APPENDIX F –

ENDANGERED SPECIES ACT

CONSULTATION

From:	Miller, Shari A. (WFF-2500) <shari.a.miller@nasa.gov>
Sent:	Wednesday, November 10, 2021 12:15 PM
To:	'cindy_schulz@fws.gov'
Cc:	Argo, Emily; Finio, Alan (MARAD); brian.c.denson@usace.army.mil; Nate Overby; Meyer, T J (WFF-2500); Finch, Kimberly (GSFC-2500); Levine, Lori M. (GSFC-2500)
Subject:	Project Review Request, Wallops Island Northern Development, NASA WFF
Attachments:	NASA WIND - USFWS_T&E Consult Ltr_111021.pdf

Dear Ms. Schulz:

The National Aeronautics and Space Administration (NASA) Wallops Flight Facility (WFF) and the Virginia Commercial Space Flight Authority (VCSFA, VA Space) propose to construct a pier for barge access and berthing and to dredge a vessel approach area connecting to the Chincoteague Inlet Federal Channel. NASA is the lead agency for the National Environmental Policy Act (NEPA) process and for this Endangered Species Act (ESA) consultation. As the Department of Transportation's Maritime Administration (MARAD) and the U.S. Army Corps of Engineers (USACE) are serving as Cooperating Agencies on this project, this consultation also serves to fulfil their requirements.

Based on the attached assessment, NASA requests your agency's concurrence with our determination of effects for each of the federally listed species under USFWS jurisdiction potentially occurring in the action area, as summarized in Table 5 of the attached.

If you have any questions or require additional information, please contact me at Shari.A.Miller@nasa.gov or (757) 824-2327.

Thank you.

Shari A. Miller

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"Remember there's no such thing as a small act of kindness. Every act creates a ripple with no logical end." —Scott Adams

National Aeronautics and Space Administration

Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337

Reply to Attn of: 250.W

November 10, 2021

Ms. Cindy Schulz
Virginia Field Office
U.S. Fish and Wildlife Service
6669 Short Lane
Gloucester, Virginia 23061

Re: Project Review Request, Wallops Island Northern Development, NASA Wallops Flight Facility, Accomack County, Virginia

Dear Ms. Schulz:

The National Aeronautics and Space Administration (NASA) Wallops Flight Facility (WFF) and the Virginia Commercial Space Flight Authority (VCSFA, VA Space) propose to construct a pier for barge access and berthing and to dredge a vessel approach area connecting to the Chincoteague Inlet Federal Channel (**Figures 1 and 2**). NASA is the lead agency for the National Environmental Policy Act (NEPA) process and for this Endangered Species Act (ESA) consultation. As the Department of Transportation's Maritime Administration (MARAD) and the U.S. Army Corps of Engineers (USACE) are serving as Cooperating Agencies on this project, this consultation also serves to fulfil their requirements.

NASA is preparing an Environmental Assessment (EA) in compliance with NEPA to analyze the potential effects of the proposed action on the environment. The EA will be tiered from the May 2019 *NASA WFF Site-Wide Programmatic Environmental Impact Statement* (PEIS), in which NASA evaluated the environmental consequences of constructing and operating new facilities and infrastructure at WFF.

The purpose of this letter is to provide information about the proposed project and to request your concurrence with our determinations regarding potential effects on federally listed threatened and endangered species under United States Fish and Wildlife Service (USFWS) jurisdiction in the action area. Additionally, NASA and VCSFA, along with MARAD and USACE, are concurrently consulting with the National Oceanic and Atmospheric Administration's Marine Fisheries Service on in-water species under their jurisdiction in the action area.

Background

The goal of the MARAD Marine Highway Program is to expand the use of America's navigable waterways; to develop and increase marine highway service options; and to facilitate their further integration into the current U.S. surface transportation system, especially where water-based transport is the most efficient, effective, and sustainable option (MARAD 2019a). The M-95 Marine Highway Corridor includes the Atlantic Ocean coastal waters; Atlantic Intracoastal Waterway; and connecting commercial navigation channels, ports, and harbors spanning 15 states including Virginia. The proposed Wallops Island M-95 Intermodal Barge Service project has the potential to support the growth of existing operations at WFF, enhance Science, Technology, Engineering, and Math (STEM) research opportunities, and spur high-tech/high-paying jobs in a predominantly rural area (MARAD 2019b).

VCSFA was created in 1995 by the General Assembly of the Commonwealth of Virginia to promote the development of the commercial space flight industry, economic development, aerospace research, and STEM education throughout the Commonwealth. In 1997, the VCSFA entered into a Reimbursable Space Act Agreement with NASA, which permitted the use of land on Wallops Island for launch pads. VCSFA also applied for and was granted a Federal Aviation Administration (FAA) license for launches to orbital trajectories. This led to the establishment of the Mid-Atlantic Regional Spaceport (MARS) which is owned and operated by VCSFA.

Development of a port and operations area to support the activities of NASA, WFF tenants, and MARS at the north end of Wallops Island was evaluated at a programmatic level of detail in the 2019 *Final Site-wide PEIS* (NASA 2019a). NASA has several long-term tenants and customers that use the WFF research airport and Wallops Island launch range, its facilities, and airspace.

Description of the Proposed Action

Under the Proposed Action, the MARS Port, including a 1,305-ft fixed pier and turning basin, would be constructed adjacent to the unmanned aerial system (UAS) Airstrip located at the north end of Wallops Island (**Figures 1 and 2**). The MARS Port would provide a port and operations area along with associated capabilities for VCSFA, NASA WFF, and other customers. The MARS Port would also serve as a new intermodal facility as part of the MARAD M-95 Marine Highway Corridor. Infrastructure (new upland facilities and improvements to the existing access road, airstrip, and utilities) would likewise be constructed or installed as part of the Proposed Action. Access road improvements would include widening of an existing culvert.

The Proposed Action would also include the dredging of a new and existing channel for enhanced vessel approach purposes (**Figure 3**). The vessel approach channel, which interfaces with two Federal waterways, the Chincoteague Inlet Channel and the Chincoteague Inlet to Bogues Bay connecting waters, would initially be used by a variety of shallow-draft, manned and unmanned vessels. Ultimately, the proposed channel would have a length of approximately 12,800 ft, a width of 100 ft, and a final depth of 12 ft below mean lower low water (MLLW). Components of the Proposed Action are further described below.

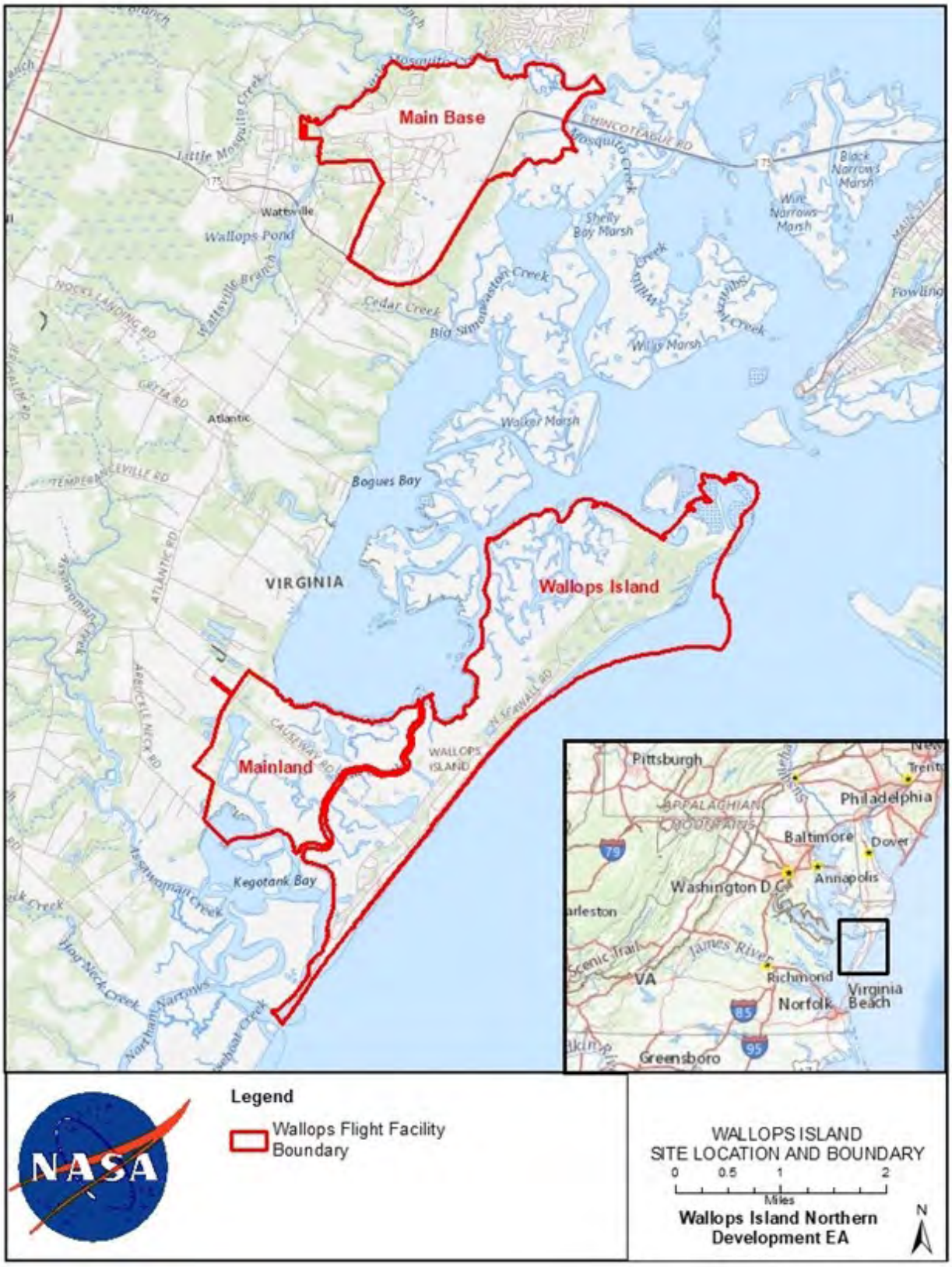

Figure 1: NASA WFF Location

Figure 2: Proposed MARS Port and Infrastructure Components

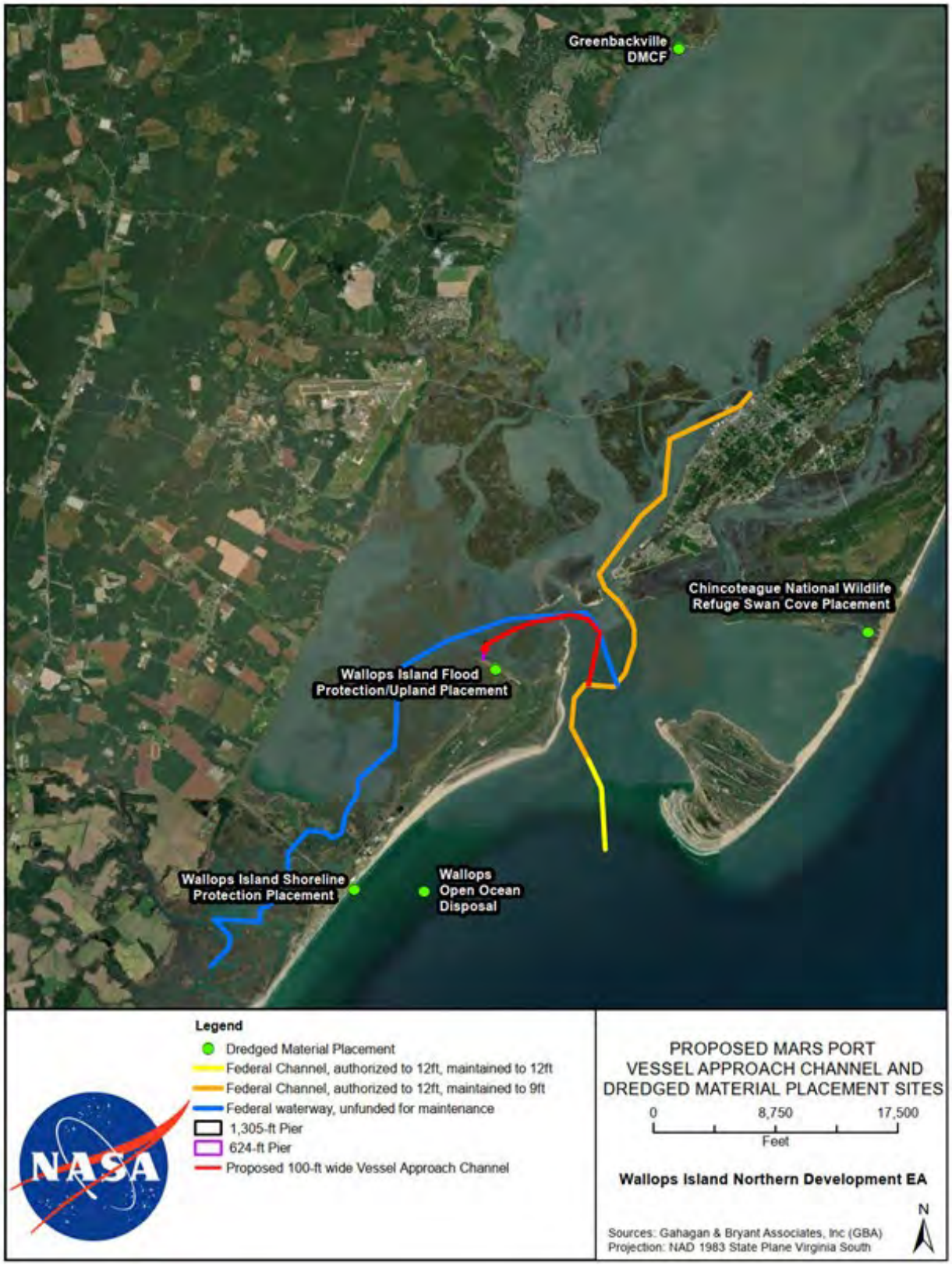

Figure 3: Proposed MARS Port Vessel Approach Channel and Dredged Material Placement Sites

Proposed Action In-Water Components

The MARS Port, including a 1,305-ft fixed pier and turning basin would be constructed on (and within the vicinity of) the UAS Airstrip located at the north end of Wallops Island. The in-water portion of the Proposed Action would also include the dredging of an existing channel for enhanced vessel approach purposes. The vessel approach channel would be approximately 12,800 ft long, 100 ft wide, and would have a final depth of 12 ft below MLLW. The MARS Port would provide a port and operations area along with associated capabilities for MARS, NASA WFF, and other customers. The MARS Port would also serve as a new part of the MARAD M-95 Marine Highway Corridor.

Construction of the Proposed Action would be carried out in three phases:

- **Phase 1** would be construction of a 624-ft fixed pier, a 200-ft-radius turning basin 9 ft deep below MLLW and dredging of the vessel approach channel to a final depth of 5 ft to 9 ft below MLLW (red outline in **Figure 4**). Additionally, a 130-ft long segment of the existing paved UAS Airstrip access road would be widened from 15 ft to 30 ft in conjunction with the widening of the culvert over which the road crosses a headwater drainage channel to Cow Gut.
- **Phase 2** would be construction of a 676-ft extension of the fixed pier to a total length of 1,305 ft and dredging of a 200-ft-radius turning basin (located at the end of the pier extension; shaded pink on **Figure 4**) to a final depth of 9 ft below MLLW.
- **Phase 3** of construction would be additional dredging of the turning basin and vessel approach channel to a final depth of 12 ft below MLLW, specifically the portion of the channel from the Phase 2 turning basin to where it meets the Chincoteague Inlet Federal Channel (shaded blue on **Figure 4**).

The portion of the channel shown in pink on **Figure 4**, which connects the vessel approach channel to the Phase 2 turning basin, is naturally deeper than 9 feet below MLLW and, therefore, would not require any dredging during Phase 2. The estimated timeline for construction of the Proposed Action would have Phase 1 beginning in 2022 and being completed by 2024, with subsequent phases occurring approximately 1 to 2 years after the completion of the prior phase. Additional information about the proposed pier and other port components is provided in Chapter 2 of the Draft EA.

A variety of shallow-draft (2- to 4-ft), manned and unmanned vessels would be serviced by the Port. The major navigational service would be a tug and barge configuration of an approximately 150-ft by 40-ft deck barge propelled by a tugboat requiring approximately 8 ft of draft. The vessel approach channel would intersect with the Chincoteague Inlet Federal Channel and the Bogues Bay connecting waters (**Figure 3**). The proposed width of the approach channel, approximately 100 ft, is consistent with the dimensions of the Federal Channel. Estimated dredging volumes for the vessel approach channel and turning basin are provided in **Table 1**.

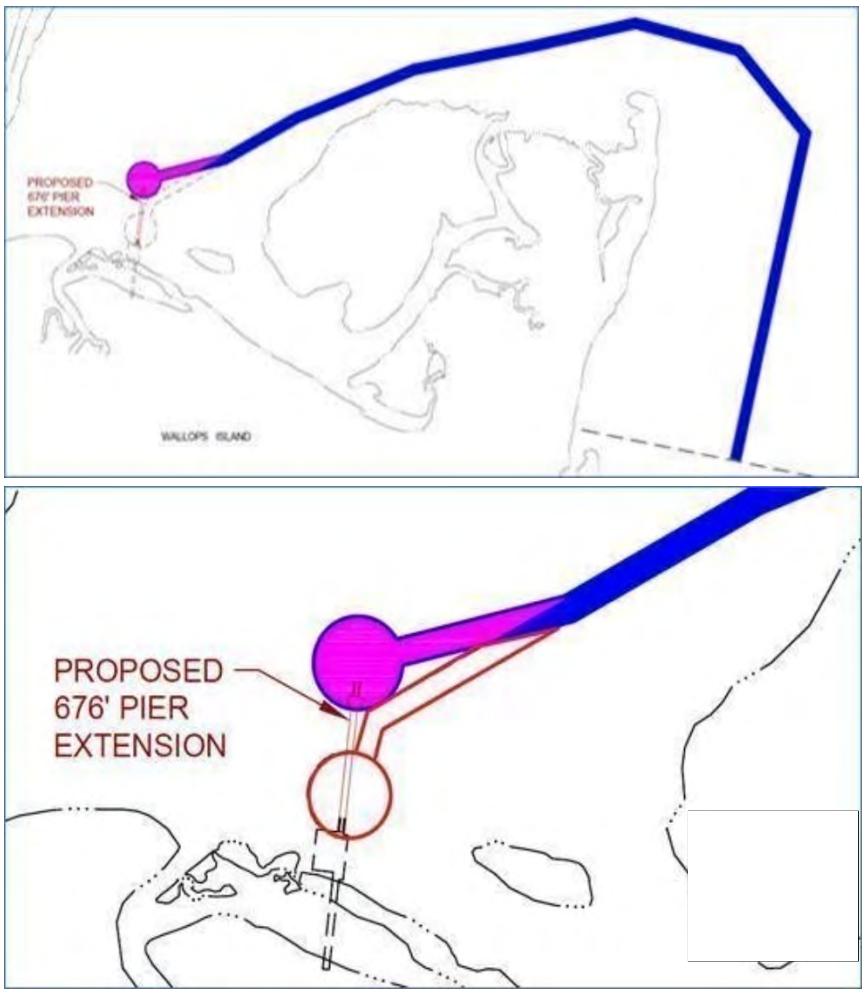

Figure 4: Diagram of Proposed Phased Construction

Table 1. Channel Dimensions and Estimated Dredging Volumes			
	Phase 1	**Phase 2**	**Phase 3**
Channel depth	9 ft deep below MLLW	9 ft deep below MLLW	12 ft deep below MLLW
Channel length	12,800 ft	11,800 ft	11,800 ft
Channel dredging volume	15,100 yd^3	0	34,600 yd^3
Turning basin dredging volume	40,500 yd^3	800 yd^3	3,200 yd^3
Total volume per phase	55,600 yd^3	800 yd^3	37,800 yd^3
		Total Volume (Phases 1–3):	**94,200 yd^3**

yd^3 = cubic yards

Five potential sites for the placement of dredged material are summarized in **Table 2** and shown on **Figure 3**. Currently, it is estimated that between 56,000 CY and 57,000 CY of material would be dredged during the initial dredging event. VCSFA intends to utilize Option 1, the Wallops Open Ocean Dredge Material Placement Area, as the initial dredge material placement site. When compared to Options 2 through 5, Option 1 is the most economical solution as it offers the lowest estimated mobilization costs, as well as the lowest unit costs for dredging, transport, and placement. The Open Ocean site is also the fastest path towards construction as it is already permitted by the USACE and has capacity for the proposed initial dredge material. While the Greenbackville DMCF (Option 3) is also already permitted by the USACE, it is not anticipated to have available capacity to handle the initial projected volume of material due to its expected use by USACE. Lastly, the dredged material is expected to be of similar physical and chemical characteristics as the material currently dredged from the Chincoteague Channel by the USACE. Dredged material placed within the Wallops Island nearshore zone is required to have the same physical characteristics (90%+ sand) as the natural bottom and anything with a higher fine-grained content would not be suitable. Based on the geotechnical borings for the proposed project, the material is anticipated to be compromised of approximately 95% sand and, therefore, would be suitable for the Open Ocean site.

For future maintenance dredging events, the Project may use Option 2, Wallops Island Flood Protection/Upland Placement. Keeping this as an option allows for future beneficial re-use of the dredge material on Wallops Island to provide resiliency to the MARS UAS Airfield. The cost of this option is higher as it would require additional studies, design, and construction to contain and shape the pumped discharge. Option 2 may also have impacts to the wetlands north of the UAS Airfield. Further analysis would be required for this impact and depending on the results, thin layer deposition or the use of geotubes could be required to hold the material. Lastly, the UAS Airfield is currently not permitted for material placement; the permitting process would require a longer timeframe than Option 1. If selected for placement during future maintenance dredging events, designs, impact analysis, and permitting would be required and would be performed at that time.

Table 2. Potential Dredged Material Placement Sites

Option	Site	Description	Sail Distance from Basin[1]	Pipe Distance from Basin[2]	Sail Distance from Channel	Pipeline Distance from Channel	Description
1	Wallops Open Ocean Dredge Material Placement Area	Open water placement site, closer than Lewis Creek or Norfolk Ocean disposal sites	6.1 mi	--	4.4 mi	--	This area is located just offshore of Wallops Island with a transportation distance of the dredged material of approximately 4 nautical mi. Open water placement options typically present the lowest cost dredging option and allows for the widest array of dredging equipment ranging from clamshell dredges to barge mounted excavators, supplying dump barges, or specially modified deck barges that are towed by tugboats to the dredged material placement site. Open water placement locations are controlled by the USACE and a CWA Section 404 permit would be required for the use of this site.
2	Wallops Island Flood Protection/ Upland Placement	Reuse of material for flood mitigation through upland placement at site identified by NASA	--	2,800 ft	--	12,040 ft	This option involves the beneficial reuse of material for flood mitigation through upland placement in low lying areas on Wallops Island. For example, there are low lying areas in the vicinity of the culvert crossing the main access road to the UAS Airstrip. This option was evaluated based on having a cutter suction dredge pump the material into this area. This option would also require development of containment measures for the dredged material in the form of containment dikes and the channeling of the effluent and its return into Bogues Bay. This effluent is the water that is used in the dredging process to transport the dredged material in slurry form to the placement location. Other alternatives could include thin layer placement for marsh enhancement in marsh areas a similar distance to the dredging location, or the use of geotubes, or synthetic membranes, for containing the dredged material.

Table 2. Potential Dredged Material Placement Sites

Option	Site	Description	Sail Distance from Basin[1]	Pipe Distance from Basin[2]	Sail Distance from Channel	Pipeline Distance from Channel	Description
3	Greenbackville Dredged Material Containment Facility (DMCF)	Upland DMCF run by USACE, requires both navigation of Chincoteague Channel and pumping on location	11.3 mi	--	9.5 mi	650 ft	The third dredged material placement option identified is the use of the upland Dredged Material Containment Facility (DMCF) owned and managed by the USACE. The USACE places material dredged from the upper reaches of the Chincoteague Channel into this DMCF. This option, which would require the USACE to first verify capacity and permit use of this site, would utilize a mechanical dredge to load the dredged material removed from the approach channel into barges. These barges would then be towed approximately 10 nautical mi to the DMCF. A specialized hydraulic unloader would be required to discharge the dredged material from the transport barges and pump the material into the DMCF. However, according to USACE, this site has limited capacity for material and may not be suitable.
4	Wallops Island Shoreline Protection Placement	Reuse of material for shoreline protection and beach repair	7.5 mi	--	6 mi	--	This option would involve the beneficial reuse of clean, compatible sand from the dredged material to repair and protect areas of the shoreline within the Launch Range area on Wallops Island. If dredged material is determined to be compatible with the current shoreline sand, the material would be placed along the seawall to protect the beach from tidal impacts or ocean overwash from coastal storms such as hurricanes and Nor'easters. This option would require using a mechanical dredge to load the dredged material removed from the approach channel into barges. These barges would then be towed approximately 6 nautical mi to the shoreline. A specialized hydraulic unloader would be required to discharge the dredged material from the transport barges and pump the material onto the placement areas.

Table 2. Potential Dredged Material Placement Sites

Option	Site	Description	Sail Distance from Basin[1]	Pipe Distance from Basin[2]	Sail Distance from Channel	Pipeline Distance from Channel	Description
5	Chincoteague National Wildlife Refuge Swan Cove Placement	Reuse of material for habitat restoration	-	9 km (5.6 mi)	-	6.9 km (4.3 mi)	This option would involve the beneficial reuse of the dredged material for the Swan Cove Pool Restoration Project located in the Chincoteague National Wildlife Refuge (NWR). If dredged material is determined to be compatible, it would be used by USFWS to create berms and enhance and/or restore currently degraded areas of the estuarine-salt marsh habitat that have been negatively impacted by an under sized culvert restricting sediment deposition and tidal flow. Although USFWS would prefer material with a high proportion of sand, they will also accept dredge material containing high organic matter content. This option was evaluated based on having a cutter suction dredge pump the material to this area. Once pumped, USFWS will assume responsibility for sediment placement and is in the process of securing appropriate permits.

[1] Sail distance = the length of the path via water required to reach the placement site from the centroid of dredging in the proposed turning basin or approach channel (statute miles)
[2] Pipe distance = the length of pipe required to reach the placement site from the centroid of dredging or from the anchorage for a vessel loaded with dredged material
DMCF = Dredged Material Containment Facility

Proposed Action Onshore Components

Onshore facilities and infrastructure that would be constructed or upgraded under the Proposed Action are summarized in **Table 3**. Their proposed locations are shown on **Figure 2**. Improvements only apply to existing roads and utilities. No expansion beyond the proposed MARS Port and onshore facilities are anticipated at this time. Any future proposed changes would be addressed in additional NEPA documentation.

Table 3. Onshore Proposed Action Components

Facility or Element	Description
Project support building	A new, approximately 8,000-square foot (ft^2) building may be constructed on at the site of the former Wallops Employee Morale Association Recreational Facility (V-065) (Old Wallops Beach Lifeboat Station) on the southwest end of the access road to the UAS Airstrip. Once the existing facility is removed or demolished the new facility may be constructed and would serve as a new North Island Operations Center. The new building would have a maximum height of 40 ft to avoid interference with a nearby air surveillance radar.
Second hangar	A new, approximately 7,125-ft^2 hangar would be constructed adjacent to the runway, east of the existing UAS airstrip hangar. The new hangar would be a secure facility to support operations, store vehicles and equipment when not in use, accommodate vehicle maintenance as required and provide a small meeting area for client usage. The new hangar would have a maximum height of 40 ft to avoid interference with a nearby air surveillance radar. This proposed second, secure hangar would provide an additional area for MARS clients without hindering usage of the existing hangar for UAS Airfield operations.
Utility infrastructure	Electricity, potable water, wastewater, and communications utilities would be extended to the Project Support Building from existing nearby infrastructure. Potable water would be supplied from the elevated north end tank (V-090), which has a 50,000-gallon capacity. Potable water supply piping would be placed in existing conduit that runs along North Seawall Road and extends from Building V-067 to the existing hangar at the UAS Airstrip. New conduit for electrical and communication utilities would be extended from the existing hangar to the proposed hangar at the UAS Airstrip. New utility conduit would also be installed along the new port access road to provide electrical and communication utilities to the pier. Wastewater from the hangars would be conveyed to a proposed temporary holding tank where it would be periodically collected and pumped into the NASA wastewater system for treatment.

