FINAL

ENVIRONMENTAL ASSESSMENT

RECONFIGURATION OF THE WALLOPS FLIGHT FACILITY MAIN ENTRANCE

Prepared for

National Aeronautics and Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337

July 2011

Prepared by

URS

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
WALLOPS FLIGHT FACILITY
WALLOPS ISLAND, VIRGINIA 23337

Lead Agency:	National Aeronautics and Space Administration
Proposed Action:	Wallops Flight Facility Main Entrance Reconfiguration
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Date:	July 2011

ABSTRACT

This Environmental Assessment (EA) addresses the proposed reconfiguration of the main entrance to the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center's (GSFC's) Wallops Flight Facility (WFF), located in Accomack County on the Eastern Shore of Virginia. Under the Proposed Action, NASA would reconfigure the main entrance to the WFF to alleviate safety concerns created by the current layout. The proposal includes construction of a badge office and accompanying parking area, truck inspection area, security personnel parking area, guard house and canopy, a traffic roundabout, and a shipping and receiving facility.

This EA analyzes the potential environmental consequences of reconfiguring the main entrance to WFF under the No Action alternative (i.e., *status quo*) and two Action Alternatives. This assessment evaluates land use; soils; surface water; coastal zone; stormwater; air quality; climate change; noise; hazardous materials and hazardous waste; vegetation; terrestrial wildlife and migratory birds; health and safety; transportation; cultural resources; and environmental justice.

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Acronym List

ACAM	Air Conformity Applicability Model
AFCEE	Air Force Center for Environmental Excellence
amsl	above mean sea level
AST	Aboveground Storage Tank
BMP	Best Management Practice
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	Methane
CMA	Coastal Management Area
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
CRA	Cultural Resources Assessment
CWA	Clean Water Act
CY	Calendar Year
CZM	Coastal Zone Management
dB	decibel
dBA	decibel weighted to the A-scale
DCR	Department of Conservation and Recreation
DHR ID#	Department of Historic Resources Identification Number
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJIP	Environmental Justice Implementation Plan
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
ERD	Environmental Resources Document
FHWA	Federal Highway Administration
FMB	Facilities Management Branch
FONSI	Finding of No Significant Impact
ft^2	square feet
GHG	Greenhouse Gas
GOV	Government Owned Vehicle

GSFC	Goddard Space Flight Center
GWP	Global Warming Potential
HAP	Hazardous Air Pollutant
ICP	Integrated Contingency Plan
kph	kilometers per hour
L_{eq}	Equivalent Sound Level
$L_{eq}(h)$	Hourly value of L_{eq}
LID	Low Impact Development
m^2	square meters
MBTA	Migratory Bird Treaty Act
MD	Maryland
mph	miles per hour
MSC	Marine Science Consortium
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NH_3	Ammonia
NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic Safety Administration
NO_2	Nitrogen Dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NO_X	Nitrous Oxides
NPDES	National Pollutant Discharge Elimination System
NPR	NASA Procedural Requirement
NRHP	National Registry of Historic Places
O_3	Ozone
OSHA	Occupational Safety and Health Administration
Pb	Lead
PM_{10}	Particulate Matter less than 10 microns in diameter
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter
POV	Personally Owned Vehicle

ppm	parts per million
PSD	Protected Services Division
PTE	Potential to Emit
RAC	Risk Assessment Code
RCNM	Roadway Construction Noise Model
RCRA	Resource Conservation and Recovery Act
SCS	Soil Conservation Service
SO_2	Sulfur Dioxide
SWPPP	Stormwater Pollution Prevention Plan
TNM	Traffic Noise Model
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VA	Virginia
VAC	Virginia Administrative Code
VCI	Virginia Council on Indians
VDEQ	Virginia Department of Environmental Quality
VDOT	Virginia Department of Transportation
VMRC	Virginia Marine Resources Commission
VOC	Volatile Organic Compound
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program
WFF	Wallops Flight Facility
WINWR	Wallops Island National Wildlife Refuge
WRP	Wallops Research Park
WSDOT	Washington State Department of Transportation

1 Mission, Purpose and Need, Background Information

The National Aeronautics and Space Administration (NASA) has prepared this Environmental Assessment (EA) to define, evaluate, and assess the potential environmental impacts of improvements to the main entrance to Wallops Flight Facility (WFF). In recent years there has been a marked increase in the amount of vehicular traffic around the main entrance to WFF. The resultant increased congestion has made an already unsafe condition worse for pedestrians and vehicles in this area. WFF proposes to reconfigure the main entrance to increase personnel safety by decreasing congestion.

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA), as amended (Title 42 of the United States Code (U.S.C.) 4321–4347), the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500–1508), NASA's regulations for implementing NEPA (14 CFR Subpart 1216.3), and the *NASA Procedural Requirement (NPR) for Implementing NEPA and Executive Order (EO) 12114* (NPR 8580.1). NEPA requires the preparation of an EA for Federal actions that do not qualify for a Categorical Exclusion and may not require an Environmental Impact Statement (EIS).

In 2005, NASA prepared a Site-wide Environmental Assessment (Site-wide EA), which provides a framework to evaluate typical recurring and reasonably foreseeable future actions undertaken by NASA and its partners at WFF.[1] The Proposed Action for the Site-wide EA was to continue existing WFF operations, expand operations, and improve facilities. Early in its planning stages, the proposed Main Entrance Reconfiguration Project was compared to the Site-wide EA and found to be outside the actions addressed by that document. Therefore, NASA is preparing this EA to analyze the potential environmental effects from the proposal. If this EA determines that the environmental effects of the Proposed Action are not significant, a Finding of No Significant Impact (FONSI) will be issued. Otherwise, a Notice of Intent to prepare an EIS will be published.

This EA will be reviewed for adequacy if major changes to the Proposed Action are under consideration or substantial changes to the environmental conditions occur. As such, the document may be supplemented in the future to assess new proposals or to address changes in existing conditions, impacts, and mitigation measures.

[1] The Site-wide EA can be accessed at (http://sites.wff.nasa.gov/code250/docs/Final Site-Wide EA.pdf).

1.1 Wallops Flight Facility

1.1.1 Mission

During its early history, the mission of the NASA Goddard Space Flight Center's (GSFC's) WFF was primarily to serve as a test site for aerospace technology experiments. Over the last several decades, the WFF mission has evolved toward a focus of supporting scientific research through carrier systems (i.e., airplanes, balloons, rockets, and uninhabited aerial systems) and mission services.

