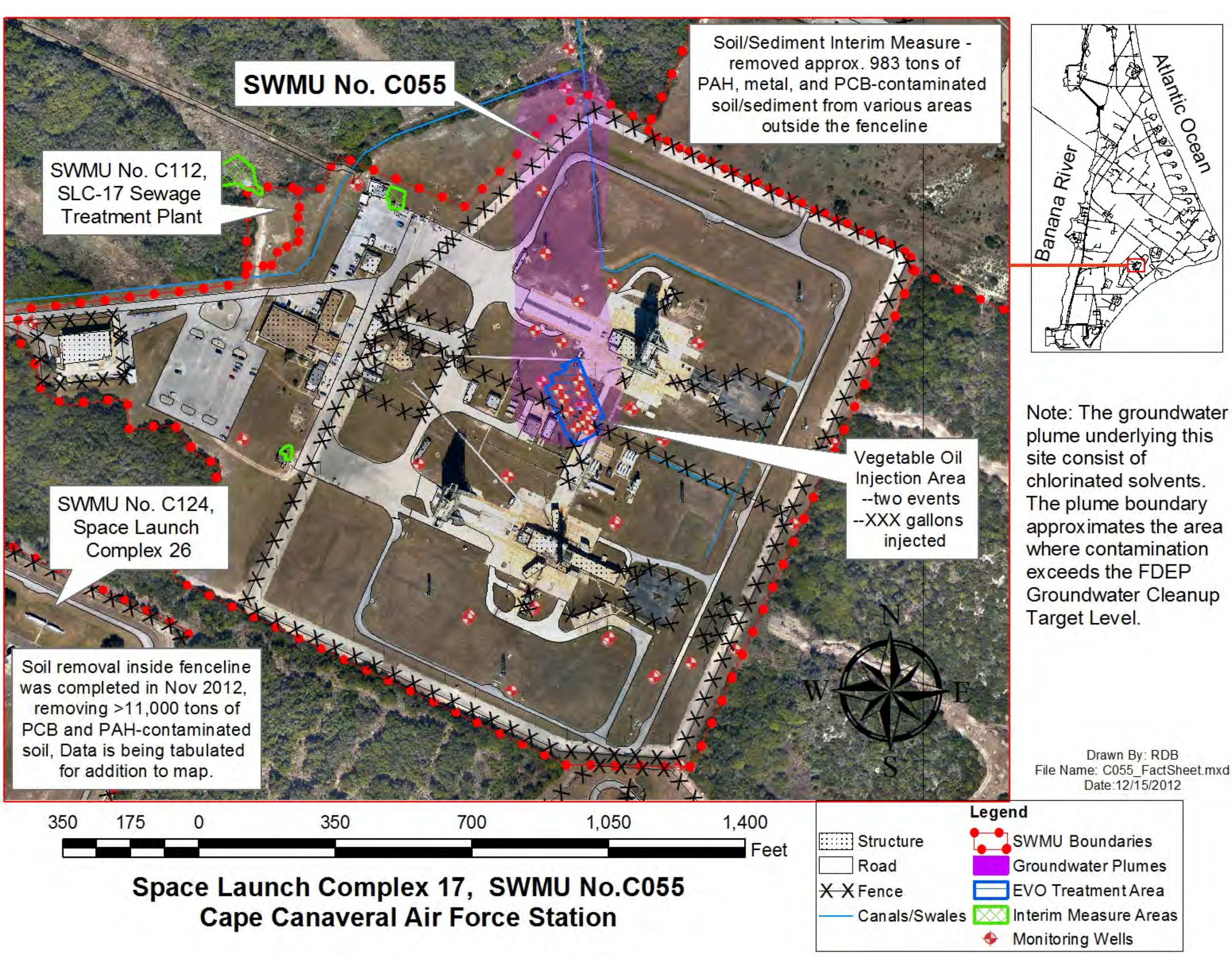
Corrective Action Summary: In accordance with the Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) of this site was completed in 1997, followed by a Site Investigation (SI) in 1998. These assessments recommended further study of this site. In 1998, a RCRA Facility Investigation (RFI) was initiated in order to fully evaluate the nature and extent of contamination at the site and to assess the human health and ecological risk posed by site contamination. Completed in 2001, the RFI recommended that an IM be conducted to remove contaminated soils and that a Corrective Measures Study (CMS) be performed in order to determine the appropriate remedy for groundwater contamination. The CMS recommended that Long Term Monitoring/MNA of groundwater be implemented and that active groundwater remediation be deferred due to several factors, including: the static nature of the plume, the documented natural attenuation of contaminants, and the active nature of the launch program at the site. An IM to remove contaminated soils located outside the facility fence line was completed in 2005, making soils there safe under industrial land use scenarios. The Statement of Basis for the remedy at SLC-17 was finalized and released for public review during August 2005. The remedy was formalized in a fall 2005 permit modification.

Upon deactivation of the launch complex in fall 2011, a soil removal inside the fenceline and groundwater injections (emulsified vegetable oil or EVO) to enhance natural attenuation were initiated. The soil removal to industrial re-use standards (>8,000 cubic yards encompassing ~10 acres) was completed in November 2011. EVO, which both sequesters the contamination and provides a carbon source for enhanced bioremediation, was injected into the core of the plume over two events in Feb-Mar 2012 and Oct 2012 (~ 84,400 gallons of EVO injected over an area of ~0.5 acres. Since the injection, vinyl chloride groundwater concentrations have dropped from 59,000 µg/L to levels near or below the cleanup level.

In 2012, a site-wide assessment for 1,4-dioxane found concentrations above regulatory cleanup target levels; this contaminant was added to the monitoring program. Additional delineation was performed in 2019-20, since 1,4-dioxane is now the primary groundwater contaminant at the site.

PA and SI efforts between 2014 and 2017 identified PFOS/PFOA in groundwater at the site at levels exceeding the EPA drinking water "lifetime health advisory"; however, groundwater at the site is not employed as a drinking water source.

Future Actions: Monitoring will continue until groundwater contaminant concentrations no longer exceed Florida Groundwater Cleanup Target Levels. LUCs will be maintained until residual contaminant concentrations in all impacted environmental media are below Florida Contaminant Cleanup Target Levels, either as a result of additional remediation or natural attenuation. Additional PFOS/PFOA-related activities will depend on establishment of regulatory drivers for environmental media and Air Force policy. The recent Optimization Report and Five Year Review (OR&FYR) included optimization recommendations. Among other recommendations, an update to the Statement of Basis was identified. A draft was prepared under the Performance-Based Remediation contract, but never formally initiated with FDEP. Additional PFOS/PFOA assessment are planned under CERCLA on a stand-alone contract. This work is being prioritized against sites across the Air Force inventory.