Table 3. Onshore Proposed Action Components	
Facility or Element	**Description**
Airstrip lighting	New airstrip lighting meeting applicable FAA airfield standards would be installed at the UAS airstrip. The lights would be located along the edge of the runway (one white light every 200 ft). Lights would only be turned on when required by an airfield operation (i.e., night-time aircraft takeoffs or landings) and turned off when the operation is completed.
Airstrip access road Improvements (culvert widening)	The existing access road at the culvert crossing is not wide enough for two-way traffic or to accept trailered loads from the proposed MARS Port. This creates a constriction and safety and operational hazards. A 130-ft segment of the existing paved access road would be widened from 15 ft to approximately 30 ft, and the culvert over which the road crosses a drainage channel to Cow Gut would also be widened.
Vehicle parking lot	A new asphalt parking area with spaces for up to 30 vehicles would be constructed near the northwest intersection of the UAS Airstrip access road and runway.
Runway hardening for port access	A 100-ft-wide section of runway would be reinforced to accommodate heavy equipment and vehicles traversing the airfield between the proposed pier and the equipment parking/storage areas.
Access road to port	A new asphalt access road would be constructed along the north side of the existing UAS Airstrip (inside the drainage infiltration trench) from the intersection with the access road to the new MARS Port pier area.

Summary of Proposed Action Construction Activities

The Proposed Action would involve: (1) construction of the pier components that would make up the MARS Port; (2) dredging of the vessel approach channel, turning basin, and placement of dredged material; and (3) construction or improvement of the onshore facilities and infrastructure.

The estimated timeframe for construction of the Proposed Action would have Phase 1 beginning in 2022 and being completed by 2024, with subsequent phases occurring approximately 1 to 2 years after completion of the prior phase. It is assumed that construction of all proposed onshore project components and infrastructure would be completed during Phase 1 (although the North Island Operations Center may be constructed later). With two crews (10 persons each), working 5 days per week (10-hour days), construction of the 624-ft long pier under Phase 1 would take approximately 12 months to complete and construction of the 676-ft long pier extension under Phase 2 (for a total pier length 1,305 ft) would take approximately 9.5 months to complete.

Phase 1 dredging activities (turning basin and channel) would take approximately 30 days to complete; Phase 2 dredging (turning basin) would take approximately 7 days, and Phase 3 dredging (turning basin and channel) would take 30 days. Work would be performed 24 hours a day, seven days a week with two crews each working 12-hour shifts.

Typical equipment used during construction would include crane barges, material barges, tugboat, vibratory pile hammer, diesel impact hammer, concrete truck, concrete pump truck, concrete vibrator, generator, welding machines, cutting torches, and various small tools.

Summary of Proposed Action Operational Activities

VCSFA/MARS currently has a facilities team that mows grass once per week, monitors for eagles twice per week during nesting season, periodically removes tree and weed growth, and inspects the infiltration trench and fencing around the Revolutionary War Earthworks. During summer months, a mosquito fogging service truck sprays the airfield once every 2 weeks. The pier structure would also require quarterly structural inspections.

Potential facility usage associated with the MARS Port is provided in **Table 4**.

Table 4. Potential MARS Port Operations/Facility Usage

Potential Facility Usage	Vessel Type	Quantity Assumptions	Total Barge / Vessel Trips	Phase Associated with Usage
Medium Class ELV 1st stage (core) and 2nd stage	Shallow-draft deck barge & inland push boat	3 launches per year; Each comes w/ ~4-6 truckloads of parts and equipment plus 2 heavy haulers	3	1
Venture Class ELV	Shallow-draft deck barge & inland push boat	Potential for 12 launches per year; 3 trucks per launch	12	1
Venture Class 2 ELV	Shallow-draft deck barge & inland push boat	9 launches per year; 1 truck per stage, 3-5 trucks for equipment	9	1
Venture Class Heavy ELV	Deck barge & 1000-1200 HP tugboat	3 launches per year, 3 first stage cores per launch w/ 1 truck each plus 3-5 trucks for equipment	3	2
Minotaur Class	Deck barge & 1000-1200 HP tugboat	4 launches per year, 3 stage/cores per launch w/ 1 truck each; 3-5 additional trucks for equipment	4	2
Recovery effort	Shallow-draft deck barge & inland push boat	1 per Venture Class ELV launch	12	1

Table 4. Potential MARS Port Operations/Facility Usage				
Potential Facility Usage	**Vessel Type**	**Quantity Assumptions**	**Total Barge / Vessel Trips**	**Phase Associated with Usage**
Autonomous Surface Vehicle (ASV)	Trailered vessel	1 deployment per month; each deployment has 5-10 vehicles included	12	1
Autonomous Underwater Vehicle (AUV)	Trailered vessel	1 deployment every other month; each deployment has 5-10 vehicles included	6	1
Miscellaneous usage	Shallow-draft vessel	1 deployment every other month	6	2
Research usage	Small research vessel	1 deployment every 4 months; each deployment has 5-10 vehicles included	3	2
Other government research & testing	Trailered vessel	1 deployment every other month	12	2
Other Site-wide PEIS construction/expansion	Deck barge & ocean tug	2 large/oversized deliveries per year	1	2
Commodity delivery	Deck barge & ocean tug	16 total barges	16	3
		Total Barge / Vessel Trips	**99**	

Description of the Action Area

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). For this project, the action area includes the north end of Wallops Island surrounding the UAS Airstrip – the onshore areas potentially affected by the construction of onshore facilities and their operation. It also includes the surrounding waters from Chincoteague Inlet to the east and north to Bogues Bay to the west – the offshore areas potentially affected by pier construction, channel and turning basin dredging, placement of dredged sediment, and vessels transiting between the proposed pier and the existing Chincoteague Inlet Federal Channel.

The onshore habitats within the action area on the north end of Wallops Island consist of forested uplands, maritime grasslands, non-tidal wetlands (emergent and scrub-shrub), and tidal wetlands. The dominant habitat within the area is tidal marsh that transitions into upland grass and maritime forest areas adjacent to the UAS airstrip. Vegetated areas adjacent to the UAS airstrip are

periodically mowed to maintain an obstruction-free zone to facilitate the safe operation of aircraft using the runway.

The offshore habitats within the action area include tidal marsh communities and the estuarine surface waters of Chincoteague Inlet, Bogues Bay, Ballast Narrows, and other waterways. The nearest beds of submerged aquatic vegetation are approximately 3 miles north of the project area. Waters in the project area contain public and private harvesting areas for shellfish (oysters and clams).

USFWS Listed Species in the Action Area and Effects Determination

The federally listed species under USFWS jurisdiction that were identified by USFWS as potentially occurring in the action area are described in the species conclusion table (**Table 5**). **Attachment 1** includes the USFWS consultation letter from the IPaC system that identified the species potentially occurring in the action area.

In 2019, USFWS issued a combined Biological Opinion (BO) for the Proposed and Ongoing Operations and Shoreline Restoration/Infrastructure Protection Program at WFF. As part of the terms and conditions of the BO to manage special-status species, WFF annually updates and administers a Protected Species Monitoring Plan. This plan outlines procedures for monitoring protected species that are likely to occur at Wallops Island including the northern long-eared bat, red knot, piping plover, and sea turtles. Monitoring reports for these species are prepared annually by WFF and submitted to the USFWS.

The species conclusion table (**Table 5**) provides the ESA Section 7 effects determination for each species (based on the analysis presented in the EA for the Wallops Island Northern Development). The determination of effects on these listed species is further discussed below.

Mammals

The northern long-eared bat is currently listed as threatened by the USFWS. In February 2016, the USFWS published a final 4(d) rule further defining “takes” and “incidental takes.” ESA 4(d) rules allow the USFWS the ability to provide more specific rules or measures to protect a species that is threatened (not endangered). The ESA 4(d) rule was passed due to the mortality faced by this species from white-nose syndrome, a fungal disease that is poorly understood at this time. Based on the final 4(d) rule and the absence of maternity roost trees or winter hibernacula on or near Wallops Island, the Proposed Action would have no effect on the northern long-eared bat.

Birds

Status of the Species in the Action Area

The red knot is federally and state-listed in Virginia as threatened. They do not breed in the vicinity of NASA WFF or Accomack County, but appear regularly on Wallops Island beaches, including those on the northern end of the island, to forage and roost during their annual spring migration, mostly during the second half of May (NASA 2015a).

Table 5. Species Conclusions: Determination of Effects on Federally Listed Species under USFWS Jurisdiction

Common Name	Scientific Name	Status[1]	Habitat	Notes	ESA Section 7 Determination of Effect
Mammals					
Northern long-eared bat	*Myotis septentrionalis*	FT	Summer: Under bark, or in cavities or crevices of live and dead trees Winter: Caves and mines	Suitable habitat is present at WFF; however, no *Myotis* guild was detected during bat acoustic and netting surveys conducted in 2017 and 2018. Relying upon the findings of the 01/05/2016 Programmatic Biological Opinion for Final 4(d) Rule of the Northern Long-eared Bat and activities excepted from take prohibitions to fulfill project-specific Section 7 responsibilities. No maternity roost trees or winter hibernacula suitable for the species have been documented on or near Wallops Island (VDGIF 2020).	No effect
Birds					
Red knot	*Calidris canutus rufa*	FT	Wallops Island beaches	Present May through July during spring migration. Regularly forages on Wallops, Assateague, and Assawoman Island beaches during northerly spring migration (NASA 2019a). In May 2019, over 2000 birds were counted on the north end of Wallops Island (NASA 2019b). The Proposed Action would not occur on beaches or near red knot habitat.	May affect, not likely to adversely affect
Piping plover	*Charadrius melodus*	FT	Sandy beaches and tidal flats along the Wallops Island shoreline	Transient and summer resident of the upper Virginia barrier islands. Regularly nests and forages on Wallops, Assateague, and Assawoman Island beaches (NASA 2019a). The Proposed Action would not occur on beaches or near piping plover habitat (NASA 2019b).	May affect, not likely to adversely affect
Roseate tern	*Sterna dougallii dougallii*	FE	Offshore ocean waters	Rarely observed along the U.S. coast south of New Jersey; may transit over oceanic waters off WFF during seasonal migration (NASA 2019a).	No effect

Table 5. Species Conclusions: Determination of Effects on Federally Listed Species under USFWS Jurisdiction

Common Name	Scientific Name	Status[1]	Habitat	Notes	ESA Section 7 Determination of Effect
Eastern black rail	*Laterallus jamaicensis jamaicensis*	FT	Salt and brackish marshes with dense cover and upland areas of such marshes	Species has recently been documented at WFF and potentially suitable habitat is present at and near WFF. However, species surveys conducted in June 2021, did not detect a call response in the action area. Through informal conference with USFWS conducted on 8/16/2019 and subsequent informal consultation, avoidance and minimization measures to be implemented by NASA, VCSFA, and their contractors during construction were identified.	May affect, not likely to adversely affect
Reptiles					
Loggerhead sea turtle	*Caretta caretta*	FT	Coastal and offshore ocean waters; nests on beaches	Most prevalent sea turtle species around WFF; has nested on Wallops and regularly nests on Assateague Island beaches (NASA 2019a; USFWS 2016). Loggerhead nests have been observed on Wallops Island beaches as recently as 2013. Greatest in-water concentrations over continental shelf; however, species is also found in deeper waters (NASA 2019). Proposed Action unlikely to affect species; construction activity not located in nesting habitat. Due to the transient presence of the species, dredging operations are unlikely to affect the loggerhead sea turtle. Potential occurrence in action area: adults and juveniles migrating and foraging May–November (NOAA Fisheries 2020).	No effect on nesting turtles
Leatherback sea turtle	*Dermochelys coriacea*	FE	Coastal and offshore ocean waters; nests on beaches	Nesting in the action area is unlikely; only one individual demonstrating nesting behavior documented on Assateague Island in 1996. Generally considered oceanic; however, will forage in coastal areas if prey species are available in high densities (NASA 2019). Potential occurrence in action area: adults and juveniles migrating and foraging May–November (NOAA Fisheries 2020).	No effect on nesting turtles
Hawksbill sea turtle	*Eretmochelys imbricata*	FE	Coastal ocean waters; nests on beaches	Unlikely to occur in or near the action area; only two observations in Virginia since 1979 (NASA 2019).	No effect on nesting turtles

Table 5. Species Conclusions: Determination of Effects on Federally Listed Species under USFWS Jurisdiction

Common Name	Scientific Name	Status[1]	Habitat	Notes	ESA Section 7 Determination of Effect
Kemp's ridley sea turtle	*Lepidochelys kempii*	FE	Coastal ocean waters; nests on beaches	Traditionally nests in Mexico; however, first Virginia nest discovered in 2012 at Virginia Beach (Virginia Army National Guard 2019), with a second nest at False Cape in summer 2014 (VDWR 2016). Generally occurs in more sheltered, shallower water habitats than other sea turtle species (NASA 2019). Potential occurrence in action area: adults and juveniles migrating and foraging May–November (NOAA Fisheries 2020).	No effect on nesting turtles
Green sea turtle	*Chelonia mydas*	FT	Coastal ocean waters; nests on beaches	Nesting unlikely; only one documented nest in Virginia -- at Virginia Beach in 2005 (NASA 2019a). Potential occurrence in action area: adults and juveniles migrating and foraging from May–November (NOAA Fisheries 2020).	No effect on nesting turtles
Flowering Plants					
Seabeach amaranth	*Amaranthus pumilus*	FT	Area seaward of primary dunes	Species has not been documented at WFF since monitoring began in 2010 (NASA 2019b); nearest documented occurrence is on Assateague Island (NASA 2019a). No primary dunes or beaches in the project limits; therefore, no suitable habitat present.	No effect
Insects					
Monarch butterfly	*Danaus plexippus*	C	Breeding – meadows and weedy fields with milkweed; migration – vegetation anywhere	Breeds throughout eastern North America where milkweed species occur. Winters in Mexico. Migrates between these areas annually (USFWS 2020). Minimal potential for milkweed in action area. May transit the area during migration.	No effect

[1] FE = federally listed as endangered; FT = federally listed as threatened; C = candidate for listing
Sources: Species and status -- USFWS (2020); habitat and notes -- NASA (2019) unless otherwise noted

In 2019, over 2,000 red knots were observed on the north end of Wallops Island (NASA 2019b) which most likely due to construction activities of the WFF Shoreline Restoration Project decreased to 117 individuals in 2020 (NASA 2020a). There are no beaches on the northwestern side of Wallops Island where onshore components of the Proposed Action would be implemented; however, narrow beaches do exist along the eastern side of the island adjacent to offshore areas where dredging for portions of the proposed vessel approach channel would occur.

The piping plover is federally and state-listed as threatened. Nesting habitat generally occurs in areas with little or no vegetation, including coastal beaches above the high tide line, sandflats at the end of spits and barrier islands, gently sloping foredunes, blowout areas behind dunes, and overwash areas between dunes. Nests have also occasionally been found under beach grass and other vegetation (NASA 2015a). Piping plovers are a transient and summer resident of the upper Virginia barrier islands and are known to inhabit the coastal habitats of the nearby Chincoteague National Wildlife Refuge. Piping plover nests have been documented on coastal beaches along the northeastern side of Wallops Island (**Figure 5**). Suitable habitat for the species is not present in areas where onshore components of the Proposed Action would be implemented.

The eastern black rail is federally listed as threatened and state listed as endangered. In the northeastern U.S., the eastern black rail typically occurs in salt and brackish marshes with dense cover but can also be found in upland areas of these marshes. Farther south along the Atlantic coast, eastern black rail habitat includes impounded and un-impounded salt and brackish marshes. The eastern black rail was documented at NASA WFF in May 2019. Suitable marsh nesting and foraging habitat for the species is present on and around areas of the northern end of Wallops Island and Ballast Narrows where components of the Proposed Action would be implemented. Through informal conference with USFWS conducted on August 16, 2019, and subsequent informal conference with USFWS during May and July 2020, a habitat survey was requested by USFWS to identify whether an eastern black rail survey would be needed.

A habitat assessment was conducted in July-August 2020 (NASA 2020b), and a follow-up species presence survey was performed in June 2021 (NASA 2021). The survey was performed in accordance with the Maryland Protocol (Wilson 2015; Gibbs and Melvin 1993), and in any situations where the Maryland Protocol did not specify a condition, the Standardized North American Marsh Bird Monitoring Protocol (SNAMBMP; Conway 2011). The methodology used for these surveys consisted of three broadcast playback field survey efforts between May 1 and July 15, conducted at the two survey stations. Surveys were not conducted in rain, fog, or when wind speeds exceeded 12 mph. These surveys were conducted as close to a half hour after sunset as possible to maintain consistency with the Maryland Protocol. Tidal conditions are not defined in the Maryland Protocol, but the SNAMBMP recommends similar tidal levels for all survey events. To maintain consistency with tidal conditions, all surveys were conducted at tide levels within approximately 1 foot of each other; the tide level at approximately 21:00 on the three dates was approximately 2 feet high and rising on June 15, 2021 and June 29, 2021 and approximately 3 feet high and receding on June 22, 2021. Eastern black rails were not detected at either survey station within (or outside) the 400-meter radii on any of the three survey nights; however, clapper rails were present and vocal for most of the surveys.

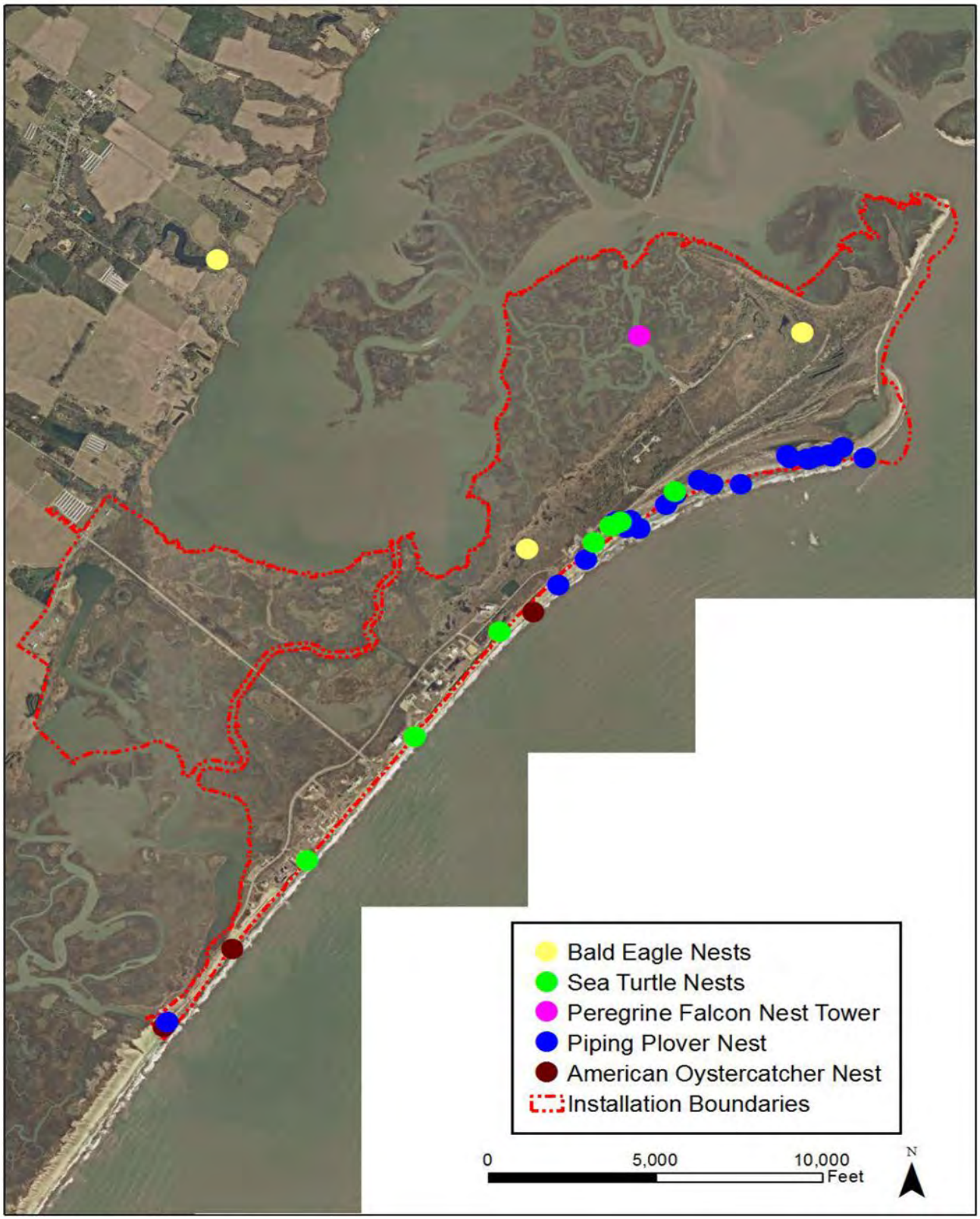

Figure 5. Historic Nesting Sites for Federally Listed and Other Special-Status Species at WFF Wallops Island and Mainland

Effects Determination

The roseate tern occurs offshore and is rarely observed along the U.S. coast south of New Jersey; therefore, the Proposed Action would have no effect on the roseate tern.

Construction of the Proposed Action would have the potential to disturb the red knot, piping plover, and eastern black rail if present in or near the action area due to stressors such as noise, increased human presence, and removal of vegetation potentially providing habitat. Airborne noise can be roughly estimated by assuming the construction equipment required and providing a distance to a noise sensitive receptor. For the replacement of the causeway bridge at the south end of Wallops Island, the noise from piling driving was estimated at 101 dBA at 50 ft (NASA 2019a). In its Programmatic Biological Opinion on the WFF Shoreline Restoration and Infrastructure Protection Program (NASA 2010), USFWS set protected species monitoring requirements at the 100 dB contours from a rocket launch (NASA 2019a). The nearest recorded nesting location for a federally listed avian species (i.e., piping plover) would be greater than 6,000 ft from pile-driving activities under the Proposed Action; thus, no airborne noise impacts are anticipated to the red knot or piping plover.

Open-water construction activities (i.e., dredging of channels and turning basins and construction of the outer portion of the pier) would have no or minimal direct impacts on listed birds because onshore habitat for these species near the areas where these activities would occur is absent or minimal. Also, birds are highly mobile and could avoid these areas during project activities.

Construction activities of the Proposed Action may affect but are not likely to adversely affect the red knot or piping plover because these species occur on beaches, and project activities would not occur in beach areas potentially providing suitable habitat for these species.

The eastern black rail potentially could utilize as habitat the salt marsh where the proposed pier would be installed. The area of habitat that would be affected would be very small compared to the extensive marsh habitat in adjacent areas. NASA anticipates a primary Area of Potential Effect (APE) within a 50-ft buffer around onshore and nearshore construction activities of the pier. Beyond the 50-ft buffer (or Primary APE), and through the informal conference process with USFWS, a conservative estimate for a preliminary secondary APE has been established to account for potential effects from light, noise, and hydrology changes from the Proposed Action. Noise from construction equipment would likely to be intermittent and temporary. Based on the typical noise from roadway construction equipment, attenuation results in a drop-off rate of 7.5 decibels A-weighted (dBA) per doubling of distance for a point source. The noise emission levels at 50 feet from the point source for pile driving, scraping, paving, and concrete mixing typically range from 80 to 95 dBA. Assuming the maximum noise from construction of 95 dBA, a nuisance level of 73 dBA and above, combined with the estimated 7.5 dBA attenuation, a conservative potential APE is noted with a 400-ft buffer from the Project Area or noise source (California Department of Transportation 2016).

Noise minimization strategies implemented to the extent practicable during construction may include: temporary noise barriers or sound walls, noise pads or dampers, movable task noise

barriers, queuing trucks to distribute idling noise, locating vehicle access points and loading and shipping facilities away from habitat areas, reducing the number of noisy activities that occur simultaneously, relocating stationary equipment away from habitat areas, and use of vibration reducing modifications to construction equipment. Implementing these practices would minimize potential effects on the eastern black rail. Therefore, NASA has determined that the construction of the Proposed Action may affect but is not likely to adversely affect the eastern black rail.

Activities associated with the operation of the proposed port would be like other commercial boating activities occurring with relative frequency in and around the action area. Such activities would not be particularly unusual or disruptive to listed birds. Birds may leave the immediate area during these operational activities but would be expected to return upon completion of project activities. Overall, the areas of potential habitat that would be temporarily disturbed by the Proposed Action would be small relative to the available, surrounding habitat.

For these reasons, effects of the Proposed Action on the red knot, piping plover, and eastern black rail would be insignificant or discountable. Accordingly, the Proposed Action may affect but is not likely to be adversely affect these bird species. It would have no effect on the roseate tern.

Sea Turtles

Status of the Species

For management purposes, the loggerhead sea turtle population is organized into nine distinct population segments (DPS), four that are listed as threatened and five that are listed as endangered. Loggerheads occurring at or near WFF belong to the Northwest Atlantic DPS, which is federally and state listed as threatened. The species nests on coastal beaches and occasionally on estuarine shorelines generally between late April and early September, with hatching occurring at night between late June and mid-November. Major nesting concentrations in the U.S. occur from North Carolina to southwest Florida. Successful loggerhead nests were observed on coastal beaches along Wallops Island as recently as 2013 (NASA 2017). The closest nest to the Project Area was approximately 1.3 mi south of the UAS Airstrip (**Figure 5**). Suitable loggerhead nesting habitat is not present in onshore areas where components of the Proposed Action would be implemented.

The leatherback sea turtle is federally and state listed as endangered. It is the largest sea turtle and largest reptile species, reaching up to 6.5 ft in length and weighing up to 2,000 lbs. Leatherbacks are commonly known as oceanic creatures but they also forage in coastal waters. They are the most migratory and wide-ranging of all sea turtle species. Nesting typically occurs in tropical waters. Leatherbacks have never been sighted at WFF but are known to occur in the waters offshore of Accomack County (NASA 2017).

The hawksbill sea turtle is federally and state listed as endangered. It can reach up to 3 ft in length and weigh up to 180 lbs. Hawksbills typically nest high up on beaches under beach and dune vegetation. Females return to natal beaches to lay their eggs every 2 to 3 years. In the continental U.S., hawksbills are found primarily in Florida and Texas, but have been observed as far north as

Massachusetts. Hawksbills have never been directly observed at WFF (NASA 2017). They may occur in offshore waters, but their preferred tropical habitat is not present at or near WFF.

The Kemp's ridley sea turtle is federally and state listed as endangered. It is the smallest of all sea turtles, growing to 28 inches long and weighing up to 100 lbs. The species' range includes the Atlantic coastline from Maine to Florida, and the Gulf of Mexico. It is commonly present in areas that have muddy or sandy bottoms. Most Kemp's ridley sea turtle nesting occurs between May and July in the Mexican state of Tamaulipas along the Gulf of Mexico's western shoreline. Occasional nests have also been documented in North Carolina, South Carolina, and Florida. A successful nest was documented in Virginia Beach in 2012. The Kemp's ridley sea turtle has never been directly observed at WFF but may occur offshore in shallow waters with depths less than 160 ft (NOAA Fisheries 2016).

The green sea turtle is federally and state listed as threatened. This species is the largest of all the hard-shelled marine turtles, growing to a length of 3 ft and weighing up to 350 lbs. Nesting generally occurs between June and July along Florida's central and southern coasts. The species is globally distributed and generally occurs in tropical and subtropical waters along continental coasts and islands (NOAA Fisheries 2016). Green sea turtles have been observed in waters off WFF and are likely to inhabit the waters off WFF during the warmer months when sea grasses and algae are plentiful (NASA 2017).

Effects Determination

Terrestrial impacts from construction activities are unlikely to adversely affect sea turtle nests due to the lack of nesting sites within the action area. Loggerhead sea turtle nesting sites have been found on Wallops Island beaches outside of the action area (**Figure 5**) but were last observed in 2013. One leatherback sea turtle was observed demonstrating nesting behavior on Assateague Island in 1996. The hawksbill sea turtle has been observed in Virginia only twice since 1979 (Mansfield 2006). Kemp's ridley and green sea turtles have been found to nest at Virginia Beach, but none have been found nesting near the action area. Due to the lack of nesting habitat in the action area, the proposed action would have no effect on nesting sea turtles.

Flowering Plants

Seabeach amaranth has not been documented at WFF. Its habitat is the area seaward of primary dunes, but there are no primary dunes or beaches in the action area. Therefore, suitable habitat is not present, and the Proposed Action would have no effect on seabeach amaranth.