Although NASA is the land owner at WFF, WFF supports multiple NASA tenants and partners, including the U.S. Navy, U.S. Coast Guard, Marine Science Consortium (MSC), Mid-Atlantic Regional Spaceport, and the National Oceanic and Atmospheric Administration (NOAA). Each tenant partially relies on NASA for institutional and programmatic services, but also has its own missions. WFF is a national resource with the facilities, personnel, core competencies, and low cost of operations to provide world-class, end-to-end services for small- to medium-sized missions. It is a fully capable launch range for rockets and balloons, and is also a research airport. In addition, Wallops personnel provide mobile range capabilities, range instrumentation engineering, range safety, flight hardware engineering, and mission operations support (NASA, 2010a).

1.1.2 Environmental Management System

NASA is committed to carrying out its research and projects at WFF in an environmentally sustainable manner. The Wallops Environmental Office (Code 250) ensures that the facility obtains the appropriate environmental permits, prepares documentation for compliance with NEPA and other environmental regulations and EOs, conducts employee and supervisor training, and implements the facility's Environmental Management System (EMS). WFF's EMS is a coherent, integrated approach to environmental management. WFF manages environmental risks through the application of the WFF EMS, which covers such topics as pollution prevention, energy and water management, maintenance of natural (green) infrastructure, and sustainable building practices (NASA, 2010a).

1.1.3 Site Location

WFF is located in the northeastern portion of Accomack County, Virginia, on the Delmarva Peninsula, and is comprised of three separate land masses; the Main Base, Wallops Mainland, and Wallops Island (Figure 1-1). The "main entrance" referred to in this document is located on the Main Base which is positioned off Virginia Route 175, approximately 3.2 kilometers (2 miles) east of U.S. Route 13 and is comprised of approximately 780 hectares (1,930 acres). It is bordered on the east by extensive marshland and creeks which lead into Chincoteague Bay and Chincoteague Inlet; on the north and west by Little Mosquito Creek, an estuarine area; and on the south and southeast by State Routes 175 and 798, respectively. Wallops Mainland and Wallops Island, located approximately 11 kilometers (7 miles) south of the Main Base, are

connected to each other via a causeway. There is an officer-manned gate located on Wallops Mainland where truck and vehicle inspections as well as badge checks occur before personnel can proceed onto either landmass (Mainland or Island). Wallops Mainland and Wallops Island will not be discussed further in this EA since the Proposed Action only affects areas on and near the Main Base property.

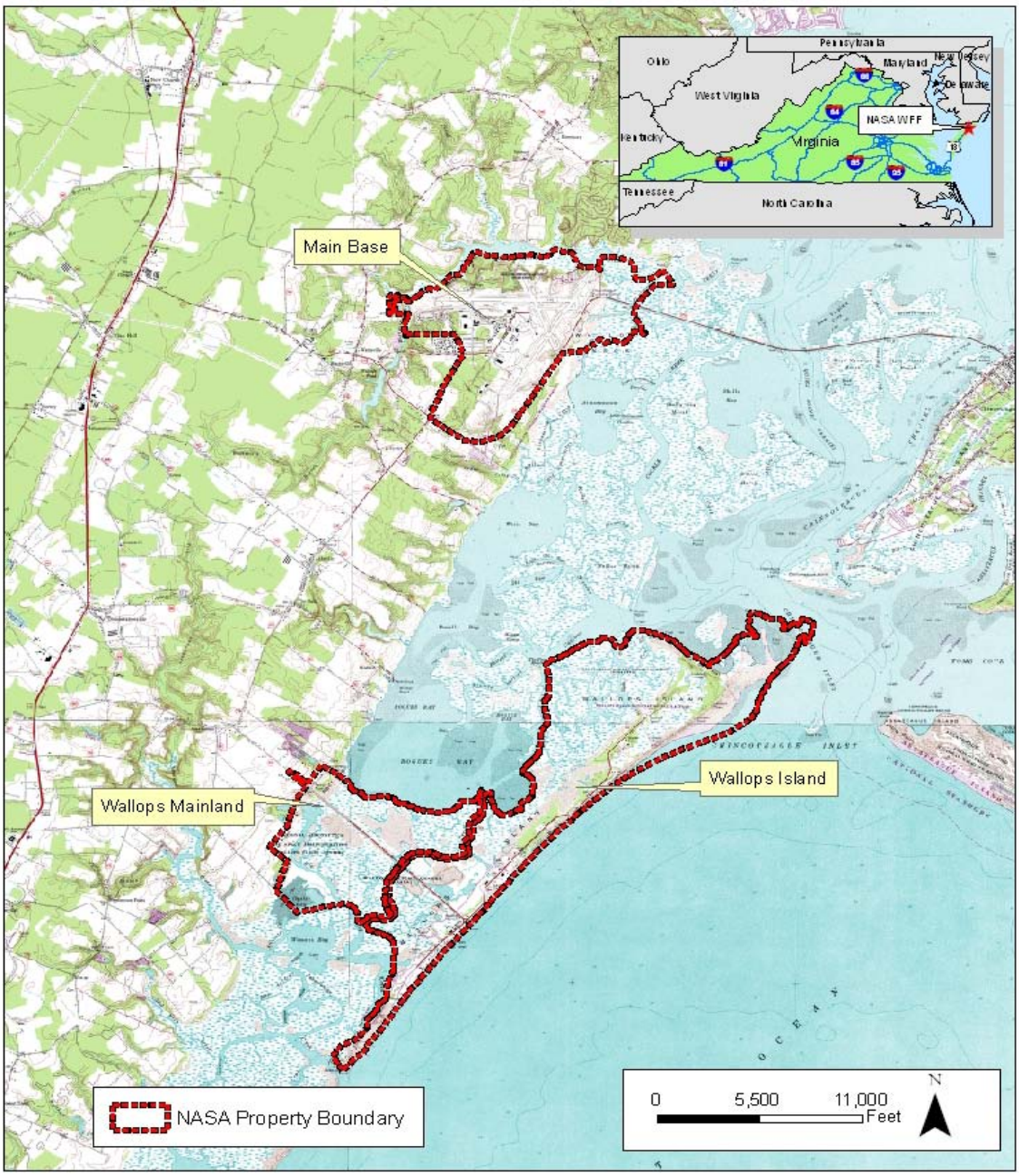


Figure 1-1: WFF landmasses

1.2 Background

1.2.1 Wallops Flight Facility Main Entrance

The entrance located at the Main Base is referred to as the "main entrance" to WFF because all visitors and new hires must first go to the badge office located at the main entrance to be issued a badge prior to accessing any of WFF's three landmasses. The main entrance into WFF consists of a single inbound traffic lane and a single outbound traffic lane, a guard house (Building N-126), a vehicle inspection lane, a badge office (Building N-127), two truck inspection lanes, and employee and badge office parking lots (Figure 1-2). The guard house is 41 square meters (m^2) (446 square feet [ft^2]) and the badge office is 247 m^2 (2,662 ft^2). The badge office parking lot has 16 regular spaces and 2 handicapped spaces and the security personnel parking lot has 14 spaces and no handicapped spaces. The entire main entrance footprint encompasses approximately 0.6 hectares (1.5 acres).