IRP Process Flow Chart

SWMU No. C055 (Space Launch Complex 17, CCAFS)

Known Legacy Contaminants

1992
Preliminary Assessment (RCRA Facility Assessment)
↓
1997
Site Investigation (Confirmation Sampling)
↓
1998
RCRA Facility Investigation
↓
2001
Corrective Measures Study
↓
Statement of Basis
↓
2004
Land Use Controls
Long Term Monitoring on Groundwater Plume
→ Interim Measure (Removal of PCB-Contaminated Soil Outside Fenceline)
2007
↓
Launch Complex Deactivation
2011
↓
Corrective Measures Implementation
—Groundwater: Vegetable Oil Injection
—Soil: Excavation and Off-site Disposal
2012
↓
2017
Land Use Controls (Soil and Groundwater) & Long Term Monitoring/ Monitored Natural Attenuation
2082

PFOS/PFOA

Preliminary Assessment/ Site Inspection
↓
Remedial Investigation
Timeframe to be determined

This photo shows an overview of the former launch towers and support facilities at SLC-17. The launch towers were demolished in 2018.
This photo was taken from SLC-31/32 facing southwest.

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UNITED STATES AIR FORCE
45th SPACE WING

Fact Sheet For: **PAD-MOUNTED TRANSFORMER, FACILITY 38320, SWMU NO. C150**
INSTALLATION RESTORATION PROGRAM– SITE DP072
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **ON-GOING MONITORED NATURAL ATTENUATION PLUME-WIDE; MANAGEMENT OF GROUNDWATER LAND USE CONTROLS**

Site History: Solid Waste Management Unit (SWMU) No. C150, Facility 38320, is a pad-mounted transformer located near the corner of Beach Road and Phillips Parkway (see site map, below) on the Cape Canaveral Air Force Station. The transformer is located south of and adjacent to Facility 43400. It has been active since 1962 and serves as a power source for Facility 43400. The transformer is a 30 kilovolt pad-mounted substation and is designated as CX3718. This SWMU was originally identified in the installation-wide Polychlorinated Biphenyl (PCB) Transformer Preliminary Assessment (PA), which was undertaken to evaluate areas where electrical equipment that historically contained PCB dielectric fluid may have released PCBs to the environment. The area around the transformer is a support area for SLC-37. It has been present since the 1960s. Since contamination assessment had never been performed in the area, once the transformer was identified as a concern, it was determined that the assessment should be expanded to take a broader look at surrounding facilities and operations, as well.

Environmental Media and Contamination

Groundwater: Chlorinated solvent residuals that exceed screening criteria have been identified in groundwater underlying the site. Since these residuals do not appear to be associated with the transformer, the SWMU boundary was enlarged to encompass a broader area and delineation was undertaken to identify the contaminant source. The original source could not be definitively identified, but two small chlorinated solvent plumes have been delineated within the SWMU. Since contaminant concentrations in the groundwater exceeded the regulatory limits for monitored natural attenuation as a default remedy, groundwater treatment was undertaken.

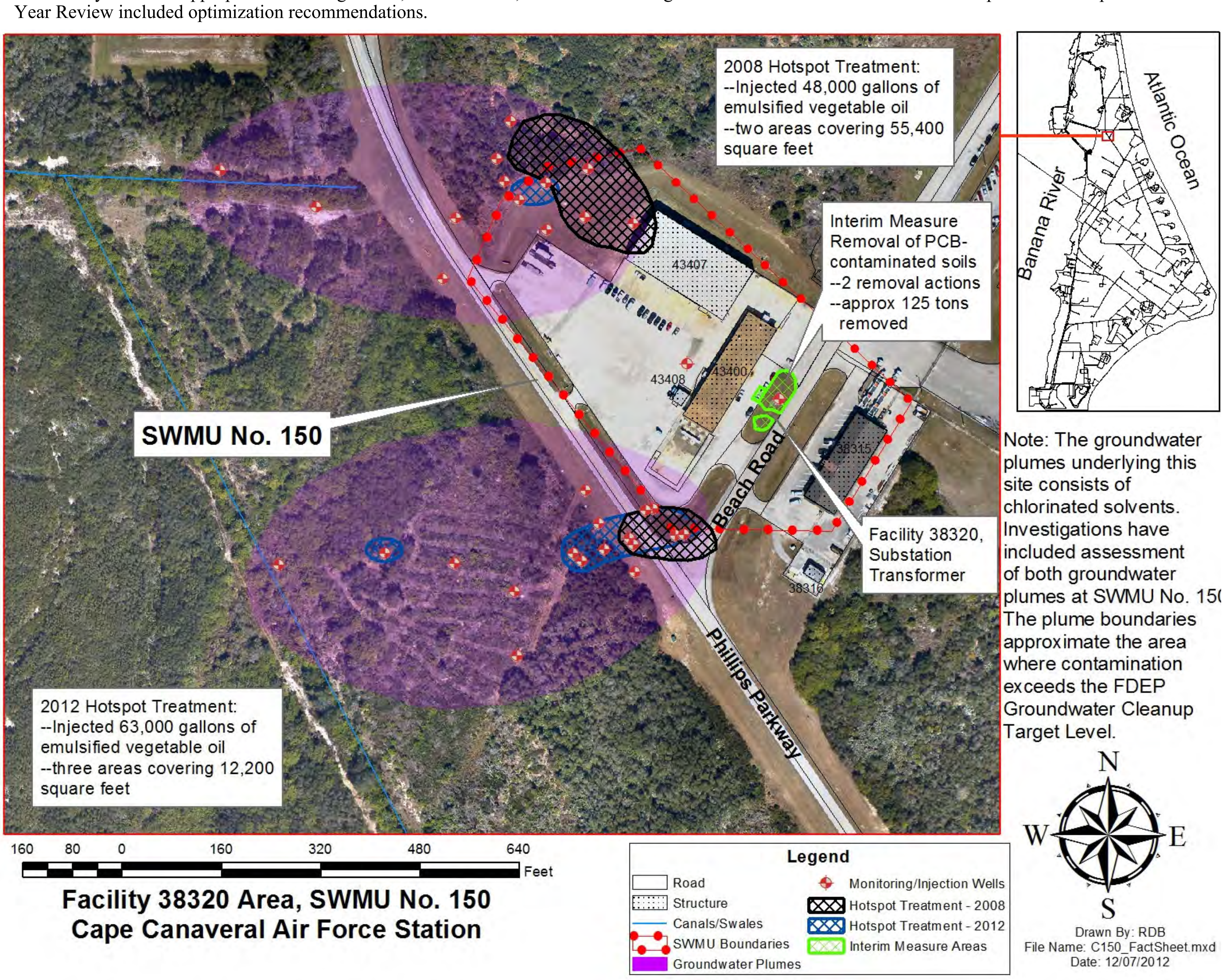
Soil: PCB contamination in excess of regulatory standards was identified in site soils. Two separate Interim Measures (IMs) have been conducted to remove the contaminated soils down to residential standards.

Surface Water/Sediment: No surface water bodies are located at the site, although surface water monitoring is performed in a downgradient canal.