Insects

The monarch butterfly was designated by the USFWS in December 2020 as a candidate species for listing as threatened or endangered; its status will be reviewed each year. The monarch is dependent on milkweeds for breeding habitat because they are the only food source for monarch caterpillars. The action area is unlikely to provide habitat for milkweeds. During migration, monarchs may occur in vegetated areas anywhere and may utilize a wide variety of nectar-producing flowers for food. Thus, they could transit through the action area during migration.

Approximately 1.1 ac of upland vegetation would be lost due to the Proposed Action. Extensive vegetation would remain around the airstrip and in other areas of NASA WFF as well as nearby National Wildlife Refuges maintained by USFWS. Vegetation impacts would be distributed over the Proposed Action's multi-year implementation period, further minimizing impacts because not all vegetation would be cleared simultaneously by the project. For these reasons, long-term impacts from the Proposed Action on common species of upland vegetation potentially providing habitat for the monarch butterfly would be minor, and the potential for impacts on the monarch butterfly would be negligible.

Best Management Practices Summary

The construction contractor would use erosion and sediment control measures in upland areas to minimize or prevent the erosion of exposed soils by wind and water and corresponding sedimentation of receiving water bodies. Accidental spills of fuel or other hazardous substances would be prevented or minimized through the contractor's adherence to the spill prevention and control measures as specified in the WFF's *Integrated Contingency Plan.* Vegetation removed in areas impacted for construction access would be replaced in accordance with the NASA WFF vegetation management policies. Construction techniques such as vibratory dampening would be used to reduce equipment vibration, and adherence to lighting best practices would be used to minimize the duration and intensity of lighting.

The intensity and duration of construction activity and the areas disturbed would vary throughout the Proposed Action's construction phases, resulting in corresponding variations in the intensity and duration of short-term impacts. The phased implementation of the Proposed Action would distribute potential impacts on listed species over multiple years, thereby minimizing impacts by ensuring that not all impacts occur simultaneously. Contractors would implement and adhere to BMPs to the extent practicable to further minimize adverse effects on listed species. BMPs could include but would not be limited to erosion control measures, noise and vibration reduction measures, and minimization of lighting frequency and/or duration in work areas to the extent practicable while maintaining safe working conditions.

Conclusions

NASA requests your agency's concurrence with our determination of effects for each of the federally listed species under USFWS jurisdiction potentially occurring in the action area, as summarized in **Table 5**.

If you have any questions or require additional information, please contact me at Shari.A.Miller@nasa.gov or (757) 824-2327.

Sincerely,

Shari A. Miller

Shari A. Miller
Center NEPA Manager and
Environmental Planning Lead

Enclosures
Attachment 1, USFWS Consultation Letter/Species List

cc:
250/Ms. K. Finch
250/Mr. T. Meyer
MARAD/Mr. A. Finio
USACE/Mr. B. Denson
VCSFA/Mr. N. Overby

Literature Cited

California Department of Transportation. 2016. Technical guidance for assessment and mitigation of the effects of highway and road construction noise on birds. June. (Contract 43A0306.) Sacramento, CA. Prepared by ICF International, Sacramento, CA, Robert Dooling, Gaithersburg, MD, and Arthur Popper, Silver Spring. MD. Accessed 11/2020 at https://dot.ca.gov/-/media/dotmedia/ programs/environmental-analysis/documents/env/noise-effects-on-birds-jun-2016-a11y.pdf.

Conway, C. J. 2011. Standardized North American Marsh Bird Monitoring Protocol. Waterbirds. 34(3). 319-346pp. Accessed 10/20 at https://bioone.org/journals/waterbirds/volume-34/issue-3/063.034.0307/Standardized-North-American-Marsh-Bird-Monitoring-Protocol/10.1675/063.034.0307.full.

Gibbs, J. P. and S. M. Melvin. 1993. Call-response Surveys for Monitoring Breeding Waterbirds. Journal of Wildlife Management 57: 27–34pp.

Mansfield, K.L. 2006. Sources of Mortality, Movements, and Behavior of Sea Turtles in Virginia. Doctoral Dissertation. College of William and Mary School of Marine Science. Accessed in November.

Maritime Administration (MARAD). 2019a. Wallops Island M-95 Intermodal Barge System. Accessed 11/17/2020 at https://www.maritime.dot.gov/sites/marad.dot.gov/files/docs/grants-finances/marine-highways/3071/marine-highway-project-description-pages-9-3-2019.pdf.

MARAD. 2019b. Marine Highway Route Descriptions. Marine-Highway-Route-Descriptions. Accessed 11/9/20 at https://maritime.dot.gov/sites/marad.dot.gov/files/docs/grants-finances/marine-highways/3061/marine-highway-route-descriptions-8-14-2019.pdf.

NASA. 2010. Final Programmatic Environmental Impact Statement for Wallops Flight Facility Shoreline Restoration and Infrastructure Protection Programs. Accessed November 8, 2020, at https://code200-external.gsfc.nasa.gov/250-WFF/programmatic-environmental-impact-statement-shoreline-restoration-and-infrastructure-protection.

NASA. 2018. Written Re-evaluation of the 2009 Final Environmental Assessment for the Expansion of the Wallops Flight Facility Launch Range and 2015 Supplemental Environmental Assessment for the Antares 200 Configuration Expendable Launch Vehicle at Wallops Flight Facility. Accessed November 2018.

NASA. 2019a. NASA Wallops Flight Facility Site-Wide Programmatic Environmental Impact Statement. Accessed November 2020 at https://code200-external.gsfc.nasa.gov/250-wff/site-wide_eis.

NASA. 2019b. 2019 Wallops Island Protected Species Monitoring Report. Accessed February 16, 2021, at

https://elibrary.gsfc.nasa.gov/_assets/doclibBidder/cur_work_docs/05)%201.3.8.1%20-%20Protected%20Species%20Annual%20Monitoring%20Report%202019.pdf.

NASA. 2020a. 2020 Wallops Island Protected Species Monitoring Report.

NASA. 2020b. Eastern Black Rail (*Laterallus jamaicensis jamaicensis*) Habitat Assessment. December 2020.

NASA. 2021. NASA Wallops Island Eastern Black Rail Survey Wallops Island, Accomack County, Virginia. CEC Project 313-382. July 15, 2021.

NOAA. 2008. Vessel Strike Avoidance Measures and Reporting for Mariners, NOAA Fishers Service, Southeast Region. November.

NOAA Fisheries. 2020. ESA Section 7 Mapper. NOAA Fisheries Greater Atlantic Region. Accessed December 2020 at https://noaa.maps.arcgis.com/apps/webappviewer/index.html?id=1bc332edc5204e03b250ac11f9914a27

Pyle, R.M. 1981. The Audubon Society Field Guide to North American Butterflies. Alfred A. Knopf, New York.

United States Fish and Wildlife Service (USFWS). 2019. USFWS Revised Biological Opinion for the Wallops Flight Facility Proposed and Ongoing Operation and Shoreline Restoration and Infrastructure Protection Program. Accessed November 2020.

USFWS. 2020. Information for Planning and Consultation (IPaC): Endangered Species Act informal consultation letter with species list. Virginia Ecological Services Field Office, Gloucester, VA. Accessed December 2020 at https://ecos.fws.gov/ipac/project/22EHFZ7YVNCQ3J5JHAONJGRBAA/resources and https://ecos.fws.gov/ipac/publicDocument/M4DVFAS35ZE7JEZSXTQBSXIAWM.

Virginia Army National Guard (VANG). 2019. Draft Integrated Natural Resources Management Plan – State Military Reserve. City of Virginia Beach, Virginia. Fiscal Years 2019-2023. Draft – July 2019. Accessed November 2020 at https://vaguard.dodlive.mil/files/2019/09/rpt_draft_SMR_INRMP-1.pdf.

Virginia Department of Wildlife Resources (VDWR). 2016. Sea Turtles in Virginia. Accessed November 16, 2020, at https://dwr.virginia.gov/blog/sea-turtles-in-virginia/.

Wilson, M. D., F. M. Smith, and B. D. Watts. 2015. Re-survey and Population Status Update of the Black Rail in Virginia. Center for Conservation Biology Technical Report Series, CCBTR-15-004. College of William and Mary and Virginia Commonwealth University. Williamsburg, VA. 15pp.

ATTACHMENT 1: Information for Planning and Consultation (IPAC)
Consultation Code: 05E2VA00-2021-SLI-1294
Event Code: 05E2VA00-2021-E-03713

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032
http://www.fws.gov/northeast/virginiafield/

In Reply Refer To: December 28, 2020
Consultation Code: 05E2VA00-2021-SLI-1294
Event Code: 05E2VA00-2021-E-03713
Project Name: Wallops Island Northern Development

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered

species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
(804) 693-6694

Project Summary

Consultation Code: 05E2VA00-2021-SLI-1294

Event Code: 05E2VA00-2021-E-03713

Project Name: Wallops Island Northern Development

Project Type: DEVELOPMENT

Project Description: Construction and operation of a pier/port, with construction of associated buildings near the NASA unmanned aerial systems (UAS) airstrip and offshore dredging of channels and turning basins.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/37.88564155082318N75.4428012803902W

Counties: Accomack, VA

Endangered Species Act Species

There is a total of 11 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10477	Threatened
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Roseate Tern *Sterna dougallii dougallii* Population: Northeast U.S. nesting population No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2083	Endangered

Reptiles

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: North Atlantic DPS There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened
Hawksbill Sea Turtle *Eretmochelys imbricata* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3656	Endangered
Kemp's Ridley Sea Turtle *Lepidochelys kempii* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5523	Endangered
Leatherback Sea Turtle *Dermochelys coriacea* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1493	Endangered
Loggerhead Sea Turtle *Caretta caretta* Population: Northwest Atlantic Ocean DPS There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1110	Threatened

Flowering Plants

NAME	STATUS
Seabeach Amaranth *Amaranthus pumilus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8549	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

REFUGE INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

From:	Miller, Shari A. (WFF-2500) <shari.a.miller@nasa.gov>
Sent:	Wednesday, November 10, 2021 12:11 PM
To:	jennifer.anderson@noaa.gov
Cc:	Nate Overby; David O'Brien (david.l.obrien@noaa.gov); Brian Hopper (Brian.D.Hopper@noaa.gov); brian.c.denson@usace.army.mil; Finio, Alan (MARAD); Meyer, T J (WFF-2500); Finch, Kimberly (GSFC-2500); Levine, Lori M. (GSFC-2500)
Subject:	Project Review Request, Wallops Island Northern Development, NASA WFF
Attachments:	NASA WFF_NorthDevelop - NOAA_T&E Consult Ltr_111021.pdf

Dear Ms. Anderson:

The National Aeronautics and Space Administration (NASA) Wallops Flight Facility (WFF) and the Virginia Commercial Space Flight Authority (VCSFA, VA Space) proposes to construct a pier for barge access and berthing and to dredge a vessel approach area connecting to the Chincoteague Inlet Federal Channel. NASA is the lead agency for the National Environmental Policy Act (NEPA) process and for this Endangered Species Act (ESA) consultation. As the Department of Transportation's Maritime Administration (MARAD) and the U.S. Army Corps of Engineers (USACE) are serving as Cooperating Agencies on this project, this consultation also serves to fulfil their requirements.

Based on the analysis in the attached assessment, all effects of the Proposed Action would be insignificant and/or discountable, we have determined that the Wallops Island Northern Development Project may affect but is not likely to adversely affect any listed species or critical habitat under NOAA Fisheries' jurisdiction. We certify that we have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination.

If you have any questions or require additional information, please contact me at Shari.A.Miller@nasa.gov or (757) 824-2327.

Thank you.

Shari A. Miller

Center NEPA Manager &
Natural Resources Manager
NASA GSFC Wallops Flight Facility
Wallops Island, VA 23337
(757) 824-2327
Shari.A.Miller@nasa.gov
https://code200-external.gsfc.nasa.gov/250-wff/

"Remember there's no such thing as a small act of kindness. Every act creates a ripple with no logical end." —Scott Adams

National Aeronautics and Space Administration

Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337

Reply to Attn of: 250.W

November 10, 2021

Ms. Jennifer Anderson
Protected Resources Division
Greater Atlantic Regional Fisheries Office
NOAA Fisheries Service
55 Great Republic Drive
Gloucester, Massachusetts 01930

Re: Project Review Request, Wallops Island Northern Development, NASA Wallops Flight Facility, Accomack County, Virginia

Dear Ms. Anderson:

The National Aeronautics and Space Administration (NASA) Wallops Flight Facility (WFF) and the Virginia Commercial Space Flight Authority (VCSFA, VA Space) proposes to construct a pier for barge access and berthing and to dredge a vessel approach area connecting to the Chincoteague Inlet Federal Channel (**Figures 1 and 2**). NASA is the lead agency for the National Environmental Policy Act (NEPA) process and for this Endangered Species Act (ESA) consultation. As the Department of Transportation's Maritime Administration (MARAD) and the U.S. Army Corps of Engineers (USACE) are serving as Cooperating Agencies on this project, this consultation also serves to fulfil their requirements.

NASA is preparing an Environmental Assessment (EA) in compliance with NEPA to analyze the potential effects of the proposed action on the environment. The EA will be tiered from the May 2019 *NASA WFF Site-Wide Programmatic Environmental Impact Statement* (PEIS), in which NASA evaluated the environmental consequences of constructing and operating new facilities and infrastructure at WFF.

The purpose of this letter is to provide information about the proposed project and to request your concurrence with our determinations regarding potential effects on federally listed threatened and endangered species under National Oceanic and Atmospheric Administration (NOAA) Fisheries jurisdiction in the action area.

Background

The goal of the MARAD Marine Highway Program is to expand the use of America's navigable waterways; to develop and increase marine highway service options; and to facilitate their further integration into the current U.S. surface transportation system, especially where water-based transport is the most efficient, effective, and sustainable option (MARAD 2019a). The M-95 Marine Highway Corridor includes the Atlantic Ocean coastal waters; Atlantic Intracoastal

Waterway; and connecting commercial navigation channels, ports, and harbors spanning 15 states including Virginia. The proposed Wallops Island M-95 Intermodal Barge Service project has the potential to support the growth of existing operations at WFF, enhance science, technology, engineering, and math (STEM) research opportunities, and spur high-tech/high-paying jobs in a predominantly rural area (MARAD 2019b).

VCSFA was created in 1995 by the General Assembly of the Commonwealth of Virginia to promote the development of the commercial space flight industry, economic development, aerospace research, and STEM education throughout the Commonwealth. In 1997, the VCSFA entered into a Reimbursable Space Act Agreement with NASA, which permitted the use of land on Wallops Island for launch pads. VCSFA also applied for and was granted a Federal Aviation Administration (FAA) license for launches to orbital trajectories. This led to the establishment of the Mid-Atlantic Regional Spaceport (MARS) which is owned and operated by VCSFA.

Development of a port and operations area to support the activities of NASA, WFF tenants, and MARS at the north end of Wallops Island was evaluated at a programmatic level of detail in the 2019 *Final Site-wide PEIS* (NASA 2019). NASA has several long-term tenants and customers that use the WFF research airport and Wallops Island launch range, its facilities, and airspace.

Description of the Proposed Action

Under the Proposed Action, the MARS Port, including a 1,305-ft fixed pier and turning basin, would be constructed adjacent to the UAS airstrip located at the north end of Wallops Island (**Figures 1 and 2**). The MARS Port would provide a port and operations area along with associated capabilities for VCSFA, NASA WFF, and other customers. The MARS Port would also serve as a new intermodal facility as part of the MARAD M-95 Marine Highway Corridor. Upland infrastructure (new facilities and improvements to the existing access road, airstrip, and utilities) would likewise be constructed/installed as part of the Proposed Action. Access road improvements would include widening of an existing culvert. Although shown for completeness in **Figure 2**, upland activities that would not affect species under NOAA Fisheries jurisdiction are not discussed further.

The Proposed Action would also include the dredging of a new and existing channel to enhance the vessel approach to the pier (**Figure 3**). The vessel approach channel, which interfaces with two Federal waterways, the Chincoteague Inlet Channel and the Chincoteague Inlet to Bogues Bay connecting waters, would initially be used by a variety of shallow-draft, manned and unmanned vessels. Ultimately, the proposed channel would have a length of approximately 12,800 ft, a width of 100 ft, and a final depth of 12 ft below mean lower low water (MLLW). Components of the Proposed Action are further described below.

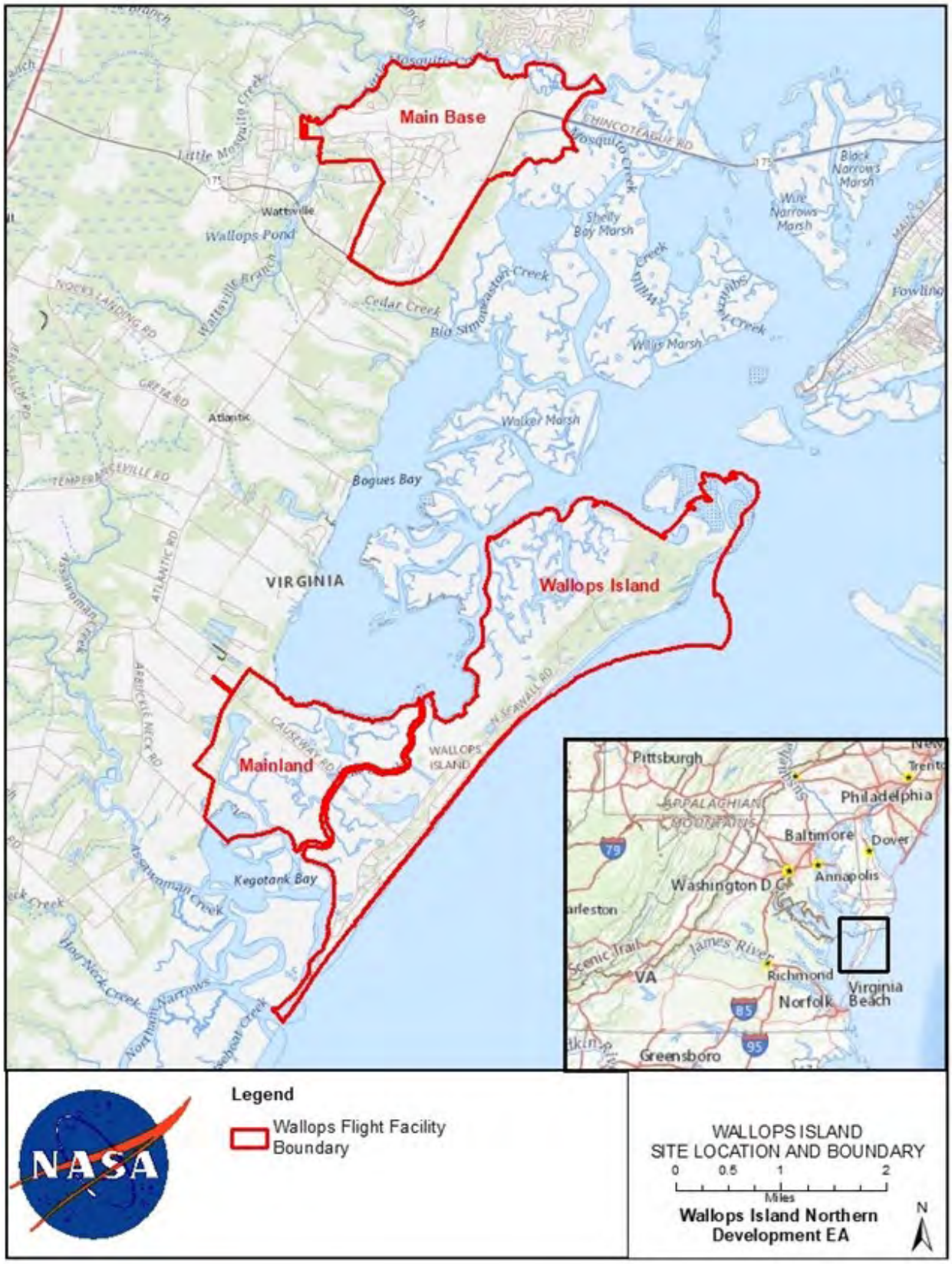


Figure 1. NASA WFF Location

Figure 2. Proposed MARS Port and Infrastructure Components

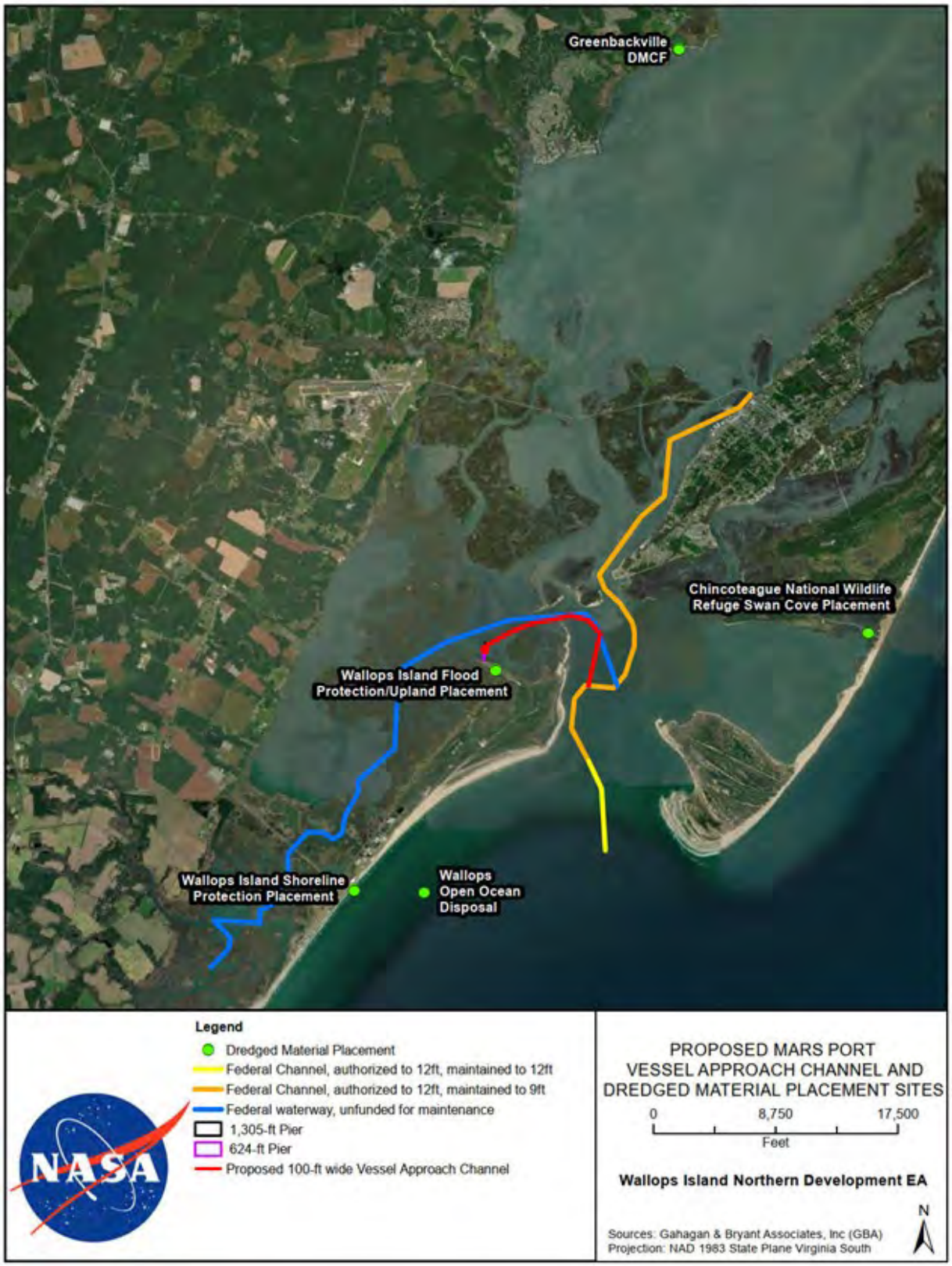


Figure 3. Proposed MARS Port Vessel Approach Channel and Dredged Material Placement Sites

Proposed Action In-Water Components

The MARS Port, including a 1,305-ft fixed pier and turning basin would be constructed on (and within the vicinity of) the UAS Airstrip located at the north end of Wallops Island. The MARS Port would provide a port and operations area along with associated capabilities for MARS, NASA WFF, and other customers. The MARS Port would also serve as a new part of the MARAD M-95 Marine Highway Corridor.

The Proposed Action would also include the dredging of an existing channel for enhanced vessel approach purposes. The vessel approach channel, which would interface with both the Chincoteague Inlet Federal Channel and the Bogues Bay connecting waterways, would be used by a variety of manned and unmanned vessels. It would be approximately 12,800 ft long, 100 ft wide, and would have a final depth of 12 ft below MLLW.

Construction of the Proposed Action would be carried out in three phases:

- **Phase 1** would be construction of a 624-ft fixed pier, a 200-ft-radius turning basin 9 ft deep below MLLW and dredging of the vessel approach channel to a final depth of 5 ft to 9 ft below MLLW (red outline in **Figure 4**). Additionally, a 130-ft long segment of the existing paved UAS Airstrip access road would be widened from 15 ft to 30 ft in conjunction with the widening of the culvert over which the road crosses a headwater drainage channel to Cow Gut.
- **Phase 2** would be construction of a 676-ft extension of the fixed pier to a total length of 1,305 ft and dredging of a 200-ft-radius turning basin (located at the end of the pier extension; shaded pink on **Figure 4**) to a final depth of 9 ft below MLLW.
- **Phase 3** of construction would be additional dredging of the turning basin and vessel approach channel to a final depth of 12 ft below MLLW, specifically the portion of the channel from the Phase 2 turning basin to where it meets the Chincoteague Inlet Federal Channel (shaded blue on **Figure 4**).

The portion of the channel shown in pink on **Figure 4**, which connects the vessel approach channel to the Phase 2 turning basin, is naturally deeper than 9 feet below MLLW and, therefore, would not require any dredging during Phase 2. The estimated timeline for construction of the Proposed Action would have Phase 1 beginning in 2022 and being completed by 2024, with subsequent phases occurring approximately 1 to 2 years after completion of the prior phase. Additional information about the proposed piers and other port components is provided in Chapter 2 of the Draft EA.

A variety of shallow-draft (2- to 4-ft), manned and unmanned vessels would be serviced by the port. The major navigational service would be a tug and barge configuration of an approximately 150-ft by 40-ft deck barge propelled by a tugboat requiring approximately 8 ft of draft. The vessel approach channel would intersect with the Chincoteague Inlet Federal Channel and the Bogues Bay connecting waterways (**Figure 3**). The proposed width of the approach channel,

approximately 100 ft, is consistent with the dimensions of the Federal Channel. Estimated dredging volumes for the vessel approach channel and turning basin are provided in **Table 1**.