1.2.1.1 Badge Issuance

The badge office issues 600 to 1,000 temporary badges per week. Approximately 80% of temporarily badged visitors travel directly to Wallops Island from the badge office (the gate located on Wallops Mainland cannot issue visitor badges).

1.2.1.2 Hours of Operation

The main entrance is manned by security officers 24 hours a day, 365 days a year. Normal operating hours are between 6:00 a.m. and 6:00 p.m. Outside of this timeframe, only permanently badged employees are allowed on base after signing in with security officers. No visitors or deliveries are allowed on base after hours. Exceptions are made if visitors are already badged and are escorted by a permanently badged employee. Also, large cargo deliveries (i.e. rocket motors, scientific payloads) can be pre-scheduled to deliver after hours in specialized circumstances.

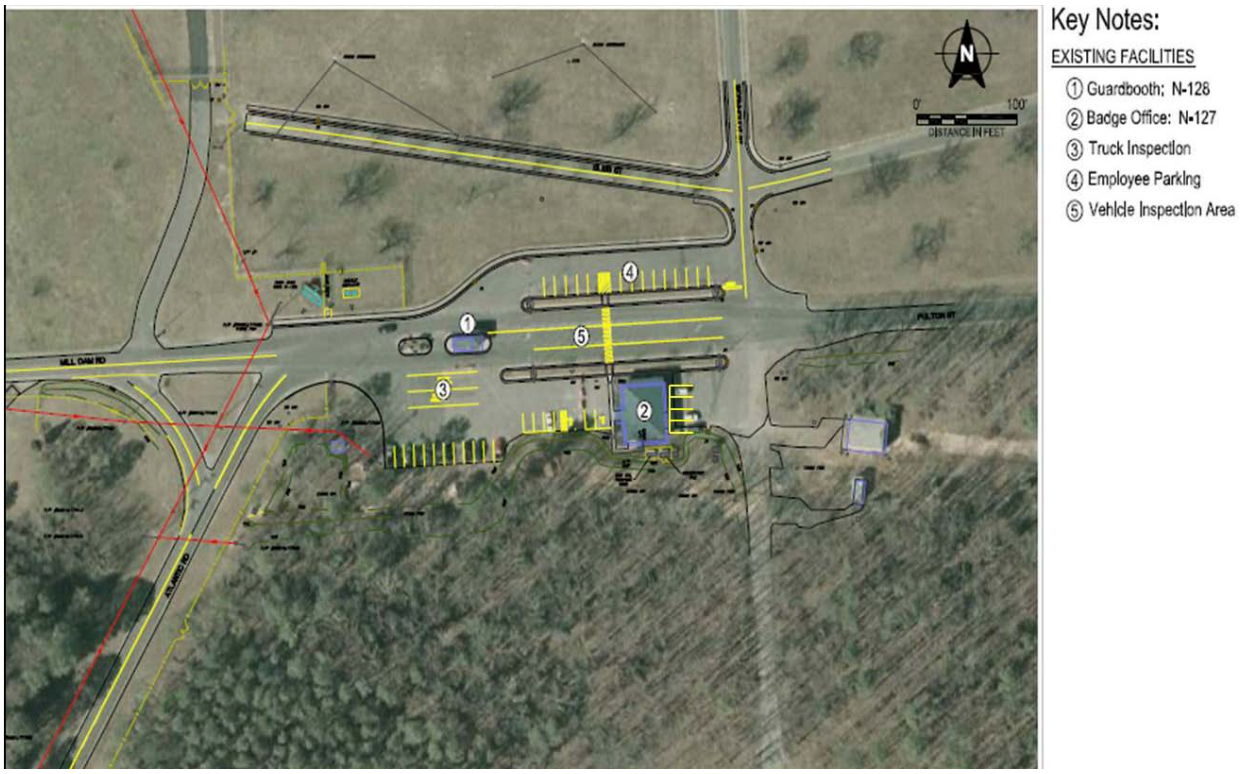


Figure 1-2: WFF main entrance existing conditions

1.3 Purpose and Need for the Proposed Action

1.3.1 Purpose

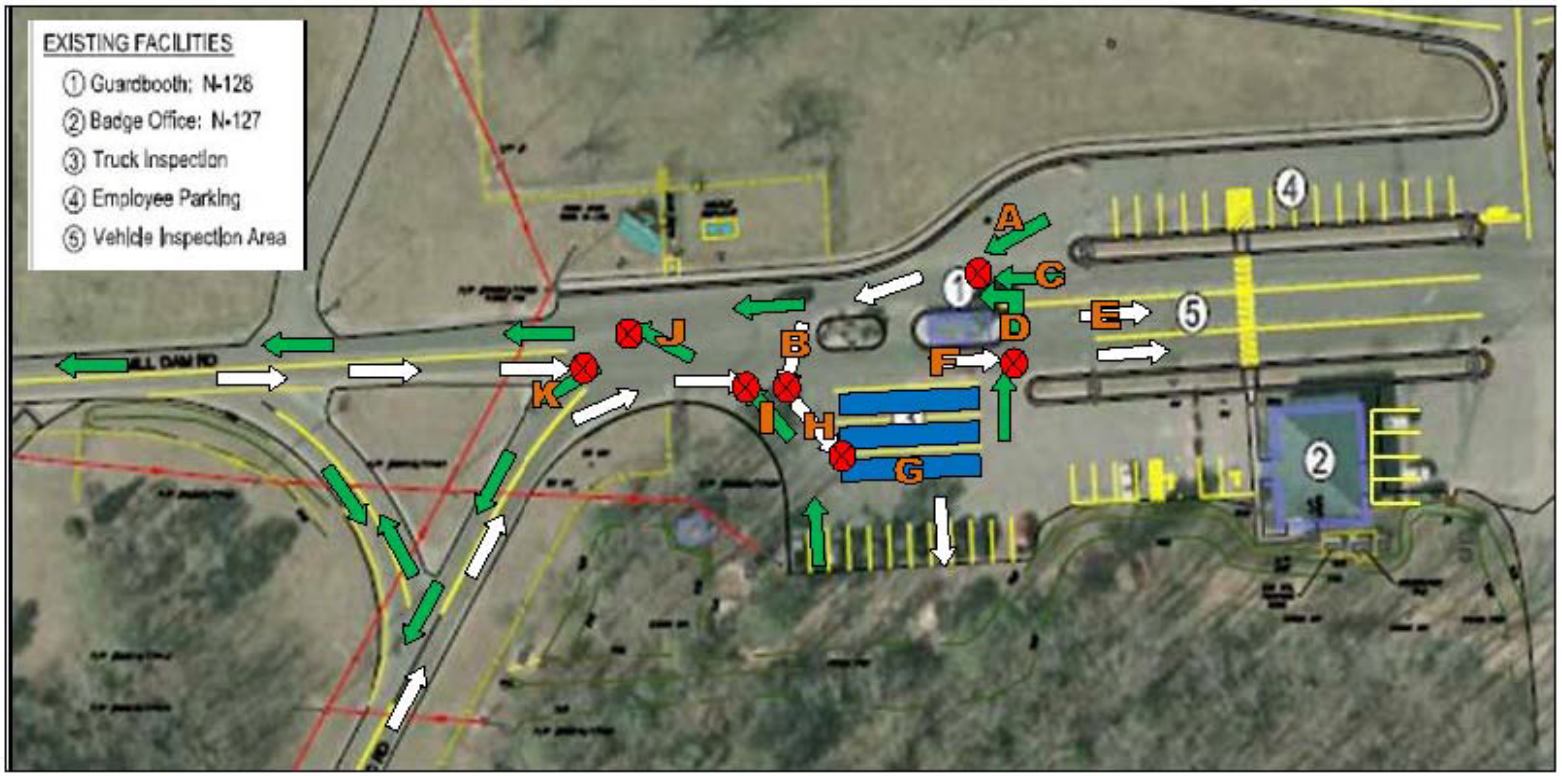
The purpose of the Proposed Action is to separate vehicles, trucks, and people to increase personnel safety by decreasing congestion at the main entrance to WFF.