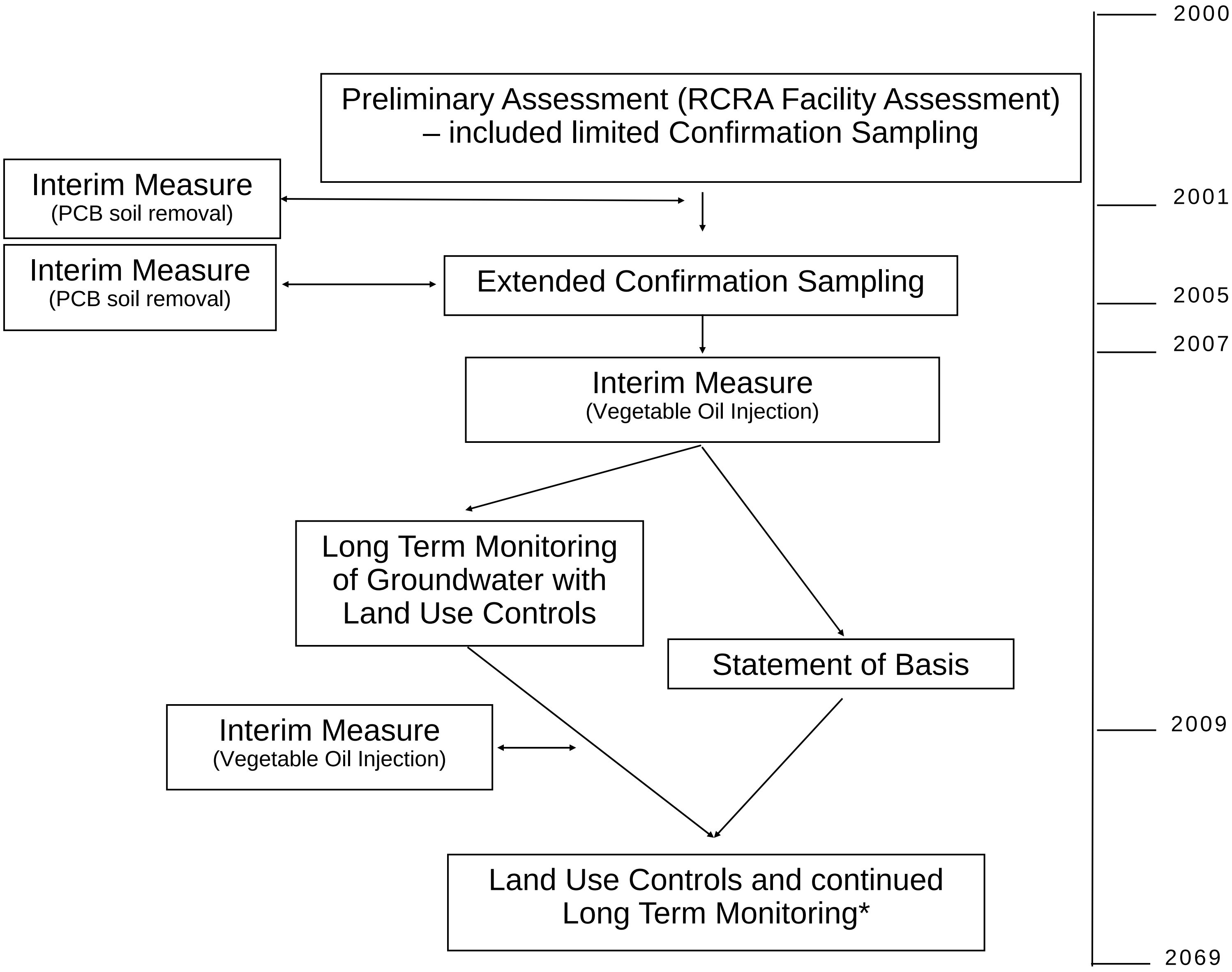
Corrective Action Summary: In accordance with the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) identified Facility 38320 as a location that historically utilized electrical equipment containing PCB dielectric fluid. Initial Confirmatory Sampling (CS) was completed as the second stage of the PA in 2001. The PA/CS Report identified PCB contaminant levels in site soil that exceeded regulatory standards. In 2002, an IM was conducted in order to remove the majority of PCB-contaminated soil from the area surrounding the transformer. One hundred-twenty (120) tons of contaminated soils were removed and transported for off-site disposal. Following this removal action, an Extended CS was commenced in 2003. Due to the levels of PCBs that were detected in soil, the Extended CS also included groundwater sampling to ensure that surface contamination had not leached into the subsurface. Additional soil sampling during the CS identified one small remaining area with PCB concentrations that exceeded residential cleanup standards. Concurrent with the CS, an additional IM was conducted to remove these soils. No PCBs were detected in groundwater during the CS, but chlorinated solvent residuals were detected. Since concentrations exceed the State standards that allow monitored natural attenuation as the default action, a groundwater treatment IM (vegetable oil injection) was initiated in 2007. During January 2008, emulsified vegetable oil solution was injected into the subsurface to sequester the contamination and provide a nutrient source for microbes that dechlorinate trichloroethene and its daughter products. Monitored natural attenuation has been on-going since the treatment was completed. A Statement of Basis documenting a remedy of enhanced natural attenuation was finalized in 2009. Although subsequent monitoring documented decreases in groundwater contaminant concentrations, hotspots persisted, particularly downgradient of the original treatment areas. An additional "hotspot" treatment injection was performed in 2012. Long Term Monitoring/Monitored Natural Attenuation (LTM/MNA) is on-going to assess the continued natural degradation of residual groundwater contamination. Land use controls (LUCs) are being maintained.

During 2016, select wells were sampled for 1,4-dioxane. No concerns were identified.

Future Actions: Land use controls will be maintained on groundwater to ensure that contaminant residuals do not cause any adverse impacts to human health or the environment. The LTM/MNA and LUC program will continue until groundwater contaminant concentrations are consistently less than appropriate screening values, at which time, the site will be eligible for unrestricted re-use. The recent Optimization Report and Five Year Review included optimization recommendations.



IRP Process Flow Chart
SWMU No. C150 (Facility 38320, CCAFS)



<u>At left:</u> Close-up of transformer where the Facility 38320 Area investigation started. (Photographer was standing in front of Facility 43400, looking southwest across Beach Road.)

<u>Below Left:</u> Area at intersection of Phillips Parkway and Beach Road, which is underlain by southern groundwater "hotspot".

<u>Below right:</u> Dry stormwater retention feature constructed at north end of site in the mid-2000s. This area is underlain by the northern groundwater "hotspot."

Last updated Jan 2021

UNITED STATES AIR FORCE
45^{th} SPACE WING

Fact Sheet For: **ESA-60 AREA AND SUBSTATION TRANSFORMER AT FACILITY 59921, SWMU NO. C153**
INSTALLATION RESTORATION PROGRAM– SITE DP075
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **MONITORED NATURAL ATTENUATION OF GROUNDWATER ON-GOING; MAINTENANCE OF GROUNDWATER LAND USE CONTROLS**

Site History: Solid Waste Management Unit (SWMU) No. C153 consists of Explosive Safe Area 60 (ESA-60), located about 1.2 miles northwest of the Cape Canaveral Air Force Station (CCAFS) Industrial Area, on Titan III Road, just south of the ITL Causeway (see site map, below). The majority of the buildings at ESA-60 were constructed in 1960. The complex was used for the assembly and fueling of satellites and other similar payloads. Hydrazine fuels were reportedly used to fuel satellites at one of the facilities within the complex. ESA-60 was essentially vacated in the early 1990s. Many of the facilities were demolished in 2005. This SWMU was originally identified during the installation-wide Polychlorinated Biphenyl (PCB) Transformer Preliminary Assessment (PA), which was undertaken to evaluate areas where electrical equipment that historically contained PCB dielectric fluid may have released PCBs to the environment. The substation transformer (Facility 59921) located just southwest of the Instrumentation Lab was brought into service in the 1960s and was identified for additional evaluation under the PCB PA. Since the ESA-60 Area had never been investigated, it was decided to expand the boundaries of the SWMU and include the entire area in the expanded assessment.