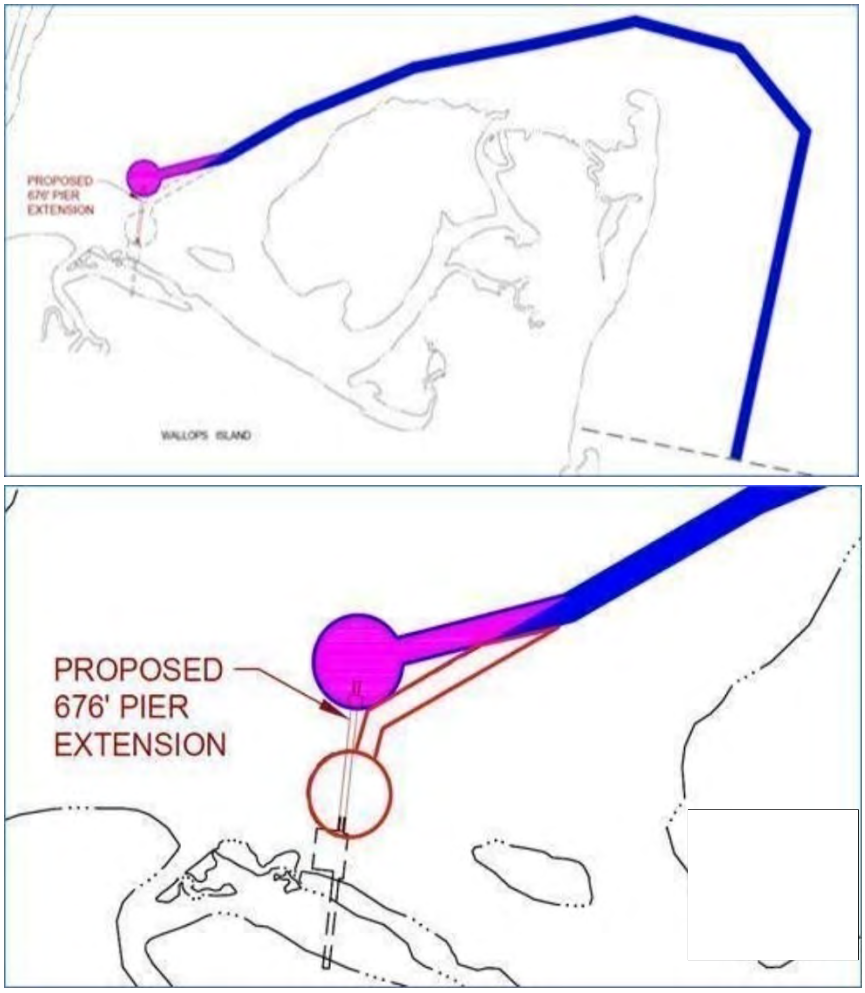


Figure 4. Diagram of Proposed Phased Construction

Table 1. Channel Dimensions and Estimated Dredging Volumes			
	Phase 1	**Phase 2**	**Phase 3**
Channel area	9 ft deep below MLLW	9 ft deep below MLLW	12 ft deep below MLLW
Channel length	12,800 ft	11,800 ft	11,800 ft
Channel dredging volume	15,100 yd^3	0	34,600 yd^3
Turning basin dredging volume	40,500 yd^3	800 yd^3	3,200 yd^3
Total volume per phase	55,600 yd^3	800 yd^3	37,800 yd^3
		Total Volume (Phases 1–3):	**94,200 yd^3**

yd^3 = cubic yards

Five potential sites for the placement of dredged material are summarized in **Table 2** and shown on **Figure 3**. Currently, it is estimated that between 56,000 CY and 57,000 CY of material would be dredged during the initial dredging event. VCSFA intends to utilize Option 1, the Wallops Open Ocean Dredge Material Placement Area, as the initial dredge material placement site. When compared to Options 2 through 5, Option 1 is the most economical solution as it offers the lowest estimated mobilization costs, as well as the lowest unit costs for dredging, transport, and placement. The Open Ocean site is also the fastest path towards construction as it is already permitted by the USACE and has capacity for the proposed initial dredge material. While the Greenbackville DMCF (Option 3) is also already permitted by the USACE, it is not anticipated to have available capacity to handle the initial projected volume of material due to its expected use by USACE. Lastly, the dredged material is expected to be of similar physical and chemical characteristics as the material currently dredged from the Chincoteague Channel by the USACE. Dredged material placed within the Wallops Island nearshore zone is required to have the same physical characteristics (90%+ sand) as the natural bottom and anything with a higher fine-grained content would not be suitable. Based on the geotechnical borings for the proposed project, the material is anticipated to be compromised of approximately 95% sand and, therefore, would be suitable for the Open Ocean site.

For future maintenance dredging events, the Project may use Option 2, Wallops Island Flood Protection/Upland Placement. Keeping this as an option allows for future beneficial re-use of the dredge material on Wallops Island to provide resiliency to the MARS UAS Airfield. The cost of this option is higher as it would require additional studies, design, and construction to contain and shape the pumped discharge. Option 2 may also have impacts to the wetlands north of the UAS Airfield. Further analysis would be required for this impact and depending on the results, thin layer deposition or the use of geotubes could be required to hold the material. Lastly, the UAS Airfield is currently not permitted for material placement; the permitting process would require a longer timeframe than Option 1. If selected for placement during future maintenance dredging events, designs, impact analysis, and permitting would be required and would be performed at that time.

Table 2. Potential Dredged Material Placement Sites

Option	Site	Description	Sail Distance from Basin[1]	Pipe Distance from Basin[2]	Sail Distance from Channel	Pipeline Distance from Channel	Description
1	Wallops Open Ocean Dredge Material Placement Area	Open water placement site, closer than Lewis Creek or Norfolk Ocean disposal sites	6.1 mi	--	4.4 mi	--	This area is located just offshore of Wallops Island with a transportation distance of the dredged material of approximately 4 nautical mi. Open water placement options typically present the lowest cost dredging option and allows for the widest array of dredging equipment ranging from clamshell dredges to barge mounted excavators supplying dump barges or specially modified deck barges that are towed by tugboats to the dredged material placement site. Open water placement locations are controlled by the USACE and a CWA Section 404 permit would be required for the use of this site
2	Wallops Island Flood Protection/ Upland Placement	Reuse of material for flood mitigation through upland placement at site identified by NASA	--	2,800 ft	--	12,040 ft	This option involves the beneficial reuse of material for flood mitigation through upland placement in low lying areas on Wallops Island. For example, there are low lying areas in the vicinity of the culvert crossing the main access road to the UAS airstrip. This option was evaluated based on having a cutter suction dredge pump the material into this area. This option would also require development of containment measures for the dredged material in the form of containment dikes and the channeling of the effluent and its return into Bogues Bay. This effluent is the water that is used in the dredging process to transport the dredged material in slurry form to the placement location. Other alternatives could include thin layer placement for marsh enhancement in marsh areas a similar distance to the dredging location, or the use of geotubes, or synthetic membranes, for containing the dredged material.

Table 2. Potential Dredged Material Placement Sites

Option	Site	Description	Sail Distance from Basin[1]	Pipe Distance from Basin[2]	Sail Distance from Channel	Pipeline Distance from Channel	Description
3	Greenbackville Dredged Material Containment Facility (DMCF)	Upland DMCF run by USACE, requires both navigation of Chincoteague Channel and pumping on location	11.3 mi	--	9.5 mi	650 ft	The third dredged material placement option identified is the use of the upland Dredged Material Containment Facility (DMCF) owned and managed by the USACE. The USACE places material dredged from the upper reaches of the Chincoteague Channel into this DMCF. This option, which would require the USACE to first verify capacity and permit use of this site, would utilize a mechanical dredge to load the dredged material removed from the approach channel into barges. These barges would then be towed approximately 10 nautical mi to the DMCF. A specialized hydraulic unloader would be required to discharge the dredged material from the transport barges and pump the material into the DMCF. However, according to USACE, this site has limited capacity for material and may not be suitable.
4	Wallops Island Shoreline Protection Placement	Reuse of material for shoreline protection and beach repair	7.5 mi	--	6 mi	--	This option would involve the beneficial reuse of clean, compatible sand from the dredged material to repair and protect areas of the shoreline within the Launch Range area on Wallops Island. If dredged material is determined to be compatible with the current shoreline sand, the material would be placed along the seawall to protect the beach from tidal impacts or ocean overwash from coastal storms such as hurricanes and Nor'easters. This option would require using a mechanical dredge to load the dredged material removed from the approach channel into barges. These barges would then be towed approximately 6 nautical mi to the shoreline. A specialized hydraulic unloader would be required to discharge the dredged material from the transport barges and pump the material onto the placement areas.

Table 2. Potential Dredged Material Placement Sites

Option	Site	Description	Sail Distance from Basin[1]	Pipe Distance from Basin[2]	Sail Distance from Channel	Pipeline Distance from Channel	Description
5	Chincoteague National Wildlife Refuge Swan Cove Placement	Reuse of material for habitat restoration	-	9 km (5.6 mi)	-	6.9 km (4.3 mi)	This option would involve the beneficial reuse of the dredged material for the Swan Cove Pool Restoration Project located in the Chincoteague National Wildlife Refuge (NWR). If dredged material is determined to be compatible, it would be used by USFWS to create berms and enhance and/or restore currently degraded areas of the estuarine-salt marsh habitat that have been negatively impacted by an under sized culvert restricting sediment deposition and tidal flow. Although USFWS would prefer material with a high proportion of sand, they will also accept dredge material containing high organic matter content. This option was evaluated based on having a cutter suction dredge pump the material to this area. Once pumped, USFWS will assume responsibility for sediment placement and is in the process of securing appropriate permits.

[1] Sail distance = the length of the path via water required to reach the placement site from the centroid of dredging in the proposed turning basin or approach channel (statute miles)
[2] Pipe distance = the length of pipe required to reach the placement site from the centroid of dredging or from the anchorage for a vessel loaded with dredged material
DMCF = Dredged Material Containment Facility

Summary of Proposed Action Construction Activities

Construction of the Proposed Action would involve: (1) construction of the pier components that would make up the MARS Port, (2) dredging of the vessel approach channel, turning basin, and placement of dredged material, and (3) construction or improvement of the proposed onshore facilities and infrastructure.

The estimated timeframe for construction of the Proposed Action would have Phase 1 beginning in 2022 and being completed by 2024, with subsequent phases occurring approximately 1 to 2 years after completion of the prior phase. It is assumed that construction of all proposed onshore project components and infrastructure would be completed during Phase 1 (although the North Island Operations Center may be constructed later). With two crews (10 persons each), working 5 days per week (10-hour days), construction of the 624-ft long pier under Phase 1 would take approximately 12 months to complete and construction of the 676-ft long pier extension under Phase 2 (for a total pier length 1,305 ft) would take approximately 9.5 months to complete.

Phase 1 dredging activities (turning basin and channel) would take approximately 30 days to complete; Phase 2 dredging (turning basin) would take approximately 7 days, and Phase 3 dredging (turning basin and channel) would take 30 days. Work would be performed 24 hours a day, seven days a week with two crews each working 12-hour shifts.

Typical equipment used during construction would include crane barges, material barges, tugboat, vibratory pile hammer, diesel impact hammer, concrete truck, concrete pump truck, concrete vibrator, generator, welding machines, cutting torches, and various small tools.

Summary of Proposed Action Operational Activities

VCFSA/MARS currently has a facilities team that mows grass once per week, monitors for eagles twice per week during nesting season, periodically removes tree and weed growth, and inspects the infiltration trench and fencing around the Revolutionary War Earthworks. During summer months, a mosquito fogging service truck sprays the airfield once every 2 weeks. The pier structure would also require quarterly structural inspections.

Potential usage of the MARS Port facility during its operation is provided in **Table 3**.

Table 3. Potential MARS Port Operations/Facility Usage

Potential Facility Usage	Vessel Type	Quantity Assumptions	Total Barge / Vessel Trips	Phase Associated with Usage
Medium Class ELV 1st stage (core) and 2nd stage	Shallow Draft Deck Barge & Inland Pushboat	3 launches per year; Each comes w/ ~4-6 truckloads of parts and equipment plus 2 heavy haulers	3	1
Venture Class ELV	Shallow Draft Deck Barge & Inland Pushboat	Potential for 12 launches per year; 3 trucks per launch	12	1

Table 3. Potential MARS Port Operations/Facility Usage				
Potential Facility Usage	**Vessel Type**	**Quantity Assumptions**	**Total Barge / Vessel Trips**	**Phase Associated with Usage**
Venture Class 2 ELV	Shallow Draft Deck Barge & Inland Pushboat	9 launches per year; 1 truck per stage, 3-5 trucks for equipment	9	1
Venture Class Heavy ELV	Deck Barge & 1000-1200 HP Tugboat	3 launches per year, 3 first stage cores per launch w/ 1 truck each plus 3-5 trucks for equipment	3	2
Minotaur Class	Deck barge & 1000-1200 HP tugboat	4 launches per year, 3 stage/cores per launch w/ 1 truck each; 3-5 additional trucks for equipment	4	2
Recovery effort	Shallow-draft deck barge & inland push boat	1 per launch	12	1
Autonomous Surface Vehicle (ASV)	Trailered vessel	1 deployment per month; each deployment has 5-10 vehicles included	12	1
Autonomous Underwater Vehicle (AUV)	Trailered vessel	1 deployment every other month; each deployment has 5-10 vehicles included	6	1
Miscellaneous usage	Shallow-draft vessel	1 deployment every other month	6	2
Research usage	Small research vessel	1 deployment every 4 months; each deployment has 5-10 vehicles included	3	2
Other government research & testing	Trailered vessel	1 deployment every other month	12	2
Other Site-wide PEIS construction/expansion	Deck barge & ocean tug	2 large/oversized deliveries per year	1	2
Commodity delivery	Deck barge & ocean tug	16 total barges	16	3
Total Barge / Vessel Trips			**99**	

Description of the Action Area

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). For this project, the action area includes the north end of Wallops Island surrounding the UAS Airstrip including the surrounding waters from Chincoteague Inlet to the east and north to Bogues Bay to the west – the offshore areas potentially affected by pier construction, dredging of channels and turning basins, placement of dredged sediment, and vessels transiting between the proposed pier and the existing Chincoteague Inlet Federal Channel.

The offshore habitats within the action area include tidal marsh communities and the estuarine surface waters of Chincoteague Inlet, Bogues Bay, Ballast Narrows, and other waterways. The nearest beds of submerged aquatic vegetation are approximately 3 miles north of the project area. Waters in the project area contain public and private harvesting areas for shellfish (oysters and clams).

NMFS Listed Species (and Critical Habitat) in the Action Area

The federally listed species and life stages with the potential to occur in the action area were identified through a query of the NOAA Fisheries Section 7 online mapping application (the ESA Section 7 Mapper) as having the potential to occur in the action area. The information from the ESA Section 7 Mapper is included in **Attachment 1**. **Table 4** summarizes the information for each species regarding the life stages that could be present in the area, the time of year when they may be present, and the types of behaviors they are expected to be engaged in when present.

Table 4. Federally Listed Species Under NOAA Fisheries Jurisdiction Potentially Occurring in the Action Area

Common Name	Scientific Name	Listing Status	DPS	Life Stage	Behavior	Time of Year	Recovery Plan
Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	Threatened/ Endangered	All	Adult and subadult	Migrating and foraging	1 Jan – 31 Dec	N/A
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	N/A	Adult and juveniles	Migrating and foraging	1 May – 30 Nov	NMFS & USFWS 1992
Loggerhead sea turtle	*Caretta caretta*	Threatened	Northwest Atlantic	Adult and juveniles	Migrating and foraging	1 May – 30 Nov	NMFS & USFWS 2008
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	N/A	Adult and juveniles	Migrating and foraging	1 May – 30 Nov	NMFS et al. 2011
Green sea turtle	*Chelonia mydas*	Threatened	North Atlantic	Adult and juveniles	Migrating and foraging	1 May – 30 Nov	NMFS & USFWS 1991

Notes:
DPS = Distinct population segment
N/A = Not applicable
Source: NOAA Fisheries (2020)

One listed fish species (Atlantic sturgeon) and four listed sea turtle species (leatherback, loggerhead, Kemp's ridley, and green) were identified by the ESA Section 7 Mapper as potentially occurring in the action area. No critical habitat for these species has been designated in the area. Information regarding the potential for occurrence of each species in the action area or the vicinity of WFF is provided below. Although not identified by the Section 7 Mapper as a species potentially occurring in the action area, the giant manta ray has been observed off the coast of Assateague Island (Swann 2018) and has been observed in estuarine waters, oceanic inlets, and bays. However, it is rare, solitary, and migratory, and the action area does not provide optimal habitat or food sources. Therefore, the giant manta ray is extremely unlikely to occur in the area and is not discussed further.

Fish

Atlantic Sturgeon

The Atlantic sturgeon is anadromous and estuarine-dependent. Adults migrate to natal rivers and spawn in flowing fresh waters between the salt front and fall line in spring and early summer, then migrate to estuarine and marine waters where they spend the majority of their lives. Atlantic sturgeon typically forage on the bottom for benthic invertebrates (e.g., crustaceans, worms, mollusks). Atlantic sturgeon are known to occur and have been documented in the deeper waters off WFF (NASA 2019). There are no known spawning areas (freshwater rivers) or congregation areas (e.g., mouths of Chesapeake and Delaware Bays) within the vicinity of action area, so it is expected that any individuals present would be opportunistically foraging during migration. Although the Atlantic sturgeon could occur at any time of the year, its likelihood of being present is greatest during fall and early spring during peak migration periods. The shallow estuary where the proposed action would occur provides minimal habitat for the Atlantic sturgeon, and its potential to occur there is likely limited to occasional transient subadults or adults.

Sea Turtles

Leatherback Sea Turtle

The leatherback sea turtle mainly forages in the ocean but also in coastal waters in search of its soft-bodied prey, predominantly jellyfish. It is the most migratory and wide-ranging of all sea turtles. Although the leatherback is known to occur in the waters offshore of Accomack County, it has never been sighted swimming or nesting on the beaches at WFF (NASA 2019). Given the minimal habitat for the leatherback or its jellyfish prey in the action area, its potential to be present is likely to be limited to occasional transient adults or juveniles passing through the area from May through November.

Loggerhead Sea Turtle

The loggerhead sea turtle spends the majority of its life in the open ocean or nearshore coastal areas, foraging for mainly invertebrate prey such as crabs, whelks, and conch. It nests on beaches and occasionally on estuarine shorelines. NOAA Fisheries has divided the loggerhead population into nine DPSs, four that are threatened and five that are endangered. The population near WFF belongs to the federally threatened Northwest Atlantic DPS. NOAA Fisheries has designated 38

critical habitat areas within marine areas occupied by the northwest Atlantic DPS, and USFWS has identified 88 beaches from North Carolina to Mississippi as critical nesting habitat. None of these areas are in the vicinity of WFF. However, loggerhead nests have been observed on Wallops Island beaches as recently as 2016 (NASA 2019). The proposed action would not occur on or affect beaches potentially providing nesting habitat for the loggerhead sea turtle. Its potential to be present in the action area is likely to be limited to occasional transient adults or juveniles foraging in or migrating through the area from May through November.

Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle ranges as far north as Maine. It is found in oceanic and estuarine areas that typically contain muddy or sandy bottoms, where it feeds on crabs as well as mollusks, fish, and jellyfish. The Kemp's ridley nests on beaches from May to July, with 95% of the worldwide nesting of the Kemp's ridley occurring in the Mexican state of Tamaulipas. Occasional nests have been documented on the east coast of the United States, including the southeast coast of Virginia. The Kemp's ridley has never been directly observed at WFF. The species may occur offshore in relatively shallow waters (less than 160 ft [50 m]) in areas where habitat exists for prey species (NASA 2019). Given the lack of documented occurrences at WFF, its potential to occur in the action area is likely to be limited to occasional transient adults or juveniles foraging in or migrating through the area from May through November.

Green Sea Turtle

The green sea turtle is unique among marine turtles in that it feeds exclusively on plants, primarily sea grasses and algae. In the U.S., the green sea turtle primarily nests in June and July along the east coast of Florida, with lower occurrences of nesting northward to North Carolina. Green sea turtles use open ocean convergence zones and coastal areas for benthic feeding on sea grasses and algae. The green sea turtle has been directly observed in waters off WFF (NASA 2019). They are likely to inhabit the waters off WFF during the warmer months when sea grasses and algae are plentiful; however, nesting habitat occurs farther south. Given the minimal habitat for the green sea turtle in the action area, including the lack of seagrass beds, its potential to be present is likely to be limited to occasional transient adults or juveniles foraging in or migrating through the area from May through November.

Effects Determination

As shown in **Table 4**, each of the five federally listed marine species potentially occurring in the action area would be expected, if present, to be engaged in foraging and/or migrating through the area. However, as indicated by their life history characteristics and records for the WFF area, the potential for occurrence of any of these species in the action area is minimal and is expected to be limited to the occasional transient passage of individuals through the area during migration or while foraging. Only the Atlantic sturgeon is potentially present in the action area throughout the full year. Sea turtles are potentially present in the area only within a 7-month period (May through November), further limiting their potential for exposure and effects. The potential for effects on these species is discussed below.

Atlantic Sturgeon

It is possible, though unlikely, that Atlantic sturgeon could be affected by the Proposed Action. Recent studies have suggested that the shallow waters off the Atlantic coast could be an important migratory corridor to and from spawning, foraging, and overwintering grounds. As there are no known spawning areas (freshwater rivers) or congregation areas (e.g., mouths of Chesapeake and Delaware Bays) within the project vicinity, it is expected that any individuals encountered would be opportunistically foraging during migration. The potential impact of construction and dredging activities on Atlantic sturgeon would depend on the time of year these activities were conducted, with the likelihood of encountering a sturgeon greatest during fall and early spring, which are times of peak migration (NASA 2019). Construction and operations activities under the Proposed Action potentially could affect Atlantic sturgeon if present in the action area as a result of pile-driving noise, vessel noise (including dredging noise), and turbidity due to sediment disturbance during construction and dredging.

Construction activities would not be anticipated to substantively affect migration or foraging behaviors of the Atlantic sturgeon. The inadvertent destruction or displacement of benthic species would be localized and would not substantially affect the quantity of benthic prey available in waters near the action area. The area of marsh and open water bottom beneath the pier would be approximately 1 acre (ac) in Phase 1 and 1.5 ac in Phase 3. The areas to be dredged, including turning basins and channels, would be approximately 34 ac in Phase 1, 4 ac in Phase 2, and 33 ac in Phase 3. Thus, the maximum area to be dredged through all phases of the Proposed Action would be approximately 71 ac. Maintenance dredging of the basin and channel would be repeated periodically as necessary to maintain the required depth and is expected to be infrequent and of short duration.

Pile-Driving Noise

Sturgeon and other special status marine species occurring in the inshore waters of the Proposed Action area potentially could be affected by underwater noise caused by pier construction. The principal source of construction noise would be pile installation. Construction of the 624-foot pier under Phase 1 would take approximately 12 months to complete, and construction of the 676-foot pier extension under Phase 2 (for a total pier length of 1,305 feet) would take approximately 9.5 months, with about 1 to 2 years between phases. Pier construction would require the installation of 260 piles over a period of 80 days in Phase 1 and 140 piles over a period of 45 days in Phase 2. The piles would be made of prestressed concrete, 24 inches square, and driven by a diesel impact hammer. A bubble curtain could be used for noise attenuation. A slow start technique would be used to allow mobile species to move away from the area.

The NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO) developed a spreadsheet Acoustics Tool (GARFO 2020) for analyzing the effects of pile driving in inshore waters on ESA-listed species of the Greater Atlantic Region. GARFO developed a Simplified Attenuation Formula (SAF) for use in estimating the ensonification area of pile-driving projects in shallow, inshore environments, such as the bays and waterways of the action area. Based on the characteristics of the proposed pile driving, information for a proxy project from the GARFO SAF spreadsheet is shown in **Table 5**. The estimated noise levels at the source associated with

pile driving for the Proposed Action, based on measurements for a proxy project (at a distance of 10 meters), are presented in **Table 6** (GARFO 2020).

Table 5. Proxy Project for Estimating Underwater Noise

Project location	Water depth (m)	Pile size (in)	Pile type	Hammer type	Attenuation rate (dB/10 m)
Not available	5	24	concrete	impact	5

m = meters; in = inches; dB = decibels
Source: GARFO (2020)

Table 6. Proxy Based Estimates for Underwater Noise Level at the Source

Pile type	Hammer type	Estimated SPL_{peak} (dB re 1 Pa)	Estimated SEL_{cum} (dB re 1 μPa^2s)	Estimated SPL_{rms} (dB re 1 µPa)
24-in concrete	impact	185	170	160

dB re 1 µPa = sound exposure level in decibels relative to 1 microPascal; dB re 1 μPa^2s = sound exposure level in decibels relative to 1 microPascal squared second; rms = root mean square; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level
Source: GARFO (2020)

The GARFO SAF model was used to estimate the distances from pile-driving activities at which thresholds for noise-related effects would be exceeded. Effects can range from behavioral changes/disturbance to physical injury. Because sound (noise) consists of variations in pressure, the unit for measuring sound is referenced to a unit of pressure, the Pascal (Pa). A decibel (dB) is defined as the ratio between the measured sound pressure level (SPL) in microPascals (µPa) and a reference pressure. In water, the reference level is decibels relative to 1 microPascal (dB re 1 µPa). SPL units can be expressed in several ways depending on the measurement properties. Acoustic source levels and sound exposure levels (SELs) also are expressed in decibels.

The thresholds for effects vary among types of organisms. Effect thresholds have been identified by NOAA Fisheries for fish (including sturgeon), sea turtles, and marine mammals. For sturgeon, the estimated distances at which pile-driving noise would equal or exceed injury or behavioral threshold levels are shown in **Table 7**.

Table 7. Estimated Distances to Sturgeon Injury and Behavioral Thresholds

Pile type	Hammer type	Distance to injury threshold (SPL_{peak} = 206 dB re 1 µPa)	Distance to injury threshold (SEL_{cum} = 187 dB re 1 μPa^2s)	Distance to behavioral threshold (SPL_{rms} = 150 dB re 1 µPa)
24-in concrete	impact	NA	30 m	50 m

m = meters; in = inches; dB re 1 µPa = sound exposure level in decibels relative to 1 microPascal; dB re 1 μPa^2s = sound exposure level in decibels relative to 1 microPascal squared second; rms = root mean square; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level; NA = not applicable because source level is less than or equal to threshold level
Source: GARFO (2020)

The peak exposure criterion (SPL_{peak} = 206 dB re 1 Pa) for sturgeon is related to the energy received from a single pile strike. The potential for injury also exists from multiple exposures to

noise over a period of time, which is accounted for by the SEL_{cum} threshold (SEL_{cum} = 187 dB re 1 μPa^{2}s). The SEL_{cum} is not an instantaneous maximum noise level but is a measure of the accumulated energy over a specific period of time (e.g., the period of time it takes to install a pile). The farther away a fish is from the pile being driven, the more strikes it must be exposed to for enough energy to accumulate to result in injury. For behavioral effects, the exposure criterion for sturgeon is expressed as a root-mean-square sound pressure level (SPL_{rms}= 150 dB re 1 μPa).

Exposure to impulsive underwater noise levels of 206 dB re 1 μPa (SPL_{peak}) or 187 dB re 1 μPa^{2}s (SEL_{cum}) can result in injury to sturgeon.

As shown in **Table 7**, exposure to an SPL_{peak} that may result in injury to sturgeon is not anticipated to occur during pile driving for the Proposed Action because the SPL_{peak} at the source (185 dB re 1 Pa) would be less than the effects threshold (206 dB re 1 Pa). However, based on the SEL_{cum} exposure criterion, injury to a sturgeon potentially could occur if the fish remained within 30 meters (98 feet) while the pile was being driven. In order to be exposed to potentially injurious levels of noise during installation of the piles, a sturgeon would need to remain within 30 meters of the pile during the time it is being driven in order to be exposed to this SEL_{cum} threshold. This is extremely unlikely to occur because sturgeon would be expected to modify their behavior and move away from the source upon exposure to underwater noise levels greater than the behavioral effects threshold (SPL_{rms} = 150 dB re 1 μPa). Sturgeon would be exposed to levels of noise that cause behavioral modification at 165 feet according to the model estimate and would be expected to move away from the sound source before cumulative exposure could result in injury. If a sturgeon were within 100 feet of the pile at the time pile driving begins, it likely would leave the area quickly. Additionally, the use of a soft start technique should also give any sturgeon in the area time to move out of the range of any potential injury from noise. Therefore, noise injury to sturgeon is not anticipated.

Behavioral effects, such as avoidance of the area or disruption of foraging activities, may occur in sturgeon exposed to noise above the behavioral threshold (SPL_{rms} = 150 dB re 1 μPa). Underwater noise levels are predicted to be below this threshold at distances beyond approximately 165 feet from the pile being installed. As discussed above, it is reasonable to assume that a sturgeon within the action area that detects underwater noise levels of 150 dB re 1 μPa would modify its behavior and redirect its course of movement away from the ensonified area. It is extremely unlikely that these movements will affect essential sturgeon behaviors such as spawning, foraging, resting, or migration. The Proposed Action area is not sturgeon spawning habitat, and the bays and waterways of the area are sufficiently extensive to allow sturgeon to avoid the ensonified area while continuing to forage and migrate. Given the small distance that a sturgeon would need to move to avoid disturbing levels of noise, any effects would not be measurable or detectable and, therefore, would be insignificant.

Mitigation Measures for Underwater Noise from Pile Driving

A soft-start procedure would be used for pile driving to allow sturgeon that may be in the project area to detect the presence of noise-producing activities and to depart the area before full-power pile driving begins. A bubble curtain around each pile being driven could be used for noise attenuation. The estimated effects of using a bubble curtain were not included in the calculation of threshold distances using the GARFO SAF spreadsheet model.

Vessel Noise

Noise generated by vessels during project construction or vessels calling on the pier during its operation potentially could affect sturgeon in the Proposed Action area. The area is already affected by anthropogenic noise from vessels and other sources. Construction and use of the pier would cause additional noise in the area. The noise produced by vessels during project construction would vary depending on the vessel size, speed, and whether it uses dynamic positioning thrusters. Large ships tend to be noisier than small ones, and ships with a full load (including towing or pushing a load) tend to be noisier than unloaded vessels. Vessel noise is a combination of narrow-band (tonal) sound and broadband sound. The intensity of noise produced is approximately related to the size and speed of the vessel. Individual vessels may generate very different sound levels and have different frequency characteristics depending on factors such as the propulsion system and whether there is propeller cavitation or singing (Spiga et al. 2012).