1.3.2 Need

The Proposed Action is needed because there are multiple substantial safety risks associated with the continued use of the main entrance in its current configuration. Figure 1-3 illustrates potential conflicts that could occur at the main entrance at any given time. Below is a discussion of how these conflicts and other risks would be mitigated by implementing the Proposed Action.

1.3.2.1 Safety Concerns: Risk Assessment Code Score

During its facility planning process, NASA assigns a Risk Assessment Code (RAC) score to existing conditions for each proposed project as a means of prioritizing those projects that, if implemented, would remedy identified safety concerns. The RAC is a numerical expression of risk determined by an evaluation of both the potential severity of a condition and the probability



KEY

- Incoming Traffic
- Outgoing Traffic
- Trucks Queuing
- Points of potential conflict

A Security vehicle exiting security employee parking lot
B Permanent employee coming to badge office parking lot to escort visitors
C On-base vehicle exiting facility
D Vehicle exiting badge office parking lot, crossing over guard house to exit facility
E Vehicle being inspected by security officer
F Full time employee coming to work, stopped at guard house for badge check
G Truck queued outside of designated inspection lanes
H Visitor entering badge office parking lot to pick up temporary badge
I Vehicle exiting badge office parking lot, traveling to Wallops Island
J Vehicle exiting badge office parking lot, leaving facility via Mill Dam Rd.
K Vehicle exiting badge office parking lot, leaving facility via Atlantic Rd.

Figure 1-3: Main entrance showing possible traffic conflicts

of its occurrence. The following RAC Matrix (Figure 1-4) considers the severity class and probability estimate of a situation to determine the final score.

SEVERITY CLASS	PROBABILITY ESTIMATE A	B	C	D	E
I	1	1	2	3	4
II	1	2	3	4	5
III	2	3	4	5	6
IV	3	4	5	6	7

Figure 1-4: RAC scoring matrix

Severity classifications are defined as follows:

- Class I – Catastrophic – A condition that may cause death or permanently disabling injury. Facility or systems destruction on the ground, or loss of crew, major systems, or vehicle during the mission.
- Class II – Critical – A condition that may cause severe injury or occupational illness, or major property damage to facilities systems or flight hardware.
- Class III – Moderate – A condition that may cause minor injury or occupational illness, or minor property damage to facilities, systems, or equipment.
- Class IV – Negligible – A condition that could require first aid treatment, though would not adversely affect personal safety or health, but is a violation of specific criteria.

Probability is the likelihood that an identified hazard will result in a mishap, based on an assessment of such factors as location, exposure in terms of cycles or hours of operation, and affected population. The probability estimates used for this RAC matrix are defined as follows:

- A – Likely to occur immediately
- B – Probably will occur in time
- C – May occur in time
- D – Unlikely to occur
- E – Improbable to occur

The RAC score can range from 1 to 7 with 1 representing immediate danger and 7 representing improbable. The current conditions created by the present configuration of the main entrance to WFF scored a 3 using the RAC matrix, with a Class II severity classification (critical) and a probability estimate of C (may occur in time).

The safety issues identified that supported a RAC score of 3 were as follows:

- Truck inspection lanes are located within the badge office parking lot which is also used by visitors requiring temporary badges or employees dealing with badging issues;
- Security personnel must cross several lanes of active traffic, estimated at anywhere from 25 to 100 times per shift for each officer; and
- Numerous transportation hazards (as illustrated in Figure 1-3) have manifested due to the current configuration of the main entrance. For example, vehicles needing to exit the badge office parking lot and travel to Wallops Island must make a maneuver across several traffic lanes (both incoming and outgoing) with obscured sightlines due to the location of the truck inspection lanes and the existing guard house, an inherently dangerous operation.

The current main entrance is the chokepoint for goods and services passing in and out of WFF. With a continuing increase in activities, the potential exists that someone will get severely injured at this location due to the adverse mix of multiple security functions (i.e., badge issuance, badge checking, and vehicle and truck inspection) and increased traffic flow. Accordingly, NASA determined that a RAC Score of 3 (IIC) justified the need for reconfiguration of the main entrance to WFF.

1.3.2.2 Badging & Inspection Requirements

NASA requires that all employees and visitors wear security badges at all times per NPR 1600.1, *NASA Security Program Procedural Requirements*. Every truck that enters the facility must undergo a thorough inspection process and all personally owned vehicles (POVs) are subject to random inspections (NPR 1600.1 and 14 CFR part 1204, subpart 10). Visitors with an escort badge must have their POV inspected each time they enter the facility. Currently, all inspections are conducted immediately adjacent to the main entrance, which presents a safety risk to WFF security personnel and those persons having their vehicles inspected, while also compounding the effects of slowing ingress and egress in an already congested area.

1.3.2.3 Increased Use of Main Entrance and Badge Office

In recent years there has been a marked increase in the amount of vehicular traffic around the main entrance to WFF as well as an increased utilization of the badge office for the processing of temporary badge requests (Figures 1-5 and 1-6). During peak hours the badge office can become overcrowded, forcing visitors to wait in a line that extends out of the badge office into the

parking lot. The average wait time at the badge office depends on current activities; special projects, special events, group tours, new construction, etc. Extra staff may help alleviate the wait time issue; however, the main issue is the unsafe situation surrounding the congestion in the badge office parking lot due to the intermixing of vehicles, trucks, and people. Based on observation, the maximum capacity of the badge office is estimated to be exceeded approximately 35% of the time, or 14 hours out of a 40 hour work week (Perry, Protected Service Division [PSD], personal comm.).