Environmental Media and Contamination

Groundwater: Low levels of trichloroethene (TCE) and dichloroethene (DCE) were detected in the groundwater, along with several inorganic compounds. The inorganic compounds concentrations were generally within the range of naturally-occurring background observed at CCAFS.

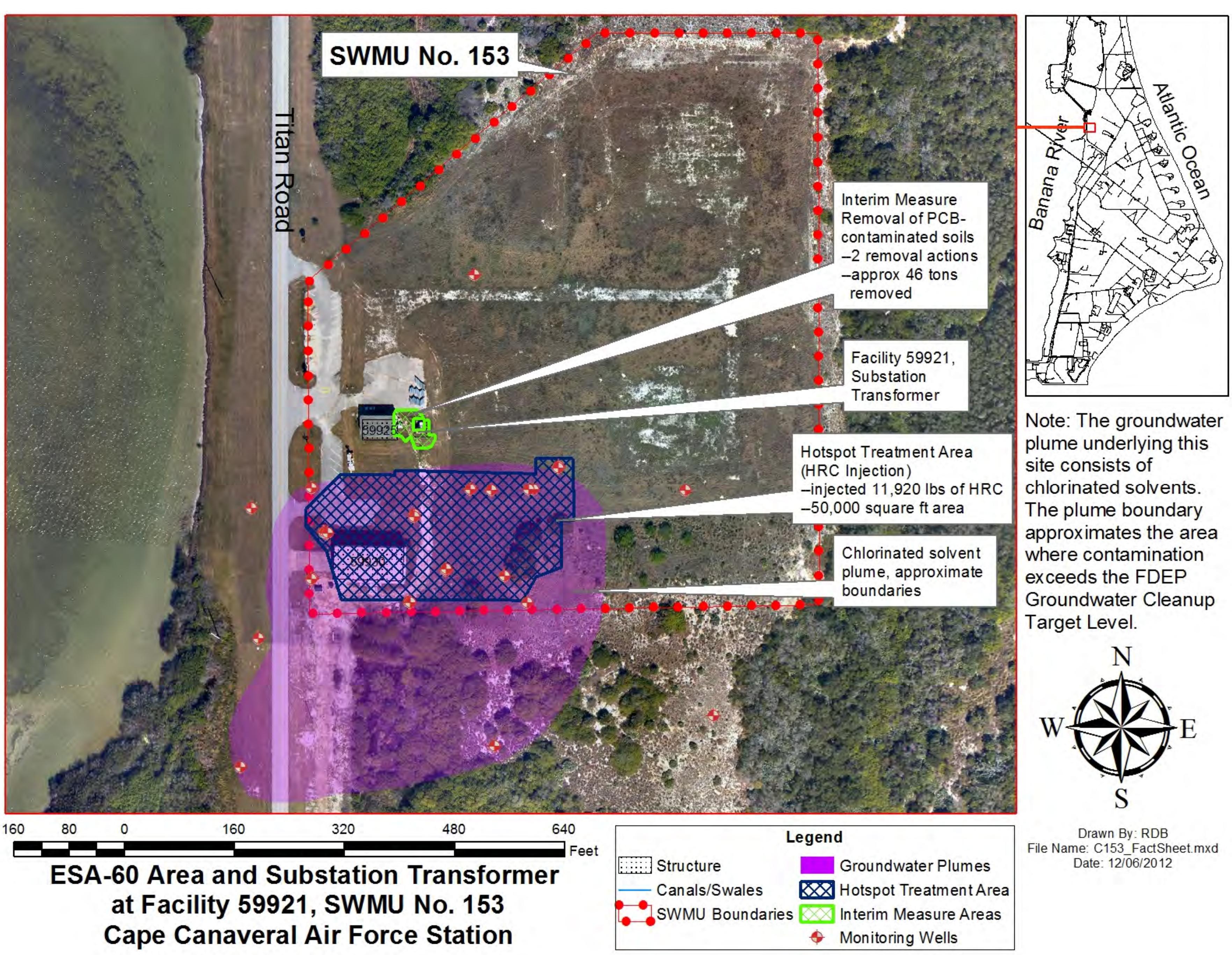
Soil: PCB contamination in excess of regulatory standards was identified in site soils. Two Interim Measures (IM) were performed to remove the contaminated soils down to residential standards.

Surface Water/Sediment: No surface water bodies are located at or near the site.

Corrective Action Summary: In accordance with the Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) identified Facility 59921 as a location that historically utilized electrical equipment containing PCB dielectric fluid. Initial Confirmatory Sampling (CS) was completed as the second stage of the PA in 2001. The PA/CS Report identified PCB contaminant levels in site soil that exceeded regulatory standards. Due to the levels of PCBs that were present in soil, an Extended CS was planned to delineate the soil contamination and evaluate groundwater to ensure that surface contamination had not leached into the subsurface. At that time, it was decided to further expand the assessment to include the ESA-60 area as a whole. ESA-60 had not previously been assessed by the IRP, and activities there were known to have utilized hazardous substances. Therefore, the SWMU boundaries were expanded and the Extended CS included groundwater and soil sampling from throughout the ESA-60 area. In 2002, an IM was conducted in order to remove the PCB-contaminated soil from the area surrounding the transformer. Thirty-six (36) tons of contaminated soils were removed and transported for off-site disposal. During the CS, additional sampling was performed beneath the transformer pad and an additional 10.2 tons of contaminated soils were removed. Following additional confirmation sampling, an IM Report Addendum with a recommendation of No Further Action for soil. No PCBs were detected in groundwater, but due to the low-level chlorinated solvents (TCE and DCE) that were identified, a groundwater treatment IM was initiated following the CS. In 2005 and 2006, three rounds of injections were performed to introduce hydrogen-releasing compound into the subsurface, facilitating the degradation of the chlorinated solvent contamination. A total of 11,920 pounds of treatment agent were injected. Upon completion of these injection actions, monitored natural attenuation was approved as the remedy for remaining groundwater contamination. A Statement of Basis (SB) was prepared, documenting this recommendation. Monitored Natural Attenuation is on-going to assess the continued natural degradation of residual groundwater contamination. Land use controls are being maintained.

During 2016, select wells were sampled for 1,4-dioxane. It was not detected.

Future Actions: Land use controls will be maintained on groundwater to ensure that contaminant residuals do not cause any adverse impacts to human health or the environment. The monitored natural attenuation and land use control program will continue until groundwater contaminant concentrations are consistently less than appropriate screening values, at which time, the site will be eligible for unrestricted re-use. The recent Optimization Report and Five Year Review included optimization recommendations.