Noise from vessels traveling to and from the pier potentially would cause behavioral disturbance to sturgeon but would not result in injury. Smaller ships such as tugs or trawlers produce broadband noise with a source level (SPL) of typically 168 to 170 dB re 1μ Pa at 1 meter, while larger ships such as supertankers produce underwater broadband noise at source levels of up to 190 dB re 1 μPa at 1 meter (Spiga et al. 2012). These SPLs at 1 meter are less than the sturgeon noise response criteria for injury and greater than the sturgeon noise response criterion for non-impulsive behavioral effects (**Table 7**). However, a sturgeon would need to be in relatively close proximity to the vessel to experience sound levels that exceed the 150 dB re 1μ Pa behavioral effect threshold.

Impacts from vessel noise would not cause physical injury to sturgeon. When vessels are underway in open waters, sturgeon in adjacent areas could be disturbed. However, construction vessels and vessels visiting the pier during operation would be shallow-draft, slow-moving and likely would produce noise levels less than the behavioral effects level for sturgeon. Noise from project vessels during construction and operation would not be expected to potentially cause more than local and temporary behavioral responses in sturgeon if present nearby. The presence of a sturgeon foraging or migrating through the Proposed Action area at the time of a vessel visit is unlikely.

Noise from dredging vessels and associated equipment and operations was evaluated by NMFS in a 2012 Biological Opinion, which concluded that the effects of dredge noise on whales are discountable (NASA 2018). Similarly, the numbers of sturgeon in the Proposed Action area are very low, and it is extremely unlikely for a sturgeon to occur close enough to the dredge to be disturbed by noise. Thus, the overall likelihood of a sturgeon being adversely affected by vessel noise from construction or operation of the Proposed Action also would be discountable, and any potential effects would be insignificant.

Vessel Strikes

Where there is overlap between vessel traffic and Atlantic sturgeon habitat, there is the possibility of vessel strikes to sea turtles, which potentially can result in injury or mortality. The dredging of new channels and turning basins as part of the Proposed Action would increase vessel traffic in the action area during dredging operations, and the use of the navigation channel during operation of the proposed pier would result in additional vessels transiting through the area in the future. Any increases in vessel traffic may not directly correlate to more vessels in the Project Area, as active vessels in the area may move elsewhere or be retired from use. During dredging and placement of dredged material, only one or two project vessels would likely be utilized, and the use of dredging vessels would be intermittent, temporary, and restricted to a small portion of the overall Project Area on any day that dredging occurs.

Once dredging of the existing channel and new turning basin is completed, there would be an increase in the baseline number of vessels or changes in vessel traffic patterns due to vessels transiting to the MARS Port pier during the period of operation. However, it would be extremely unlikely for a vessel related to the Proposed Action to strike and injure or kill a sturgeon given the nature of the habitat in the Project Area; the low baseline risk of vessel strikes in the area; and the extremely small, intermittent, and temporary increase in vessel traffic that would be added to existing traffic in the area as a result of the project. Also, given that the numbers of sturgeon in the Project Area are small, the risk of vessel strike is extremely low. Additionally, vessels entering the inlet would reduce speed, further reducing the probability of vessels strikes. As a result, the effect of the Proposed Action on the risk of a vessel strike on Atlantic sturgeon in the Project Area is discountable.

Turbidity

Pile driving for pier construction, channel and turning basin dredging, and placement of dredged sediment would cause temporary increases in suspended sediment, thereby increasing local turbidity. Increased turbidity from construction activities would likely be short-lived and with proper, required controls, such as turbidity curtains (sediment curtains), turbidity impacts would be reduced. Sediment plumes from construction would likely settle out in a few hours, limiting effects from increased turbidity to the short-term. Increased turbidity has the potential to temporarily impact foraging habitat for the Atlantic sturgeon, and sturgeon may avoid the locally affected area entirely if the sediment load is extremely high. A relatively limited area potentially would be affected temporarily, and extensive areas of unaffected foraging habitat would remain available in the waterways of the action area. Thus, the overall likelihood of the Atlantic sturgeon being adversely affected by turbidity from construction or operation of the Proposed Action would be discountable, and any potential effects would be insignificant.

Effects Determination for Atlantic Sturgeon

The Proposed Action may affect but is not likely to adversely affect Atlantic sturgeon if present in the action area.

Sea Turtles

The time of year when activities occur under the Proposed Action affects the chances for impacts to sea turtles. As shown in **Table 4**, sea turtles potentially occur in the action area only during the seven months of the year when water temperatures are warmest (May through November). Activities occurring in the other five months would have no effect on sea turtles. Construction and operations activities under the Proposed Action potentially could affect sea turtles if present in the action area as a result of pile-driving noise, vessel noise (including dredging noise), vessel strikes, and turbidity due to sediment disturbance during construction and dredging.

Pile-Driving Noise

As discussed for sturgeon, the NOAA Fisheries GARFO Acoustics Tool (GARFO 2020) for analyzing the effects of pile driving in inshore waters on ESA-listed species was used to evaluate potential underwater noise impacts on sea turtles from pile driving during construction of the Proposed Action. The GARFO SAF spreadsheet model was used to estimate the ensonification area from pile-driving in the shallow, inshore bays and waterways of the action area. Based on the characteristics of the proposed pile driving, information for a proxy project from the GARFO SAF spreadsheet is shown in **Table 5**. The estimated noise levels at the source associated with pile driving for the Proposed Action, based on measurements for a proxy project (at a distance of 33 feet), are presented in **Table 6** (GARFO 2020).

The thresholds for effects vary among types of organisms. Effect thresholds have been identified by NOAA Fisheries for fish, sea turtles, and marine mammals. For sea turtles, the estimated distances at which pile-driving noise would equal or exceed injury or behavioral threshold levels are shown in **Table 8**.

Table 8. Estimated Distances to Sea Turtle Injury and Behavioral Thresholds

Pile type	Hammer type	Distance to injury threshold (SPL_{peak} = 226 dB re 1 µPa for TTS, = 232 dB re 1 µPa for PTS)	Distance to injury threshold (SEL_{cum} = 189 dB re 1 µPa^{2}s for TTS, = 204 dB re 1 µPa^{2}s for PTS)	Distance to behavioral threshold (SPL_{rms} = 175 dB re 1 µPa)
24-in concrete	Impact	NA	NA	NA

m = meters; in = inches; dB re 1 µPa = sound exposure level in decibels relative to 1 microPascal; dB re 1 µPa^{2}s = sound exposure level in decibels relative to 1 microPascal squared second; rms = root mean square; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level; TTS = temporary threshold shift; PTS = permanent threshold shift; NA = not applicable because source level is less than or equal to threshold level
Source: GARFO (2020)

A loss of hearing sensitivity (i.e., an elevated hearing threshold) may result from exposure to sound of sufficient SPL and duration. Such a loss of hearing sensitivity is referred to as a noise-induced threshold shift (TS). If the hearing threshold eventually returns to normal, the TS is referred to as a temporary threshold shift (TTS). If the threshold remains elevated after an extended period of

time, the TS that remains is referred to as a permanent threshold shift (PTS). TTS and PTS criteria and thresholds are used to predict auditory effects in sea turtles exposed to underwater noise, which is similar to their use in the development of safe noise exposure guidelines for people in noisy environments. TTS is defined as a temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level, and PTS is defined as a permanent, irreversible increase in this threshold (NOAA Fisheries 2018).

Exposure to impulsive underwater noise levels of 232 dB re 1 μPa (SPL_{peak}) or 204 dB re 1 μPa^2s (SEL_{cum}) can result in PTS injury to sea turtles, and exposure to lower levels can result in TTS. As shown in **Table 8**, exposure to an SPL_{peak} that may result in injury to sea turtles is not anticipated to occur during pile driving for the Proposed Action because the SPL_{peak} and the SEL_{cum} at the source (i.e., within 33 feet of the pile being driven) would be less than the effects thresholds. Therefore, no noise injury to sea turtles is anticipated. Behavioral effects, such as avoidance of the area or disruption of foraging activities, may occur in sea turtles exposed to noise above the behavioral threshold (SPL_{rms} = 175 dB re 1 μPa). Underwater noise levels are also predicted to be below this threshold at the source. Sea turtles are mobile, would avoid the activity and noise associated with pile driving, and would not remain adjacent to a pile being driven. Thus, the effects of pile-driving noise on sea turtles during construction of the Proposed Action would be insignificant.

Mitigation Measures for Underwater Noise from Pile Driving

A soft-start procedure would be used for pile driving to allow sea turtles that may be in the project area to detect the presence of noise-producing activities and to depart the area before full-power, pile-driving activity begins. Soft-start procedures would not begin until the exclusion zone, which would surround the project location and be monitored for the presence of sea turtles, has been cleared. A bubble curtain around each pile being driven could be used for noise attenuation. The estimated effects of using a bubble curtain were not included in the calculation of threshold distances using the GARFO SAF spreadsheet model.

Vessel Noise

As described above for sturgeon, noise generated by vessels during project construction or vessels calling on the pier during its operation potentially could affect sea turtles in the action area. Smaller ships such as tugs or trawlers produce broadband noise with a source level (SPL) of typically 168 to 170 dB re 1μ Pa at 1 meter, while larger ships such as supertankers produce underwater broadband noise at source levels of up to 190 dB re 1 μPa at 1 meter (Spiga et al. 2012). These SPLs at 1 meter (3.3 feet) are less than the sea turtle noise response criteria for injury (**Table 8**), and those for smaller ships are also less than the sea turtle noise response criterion for behavioral effects (175 dB re 1μ Pa). A sea turtle would need to be in close proximity to a large vessel such

as a supertanker to experience sound levels that exceed the 175 dB re 1μ Pa behavioral effect threshold, and such large vessels would not be associated with the Proposed Action.

Noise from dredging vessels and associated equipment and operations was evaluated by NMFS in a 2012 Biological Opinion, which concluded that the effects of dredge noise on whales are discountable (NASA 2018). Whales are generally more sensitive to underwater noise than sea turtles, so effects on sea turtles would be even less likely. The numbers of sea turtles in the Proposed Action area are very low, and it is extremely unlikely for a sea turtle to occur close enough to the dredge to be disturbed by noise. In addition, mitigation measures would be employed through the use of protected species observers, which can halt dredging operations when a sea turtle is observed within a minimum defined distance (e.g., 1 kilometer) of the dredge (NASA 2018). Thus, the overall likelihood of a sea turtle being adversely affected by vessel noise from construction or operation of the Proposed Action would be discountable, and any potential effects would be insignificant.

Vessel Strikes

Where there is overlap between vessel traffic and sea turtle habitat, there is the possibility of vessel strikes to sea turtles, which potentially can result in injury or mortality. The dredging of new channels and turning basins as part of the Proposed Action would increase vessel traffic in the action area during dredging operations, and the use of the navigation channel during operation of the proposed pier would result in additional vessels transiting through the area in the future. Any increases in vessel traffic may not directly correlate to more vessels in the Project Area, as active vessels in the area may move elsewhere or be retired from use. During dredging and placement of dredged material, only one or two project vessels would likely be utilized, and the use of dredging vessels would be intermittent, temporary, and restricted to a small portion of the overall Project Area on any day that dredging occurs.

Once dredging of the existing channel and new turning basin is completed, there would be an increase in the baseline number of vessels or changes in vessel traffic patterns due to vessels transiting to the MARS Port pier during the period of operation. However, it would be extremely unlikely for a vessel related to the Proposed Action to strike and injure or kill a sea turtle given the nature of the habitat in the Project Area; the low baseline risk of vessel strikes in the area; and the extremely small, intermittent, and temporary increase in vessel traffic that would be added to existing traffic in the area as a result of the project. Also, given that the presence of sea turtles in the Project Area is seasonal and the numbers potentially occurring in the warmer months are small, the risk of vessel strike is extremely low. Additionally, vessels entering the inlet would reduce speed, further reducing the probability of vessels strikes. As a result, the effect of the Proposed Action on the risk of a vessel strike on sea turtles in the Project Area is discountable.

Turbidity

Pile driving for pier construction, dredging of channels and turning basins, and placement of dredged sediment would cause temporary increases in suspended sediment, thereby increasing local turbidity. Increased turbidity from construction activities would likely be short-lived and with proper, required controls, such as turbidity curtains (sediment curtains), turbidity impacts would be reduced. Sediment plumes from construction would likely settle out in a few hours, limiting effects from increased turbidity to the short-term. Increased turbidity has the potential to temporarily impact foraging habitat for sea turtles and decrease visibility, and sea turtles may avoid the locally affected area entirely if the sediment load is extremely high. A relatively limited area potentially would be affected temporarily, and extensive areas of unaffected foraging habitat would remain available in the waterways of the action area. Thus, the overall likelihood of sea turtles being adversely affected by turbidity from construction or operation of the Proposed Action would be discountable, and any potential effects would be insignificant.

Effects Determination for Sea Turtles

The Proposed Action may affect but is not likely to adversely affect sea turtles if present in the action area.

Conclusions

The effect determinations for each species discussed above are summarized in **Table 9**.

Table 9. Effects Determinations for Species Under NOAA Fisheries Jurisdiction Potentially Occurring in the Action Area

Common Name	Listing Status	DPS	Effect Determination
Atlantic sturgeon	Threatened/ Endangered	All	May affect, not likely to adversely affect
Leatherback sea turtle	Endangered	N/A	May affect, not likely to adversely affect
Loggerhead sea turtle	Threatened	Northwest Atlantic	May affect, not likely to adversely affect
Kemp's ridley sea turtle	Endangered	N/A	May affect, not likely to adversely affect
Green sea turtle	Threatened	North Atlantic	May affect, not likely to adversely affect

Notes:
DPS = Distinct population segment
N/A = Not applicable

Based on the analysis that all effects of the Proposed Action would be insignificant and/or discountable, we have determined that the Wallops Island Northern Development Project may affect but is not likely to adversely affect any listed species or critical habitat under NOAA Fisheries' jurisdiction. We certify that we have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination.

If you have any questions or require additional information, please contact me at Shari.A.Miller@nasa.gov or (757) 824-2327.

Sincerely,

Shari A. Miller

Shari A. Miller
Center NEPA Manager and
Environmental Planning Lead

Enclosures
Attachment 1, NOAA ESA Section 7 Mapper

cc:
250/Ms. K. Finch
250/Mr. T. Meyer
NMFS/Mr. D. O'Brien
NMFS/Mr. B. Hopper
USACE/Mr. B. Denson
VCSFA/Mr. N. Overby

Literature Cited

Greater Atlantic Regional Fisheries Office (GARFO). 2020. Acoustics Tool: Analyzing the effects of pile driving in riverine/inshore waters on ESA-listed species in the Greater Atlantic Region. Spreadsheet accessed from NOAA Fisheries Section 7: Consultation Technical Guidance in the Greater Atlantic Region at https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultation-technical-guidance-greater-atlantic. Last updated Sept 14, 2020.

Maritime Administration (MARAD). 2019a. Wallops Island M-95 Intermodal Barge System. Accessed 11/17/2020 at https://www.maritime.dot.gov/sites/marad.dot.gov/files/docs/grants-finances/marine-highways/3071/marine-highway-project-description-pages-9-3-2019.pdf.

MARAD. 2019b. Marine Highway Route Descriptions. Marine-Highway-Route-Descriptions. Accessed 11/9/20 at https://maritime.dot.gov/sites/marad.dot.gov/files/docs/grants-finances/marine-highways/3061/marine-highway-route-descriptions-8-14-2019.pdf.

National Aeronautics and Space Administration (NASA). 2018. NASA WFF Shoreline Enhancement and Restoration Project Environmental Assessment, Draft. Goddard Space Flight Center, Wallops Flight Facility, Wallops Island, VA. December.

National Aeronautics and Space Administration (NASA). 2019. Wallops Flight Facility Site-wide Programmatic Environmental Impact Statement, Final. May. https://code200-external.gsfc.nasa.gov/250-wff/site-wide_eis.

NOAA Fisheries. 2018. 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. United States Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59. Accessed May 2020 at https://www.fisheries.noaa.gov/resource/document/technical-guidance-assessing-effects-anthropogenic-sound-marine-mammal-hearing.

NOAA Fisheries. 2020. ESA Section 7 Mapper. NOAA Fisheries Greater Atlantic Region. Accessed December 2020 at https://noaa.maps.arcgis.com/apps/webappviewer/index.html?id=1bc332edc5204e03b250ac11f9914a27

Spiga, I, S. Cheesman, A. Hawkins, R. Perez-Dominguez, L. Roberts, D. Hughes, M. Elliott, J. Nedwell, and M. Bentley. 2012. Understanding the Scale and Impacts of Anthropogenic Noise upon Fish and Invertebrates in the Marine Environment. SoundWaves Consortium Technical Review (ME5205).

ATTACHMENT 1: NOAA FISHERIES ESA MAPPER

NOAA Fisheries Section 7 Mapper (Version 2, Nov 2019) **Accessed 12/2/2020**
Species Descriptions for the Vicinity of the Wallops WIND Action Area

Atlantic sturgeon
Adult
Migrating & Foraging
N/A

Acipenser oxyriynchus oxyriynchus
DPS: All DPSs
ESA Status: Threatened/Endangered

Time(s) of year:
01/01 to 12/31
N/A to N/A

Federal Register: 77 FR 5880 and 77 FR 5914
Recovery Plan: N/A

Notes: We expect adult Atlantic sturgeon to opportunistically forage year round as they migrate along the coast to and from their natal spawning grounds (Hilton et al. 2016, p. 8). They may aggregate in ocean and estuarine areas during certain times of year, and exhibit seasonal coastal movements in the spring and fall. We expect that they typically remain within the 50-meter depth contour (Erickson et al. 2011, p. 356, 360), but may be found out to the Exclusive Economic Zone (EEZ)(Stein et al. 2004, p. 174).

Sources: Hilton et al. 2016; Erickson et al. 2011; Stein et al. 2004

River Kilometers (if applicable):
to , (Hilton et al. 2016, p. 8)
to , (GARFO)

Feature ID: ANS_C50_ADU_MAF
Last Updated: 7/12/2017, 8:00 PM

Atlantic sturgeon
Subadult
Migrating & Foraging
N/A

Acipenser oxyriynchus oxyriynchus
DPS: All DPSs
ESA Status: Threatened/Endangered

Time(s) of year:
01/01 to 12/31
N/A to N/A

Federal Register: 77 FR 5880 and 77 FR 5914
Recovery Plan: N/A

Notes: We expect subadult Atlantic sturgeon to opportunistically forage year round as they migrate along the coast to and from their natal rivers (Hilton et al. 2016, p. 8). They may aggregate in ocean and estuarine areas during certain times of year, and exhibit seasonal coastal movements in the spring and fall. We expect that they typically remain within the 50-meter depth contour (Erickson et al. 2011, p. 356, 360), but may be found out to the Exclusive Economic Zone (EEZ)(Stein et al. 2004, p. 174).

Sources: Hilton et al. 2016; Erickson et al. 2011; Stein et al. 2004

River Kilometers (if applicable):
to , (Hilton et al. 2016, p. 8)
to , (GARFO)

Feature ID: ANS_C50_SUB_MAF
Last Updated: 7/12/2017, 8:00 PM

Green sea turtle
Adults and juveniles
Migrating & Foraging
Massachusetts (S of Cape Cod) through Virginia

Chelonia mydas
DPS: North Atlantic DPS
ESA Status: Threatened

Time(s) of year:
5/1 to 11/30
to

Federal Register: 81 FR 20057
Recovery Plan: NMFS & USFWS 1991

Notes: In general, juvenile and adult green sea turtles migrate north in the spring as water temperatures warm, arriving in mid-Atlantic waters in May. As the waters cool in the fall, the trend is reversed with most sea turtles leaving the area by the end of November. The waters south of Cape Cod were delineated based on Ecological Protection Units (EPUs), as defined by the Northeast Fisheries Science Center.

Sources: [Loggerhead] Shoop and Kenney 1992; [Green]USFWS 2015; [Kemp's ridley] NMFS and USFWS 2015

Feature ID: GRN_STS_AJV_MAF
Last Updated: 3/26/2017, 8:00 PM

Kemp's ridley sea turtle
Adults and juveniles
Migrating & Foraging
Massachusetts (S of Cape Cod) through Virginia

Lepidochelys kempii
DPS: N/A
ESA Status: Endangered

Time(s) of year:
5/1 to 11/30
to

Federal Register: 35 FR 18319
Recovery Plan: NMFS et al. 2011

Notes: In general, juvenile and adult Kemp’s ridley sea turtles migrate north in the spring as water temperatures warm, arriving in mid-Atlantic waters in May. As the waters cool in the fall, the trend is reversed with most sea turtles leaving the area by the end of November. The waters south of Cape Cod were delineated based on

Ecological Protection Units (EPUs), as defined by the Northeast Fisheries Science Center.

Sources: [Loggerhead] Shoop and Kenney 1992; [Green]USFWS 2015; [Kemp's ridley] NMFS and USFWS 2015

Feature ID: KMP_STS_AJV_MAF
Last Updated: 3/26/2017, 8:00 PM

Leatherback sea turtle
Adults and juveniles
Migrating & Foraging
Massachusetts (S of Cape Cod) through Virginia

Dermochelys coriacea
DPS: N/A
ESA Status: Endangered

Time(s) of year:
5/1 to 11/30
to

Federal Register: 35 FR 849
Recovery Plan: NMFS & USFWS 1992

Notes: In general, juvenile and adult leatherback sea turtles migrate north in the spring as water temperatures warm, arriving in mid-Atlantic waters in May. As the waters cool in the fall, the trend is reversed with most sea turtles leaving the area by the end of November. The waters south of Cape Cod were delineated based on Ecological Protection Units (EPUs), as defined by the Northeast Fisheries Science Center.

Sources: [Loggerhead] Shoop and Kenney 1992; [Green]USFWS 2015; [Kemp's ridley] NMFS and USFWS 2015

Feature ID: LTR_STS_AJV_MAF
Last Updated: 3/26/2017, 8:00 PM

Loggerhead sea turtle
Adults and juveniles
Migrating & Foraging
Massachusetts (S of Cape Cod) through Virginia

Caretta caretta
DPS: Northwest Atlantic DPS
ESA Status: Threatened

Time(s) of year:
5/1 to 11/30
to

Federal Register: 76 FR 58868
Recovery Plan: NMFS & USFWS 2008

Notes: In general, juvenile and adult loggerhead sea turtles migrate north in the spring as water temperatures warm, arriving in mid-Atlantic waters in May. As the waters cool in the fall, the trend is reversed with most sea turtles leaving the area by the end

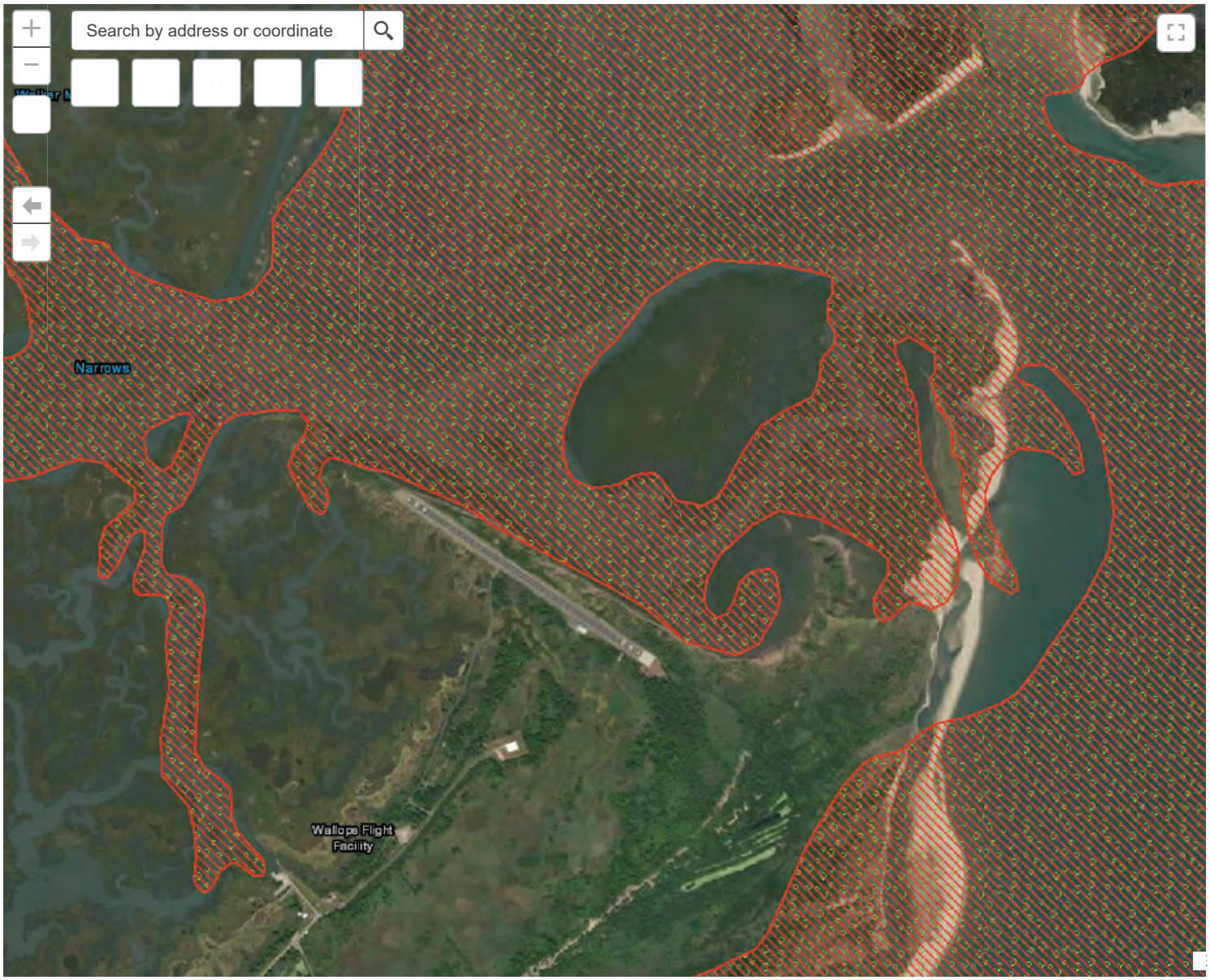
of November. The waters south of Cape Cod were delineated based on Ecological Protection Units (EPUs), as defined by the Northeast Fisheries Science Center.

Sources: [Loggerhead] Shoop and Kenney 1992; [Green]USFWS 2015; [Kemp's ridley] NMFS and USFWS 2015

Feature ID: LOG_STS_AJV_MAF
Last Updated: 3/26/2017, 8:00 PM

ESA Section 7 Mapper

NOAA Fisheries Greater Atlantic Region



Atlantic Sturgeon

Sea Turtles

0.2mi

-75.416 37.901 Degrees

From:	Miller, Shari A. (WFF-2500) <shari.a.miller@nasa.gov>
Sent:	Wednesday, November 10, 2021 1:38 PM
To:	Martin, Amy; Argo, Emily; Ruth Boettcher
Cc:	Levine, Lori M. (GSFC-2500); Nate Overby; Finio, Alan (MARAD); brian.c.denson@usace.army.mil; Meyer, T J (WFF-2500); Finch, Kimberly (GSFC-2500)
Subject:	Eastern Black Rail Survey for Wallops Island Northern Development, NASA WFF
Attachments:	313-382_NASA Wallops Island BLRA_Survey_Letter_Final.pdf
Follow Up Flag:	Follow up
Flag Status:	Flagged

Emily, Ruth, Amy,

The National Aeronautics and Space Administration (NASA) Wallops Flight Facility (WFF) and the Virginia Commercial Space Flight Authority (VCSFA, VA Space) propose to construct a pier for barge access and berthing and to dredge a vessel approach area connecting to the Chincoteague Inlet Federal Channel. NASA is the lead agency for the National Environmental Policy Act (NEPA) process and for this Endangered Species Act (ESA) consultation. As the Department of Transportation's Maritime Administration (MARAD) and the U.S. Army Corps of Engineers (USACE) are serving as Cooperating Agencies on this project, this consultation also serves to fulfil their requirements.

NASA contracted AECOM to conduct a breeding survey for eastern black rails (*Laterallus jamaicensis jamaicensis*). Three iterations of marsh bird surveys were conducted on the evenings of June 15, 2021, June 22, 2021, and June 29, 2021. The surveys occurred at two (2) survey stations in the vicinity of an existing unmanned aerial systems airstrip. Eastern black rails were not detected at either survey station within (or outside) the 400-meter (0.25-mile) radii on any of the 3 survey nights; however, clapper rails (CLRA) were present and
vocal for most of the surveys.