The number of delivery trucks and required truck inspections has also notably increased. The resultant increased congestion has made already unsafe conditions at the main entrance to WFF worse. Visitors are forced to double and even triple park to accommodate their vehicles during badge pick-up (Figure 1-7). In the referenced photograph, truck inspections are being conducted, pedestrians are weaving around vehicles, and vehicles are having difficulty maneuvering through the congested lot.

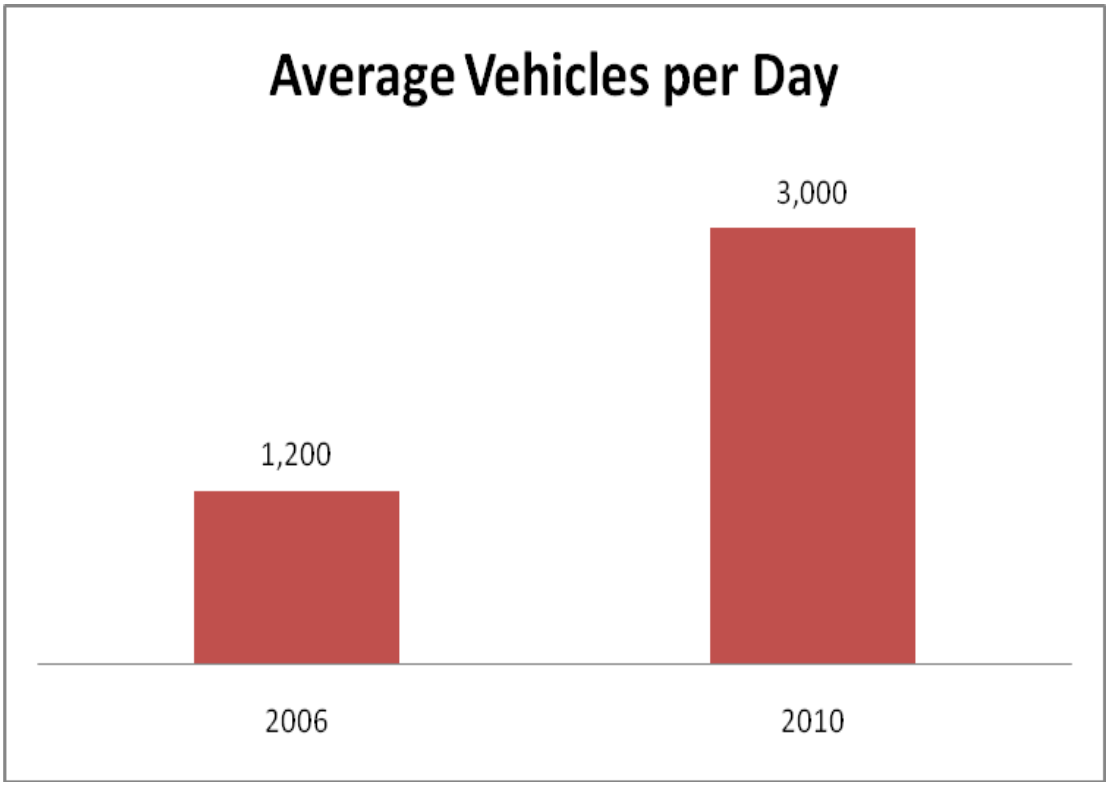


Figure 1-5: 150 percent increase in vehicular traffic at WFF main entrance

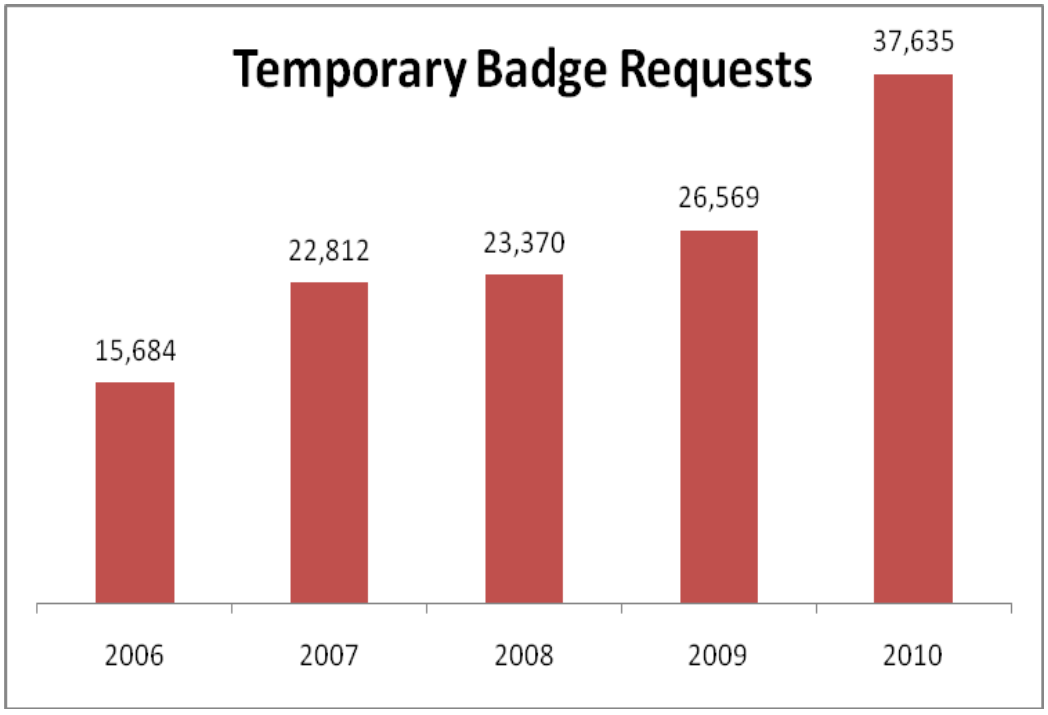


Figure 1-6: Nearly 140 percent increase in temporary badge requests at WFF

Figure 1-7: Badge office parking lot

1.3.2.4 Multiple Operations

The layout of the existing complex is unsafe because it lacks the space needed for multiple operations. There are two truck inspection lanes within the confines of the same parking lot that is used by all visitors and employees to obtain badges. On many days, several trucks are stacked up waiting for inspection, making the remainder of the lot either unusable or difficult to navigate for those utilizing the badge office (Figure 1-8).

Figure 1-8: Trucks overflowing the inspection lanes

1.3.2.5 Parking Lots

Security personnel stationed at the guard house or badge office are required to park in a small parking lot just northeast of the guard house. Security officers must cross several lanes of traffic at the highly congested main entrance to WFF several times a day (estimated anywhere from 25 to 100 times per officer per shift), creating a safety hazard. Additionally, with only 14 spaces and no handicapped spaces, the current parking lot cannot accommodate all employee POVs and government owned vehicles (GOVs) used during work hours. Security personnel are often forced to double park in an even smaller lot directly behind the badge office (Figure 1-9).