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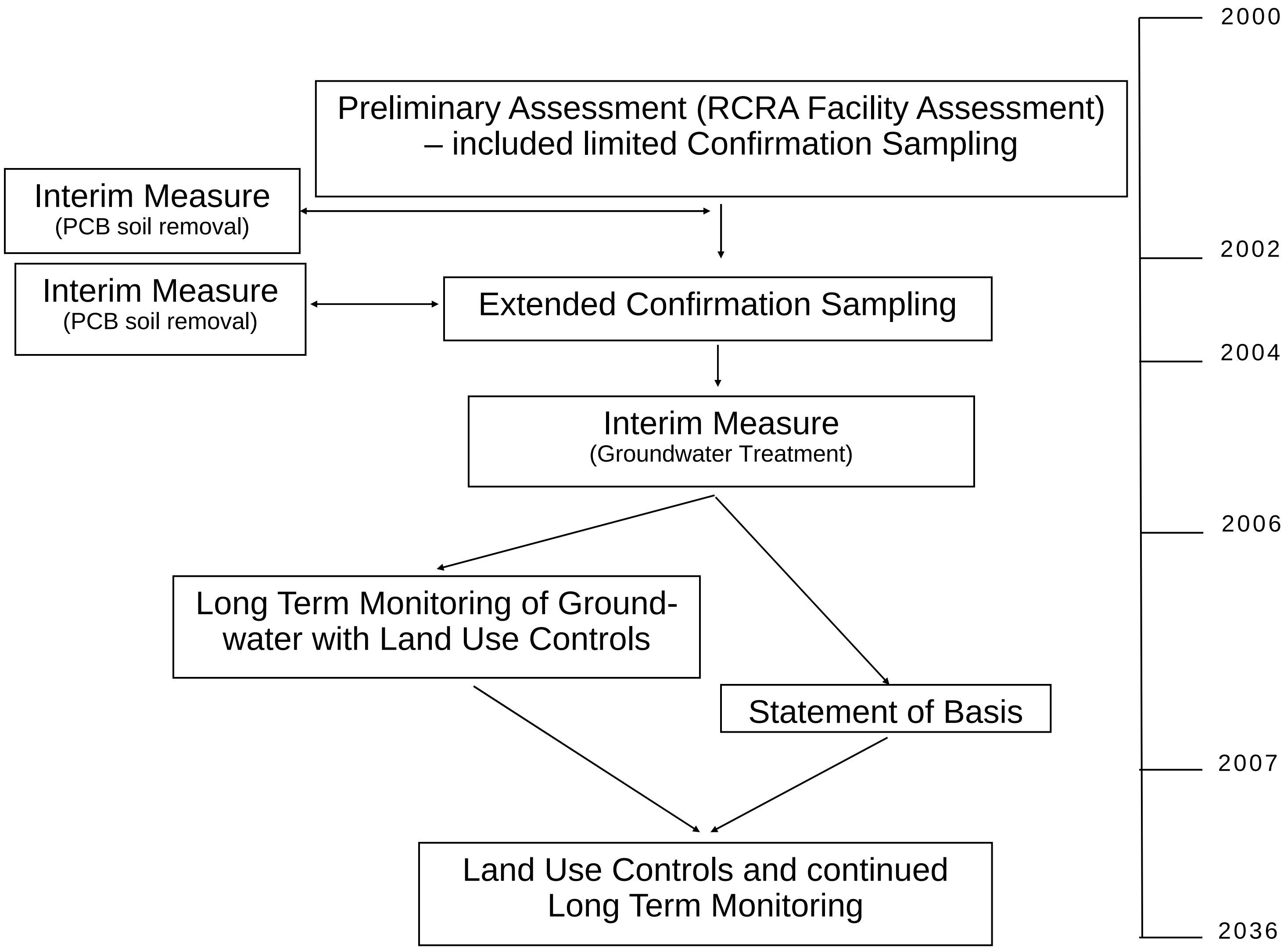
IRP Process Flow Chart

SWMU No. C153 (ESA-60, CCAFS)



Above: Remaining facilities in ESA-60 Area. Facility 59930 is in background. Plume underlies the area around Facility 59930.
Right: Area behind (east of) Facility 59930 (shown in background of photo), where head of groundwater plume is located.

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UNITED STATES AIR FORCE
45th SPACE WING

Fact Sheet For: **HANGAR C AREA AND SUBSTATION TRANSFORMER AT FACILITY 7802, SWMU NO. C154**
INSTALLATION RESTORATION PROGRAM– SITE DP076
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **MONITORED NATURAL ATTENUATION OF GROUNDWATER ON-GOING; MAINTENANCE OF GROUNDWATER LAND USE CONTROLS**

Site History: Solid Waste Management Unit (SWMU) No. C154 consists of the Hangar C Area, located in the eastern portion of Cape Canaveral Air Force Station (CCAFS) Industrial Area, west of Lighthouse Road and north of Control Tower Road (see site map, below). Hangar C was constructed in 1953 and is one of the older hangars on the installation. Over the years, it has housed a variety of functions including assembly of missiles under the Vanguard program and refurbishment of missiles for the Air Force Space and Missile Museum. This SWMU was originally identified during the installation-wide Polychlorinated Biphenyl (PCB) Transformer Preliminary Assessment (PA), which was undertaken to evaluate areas where electrical equipment that historically contained PCB dielectric fluid may have released PCBs to the environment. The substation transformer (Facility 7802) located at the southeast corner of the hangar was brought into service in the 1950s and was identified for additional evaluation under the PCB PA. Since the Hangar C Area had never been previously investigated, it was decided to expand the boundaries of the SWMU and include the entire area in the expanded assessment.

Environmental Media and Contamination

Groundwater: Dichloroethene (DCE) and vinyl chloride (VC) were detected in the groundwater at concentrations that warranted a groundwater treatment action.

Soil: PCBs, polynuclear aromatic hydrocarbons (PAHs), and metals contamination in excess of regulatory standards was identified in site soils. Two Interim Measures (IM) were performed to remove the contaminated soils down to residential standards.