The report of the survey is attached for your review and comment. If you have any questions or require additional information, please contact me at Shari.A.Miller@nasa.gov or (757) 824-2327.

Thank you.

Shari A. Miller

Center NEPA Manager &
Natural Resources Manager
NASA GSFC Wallops Flight Facility
Wallops Island, VA 23337
(757) 824-2327
Shari.A.Miller@nasa.gov
https://code200-external.gsfc.nasa.gov/250-wff/

August 5, 2021

Ms. Shari Miller
Center NEPA Manager and Natural Resource Manager
NASA GSFC Wallops Flight Facility
Wallops Island, VA 23337

Dear Ms. Miller:

Subject: NASA Wallops Island Eastern Black Rail Survey
Wallops Island, Accomack County, Virginia
CEC Project 313-382

1.0 INTRODUCTION

Tommy Goodwin, PE (CEC) and Christian Knatt (AECOM) conducted three iterations of marsh bird surveys on the evenings of June 15, 2021, June 22, 2021, and June 29, 2021 for the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center's Wallops Flight Facility (WFF) Wallops Island Northern Development Project in Wallops Island, Accomack County, Virginia. The purpose of the study was to conduct a breeding survey for eastern black rails (*Laterallus jamaicensis jamaicensis).* The surveys occurred at two (2) survey stations in the vicinity of an existing unmanned aerial systems airstrip (Figure 1). The survey stations were designated by AECOM in their habitat assessment for this project (AECOM 2020). The approximate center of the project area is located at 37.885818 °N, -75.436997 °W.

2.0 BACKGROUND

Black rails are a very small species of rail described by a slate gray/black body with a chestnut colored nape and thin white spotting on the rump and flanks; the bill is blueish gray and the eyes are bright red. Black rails are the smallest rail species in North America, measuring 10 to 15 centimeters (4 to 6 inches) in length and have a mean mass of approximately 35 grams (1.2 ounces), approximately the size of a deer mouse (Eddleman 2020). Eastern black rails, the subspecies found along the Atlantic coast and the largest subspecies of black rail, do not have a substantially different habitat or behavior from the other subspecies of black rail. Due to the size of black rails, their habitat tolerance is very narrow; they rely on high marshes which only flood in severe weather, but are consistently at least moist. Black rails need wet soils, but cannot tolerate more than 3 centimeters (1.2 inches) of water depth (Flores 1995). Black rails are typically found

in high marsh areas abundant in species including cordgrasses (ie. *Spartina patens, S. alterniflora, S. cynosuroides,* and *S. bakeri*), pickleweeds (*Salicornia spp.*), saltgrass (*Distichlis spicata*), black rush (*Juncus gerardi*), needlerush (*Juncus roemerianus*), or Olney bulrush (*Scirpus olneyi*). This habitat is more saturated than that which common reed (*Phragmites australis*) begins to dominate (Flores 1995; D. Brinkler, Maryland Department of Natural Resources (MDDNR) June 29, 2021, personal communication).

Prior to the mid 1990's, eastern black rails were one of the most abundant species/subspecies of rail in the Delmarva Peninsula, only outnumbered by Virginia rail and clapper rail (D. Brinkler, MDDNR June 29, 2021, personal communication). Due to rising sea levels, the high marshes along the Atlantic coast flood more frequently and have been transitioning to low marsh while upland habitats are unable to transition to high marsh habitat at a similar rate either due to geographical/geological restrictions or established flora that will take time to change (Watts 2016).

Like most rail species, black rails are primarily nocturnal callers and typically only fly when in distress, preferring to walk between the stems of flora in their environment; this makes observing this secretive species a challenging endeavor. No observations of eastern black rail have occurred during federal or state agency surveys in Maryland or Virginia since prior to 2019 (D. Brinkler, MDDNR June 29, 2021, personal communication). Every state along the Atlantic coast has also seen drastic reductions to eastern black rail populations leading to the eastern black rails obtaining federal protection on November 9, 2020 (USFWS 2020).

3.0 SURVEY STATIONS

Locations of the two (2) survey stations were determined by AECOM based on the findings in their Habitat Assessment for the WFF (AECOM 2020). These stations were located such that all high marsh habitat within 122 meters (400 feet) of the proposed buildings and runway expansion was included within a 400-meter (0.25-mile) radius survey area from the survey stations (Figure 1). According to AECOM (2020), a total of 8.9 hectares (22 acres) of high marsh habitat consisting primarily of saltmeadow hay (cordgrass; *Spartina patens)* and other high marsh flora exists within the survey station 400-meter (0.25-mile) radii. The two survey stations were positioned such that double counting of any rails would not be likely to occur.

4.0 METHODS

The survey was performed in accordance with the Maryland Protocol (Wilson 2015; Gibbs and Melvin 1993), and, in any situations where the Maryland Protocol did not specify a condition, the Standardized North American Marsh Bird Monitoring Protocol (SNAMBMP; Conway 2011) was followed.

The methodology used for these surveys consisted of 3 broadcast playback field survey efforts, between the first of May (May 1) and the fifteenth of July (July 15), conducted at the 2 survey stations. Surveys were not conducted in rain, fog, or when wind speeds exceeded 19.3 kilometers per hour (12 miles per hour). These surveys were conducted as close to 0.5-hour after sunset as possible to maintain consistency with the Maryland Protocol. Tidal conditions are not defined in the Maryland Protocol, but the SNAMBMP recommends similar tidal levels for all survey events.

Due to the nature of the secretive marsh birds, auditory surveys are the most effective method for identifying eastern black rails. In accordance with the Maryland Protocol, broadcast playback surveys were conducted at each survey station for 10 minutes with a call sequence as follows:

- 2 minutes of silence;
- 4 minutes of eastern black rail calls (ki-ki-ker, growls, ki-ki doo);
- 1 minute of silence;
- 2 minutes Virginia rail calls; and
- 1 minute of silence.

5.0 RESULTS

Eastern black rails were not detected at either survey station within (or outside) the 400-meter (0.25-mile) radii on any of the 3 survey nights; however, clapper rails (CLRA) were present and vocal for most of the surveys. Delays, of approximately 0.5 hour, were experienced due to runway access and excessive wind speed on the second and third surveys. To maintain consistency with tidal conditions, all surveys were conducted at tide levels within approximately 0.3 meter (1 foot) of each other; the tide level at approximately 21:00 on the 3 dates was approximately 0.6 meter (2 feet) high and rising on June 15, 2021 and June 29, 2021 and approximately 0.9 meter (3 feet) high and receding on June 22, 2021. A summary of the results of the surveys can be found in Table 1.

Table 1: Summary of Wallops Island Marsh Bird Surveys

Date	Time	Survey Station	Species	Individuals
June 15, 2021	21:00	1	CLRA	1
	21:20	2	None	0
June 22, 2021	21:30	1	CLRA	4
	21:45	2	CLRA	1
June 29, 2021	21:25	1	CLRA	1
	21:50	2	None	0

Data collection included survey station, date, time, weather conditions, ambient noise levels, any marsh bird vocalizations, and approximate distance/direction of detected birds from observers. Field forms were adapted from the SNAMBMP and are included as Attachment 1.

Sincerely,
CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

Tommy J. Goodwin, Jr., PE
Project Consultant

Ryan A. Slack
Principal

Enclosures: References
Figure 1: Eastern Black Rail Survey Map
Attachment 1: Scanned Field Forms

REFERENCES

AECOM. 2020. Eastern Black Rail (*Laterallus jamaicensis jamaicensis)* Habitat Assessment. NASA Wallops Flight Facility. 15pp.

Conway, C. J. 2011. Standardized North American Marsh Bird Monitoring Protocol. Waterbirds. 34(3). 319-346pp.

Eddleman, W. R., R. E. Flores, and M. Legare (2020). Black Rail (Laterallus jamaicensis), version 1.0. In Birds of the World (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA.

Flores, R. E. and W. R. Eddleman. (1995). California Black Rail use of habitat in southwestern Arizona. Journal of Wildlife Management 59.

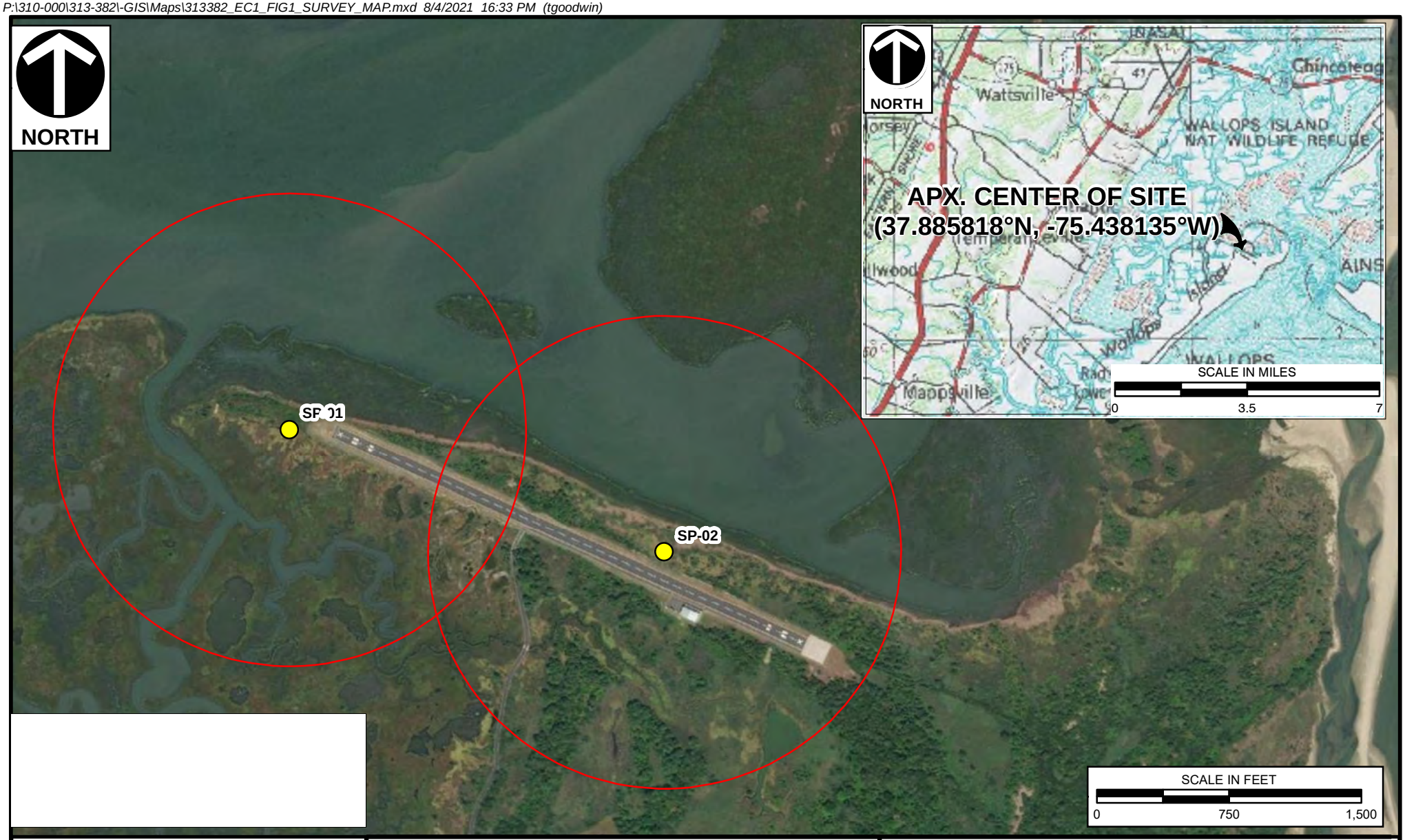
Gibbs, J. P. and S. M. Melvin. 1993. Call-response Surveys for Monitoring Breeding Waterbirds. Journal of Wildlife Management 57: 27–34pp.

US Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Threatened Species Status for Eastern Black Rail with a Section 4(d) Rule. 50 CFR Part 17. Federal Registrar. Vol. 85, No. 196. 63764-63803pp.

Watts, B. D. 2016. Status and distribution of the eastern black rail along the Atlantic and Gulf Coasts of North America. The Center for Conservation Biology Technical Report Series, CCBTR-16-09. College of William and Mary/Virginia Commonwealth University, Williamsburg, VA. 148 pp.

Wilson, M. D., F. M. Smith, and B. D. Watts. 2015. Re-survey and Population Status Update of the Black Rail in Virginia. Center for Conservation Biology Technical Report Series, CCBTR-15-004. College of William and Mary and Virginia Commonwealth University. Williamsburg, VA. 15pp.

P:\310-000\313-382\-GIS\Maps\313382_EC1_FIG1_SURVEY_MAP.mxd 8/4/2021 16:33 PM (tgoodwin)



REFERENCE

ESRI WORLD IMAGERY / ARCGIS MAP SERVICE:
HTTP://GOTO.ARCGISONLINE.COM/MAPS/
WORLD_IMAGERY, ACCESSED 8/4/2021,

USGS TOPOGRAPHIC MAP/ ARCGIS MAP SERVICE:
HTTP://GOTO.ARCGISONLINE.COM/MAPS/
USA_TOPO_MAPS, ACCESSED 8/4/2021

Civil & Environmental Consultants, Inc.
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www.cecinc.com

NATIONAL AERONAUTICS AND SPACE AGENCY
WALLOPS ISLAND FACILITY
WALLOPS ISLAND, ACCOMACK COUNTY, VIRGINIA

EASTERN BLACK RAIL SURVEY MAP

DRAWN BY:	TJG	CHECKED BY:	SRD	APPROVED BY:	RAS	FIGURE NO:	1
DATE:	8/4/2021	SCALE:	1 " = 750 '	PROJECT NO:	313-382.0001	* Hand signature on file	

National Marsh Bird Monitoring Program Survey Data Sheet

Date: 6/15/2021 **Location:** Wallops Island

Route: ~~MASH~~ Wallops Island, VA

Observer(s): T Goodwin / C Kraft

Instructor

Survey replicate # : 1

	Before/After
Temperature (°F) :	75 / 73
Wind speed (mph) :	1-3 / 1-3
Cloud cover (%) :	1 / 1
Precipitation (see below) :	none / none

Total # during survey			
PBGR		VIRA	
LEBI		CLRA	
AMBI		COGA	
BLRA		SORA	
AMCO		CLRA	1

**list all observers in order of their contribution to the data collected*

put an "S" in the appropriate column if the bird was seen, a "1" if the bird was heard, and "1S" if both heard and seen

Station#	Start Time (military)	Background noise	Species	Responded During: Before	Pass 0-1	Pass 1-2	BLRA 2-3	BLRA 3-4	BLRA 4-5	BLRA 5-6	Pass 6-7	VIRA 7-9	Pass 9-10	After	Call Type(s)	Direction	Distance (meters)	Detected at a Previous Point	Comments
1	~~2100~~ 2057	0	CLRA									1			Kek		200		
2	2120	1	—																No Birds

Call Types: BLRA: *kicky-doo, grr, churt* RIRA: cltr, kburr, kek, khurrah LEBI: *coo, kak, ert* VIRA: *grunt, ticket, kicker*
SORA: whinny, perweep, keep PBGR: owhoop, hyena COGA: wpt, beep AMCO: burup, honk, hicup AMBI: pump-er-lunk

If the call type is not one of the above listed types, describe the call in the comments column

Precipitation: light rain, rain, heavy rain, light snow, snow, heavy snow, fog, none

Background noise: 0 *no noise* 1 *faint noise* 2 *moderate noise (probably can't hear some birds beyond 100m)*
3 *loud noise (probably can't hear some birds beyond 50m)* 4 *intense noise (probably can't hear some birds beyond 25m)*

National Marsh Bird Monitoring Program Survey Data Sheet

Date: 6/22/21 **Location:** WALLOPS ISLAND

Route: Wallops Island, VA

Observer(s): T Goodwin / C Kneff

Instructor

Survey replicate # : 2

Before/After	
Temperature *(°F)* :	68 / 68
Wind speed *(mph)* :	5 / 5
Cloud cover *(%)* :	90 / 90
Precipitation *(see below)* :	none / none

Total # during survey			
PBGR		VIRA	
LEBI		CLRA	
AMBI		COGA	
BLRA		SORA	
AMCO		CLRA	5

**list all observers in order of their contribution to the data collected*

put an "S" in the appropriate column if the bird was seen, a "1" if the bird was heard, and "1S" if both heard and seen

Station#	Start Time (military)	Background noise	Species	Responded During: Before	Pass 0-1	Pass 1-2	BLRA 2-3	BLRA 3-4	BLRA 4-5	BLRA 5-6	Pass 6-7	VIRA 7-9	Pass 9-10	After	Call Type(s)	Direction	Distance (meters)	Detected at a Previous Point	Comments
1	2130	1	CLRA	1		1	1	1	1	1					Kek		300		
			CLRA			1						1					300		
			CLRA									1					350		
			CLRA										1				50		
2	2145	1	CLRA										1	1(2)			15		

Call Types: BLRA: *kicky-doo, grr, churt* RIRA: cltr, kburr, kek, khurrah LEBI: *coo, kak, ert* VIRA: *grunt, ticket, kicker*
SORA: whinny, perweep, keep PBGR: owhoop, hyena COGA: wpt, beep AMCO: burup, honk, hicup AMBI: pump-er-lunk

If the call type is not one of the above listed types, describe the call in the comments column

Precipitation: light rain, rain, heavy rain, light snow, snow, heavy snow, fog, none

Background noise: 0 *no noise* 1 *faint noise* 2 *moderate noise (probably can't hear some birds beyond 100m)*
3 *loud noise (probably can't hear some birds beyond 50m)* 4 *intense noise (probably can't hear some birds beyond 25m)*

National Marsh Bird Monitoring Program Survey Data Sheet

Date: 6/29/2021 **Location:** Wallops Island

Route: (B) ~~WASA~~ Wallops Island, VA

Observer(s): T Goodwin / C Kraft

Instructor

Survey replicate # : 3

	Before/After
Temperature *(°F)* :	80 / 80
Wind speed *(mph)* :	10 / 10
Cloud cover *(%)* :	0 / 0
Precipitation *(see below)* :	None / None

Total # during survey			
PBGR		VIRA	
LEBI		CLRA	
AMBI		COGA	
BLRA		SORA	
AMCO		CLRA	1

**list all observers in order of their contribution to the data collected*

put an "S" in the appropriate column if the bird was seen, a "1" if the bird was heard, and "1S" if both heard and seen

Station#	Start Time (military)	Background noise	Species	Responded During: Before	Pass 0-1	Pass 1-2	BLRA 2-3	BLRA 3-4	BLRA 4-5	BLRA 5-6	Pass 6-7	VIRA 7-9	Pass 9-10	After	Call Type(s)	Direction	Distance (meters)	Detected at a Previous Point	Comments
1	2125	0	CLRA										1		~~KEK~~ ~~CACK~~	←	300		
2	2150	1	—																No birds

Call Types: BLRA: *kicky-doo, grr, churt* RIRA: cltr, kburr, kek, khurrah LEBI: *coo, kak, ert* VIRA: *grunt, ticket, kicker*
SORA: whinny, perweep, keep PBGR: owhoop, hyena COGA: wpt, beep AMCO: burup, honk, hicup AMBI: pump-er-lunk

If the call type is not one of the above listed types, describe the call in the comments column

Precipitation: light rain, rain, heavy rain, light snow, snow, heavy snow, fog, none

Background noise: 0 *no noise* 1 *faint noise* 2 *moderate noise (probably can't hear some birds beyond 100m)*
3 *loud noise (probably can't hear some birds beyond 50m)* 4 *intense noise (probably can't hear some birds beyond 25m)*

Eastern Black Rail (*Laterallus jamaicensis jamaicensis*) Habitat Assessment

Prepared for the

NASA WFF Wallops Island Northern Development Environmental Assessment

Accomack County, Virginia

NASA Wallops Flight Facility
32400 Fulton Street
Wallops Island, VA 23337

Prepared by

AECOM

4840 Cox Road
Glen Allen, VA 23060

December 23, 2020

Table of Contents

APPENDICES

1.0 INTRODUCTION

The National Aeronautics and Space Administration (NASA) Wallops Flight Facility (WFF) is proposing; developments would constitute a new Intermodal Facility at Wallops Island located in proximity to the existing Mid-Atlantic Regional Spaceport (MARS) Unmanned Aerial Systems (UAS) airstrip (**Appendix A, Figure 1**). Proposed developments could include construction and operation of a Wallops Island Pier Area, a second hangar at the UAS airstrip, potable and wastewater lines to the hangars, airstrip lighting, doubling of the existing access road culvert, a 25-30 vehicle parking lot, and a project support building at the entrance of the access road to the airstrip (Project Area). According to the U.S. Maritime Administration (MARAD), this project has the potential to grow existing site capabilities at Wallops Island; enhance science, technology, engineering, and mathematics (STEM) research opportunities; and spur high-tech/high-paying jobs in a predominately rural area. The Eastern Black Rail (*Laterallus jamaicensis jamaicensis*) was identified as a species with potential to be impacted by Project activities. The Eastern Black Rail was upgraded under the Endangered Species Act (ESA) from proposed to threatened status with 4D rule in the Federal Register (October 8, 2020) effective November 9, 2020 (85 FR 63764). The Virginia Department of Wildlife Resources (VDWR) also lists the species as endangered. To address the Project's potential for impacts to this species, an Eastern Black Rail Habitat Assessment was conducted by AECOM. The results of desktop analysis and field efforts are presented in this document.

2.0 PURPOSE

As part of the National Environmental Policy Act (NEPA) review process Wallops Island Northern Development (WIND) Environmental Assessment (EA), NASA identified the (then candidate species,) the Eastern Black Rail (*Laterallus jamaicensis jamaicensis*) for review. The Eastern Black Rail was documented on WFF Wallops Island in May 2019 (WFF Marsh Fiber Project Draft Environmental Assessment [NASA 2020]). Through subsequent informal conference with U.S. Fish and Wildlife Service (USFWS) during May and July of 2020, a habitat survey was requested by USFWS to identify whether an Eastern Black Rail species survey was needed (USFWS 2020a). The purpose of this document is to satisfy the request of USFWS and document the findings of a habitat assessment to identify whether suitable Eastern Black Rail habitat is present within or near the Project Area. It is anticipated that the habitat assessment results will support the development of further actions addressing the Project's potential for impacts to the Eastern Black Rail including the identification of future survey area and effort, potential impacts associated with design and engineering, and avoidance and minimization measures, as applicable.

3.0 PROJECT AREA

The Project Area is located on Wallops Island in Accomack County, Virginia, east of Atlantic Road (Route 679), north of Causeway Road (Route 803), and south of Chincoteague Island, and can be accessed from North Seawall Road (**Appendix A, Figure 1**). The United States Geological Survey (USGS) Quadrangle map (Quad) for Chincoteague West, VA (USGS 2019) depicts a mix of generally flat non-vegetated land cover and vegetated submerged swamps (including Cow Gut Flat) with Cow Gut bordering the southwest edge of the Project Area. Upland elevations depicted on the Chincoteague Quad range from 5 feet above mean sea level (amsl) to 0 feet amsl. ESRI™ (2019) aerial imagery depicts similar landcover as the USGS Quadrangle (Quad) map, but also shows paved roads, maintained shoulders, and a runway (**Appendix A, Figure 2**). The project figures in **Appendix A** depict the study area, which combines both the potential primary and secondary area of potential effect (APE). The active runway hosts air launches, a variety of

personnel, as well as air and vehicular traffic for training events. Resident wildlife would be assumed to have acclimated or moved away from the existing level of noise.

3.1 Primary APE

The proposed project is in the alternative planning stages and final engineering plans or site arrangements were not available at the time of the habitat assessment. Therefore, the anticipated primary APE is based on preliminary site plans or project area with a 50 foot (ft) buffer to account for site-specific adjustments (**Figure 2**).

3.2 Secondary APE

Beyond the 50 ft buffer (or Primary APE), the habitat assessment area was be expanded to include a conservative estimate for a preliminary secondary APE to account for potential effects from light, noise, and hydrology changes from the proposed activities, at the request of the USFWS through the informal conference process. The secondary APE used for the Eastern Black Rail habitat assessment may be further reduced as site-specific construction techniques are coordinated, once a contractor has been selected.

Noise from construction equipment would likely to be intermittent and temporary. Based on the typical equipment roadway construction equipment, attenuation results in a drop-off rate of 7.5 decibel, A-weighted (dBA) per doubling of distance for a point source (**Table 1**). **Table 2** below includes typical construction equipment and their max dBA. The noise emission levels at 50 feet from the point source for pile driving, scraping, paving, and concrete mixing typically range from 80 to 95 dBA. Assuming the maximum noise from construction of 95 dBA, a nuisance level of 73 dBA and above, combined with the estimated the 7.5 dBA attenuation, a conservative potential APE is noted with a 400 ft buffer from the Project Area or noise source (California Department of Transportation 2016).

Noise minimization strategies implemented to the extent practicable during construction may include: temporary noise barriers or sound walls, noise pads or dampers, movable task noise barriers, queuing trucks to distribute idling noise, locating vehicle access points and loading and shipping facilities away from habitat areas, reducing the number of noisy activities that occur simultaneously, relocating stationary equipment away from habitat areas, and use vibration reducing modifications to construction equipment.

Table 1: Anticipated Noise Attenuation based on Federal Highway Administration (FHWA 2006)

Noise level (dBA)	Distance from source ft (m)
95	50 (15)
88	100 (30)
80	200 (61)
73	400 (122)
65	800 (244)

Table 2: Construction Equipment Noise Emission Levels (greatest-to-least)

Equipment	Typical Lmax at 50 feet (15.2 m) from Source (dBA, Slow)
Pile Driver (Impact)	95
Vibratory Pile Driver	95
Rock Drill	85
Paver	85
Scraper	85
Crane	85
Concrete Mixer Truck	85
Dozer	85
Grader	85
Jackhammer	85
Pneumatic Tool	85
Crane	85
Chain w	85
Roller	85
Tractor	84
Concrete Pump Truck	82
Generator	82
Compactor (ground)	80
Compressor (Air)	80
Backhoe	80
Vibratory Concrete Mixer	80
Pumps	77

Lighting for construction is anticipated to be temporary and consistent with best practices which may include: turning off unnecessary lights; facing lights away from the habitat; shielding light sources; and/or using recessed lighting versus exposed light source, directional lighting versus scattered light sources, low-profile low-level lamps on light poles, low pressure sodium vapor lighting, yellow "bug" lights of 25 watts or less versus white incandescent bulbs, and/or motion detector lights with short time settings.

Hydrology impacts are anticipated to be limited to the primary APE depicted in **Figure 2** due to anticipated fill prisms for the proposed grading and structures. Due to the dynamic nature of a tidal-driven saltmarsh, secondary hydrology impacts are not anticipated.

As requested by USFWS, the anticipated, conservative limits of primary and secondary APE were evaluated for noise, light, and hydrology. Of these, it appears that construction noise has the potential to disturb the Eastern Black Rail the furthest distance from the construction activities. Therefore, the potential secondary APE is conservatively defined by a 400 ft buffer (distance to noise attenuation to 73 dBA) from the anticipated sources of construction noise and clipped to certain unsuitable habitat factors such as open water.

4.0 EASTERN BLACK RAIL DESCRIPTION

The Eastern Black Rail is a small, secretive, marsh-dwelling bird that is broadly distributed through portions of the United States, Central America, and South America. The Eastern Black Rail is one of four subspecies of Black Rail and, effective October 9, 2020, is listed as federally threatened by the USFWS under the ESA. The species is additionally protected by VDWR and the Migratory Bird Treaty Act of 1918. Adult Eastern Black Rails vary in size from four to six inches in length, have a wingspan of nine to 11 inches, and weigh less than 0.1 pound. Males and females are similar in size and adults are generally pale to blackish-gray, with a small blackish bill and bright red eyes. Feeding behavior for the Eastern Black Rail is generally unknown but it is believed that they are opportunistic foragers. The shape of their bill suggests adaptations for gleaning or pecking at items. The diet of the Eastern Black Rail consists of small aquatic and terrestrial invertebrates, as well as small seeds (USFWS 2019).