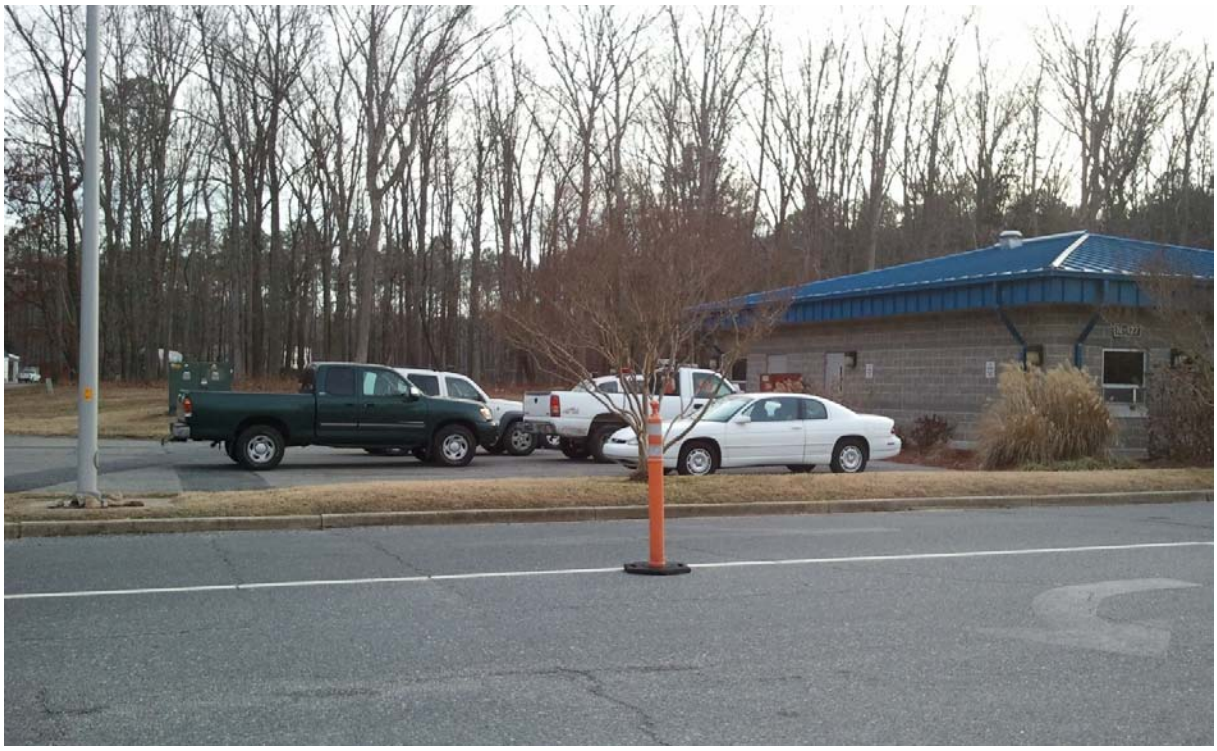


Figure 1-9: Double parking behind existing badge office (N-127)

The parking lot in front of the badge office has 16 regular spaces and 2 handicapped spaces. The recent increase in visitors, combined with expected growth into the foreseeable future (estimated by traffic engineers to plateau around 5% per year [NASA, 2010b]), leaves the parking lot in front of the badge office unable to handle the demand.

To further complicate the current conditions, visitors needing to exit the badge office parking lot and travel to Wallops Island must make a maneuver across several traffic lanes (both incoming and outgoing) with obscured sightlines due to the location of the truck inspection lanes and the existing guard house.

1.3.2.6 Inclement Weather Conditions and Delayed Openings

The current badge office is 247 m^2 (2,662 ft^2). The number of visitors requiring temporary badges has increased to the point where the badge office is often past maximum capacity. During peak hours the line for temporary badges can extend out of the door of the badge office into the parking lot, leaving visitors exposed to inclement weather conditions. This situation will likely only worsen over time.

WFF employees and visitors are subject to random vehicle inspections. While their POV is being inspected by security, they must stand outside, regardless of weather. Inspections can occur any time of day or night and there is no lighting for conducting nighttime inspections.

There is a single inbound lane and single outbound lane leading to and from the main entrance to WFF. Two roads, Atlantic Road and Mill Dam Road, merge into one inbound lane via a "Y" intersection at the main entrance to WFF. When WFF experiences a delayed opening (e.g., due to inclement weather conditions) the traffic (i.e., employees, visitors, trucks) on both Atlantic and Mill Dam Roads can become significantly backed up. Delayed openings increase congestion at the main entrance to WFF because employees who normally filter in over a few hours are now all entering at once; all visitors are utilizing the badge office in the same time frame; and the queued trucks all require inspection. This influx of vehicular and pedestrian traffic can create a safety hazard when the inbound traffic lane and badge office parking lot become too full to accommodate the entering cars and trucks.

1.3.2.7 Shipping and Receiving

WFF shipping (Building D-049) and receiving (Building F-019) buildings are currently located well within the interior of the Main Base (Figure 1-10). All trucks carrying supplies to WFF must first be inspected at the main entrance before being allowed to proceed to shipping and/or receiving. Relocating the shipping and receiving facilities to a location outside of the WFF fence would successfully separate large trucks from other vehicles, a prime safety issue given the current configuration of the main entrance. Another added benefit would be that all trucks would not be required to be inspected as most would not be entering NASA property; this would save security officer time and it would reduce inspection-related congestion in the main entrance area. Having the facility located outside the perimeter fence would enable inspections to focus on cargo once unloaded (rather than both the vehicle and cargo under the current scenario).