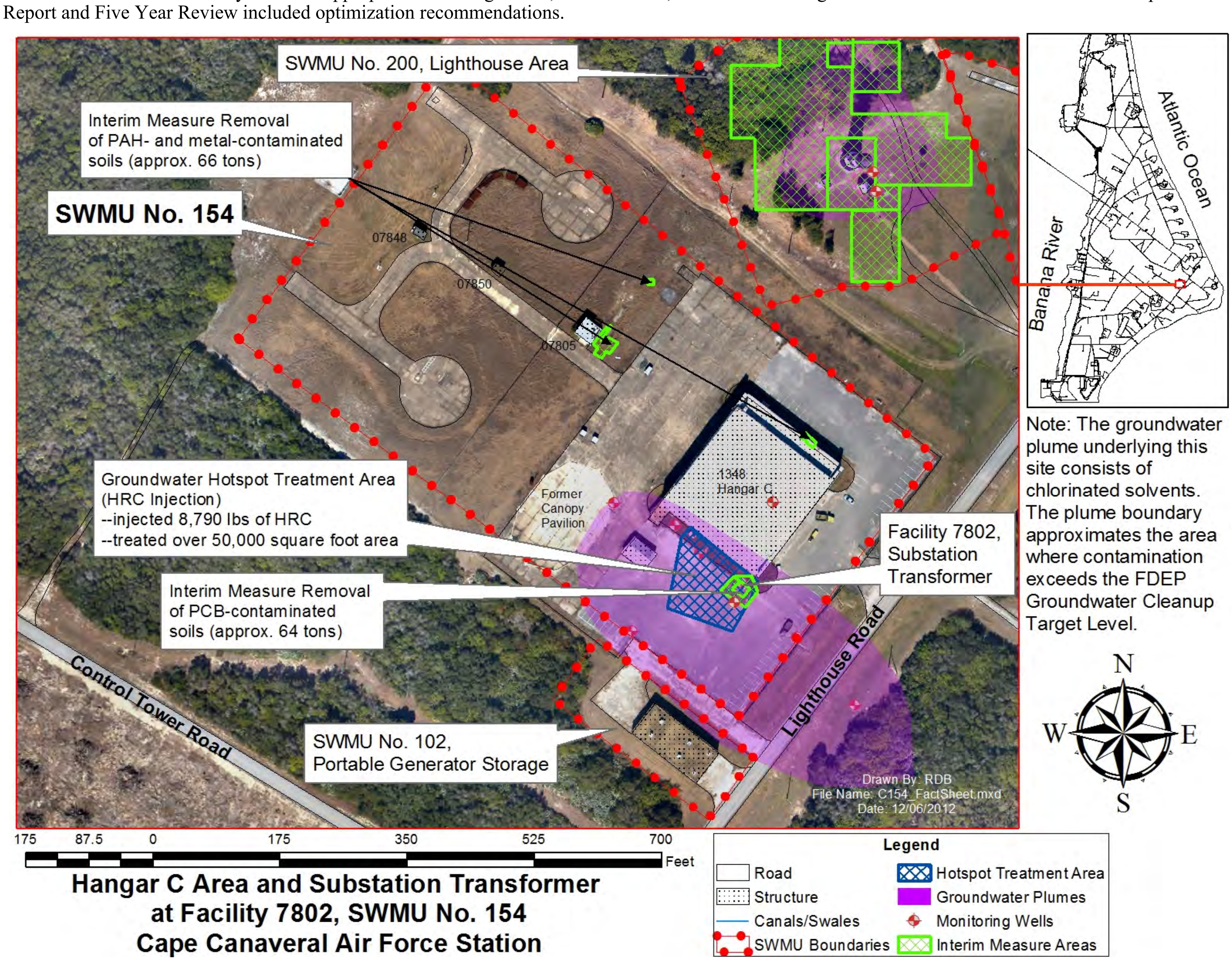
Surface Water/Sediment: No surface water bodies are located at or near the site.

Corrective Action Summary: In accordance with the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) identified Facility 7802 as a location that historically utilized electrical equipment containing PCB dielectric fluid. Initial Confirmatory Sampling (CS) was completed as the second stage of the PA in 2001. The PA/CS Report identified PCB contaminant levels in site soil that exceeded regulatory standards. Due to the levels of PCBs that were present in soil, an Extended CS was planned to delineate the soil contamination and evaluate groundwater to ensure that surface contamination had not leached into the subsurface. At that time, it was decided to further expand the assessment to include the Hangar C area as a whole. Hangar C had not previously been assessed by the IRP, and most of the hangars on the installation are known to have supported operations that utilized hazardous and toxic substances or produced wastes. Therefore, the SWMU boundaries were expanded and the Extended CS included groundwater and soil sampling from throughout the Hangar C area. In 2003, an IM was conducted in order to remove the PCB-contaminated soil from the area surrounding the transformer. Sixty-four (64) tons of contaminated soils were removed and transported for off-site disposal. Concurrent with the CS in 2004, a second IM was conducted in order to remove PAH and metal-contaminated soils that were identified elsewhere on the site during the CS. Sixty-six (66) tons of contaminated soils were removed and transported for off-site disposal. The CS recommended No Further Action (NFA) for soil at Hangar C. No PCBs were detected in groundwater during the CS, but chlorinated solvent residuals were detected. Since concentrations exceeded the State standards that allow monitored natural attenuation as the default action, a groundwater treatment IM was initiated upon completion of the CS. In 2005, hydrogen-releasing compound was injected into the subsurface to facilitate the degradation of the chlorinated solvent contamination. In 2005 and 2006, two rounds of injections were performed to introduce hydrogen-releasing compound into the sub-surface, facilitating the degradation of the chlorinated solvent contamination. A total of 8,790 pounds of treatment agent were injected. Upon completion of these injection actions, monitored natural attenuation was approved as the remedy for remaining groundwater contamination. A Statement of Basis (SB) was prepared, documenting this recommendation. IM activities concluded with a recommendation for No Further Action on soil at Hangar C. Monitored Natural Attenuation is on-going to assess the continued natural degradation of residual groundwater contamination. Land use controls are being maintained.

As of approximately 2009, low-level vinyl chloride contamination in the nearby Lighthouse Area (SWMU No. C200) was combined into the Hangar C monitoring program. This was appropriate for several reasons, including: proximity of the two sites, similarity of groundwater contaminants, and the limited extent and low concentration of contamination in the Lighthouse Area. (Refer to the C200 Fact Sheet for details on assessments in the Lighthouse Area).

During 2015, select wells were sampled for 1,4-dioxane. All detected concentrations were below the Groundwater Cleanup Target Level.

Future Actions: Land use controls will be maintained on groundwater to ensure that contaminant residuals do not cause any adverse impacts to human health or the environment. The monitored natural attenuation and land use control program will continue until groundwater contaminant concentrations are consistently less than appropriate screening values, at which time, the site will be eligible for unrestricted re-use. The recent Optimization Report and Five Year Review included optimization recommendations.