The marsh-dependent species' habitat can be tidally or non-tidally influenced and range in salinity from salt to brackish to fresh. In the northeastern United States, the Eastern Black Rail can typically be found in salt and brackish marshes with dense cover but can also be found in upland areas of these marshes. Farther south along the Atlantic coast, Eastern Black Rail habitat includes impounded and unimpounded salt and brackish marshes (USFWS 2019). The preferred habitat of Eastern Black Rails in Virginia is the salt marsh zone known as high marsh (USFWS 2020a).

There are inherent challenges to studying or surveying for marsh birds. The Standardized North American Marsh Bird Monitoring Protocol (2011) describes marsh birds as "inconspicuous" or "secretive." Moreover, the Eastern Black Rail has been described as the "most secretive of the secret marsh birds" and lacking basic information on population status and trends in most areas (Watts 2016). It follows that, Eastern Black Rail nesting behavior has not been thoroughly studied but the species is known to tolerate a narrow range of water levels and variation within those water levels (Watts 2016, USFWS 2020b). Nesting sites have been found in the upper reaches of marshes, a few inches above ground or shallow water in clumps of vegetation (Audubon n.d.). Other Black Rail studies specify that nesting habitat requires inundation less than one inch (three cm) in depth (Conway 2011, USFWS 2020b).

The Virginia Institute of Marine Science (VIMS) located in Gloucester, Virginia describes the high marsh habitat zone as only flooded during extreme high tides and storm events. Common vegetation found in Eastern Black Rail habitat includes saltmeadow hay (*Spartina patens)*, chairmaker's bulrush (*Schoenoplectus americanus*), saltgrass (*Distichlis spicata*), and various needlerush (*Juncus*) species (Cornell, 2020). The VIMS salt marsh field guide (VIMS n.d.) distinguishes low marsh that is flooded daily during high tides and exposed during low tides (typified by saltmarsh cordgrass, (*Spartina alterniflora*), black needlerush (*Juncus roemerianus*), and saltmarsh bulrush (*Bolboshoenus robustus*)) from high marsh, which has a higher plant species diversity and includes saltmeadow hay, salt grass, sea lavender (*Limonium carolinanum*), big cordgrass (*Spartina cynosuroides*), marsh elder (*Iva frutescens*), among others. This is consistent with the NatureServe Explorer Floristic Summary for the Atlantic & Gulf Coastal High Salt Marsh which describes vegetation in the upper herbaceous or herb-shrub zones that develops between mean daily high tide and spring tides that still receive tidal influence from spring tides, wind tides, or other events (NatureServe n.d.).

5.0 METHODS

AECOM biologists completed a field reconnaissance following a desktop suitability estimate to determine the extent or presence of suitable high marsh Eastern Black Rail nesting habitat within 400 ft from potential construction noise sources. The desktop suitability estimate was qualitative and designed to

guide the field reconnaissance effort which documented vegetation density, composition, and qualitative water level class.

5.1 Desktop Suitability Estimate

AECOM biologists assessed the primary and secondary APE (study area) through analysis of desktop resources prior to field assessment (Figure 3). Historic aerials were also reviewed to estimate where anticipated uplands, high marsh, low marsh, or open water may be located and to guide the planned transect density. Areas anticipated to be open water were noted for spot check during the field survey to determine if a belt transect was required within the 400 ft buffer.

5.2 Field Reconnaissance

Vegetated wetlands and uplands (i.e. not open water) within the study area were evaluated for the presence/absence of suitable Eastern Black Rail high marsh nesting habitat by pedestrian transects spaced approximately 100 ft apart. This spacing was based on the approximate maximum distance that sightlines allowed for visualization of the prior transect line (and not obscured by taller vegetation). During a wetland delineation site visit on July 29, 2020, AECOM biologists noted the extensive monoculture of low marsh west of North Seawall Road. The proposed transect length was reduced and density displayed to 500 ft apart due to the increased sight lines and lack of apparent hummocks or upland islands.

Vegetation zones and transitions among marsh types were located with a hand-held sub-meter accuracy global positioning system (GPS) device to ground truth contour-derived estimates of suitable and unsuitable habitat. Representative photographs of marsh habitat and ecotones were recorded along with semi-quantitative water level class, and vegetation cover type and density. Previously disturbed areas unlikely to encourage bird activities were also recorded with georeferenced photographs.

Alternating colors of photo-degradable flagging tape were used to designate and record the start of each transect lines. Surveyors ran three concurrent transects to use each other as distance cues, ensuring consistent distance to neighboring surveyor. Surveyors used GPS devices to maintain transect lines generally perpendicular to the shoreline and the runway. Uplands and open water areas were spot-checked. In addition to the belt transects, meandering surveys were performed in high marsh habitat with dense stands of reed grass (*Phragmites australis*) due to poor visibility between transects.

Along select points of the transects, representative vegetative cover estimates were recorded for at least three meter-squared quadrats within each upland, high marsh, and low marsh zones within the study area. Vegetation were identified to species where possible according to the *Field Guide to Coastal Wetland Plants of the Southeastern United States* (Tiner, 1987) and cover classes according to Daubenmire (1959, **Table 3**).

Table 3: Vegetation Cover Classes (Daubenmire 1959)

Cover Class	Range of Coverage (%)	Midpoint of Range (%)
1	0-5	2.5
2	5-25	15.0
3	25-50	37.5
4	50-75	62.5
5	75-95	85.0
6	95-100	97.5

Qualitative water level class observations were made along transects to note inundation where:

- 0 = no inundation;
- 1 = surface water at ground level to below the ankle (or top of the toe of a boot);
- 2 = between ankle and knee height;
- 3 = between knee and hip; and
- 4 was deeper than the observer's hip.

As the Eastern Black Rail nesting habitat requires inundation less than one inch (three cm) in depth, water level classes of two or more were considered unsuitable. Desktop delineation of marsh zones were corrected based on georeferenced vegetative field observations. Water depth observations and vegetation density notes were included to remove areas of inundation and unsuitable vegetation composition or density from suitable habitat mapping. Photographs were taken at each vegetation sampling quadrat and along representative vegetation zones and ecotones. It should be noted that the purpose of this habitat survey is not to provide a detailed floral or faunal inventory but to assess the extent and location of suitable high marsh habitat for the Eastern Black Rail and provide a brief characterization of the various salt marsh zonation to provide a thorough review of site conditions in order to verify or adjust the initial desktop findings.

6.0 HABITAT ASSESSMENT RESULTS

The Eastern Black Rail habitat assessment was conducted from August 31 through September 2, 2020 by AECOM biologists. Approximately 40 man-hours were used to survey the approximately 77-acre study area. National Oceanic and Atmospheric Administration (NOAA) tidal water levels during the survey ranged from 0.03 ft to 3.27 ft (**Table 4**). Georeferenced representative photographs taken along transects and spot-checks can be found in **Appendix B.** For general ease of site walking, surveys were completed during lower tides. Therefore, water level classes should be considered conservative with higher inundation levels assumed during higher tides.

A total of 938,590 square feet (22 acres) of high marsh was identified within the study area (**Figure 4**). Most was at or above 2 ft amsl, and typical inundation during the survey ranged between no inundation to inundation up to the observers' knee (i.e., water level class zero to two, **Table 5**). Microtopographic variations in elevation (e.g., hummocks) were not observed. Some upland islands corresponding to higher elevation contours were observed. Vegetative cover and inundation levels were recorded to document areas of high marsh that were unsuitable habitat. High marsh vegetation primarily consisted of saltmeadow hay and reed grass (**Table 6**). Other vegetation species such as sea oxeye (*Borrichia frutescens*), American germander (*Teucrium canadense*), and some scrub-shrub species (wax myrtle [*Myrica cerifera*] and groundsel tree [*Baccharis halimifolia*]) were occasionally found in high marsh. One small area of marginally suitable habitat with black needlerush (*Juncus romarianus*) was mapped on the western portion of the study area (**Photograph 43**). High marsh with inundation category 2 (above the ankle) or more were excluded from suitable habitat (e.g., **Photograph 22**) as were areas of dense reed grass monoculture

(e.g., **Photograph 22**). Areas of high marsh are noted as potentially suitable habitat on **Figure 4,** and representative **Photograph 51**.

Only small tracts of maritime forest were observed in the study area—on the western tip and east of the North Seawall Road along the north and south perimeter of the island. Maritime forest habitat was typically located above four feet amsl. Maritime forest canopy coverage greater than 30 percent was considered forested and unsuitable habitat, if not located within 15 feet of high marsh. Woody species observed within maritime forests consist of a high canopy story of loblolly pine (*Pinus taeda*) and a lower understory or scrub-shrub community including black cherry (*Prunus serotine*), red cedar (*Juniperus virginiana*), American holly (*Ilex opaca*), and wax myrtle. The herbaceous vegetation diversity observed within the understory and groundcover was variable. In some areas herbaceous vegetative cover was less than five percent and dominated by greenbrier species (roundleaf greenbrier [*Smilax rotundifoliaa*], saw greenbrier [*S. bona-nox*], cat greenbrier [*S. glauca*]), or poison ivy (*Toxicodendron radicans*), especially along the edge of disturbed plots along the runway and aviation hangar; and along the transition to the high marsh ecotone (**Table 6**). **Photograph 28** depicts typical areas of minimal herbaceous cover under maritime forest. The coverage is sparse and not suitable for black rail habitat. Some areas had greater than 75 percent absolute coverage of greenbrier which does not provide suitable habitat either (**Table 5**).

Uplands were differentiated from maritime forests as areas with historic runway fill that were considerably disturbed or consistently maintained. They were treated similarly to maritime forest where only the upland edge with high marsh was evaluated for potential habitat. Some upland areas meet the high marsh with an ecotonal edge dominated with dense monoculture stands of reed grass, which is categorized as unsuitable habitat (e.g., **Photograph 24**). The uplands located along the southern boundary of the primary APE east of the North Seawall Road transitioned directly into low marsh/salt meadow habitat. The uplands along the airstrip showed evidence of historic alteration, disturbance, and fill. This area was dominated with maintained turfgrass and is included in the unsuitable habitat category on **Figure 4**.

Open water was typically mapped below elevation 1 ft amsl. Areas of open water were still present within the low marsh/salt meadow during the minimum tide interval as encapsulated shallow pools. The ground cover and soils within these pools contained gleyed soils, no vegetation, and had a inundation between the observers' ankle and hip (i.e., water level class between 2 and 3). During the field survey no submerged aquatic vegetation (SAV) was observed. Open water is included in the unsuitable habitat category on **Figure 4** (e.g., **Photograph 3**).

Low marsh was found at elevations between open water and high marsh (generally 1 to 2 ft amsl). Vegetation primarily included smooth cordgrass (*Spartina alterniflora*, **Table 5**). Other species present to a lesser extent, included Carolina sea lavender (*Limonium carolinianum*), glassworts and saltworts (*Salicoria spp.*), salt grass (*Districhlis spicata*), and salt marsh bulrush (*Scripus robustus*) (e.g., **Photograph 42**). Typical inundation during the survey ranged between no inundation and the observers' hip (water level class 0 to 3, **Table 4**). Low marsh was still evaluated in transects to ensure hummocks of high marsh were not overlooked. Low marsh is noted as unsuitable habitat in **Figure 4**. Maritime forest had no inundation (water level class 0) while inundation in the open water habitat was consistently above the observers' ankle (water level class 2 to 4, **Table 5**). High marsh and low marsh inundation varied from no inundation to between the observers' knee and hip (water level class 0 to 3). Potentially suitable habitat was identified along transects CI-003, MB-006, CI-004, MB-008, KN-004, CI-006, CI-007, and MB-001 as well as nearby transects KN-002 and MB-009 (**Table 7**).

Table 4: Tide summary during habitat assessment

Date	Survey start and end time	Min tide[1] during survey (ft)	Max tide[1] during survey (ft)	Min tide[2] level during survey (ft)	Max tide[2] level during survey (ft)	NOAA daily min tide times[2]	NOAA daily max tide time[2]	Tide station mean tidal range[1] (ft)
8/31/2020	1000-1600	-1.72	-0.02	0.03	2.11	0106 1254	06:4 1924	-1.12
9/01/2020	1000-1600	-1.54	0.66	0.03	2.15	0145 1338	0737 2004	-0.80
9/02/2020	0900-1200	0.12	1.59	1.44	3.27	0220 1420	0818 2043	0.98

[1]USGS Water Data for the USA https://nwis.waterdata.usgs.gov/nwis? for Tide Station USGS 01484746 Chincoteague Bay Inlet at Chincoteague, VA.
[2] NOAA iPhone App Tide Alert v2.1 for Wallops Island, VA (NOAA 2019).

Table 5: Qualitative water level class observations according to habitat zone

Date	Survey time start and end	Maritime Forest	High marsh	Low marsh	Open water
8/31/2020	1000-1600	0	0	1	2-4
9/01/2020	1000-1600	0	0-2	0-1	2-4
9/02/2020	0900-1200	0	1	1-3	2-4

Note: [1]0 = no inundation; 1 = surface water at ground level to below the ankle (or top of the toe of a boot);
2 = between ankle and knee height; 3 = between knee and hip; 4 =is deeper than the observer's hip.

Table 6: Vegetative Plot Summary

		High Marsh Plot ID						Low Marsh Plot ID					Maritime Forest Plot ID			
Herbaceous Plot ID		1	2	3	4	5	6	1	2	3	4	5	1	2	3	4
Alternate Plot Name		HM Z01	HM Z-02	MB HM-012	KN-HMW-004	MB-HMW-005	KN-UP2HM-001	LMZ-01	LMZ-02	CJI-LM-veg	KN-LMW-001	KN-LMW-004	KN-UPZ-006	MB UPZ-013	CJI-Veg-001	KN-WA
Water Level Class		0	0		0	1	0	0	0	0	1	1	0	0	0	0
Plant Name (Tiner, 1987)	**Plant Name (BONAP 2018)**															
Spartina patens	*Spartina patens*	5		6	6	6	6									
Scirpus robustus	*Schoenoplectus robustus*					3										
Spartina alterniflora	*Spartina alterniflora*						1	6		5	6	6				
Phragmites australis	*Phragmites australis*	2	6													2
Smilax rotundifolia	*Smilax rotundifolia*	1											1	2	2	5
Distichlis spicata	*Distichlis spicata*							P	6							
Andropogon virginicus	*Andropogon virginicus*													3		
Toxicodendron radicans	*Toxicodendron radicans*													1		
Teucrium canadense	*Teucrium canadense*	2					2									
Limonium carolinianum	*Limonium carolinianum*								2	1						
Pinus taeda	*Pinus taeda*														2	
Myrica cerifera	*Morella cerifera*														2	
Salicornia depressa	*Salicornia depressa*									1						
Iva frutescens	*Iva frutescens*										P					

Daubenmire Cover Class definition: 1 = 0-5%, 2 = 5-25%, 3 = 25-50%, 4 = 50-75%, 5 = 75-95%, 6 = 95-100%; P = presence noted but not quantified; Maritime Forest herbaceous cover does not include saplings and trees. Water level class 0 = no inundation; 1 = surface water at ground level to below the ankle; 2 = between ankle and knee height; 3 = between knee and hip; 4 =is deeper than the observer's hip.

Table 7: Eastern Black Rail Habitat Summary by Transect

Transect ID	Habitat Identified Along Transect	Vegetation Plot ID	Photo ID
MB-003	None		
MB-001	None	High Marsh Plot 1, Low Marsh Plot 1	1, 2, 3
KN-001	None	Low Marsh Plot 4, High Marsh Plot 6	
CI-001	None		
MB-004	None		4, 5
KN-002	Habitat mapped west of transect		6, 7
CI-002	None		
MB-005	None	High Marsh Plot 5	8
CI-003	Habitat mapped along transect	Maritime Forest Plot 3	9, 46
MB-006	Habitat mapped along transect		10, 47
CI-004	Habitat mapped along transect		48
MB-007	None		
KN-003	None		
CI-005	None		11
MB-008	Habitat mapped along transect		12, 49
KN-004	Habitat mapped along transect	Low Marsh Plot 5, High Marsh Plot 3	50
CI-006	Habitat mapped along transect		
MB-009	Habitat mapped near both sides of transect		
CI-007	Habitat mapped along transect		
MB-010	None		13, 14
KN-005	None		15, 16, 17, 18
MB-011	None		19, 20, 21
MB-012	None		22, 23, 24, 25
KN-006	None		28, 29
MB-013	None	Maritime Forest Plot 2	30, 31, 32, 33
MB-014	None		34, 35
CI-010A	None	Low Marsh Plot 3	36
CI-010	None		
MB-015	None		
CI-011	None		
CI-012	None		
KN0007	None		37
CI-013	None		
MB-016	None		38, 39, 40, 41
MB-001	Habitat mapped along transect	Low Marsh Plot 2	42, 43, 44
Unnamed Meander	None	Maritime Forest Plot 4	45
Unnamed Meander	None	High Marsh Plot 2	

7.0 CONCLUSIONS AND RECOMMENDATIONS

According to the USFWS, the Eastern Black Rail requires high marsh habitats with fine-stemmed emergent vegetation with high stem density and dense canopy cover (USFWS 2020c). Ideal vegetation height is generally less than or equal to one meter. Additionally, high marsh habitat with higher shrub density is not considered ideal habitat. They also require, on average, surface water depths less than one inch (three cm) to prevent eggs in the nest from becoming submerged and chicks' down feathers from becoming waterlogged during brood rearing. Based on these habitat requirements, some areas of high marsh habitat in **Figure 4** were not considered potential habitat due to shrub density being too high (e.g.,

Photo 10), vegetation density being too low, vegetation height being too high (e.g., **Photo 14**), or surface water depths greater than one inch (e.g,. **Photo 23**). Areas field identified as potential Eastern Black Rail marsh suitable nesting habitat are anticipated for species survey in Spring of 2021, during the USFWS and VDWR survey window with an approved methodology and using surveyors with *a priori* credential verification.

8.0 REFERENCES

Audubon. n.d. *Guide to North American Birds, Black Rail Laterallus jamaicensis*. Retrieved from https://www.audubon.org/field-guide/bird/black-rail [Access July 2020]

California Department of Transportation. 2016. *Technical guidance for assessment and mitigation of the effects of highway and road construction noise on birds*. June. (Contract 43A0306.) Sacramento, CA. Prepared by ICF International, Sacramento, CA, Robert Dooling, Gaithersburg, MD, and Arthur Popper, Silver Spring. MD. Retrieved from https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/noise-effects-on-birds-jun-2016-a11y.pdf. [Accessed November 2020].

Conway, C.J. 2011. The standardized North American marsh bird monitoring protocol. *Waterbirds*, 34(3):319-346. Retrieved from https://bioone.org/journals/waterbirds/volume-34/issue-3/063.034.0307/Standardized-North-American-Marsh-Bird-Monitoring-Protocol/10.1675/063.034.0307.full [Accessed October 2020].

Cornell Lab of Ornithology. 2019. Eastern black rail life history. *All About Birds*. Ithaca, NY. Retrieved from https://www.allaboutbirds.org/guide/Black_Rail/lifehistory [Accessed July 2020]

Daubenmire R. 1959. A canopy-coverage method of vegetational analysis. *Northwest Sci.* 33:43-64. Retrieved from https://www.webpages.uidaho.edu/veg_measure/Modules/Lessons/Module%208(Cover)/Pix&Others/Daubenmire_Exerpts_Sampling_Vegetation(2).pdf [Accessed September 2020].

Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Retrieved from https://www.esri.com/en-us/arcgis/about-arcgis/overview. [Accessed August 2020].

Federal Highway Administration. 2006. *Roadway construction noise model user's guide*. [Accessed September 2020]

National Aeronautics and Space Administration (NASA). 2020. NASA Wallops Flight Facility Marsh Fiber Project Draft Environmental Assessment. Retrieved from https://code200-external.gsfc.nasa.gov/sites/code250wff/files/inline-files/Marsh_Fiber_EA/wffdraftmarshfibereanoappendices.pdf [Accessed October 2020].

NatureServe. n.d. *Atlantic & Gulf Coastal High Salt Marsh*. n.d. Retrieved from https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.837345/Spartina_patens_-_Iva_frutescens_High_Salt_Marsh_Group [Accessed August 2020].

National Oceanic and Atmospheric Administration Tide Alert (NOAA) - USA (2.1). 2019. https://apps.apple.com/us/app/tide-alert-noaa-usa/id1352211125 [Accessed August 2020].

Tiner, Ralph W. 1987. *Field guide to coastal wetland plants of the southeastern United States*. The University of Massachusetts Press:Amherst.

U.S. Fish and Wildlife Service (USFWS). 2018. *Species Status assessment report for the eastern black rail* (*Laterallus jamaicensis jamaicensis*). Version 1.2. Atlanta, Georgia.

USFWS. 2019. *National wetlands inventory*. Retrieved from https://www.fws.gov/wetlands/data/data-download.html [Accessed July 2020].

USFWS. 2020a. Personal communication with E. Argo. July 9, 2020.

USFWS. 2020b. Endangered and Threatened Wildlife and plants; Threatened Species Status for Eastern Black Rail with a Section 4(d) Rule. 85 FR 63764. (final rule October 9, 2020). Retrieved from https://www.govinfo.gov/content/pkg/FR-2020-10-08/pdf/2020-19661.pdf#page=1. [Accessed October 2020].

USFWS. 2020c. *Eastern black rail Laterallus jamaicensis jamaicensis.* Retrieved from https://www.fws.gov/southeast/wildlife/birds/eastern-black-rail/ [Accessed July 2020]

U.S. Geological Survey (USGS). 2020. *USGS water data for the USA*. Retrieved from https://nwis.waterdata.usgs.gov/nwis? [Accessed September 2020].

USGS. 2019. *Chincoteague west quadrangle, Virginia-Accomack County*. Retrieved from https://www.usgs.gov/core-science-systems/national-geospatial-program [Accessed July 2020].

Virginia Institute of Marine Science. n.d. *Field guide to Virginia salt and brackish marsh plants*. Retrieved from https://www.vims.edu/ccrm/outreach/teaching_marsh/native_plants/salt_marsh/index.php [Accessed October 2020].

Watts, B.D. 2016. *Status and distribution of the eastern black rail along the Atlantic and Gulf Coasts of North America*. The Center for Conservation Biology Technical Report Series, CCBTR-16-09. College of William and Mary/Virginia Commonwealth University, Williamsburg, VA. 148 pp. Retrieved from https://scholarworks.wm.edu/cgi/viewcontent.cgi?article=1314&context=ccb_reports [Accessed October 2020].

Appendix A: Figures

AECOM

National Aeronautic Space Administration
Wallops Island Flight Facility
2020

Wallops Pier
Accomack County, VA
Last Date Edited: 9/10/2020
Project Number: 60632314

0 2,500 5,000 Feet

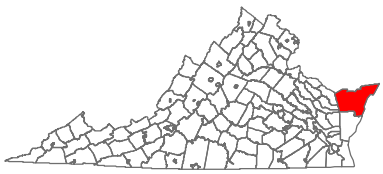
Legend

Study Area

N W E S

Note: This map is for reference only
NAD83 State Plane Virginia North;
Topographic map source: ESRI, 2019

Figure 1
Project Vicinity



Accomack County

AECOM

National Aeronautics and Space Administration
Wallops Flight Facility
2020
Wallops Pier
Accomack County, VA

Last Date Edited: 9/10/2020
Project Number: 60632314

0 500 1,000 Feet

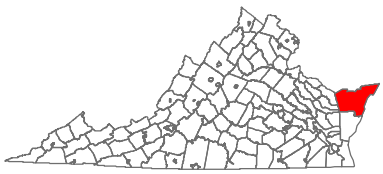
Legend

Study Area

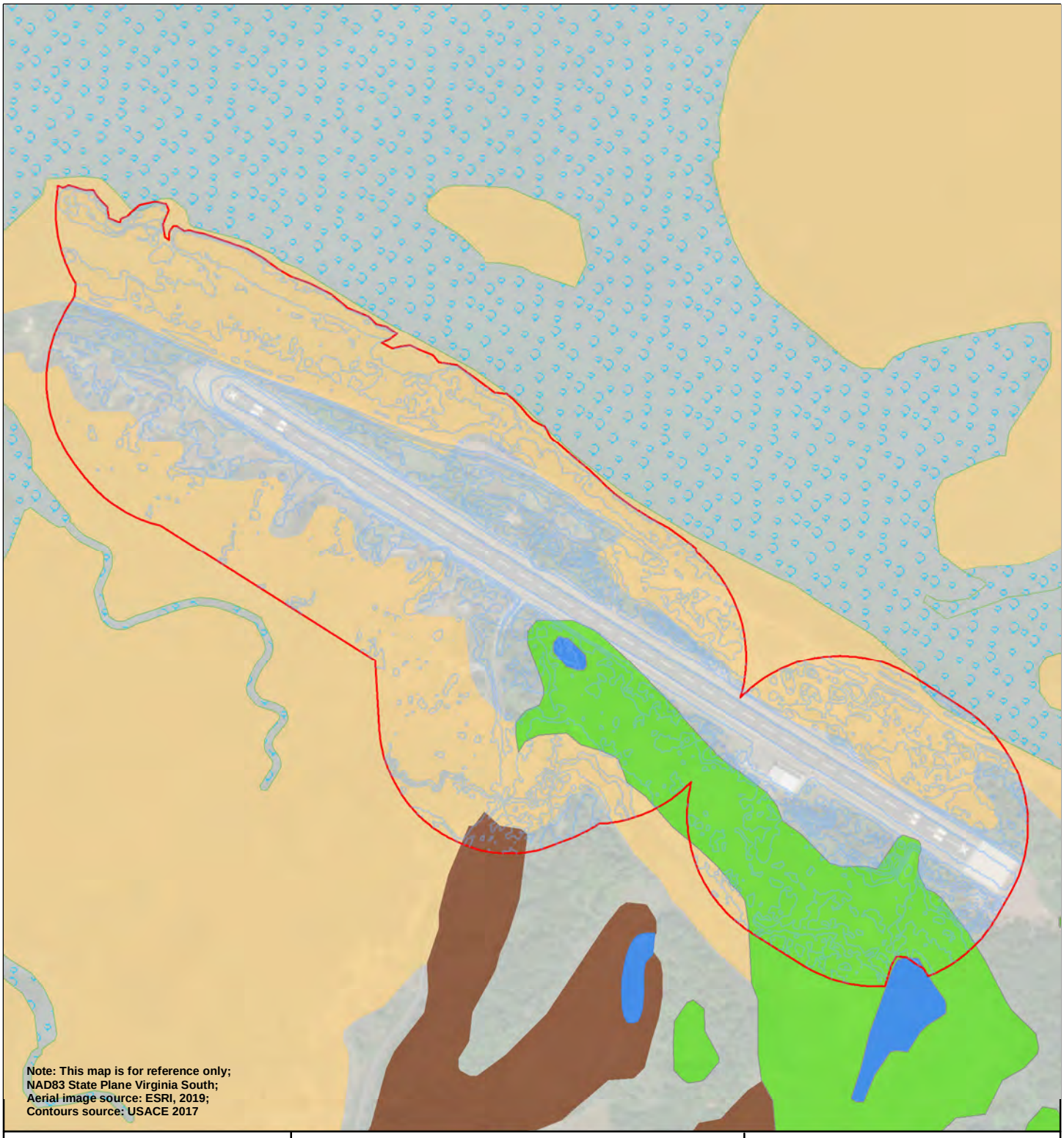
N
W E
S

Notes: This map is for reference only.
NAD83 State Plane Virginia North; Aerial Image Source: ESRI, 2019

Figure 2
Project Location



Accomack County



AECOM

National Aeronautics and Space Administration Wallops Flight Facility 2020

Wallops Pier
Accomack County, VA

Last Date Edited: 10/19/2020
Project Number: 60617789

Legend

0 250 500 Feet

Study Area

Contours, 1ft. (USACE, 2017)

Waters of the US (NWI, 2020)