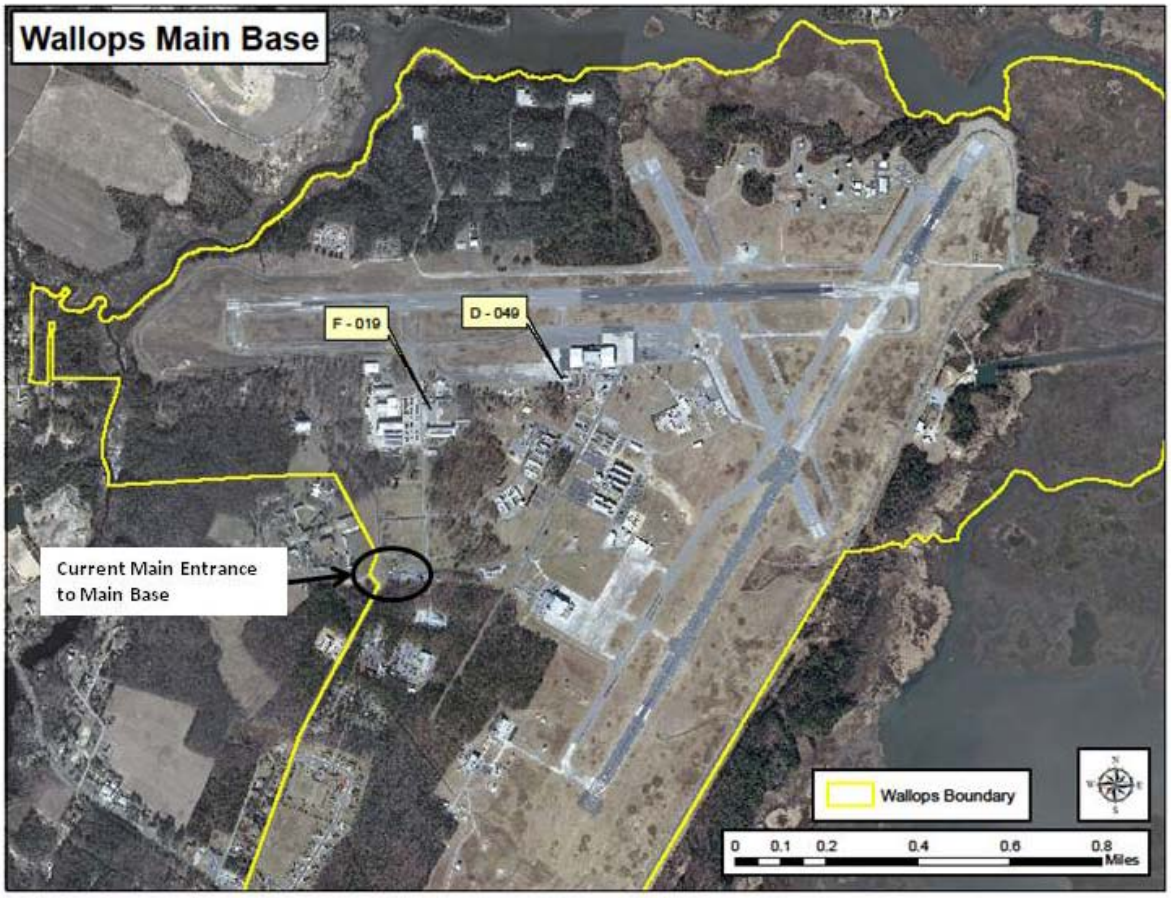


Figure 1-10: Location of WFF shipping (D-049) and receiving (F-019) buildings well within the interior of the property boundary

2 Proposed Action and Alternatives

2.1 Introduction

This section provides a detailed discussion of the alternatives under consideration for the reconfiguration of the main entrance to WFF. The No Action Alternative and two Action Alternatives are evaluated in this EA.

2.2 No Action Alternative

Under the No Action Alternative the main entrance to WFF would not be reconfigured and the existing (and expected increase in) safety issues due to congestion among vehicles, trucks, and people would remain. Figures 1-2 and 1-3 depict the current main entrance configuration and traffic scenarios, respectively, that would not change under the No Action Alternative.

2.3 Alternatives Considered but Not Carried Forward

2.3.1 Screening Process

NASA initially performed a high-level concept study for the reconfiguration of the main entrance to WFF (TranSystems, 2010). Nine different redesign concepts were created. Figure 2-1 is an example of one of those nine designs. The numerous redesign concepts had only slight variations among them, with the main difference being the location of the truck inspection area. Minor differences included location and size of the parking lots, guard house location, and intersection design. Design concepts 1 through 5 were considered undesirable due to the need for hiring additional staff to oversee a separate truck inspection area; concepts 6, 7, and 9 did not adequately separate trucks from cars. Additionally, many of the redesign concepts did not sufficiently alleviate congestion at the main entrance due to a complex reconfiguration of incoming and outgoing traffic lanes. Together, the WFF Facilities Management Branch (FMB) and PSD determined that redesign option 8 (Figure 2-2) was the best general configuration to meet all the needs of the project as it was the only option that moved the badge office from its current location. Redesign option 8 was then used as the starting concept for what ultimately became the Action Alternatives that are evaluated in detail in this EA.