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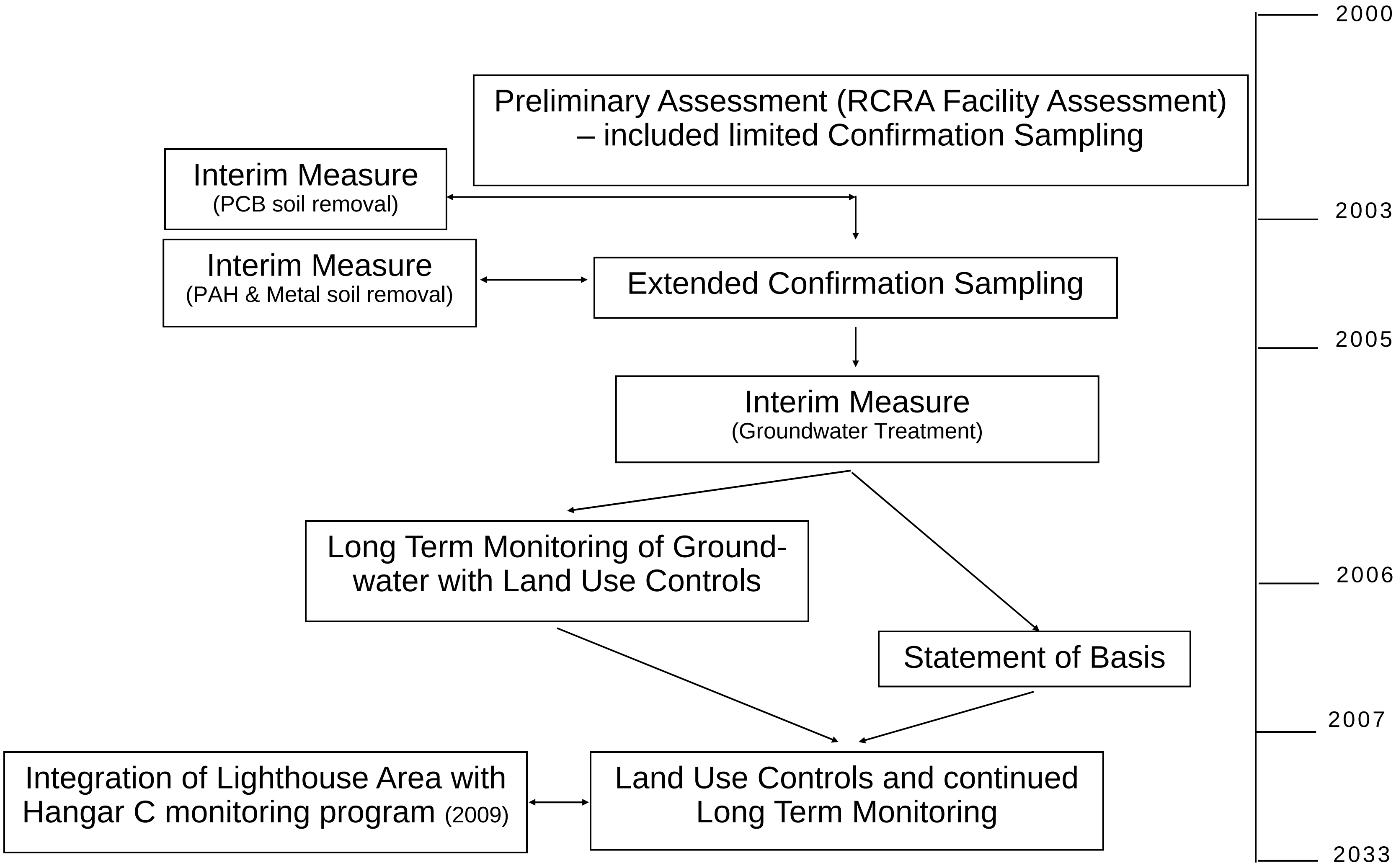
IRP Process Flow Chart

SWMU No. C154 (Hangar C, CCAFS)



At left: Transformer Substation, Facility 7802, where Hangar C assessment originated. Transformer is located on southwest corner of Hangar. Groundwater contamination is also on that side of the hangar.

Below: Hangar C Area. Boxed area indicates location of substation transformer. Groundwater plume underlies area on left side of photo. Photo was taken from across Lighthouse Road, looking to the north.

(photos from mid-2000s; site has not changed significantly)

UNITED STATES AIR FORCE
45TH SPACE WING

Fact Sheet For: **LIGHTHOUSE AREA, FACILITY 07700, SWMU NO. C200**
INSTALLATION RESTORATION PROGRAM– SITE SA079
CAPE CANAVERAL AIR FORCE STATION, FLORIDA

Current Status: **SOIL REMEDIATION COMPLETED— NO REMAINING SOIL CONCERNS; GROUNDWATER LONG TERM MONITORING AND CONTROLS UNDER WAY**

Site History: Solid Waste Management Unit (SWMU) No. C200, the Lighthouse Area, is located west of Lighthouse Road (see site map, below), south of its intersection with Camera Road B on Cape Canaveral Air Force Station (CCAFS). The Lighthouse Area is located just north of Hangar C. The current lighthouse was originally constructed in 1868 at a location farther to the east, replacing an earlier structure that was deemed too short to provide adequate navigational assistance. It was moved to its current location in 1893, when shoreline erosion threatened the previous site. Originally there were several keeper's houses and support structures on the site, in addition to the steel-plated lighthouse. When CCAFS was created, new structures were added for use by the military and some existing structures were adapted for industrial use. Today only the lighthouse itself and several small support structures remain.

During routine painting activities in 2006, lead contamination in the surrounding soil was identified, likely due to historical paint maintenance activities in the area. Other activities in the area with a potential environmental impact include historical storage activities and vehicle repair operations.

The Lighthouse Area was originally included in SWMU No. 081. Investigations there primarily focused on the nearby Firehouse Area, but did include some assessment in the vicinity of the Lighthouse. SWMU No. 081 was approved for No Further Action in 1997. Based on the discovery of paint-related contamination in the Lighthouse Area in 2006, past operations in the vicinity were reviewed in greater detail. A number of previously-unassessed facilities were identified. It was decided to establish the Lighthouse Area as a separate SWMU, and proceed through the RCRA Corrective Action Process there.

Environmental Media and Contaminants:

Groundwater: Residual industrial solvents and metals were detected in groundwater at concentrations above screening values. The low levels and isolated nature of the detections did not warrant treatment. The decision was made to incorporate the well into the nearby monitoring program at Hangar C. Within the first year of monitoring, metals monitoring was eliminated. One well continues to be monitored for low level vinyl chloride.

Soil: Lead, arsenic, barium, and PCBs were detected at concentrations exceeding residential cleanup levels. Concentrations allowed on-site tilling to mitigate lead, arsenic, and barium contamination. PCBs are not suitable for tilling, so a small area was excavated and disposed off-site.

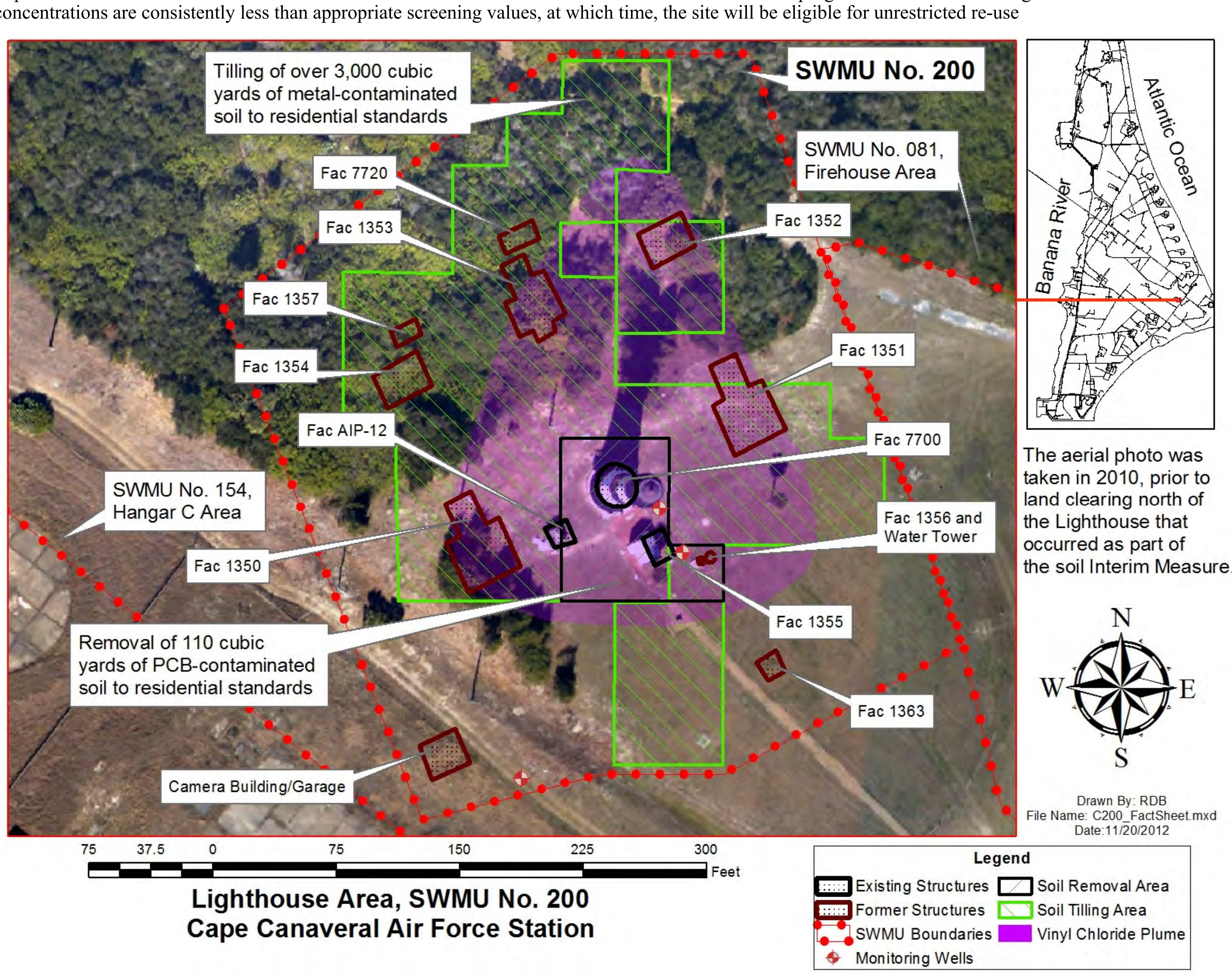
Surface Water/Sediment: No surface water bodies are located at or near the site.