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

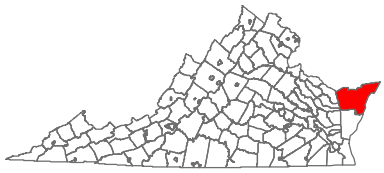
Freshwater Forested/Shrub Wetland

Freshwater Pond

N W E S

Figure 3

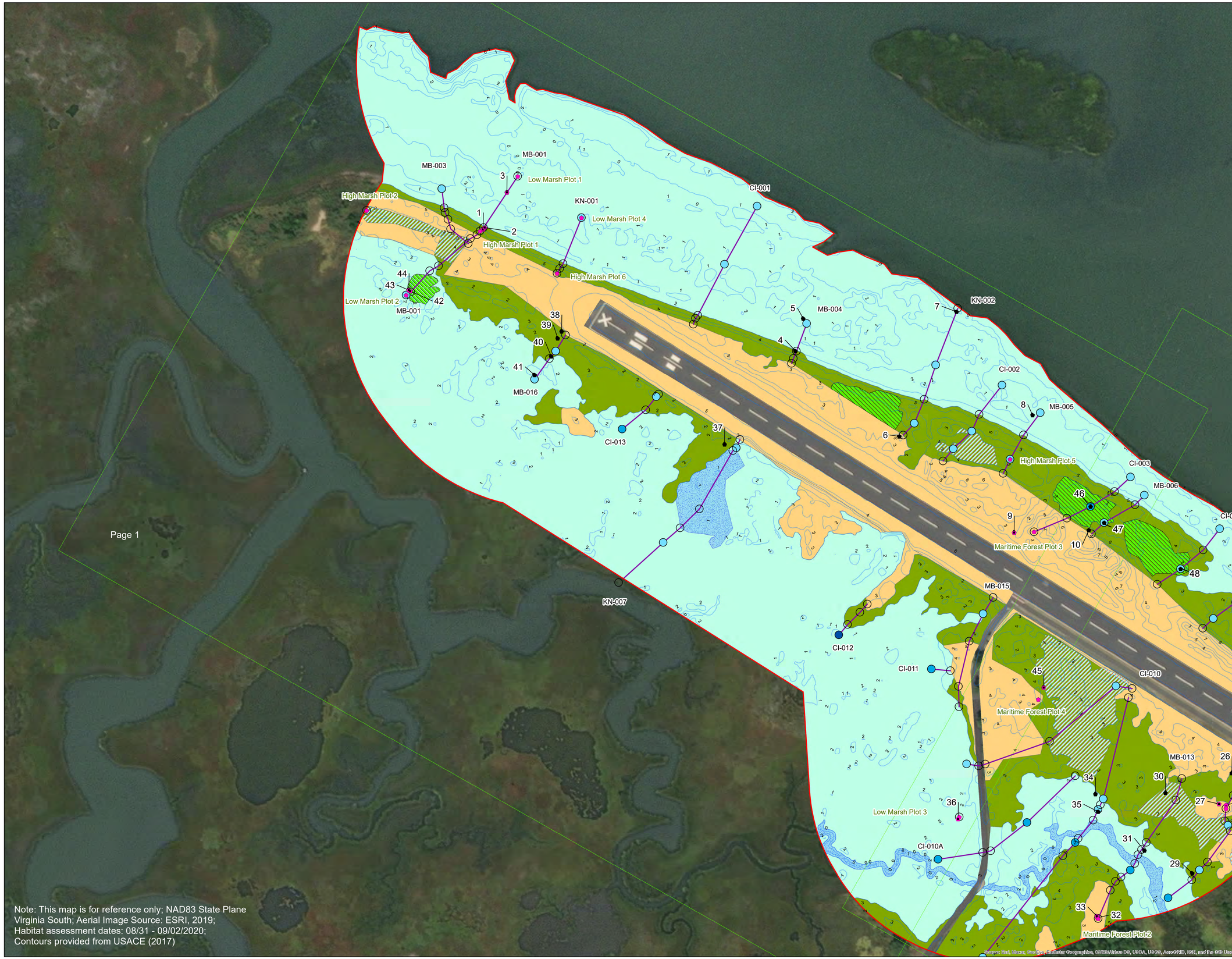
Background Resources Map



Accomack County

Figure 4

Laterallus jamaicensis jamaicenses (Eastern Black Rail) Habitat Map



Note: This map is for reference only; NAD83 State Plane Virginia South; Aerial Image Source: ESRI, 2019; Habitat assessment dates: 08/31 - 09/02/2020; Contours provided from USACE (2017)

Legend

- Study Area
- Upland and Maritime Forest
- High Marsh
- Low Marsh
- Surface Water
- Potential Eastern Black Rail Habitat
- Dense Phragmites australis
- Transect (MB-001)
- Contours, 1ft (USACE, 2017)

Data Points

- Photo Location (36)
- Vegetation Plot (Low Marsh Plot 1)
- Photo Location and Vegetation Plot

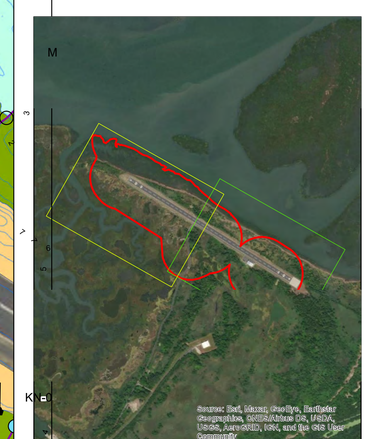
Water Level Class

- 0 (no inundation)
- 1 (ground level to below ankle)
- 2 (ankle to knee)
- 3 (knee to hip)

N

0 200 400

Feet



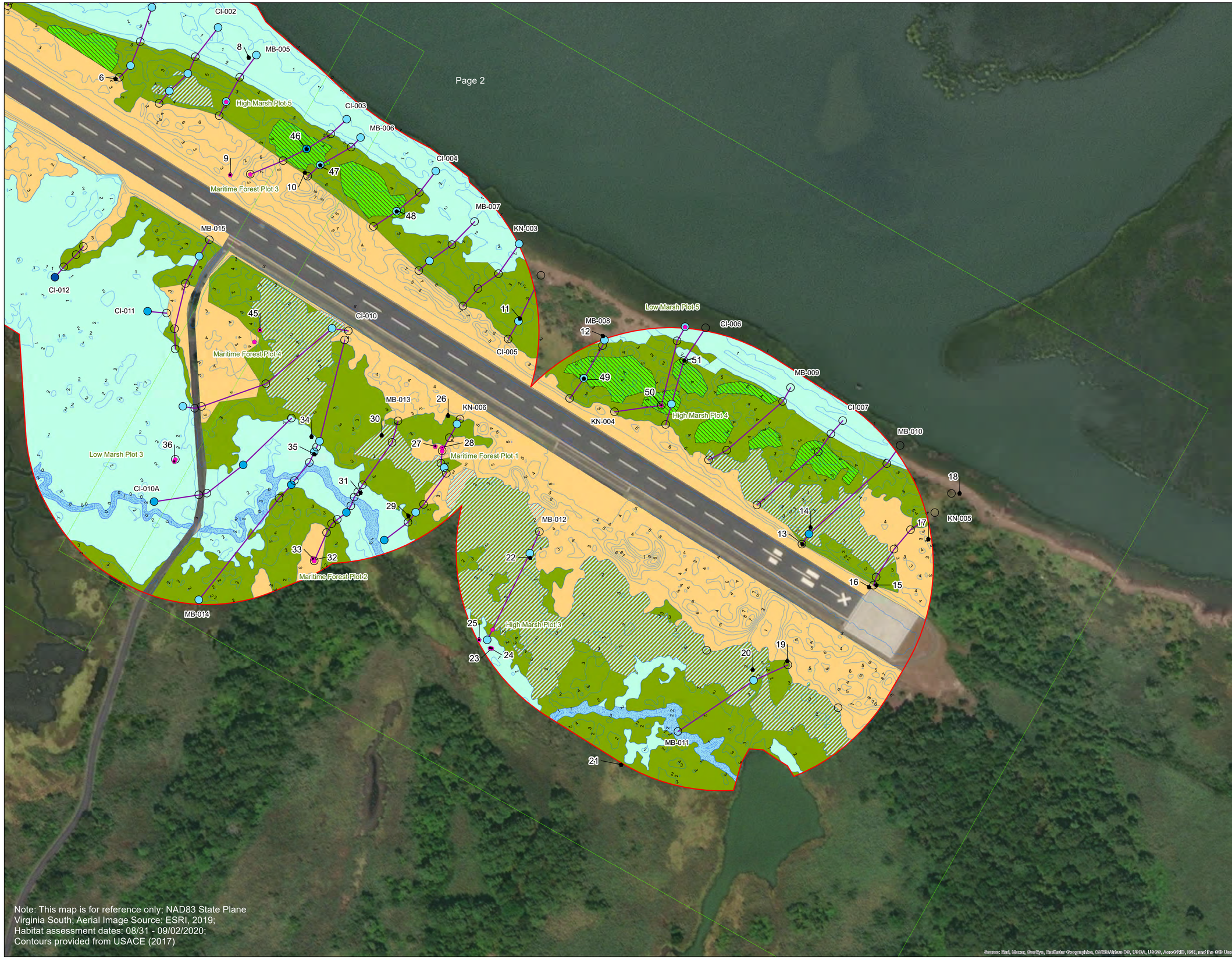
AECOM

National Aeronautics and Space Agency
Wallops Flight Facility
Accomack Co., Virginia

Date: 11/12/2020

Figure 4

Laterallus jamaicensis jamaicenses (Eastern Black Rail) Habitat Map



Note: This map is for reference only; NAD83 State Plane Virginia South; Aerial Image Source: ESRI, 2019; Habitat assessment dates: 08/31 - 09/02/2020; Contours provided from USACE (2017)

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Date: 11/12/2020

Legend

- Study Area
- Upland and Maritime Forest
- High Marsh
- Low Marsh
- Surface Water
- Potential Eastern Black Rail Habitat
- Dense Phragmites australis
- Transect (MB-001)
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N

0 200 400
Feet

AECOM

National Aeronautics and Space Agency
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Accomack Co., Virginia

Appendix B:
Representative Photographs

Photo Type: Typical Vegetation	
Photo ID: 1	**Photo Date:** 8/31/2020
Water Level Class: 0	**Transect:** MB-001
Vegetation Plot: High Marsh Plot 1	
Lat/Long: 37.888191,-75.442321	
Description: Another view of the narrow vegetation coverage with an increase of high scrub (*B. halimifolia, I. frutescens*) densities. The vegetation continues to the western tip of the island and changes to a mono-culture of high density Phragmites.	

Photo Type: Typical Vegetation	
Photo ID: 2	**Photo Date:** 8/31/2020
Water Level Class: 0	**Transect:** MB-001
Vegetation Plot: High Marsh Plot 1	
Lat/Long: 37.888202,-75.442308	
Description: A narrow strip of high marsh vegetation in transect MB-001 between low marsh and maritime forest or scrub-shrub communi-ties.	

Photo Type: Vegetation Plot	
Photo ID: 3	**Photo Date:** 8/31/2020
Water Level Class: 0	**Transect:** MB-001
Vegetaation Plot: Low Marsh Plot 1	
Lat/Long: 37.888422,-75.442121	
Description: Monoculture of *Spartina alterniflora* in the low marsh along the northwestern tip of the island. Not suitable habitat due to increase of water levels above 6 cm deep and lack of high stem densities and dense canopy cover.	

Photo Type: Typical Water Level	
Photo ID: 4	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** MB-004
Vegetation Plot: N/A	
Lat/Long: 37.887351,-75.439841	
Description: The high tide rack line was prevalent along the southern edge of the island indicating that area experiences large tidal influences.	

Photo Type: Typical Water Level	
Photo ID: 5	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-004
Vegetation Plot: N/A	
Lat/Long: 37.887556,-75.439770	
Description: During low tide the low marsh along the northern shore line had a water level below 3 cm.	

Photo Type: Typical Vegetation	
Photo ID: 6	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** KN-002
Vegetation Plot: N/A	
Lat/Long: 37.886786,-75.439027	
Description: This high marsh habitat in transect KN-002 exhibits dense vegetation with water lev-els at or above 3 cm during low tide. This would potentially be suitable habitat if water levels were below 3 cm during high tide for successful nesting habitat.	

Photo Type: Ecotone	
Photo ID: 7	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** KN-002
Vegetation Plot: N/A	
Lat/Long: 37.887569,-75.438536	
Description: Open water on the northern boundary of the study area in transect KN-002.	

Photo Type: Typical Vegetation	
Photo ID: 8	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-005
Vegetation Plot: N/A	
Lat/Long: 37.886893,-75.437950	
Description: The low marsh in transect MB-005 was typified with *Spartina alterniflora* at the density shown.	

Photo Type: Typical Vegetation	
Photo ID: 9	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** CI-003
Vegetation Plot: Maritime Forest Plot 3	
Lat/Long: 37.886150,-75.438130	
Description: Upland vegetation in the maritime forest lack groundcover vegetation density. The vegetation coverage does not provide enough protection from predators and provide shelter from the elements.	

Photo Type: Ecotone	
Photo ID: 10	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** MB-006
Vegetation Plot: N/A	
Lat/Long: 37.886150,-75.437529	
Description: This maritime forest to high marsh eco-tone provides unsuitable habitat due to dense woody vine vegetation coverage. This does not provide adequate escape route and mobility from ground dwelling predators.	

Photo Type: Typical Water Level	
Photo ID: 11	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** CI-005
Vegetation Plot: N/A	
Lat/Long: 37.885174,-75.435838	
Description: This unsuitable high marsh habitat displayed water level above 6 cm during low tide. It was surrounded with a dense shrub ecotone to the low marsh.	

Photo Type: Typical Water Level	
Photo ID: 12	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-008
Vegetation Plot: N/A	
Lat/Long: 37.885046,-75.435175	
Description: This high tide rack line was observed on the northern bank of the island across from the existing hanger. This high tide rack was observed transecting into the high marsh and depositing into pockets in various locations. The topographic change that allows hightidal influences along this portion of the island contributes to the dense phragmites pockets with high water levels. Resulting in poor and unsuit-able habitat for nesting. This also indicates that this side of the island experiences high tide surges during storm events.	

Photo Type: Typical Vegetation	
Photo ID: 13	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** MB-010
Vegetation Plot: N/A	
Lat/Long: 37.883676,-75.433623	
Description: This high marsh area displayed unsuitable habitat due to the dense monoculture of *P. australis* with plenty of canopy cover-age. In addition, this low-lying pocket had a water level between 10 –38 cm during low tide.	

Photo Type: Typical Water Level	
Photo ID: 14	**Photo Date:** 9/1/2020
Water Level Class: 2	**Transect:** MB-010
Vegetation Plot: N/A	
Lat/Long: 37.883782,-75.433554	
Description: This area of high marsh had unsuitable habitat due to the thick vegetation of *P. australis* and undulated with water levels above 6 cm during low tide. This would not allow adequate mobility and successful nesting conditions.	

Photo Type: Typical Vegetation	
Photo ID: 15	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** KN-005
Vegetation Plot: N/A	
Lat/Long: 37.883402,-75.433041	
Description: This high marsh habitat exhibits dense vegetation with water levels at or above 3 cm during low tide. This would potentially be suitable habitat if water levels were below 3 cm during high tide for successful nesting habitat.	

Photo Type: Dense Phragmites Sites	
Photo ID: 16	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** KN-005
Vegetation Plot: N/A	
Lat/Long: 37.883391,-75.433099	
Description: High density areas of *P. australis* on the edge of the runway in transect KN-005.	

Photo Type: Ecotone	
Photo ID: 17	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** KN-005
Vegetation Plot: N/A	
Lat/Long: 37.883683,-75.432611	
Description: This high tide rack line was observed on the northern bank of the island across from the existing hanger. This high tide rack was observed transecting into the high marsh and depositing into pockets in various locations. The topographic change that allows high tidal influences along this portion of the island contributes to the dense phragmites pockets with high water levels. Resulting in poor and unsuit-able habitat for nesting. This also indicates that this side of the island experiences high tide surges during storm events.	

Photo Type: Dense Phragmites Site	
Photo ID: 18	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** KN-005
Vegetation Plot: N/A	
Lat/Long: 37.883969,-75.432347	
Description: High density area of *P. australis* in transect KN-005. Area not suitable for Eastern Black Rail habitat due to area not being adequate for escape routes from predators.	

Photo Type: Ecotone	
Photo ID: 19	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** MB-011
Vegetation Plot: N/A	
Lat/Long: 37.882935,-75.433777	
Description: This maritime forest to high marsh ecotone provides unsuitable habitat due to dense woody vine vegetation coverage. This does not provide adequate escape route and mobility from ground dwelling predators.	

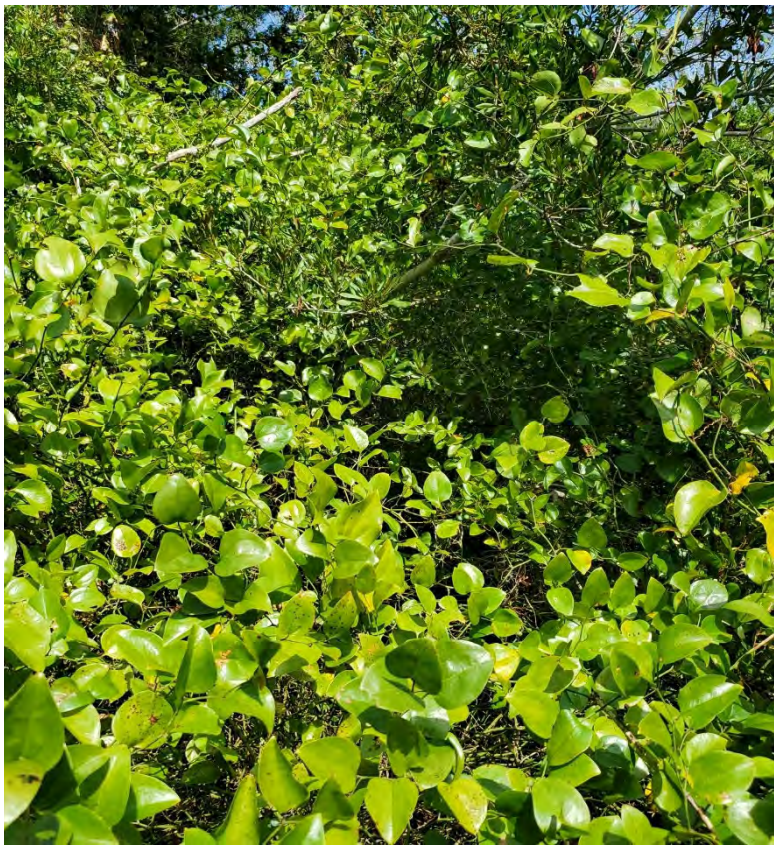

Photo Type: Typical Water Level	
Photo ID: 20	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-011
Vegetation Plot: N/A	
Lat/Long: 37.882888,-75.434057	
Description: Another high marsh area that displayed high water levels above 6 cm during low tide times, which is unsuitable for nesting habitat. This area is located behind the proposed parking area.	

Photo Type: Typical Vegetation	
Photo ID: 21	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-011
Vegetation Plot: N/A	
Lat/Long: 37.882309,-75.435140	
Description: High marsh habitat in transect MB-011 that is not Eastern Black Rail habitat due to the vegetation coverage not being fine-stemmed emergent vegetation.	

Photo Type: Typical Water Level	
Photo ID: 22	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-012
Vegetation Plot: N/A	
Lat/Long: 37.883647,-75.435818	
Description: High marsh habitat with dense *P. australis* and a surface water level too high for Eastern Black Rail habitat in transect MB-012.	

Photo Type: Vegetation Plot	
Photo ID: 23	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-012
Vegetation Plot: High Marsh Plot 3	
Lat/Long: 37.883078,-75.436150	
Description: This is a view of the southern portion of the study area in High Marsh Plot 3 looking toward North Seawall Road. This area was not suitable habitat due to the high water level greater than 6cm. This photo was taken at low tide where water levels reach above 76 cm.	

Photo Type: Vegetation Plot	
Photo ID: 24	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-012
Vegetation Plot: High Marsh Plot 3	
Lat/Long: 37.883080,-75.436163	
Description: View of High Marsh Plot 3 inundated with open water and densely vegetated with *P. austra-lis* along the southeastern side of the study area behind the existing hangar.	

Photo Type: Vegetation Plot	
Photo ID: 25	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-012
Vegetation Plot: High Marsh Plot 3	
Lat/Long: 37.883135,-75.436250	
Description: High Marsh Plot 3 was densely covered with salt marsh hay; however, only small sporadic vegetation mounds amongst the open water impoundments were available for nesting. This was unsuitable habitat due to minimum areas of low water levels below 3 cm to allow chicks to forage with-out becoming waterlogged during swim attempts.	

Photo Type: Typical Vegetation	
Photo ID: 26	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** KN-006
Vegetation Plot: N/A	
Lat/Long: 37.884572,-75.436441	
Description: The transition area from high marsh to low marsh with vegetation density being too high for Eastern Black Rail to maneu-ver in transect KN-005.	

Photo Type: Vegetation Plot	
Photo ID: 27	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** KN-006
Vegetation Plot: Maritime Forest Plot 1	
Lat/Long: 37.884377,-75.436552	
Description: Upland maritime forested area in Maritime Forest Plot 1 located adjacent to the hanger showing lack of ground level vegetation coverage.	

Photo Type: Vegetation Plot	
Photo ID: 28	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** KN-006
Vegetation Plot: Maritime Forest Plot 1	
Lat/Long: 37.884369,-75.436497	
Description: A photo of the Maritime Forest Plot 1 de-picted in Photo 27.	

Photo Type: Typical Vegetation	
Photo ID: 29	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** KN-006
Vegetation Plot: N/A	
Lat/Long: 37.883941,-75.436786	
Description: An upland to high marsh transition in transect KN-006 with a high density of *P. australis* excluding this area as potential habitat for Eastern Black Rail.	

Photo Type: Typical Vegetation	
Photo ID: 30	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** MB-013
Vegetation Plot: N/A	
Lat/Long: 37.884458,-75.436980	
Description: High marsh habitat that consisted of *P. australis* cover too dense for Eastern Black Rail habitat in the south central portion of the study area in transect MB-013.	

Photo Type: Typical Water Level	
Photo ID: 31	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** MB-013
Vegetation Plot: N/A	
Lat/Long: 37.884096,-75.437165	
Description: An example of low marsh habitat with water levels too high for Eastern Black Rail habitat in the south central portion of the study area in transect MB-013.	

Photo Type: Vegetation Plots	
Photo ID: 32	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** MB-013
Vegetation Plot: Maritime Forest Plot 2	
Lat/Long: 37.883677,-75.437560	
Description: A photo of typical vegetation in Maritime Forest Plot 2.	

Photo Type: Vegetation Plot	
Photo ID: 33	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** MB-013
Vegetation Plot: Maritime Forest Plot 2	
Lat/Long: 37.883687,-75.437565	
Description: Upland maritime forest vegetation coverage conditions at Maritime Forest Plot 2.	

Photo Type: Typical Water Level	
Photo ID: 34	**Photo Date:** 9/2/2020
Water Level Class: 1	**Transect:** MB-014
Vegetation Plot: N/A	
Lat/Long: 37.884465,-75.437545	
Description: High marsh habitat during low tide in transect MB-014. Water level not ideal for Eastern Black Rail habitat.	

Photo Type: Typical Water Level	
Photo ID: 35	**Photo Date:** 9/2/2020
Water Level Class: 1	**Transect:** MB-014
Vegetation Plot: N/A	
Lat/Long: 37.884352,-75.437526	
Description: Low marsh with water levels too high for Eastern Black Rail habitat in the south-west section of the study area in transect MB-014.	

Photo Type: Vegetation Plot	
Photo ID: 36	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** N/A
Vegetation Plot: Low Marsh Plot 3	
Lat/Long: 37.884336,-75.438655	
Description: This area at Low Marsh Plot 3 showed areas of impounded water during low tide. In addition, the lack of canopy cov-erage with little to no high marsh habitat along its border along North Seawall Road.	

Photo Type: Ecotone	
Photo ID: 37	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** KN-007
Vegetation Plot: N/A	
Lat/Long: 37.886772,-75.440436	
Description: Open water within the low marsh of tran-sect KN-007 in the southwestern portion of the study area.	

Photo Type: Typical Vegetation	
Photo ID: 38	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** MB-016
Vegetation Plot: N/A	
Lat/Long: 37.887524,-75.441717	
Description: Maintained uplands on the northwestern edge of the runway at transect MB-013.	

Photo Type: Typical Water Level	
Photo ID: 39	**Photo Date:** 9/2/2020
Water Level Class: 1	**Transect:** MB-016
Vegetation Plot: N/A	
Lat/Long: 37.887482,-75.441750	
Description: High marsh habitat in transect MB-016 with stem density too low and water level too high for Eastern Black Rail habitat.	

Photo Type: Ecotone	
Photo ID: 40	**Photo Date:** 9/2/2020
Water Level Class: 0	**Transect:** MB-016
Vegetation Plot: N/A	
Lat/Long: 37.887368,-75.441808	
Description: The transition from high marsh to low marsh in transect MB-016 of the south-west portion of the study area.	

Photo Type: Typical Water Level	
Photo ID: 41	**Photo Date:** 9/2/2020
Water Level Class: 1	**Transect:** MB-016
Vegetation Plot: N/A	
Lat/Long: 37.88725,-75.441945	
Description: Low marsh habitat in transect MB-016 with sparse vegetation density and water levels too high for Eastern Black Rail habitat.	

Photo Type: Vegetation Plot	
Photo ID: 42	**Photo Date:** 8/31/2020
Water Level Class: 1	**Transect:** MB-001
Vegetation Plot: Low Marsh Plot 2	
Lat/Long: 37.887813,-75.442925	
Description: The low marsh water level on the southwestern side of the island during low tide was 1 to 7 cm. There were areas of open water that remain impounded at low tide in Low Marsh Plot 2.	

Photo Type: Vegetation Plot	
Photo ID: 43	**Photo Date:** 8/31/2020
Water Level Class: 1	**Transect:** MB-001
Vegetation Plot: Low Marsh Plot 2	
Lat/Long: 37.887819,-75.442935	
Description: There was a small area, approximately 0.10 acre, that had a patch of *Juncus roemerianus* that appeared to be suitable habitat. This was the only location of this species found on the island. Due to the lack in acreage and low canopy coverage, it should be considered only marginal habitat.	

Photo Type: Vegetation Plot	
Photo ID: 44	**Photo Date:** 8/31/2020
Water Level Class: 1	**Transect:** MB-001
Vegetation Plot: Low Marsh Plot 2	
Lat/Long: 37.887819,-75.442935	
Description: View of the southeastern portion of the *J. roemerianus* vegetation in Low Marsh Plot 2, looking along the southern edge of the runway toward North Seawall Road.	

Photo Type: Vegetation Plot	
Photo ID: 45	**Photo Date:** 8/31/2020
Water Level Class: 0	**Transect:** N/A
Vegetation Plot: High Marsh Plot 2	
Lat/Long: 37.885155,-75.437932	
Description: High density areas of *P. australis* on the edge of the runway in High Marsh Plot 2.	

Photo Type: Typical Vegetation	
Photo ID: 46	**Photo Date:** 9/1/2020
Water Level Class: 2	**Transect:** CI-003
Vegetation Plot: N/A	
Lat/Long: 37.886244,-75.437688	
Description: An example of potential Eastern Black Rail Habitat in transect CI-003 on the northern portion of the study area. Dense fine-stemmed herbaceous vegetation with some canopy coverage is present.	

Photo Type: Typical Vegetation	
Photo ID: 47	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-006
Vegetation Plot: N/A	
Lat/Long: 37.886159,-75.437505	
Description: An example of potential Eastern Black Rail Habitat in transect MB-006 on the north-ern portion of the study area. Dense fine-stemmed herbaceous vegetation with some canopy coverage is present.	

Photo Type: Typical Vegetation	
Photo ID: 48	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** CI-004
Vegetation Plot: N/A	
Lat/Long: 37.885766,-75.436977	
Description: An example of potential Eastern Black Rail Habitat in transect CI-004 on the northern portion of the study area. Dense fine-stemmed herbaceous vegetation with some canopy coverage is present.	

Photo Type: Typical Vegetation	
Photo ID: 49	**Photo Date:** 9/1/2020
Water Level Class: 1	**Transect:** MB-008
Vegetation Plot: N/A	
Lat/Long: 37.884875,-75.435379	
Description: An example of potential Eastern Black Rail Habitat in transect MB-008 on the northern portion of the study area. Dense fine-stemmed herbaceous vegetation with some canopy coverage is present.	

Photo Type: Vegetation Plot	
Photo ID: 50	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** KN-004
Vegetation Plot: High Marsh Plot 4	
Lat/Long: 37.884436,-75.434794	
Description: An example of potential Eastern Black Rail Habitat in transect KN-004 on the northern portion of the study area. Dense fine-stemmed herbaceous vegetation with some canopy coverage is present.	

Photo Type: Typical Vegetation	
Photo ID: 51	**Photo Date:** 9/1/2020
Water Level Class: 0	**Transect:** CI-006
Vegetation Plot: N/A	
Lat/Long: 37.884908,-75.434516	
Description: An example of potential Eastern Black Rail Habitat in transect CI-006 on the northern portion of the study area. Dense fine-stemmed herbaceous vegetation with some canopy coverage is present.