Corrective Action Summary: In accordance with the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA), a Preliminary Assessment (PA) of this site was completed in 2006. Thirteen current or former facilities in the area were assessed under the PA. Confirmation Sampling (CS) and additional delineation were then completed. The final Confirmation Sampling Report was issued in 2008. Recommendations for the site include soil remediation and initiation of a groundwater monitoring and land use control (LUC) program. Since groundwater contamination was low-level and limited in extent, the decision was made to include the monitoring wells (one for vinyl chloride and two for metals) in the nearby Hangar C monitoring program. Within a year of semi-annual monitoring, both wells with metal concerns were eliminated. Vinyl chloride monitoring continues.

Due to cultural and archaeological issues at the site, a conventional excavation project was not feasible, since it might remove artifacts from the site. Feedback from the Florida Department of Environmental Protection, the State Historic Preservation Office, and the Tribal Historic Preservation Office helped identify soil tilling as a viable technology to reduce metals concentrations to levels safe for unrestricted re-use and ensure that any artifacts remained on-site. Since the area containing PCBs was very limited, it was agreed that those soils could be screened and then disposed off-site. The rest of the contaminated area was tilled in 15 centimeter lifts. The project was painstakingly undertaken to avoid damaging historical site features. All soils to be removed from the site were screened for artifacts, as were all areas to be tilled that the installation archaeologist deemed potentially significant. Over 3,000 cubic yards of soil was tilled until residential cleanup levels were achieved. Another 110 cubic yards of soil was excavated and disposed off-site. A Statement of Basis (SB) was prepared in 2013, documenting unrestricted re-use for soil and a remedy of monitored natural attenuation and groundwater land use controls.

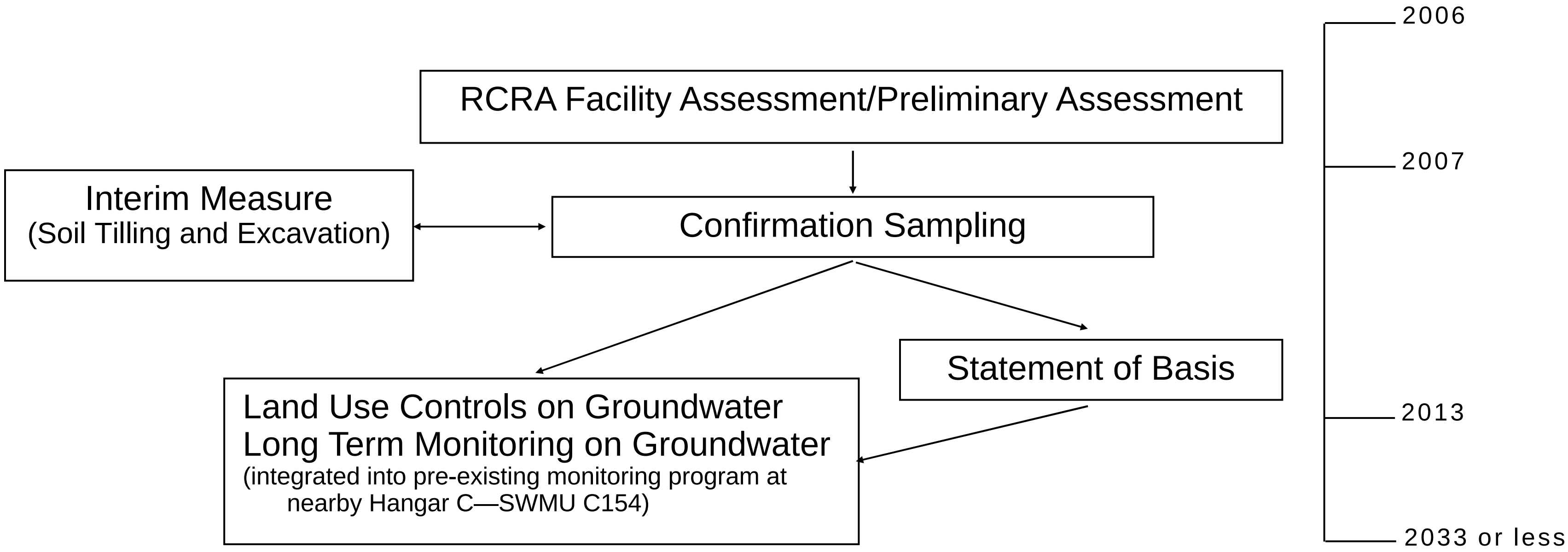
During 2015, the remaining well was sampled for 1,4-dioxane. It was not detected.

Future Actions: Land use controls will be maintained on groundwater to ensure that contaminant residuals do not cause any adverse impacts to human health or the environment. The monitored natural attenuation and land use control program will continue until groundwater contaminant concentrations are consistently less than appropriate screening values, at which time, the site will be eligible for unrestricted re-use



IRP Process Flow Chart

SWMU No. C200 (Lighthouse, CCAFS)*



- \- The Lighthouse Area was originally included in SWMU No. 081, which focused on the adjacent Firehouse Area, but included limited assessment at the Lighthouse. When additional concerns were identified in the Lighthouse Area, the decision was made to establish the Lighthouse Area as a separate SWMU and to proceed through the RCRA Corrective Action Process there. The steps shown here are unique to SWMU No. 200 and do not include previous assessments under SWMU No. 081.

Clockwise from upper left: Archaeological shovel testing prior to any environmental cleanup work; Hand excavation of buried brick walkways in advance of tilling; Soil tilling; Soil screening; Cataloguing, brush cleaning and wipe-sampling recovered artifacts.