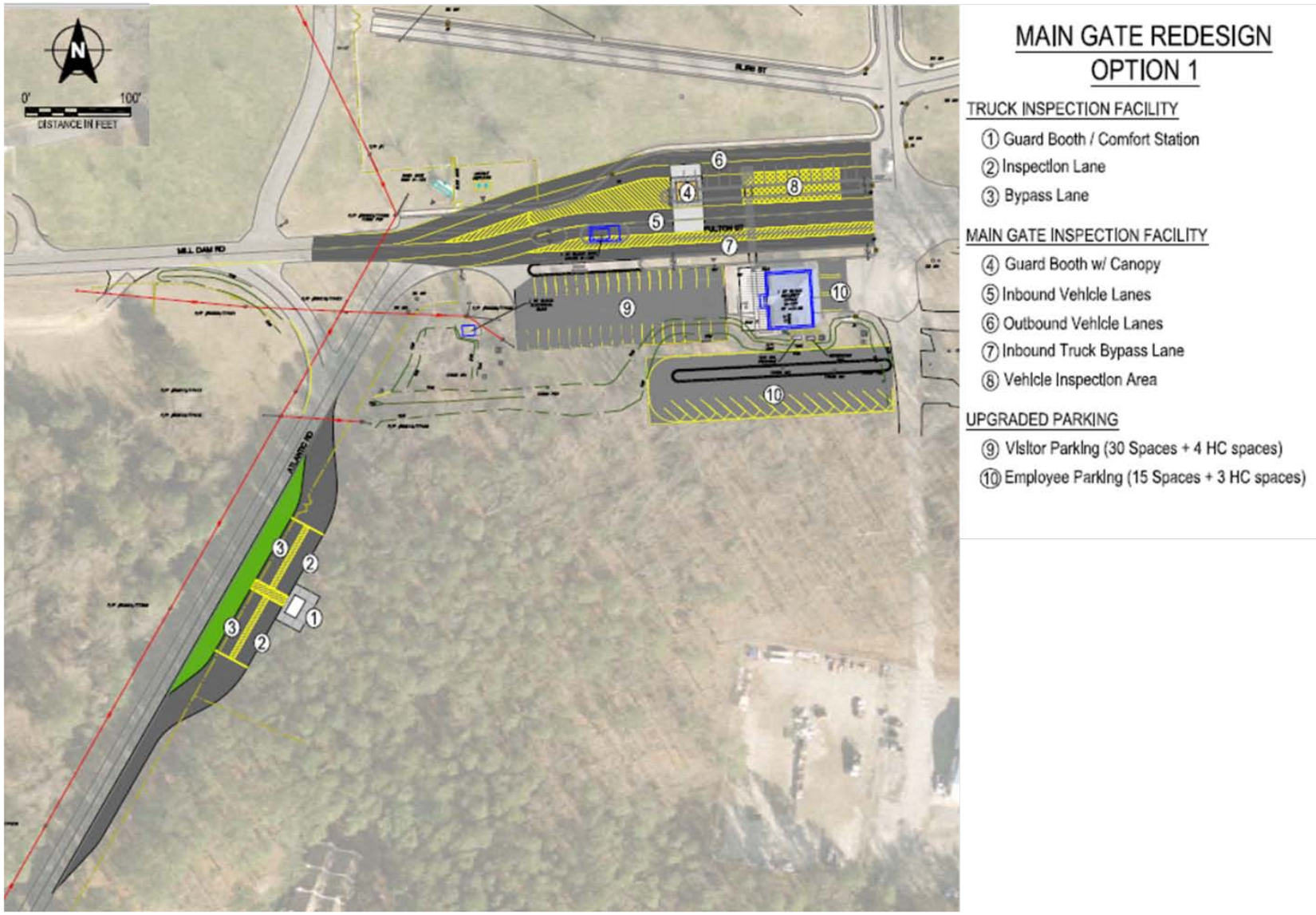


Figure 2-1: One of the 9 redesign options considered during initial concept study

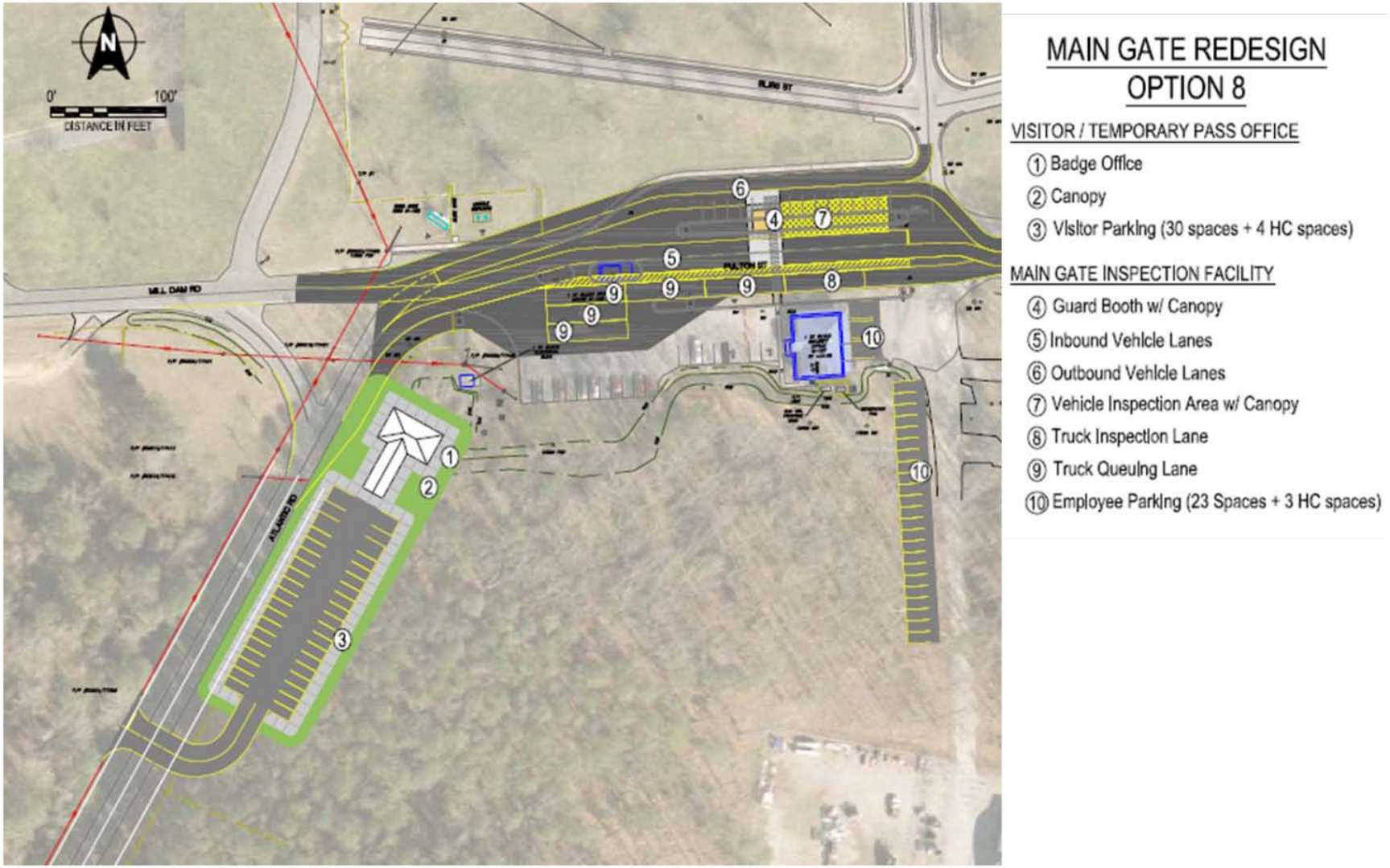


Figure 2-2: Redesign option 8, used as initial concept for development of Action Alternatives analyzed in this EA

2.3.2 Non-NASA Property

In evaluating potential alternative sites for relocation of the main entrance badging and shipping/receiving facilities, NASA considered the open lands west of the entrance on both sides of Mill Dam Road as well as the west side of Atlantic Road; however all of these properties are part of the Wallops Research Park (WRP). The WRP is a planned multi-use development along Mill Dam and Atlantic Roads dedicated to space and science research, educational facilities, and recreational areas that will be shared by NASA, MSC and Accomack County.

The approximately 32 hectare (80 acre) NASA-owned property within the WRP north of Mill Dam Road does not have any road frontage and will be primarily developed for aerospace activities including payload processing and aircraft operation and maintenance. The MSC property, on the south side of Mill Dam Road, will be developed for research and development and industrial use. The MSC owns 25 hectares (62 acres) within the WRP site boundary; the MSC campus, which is located on the north side of Mill Dam Road, encompasses approximately 13 hectares (33 acres). Accomack County property north of Mill Dam Road will be developed to accommodate research and development and industrial land use. Additional Accomack County property west of the closed landfill and south of Mill Dam Road will be used for recreational activities and maintained as a county park. No WRP development will occur within the 14 hectares (35 acre) footprint of the closed Accomack County landfill.

As the areas along Mill Dam and Atlantic Roads are either not owned by NASA or already reserved for future developments, they were not carried forward as (Figure 2-3) viable site locations for this project.

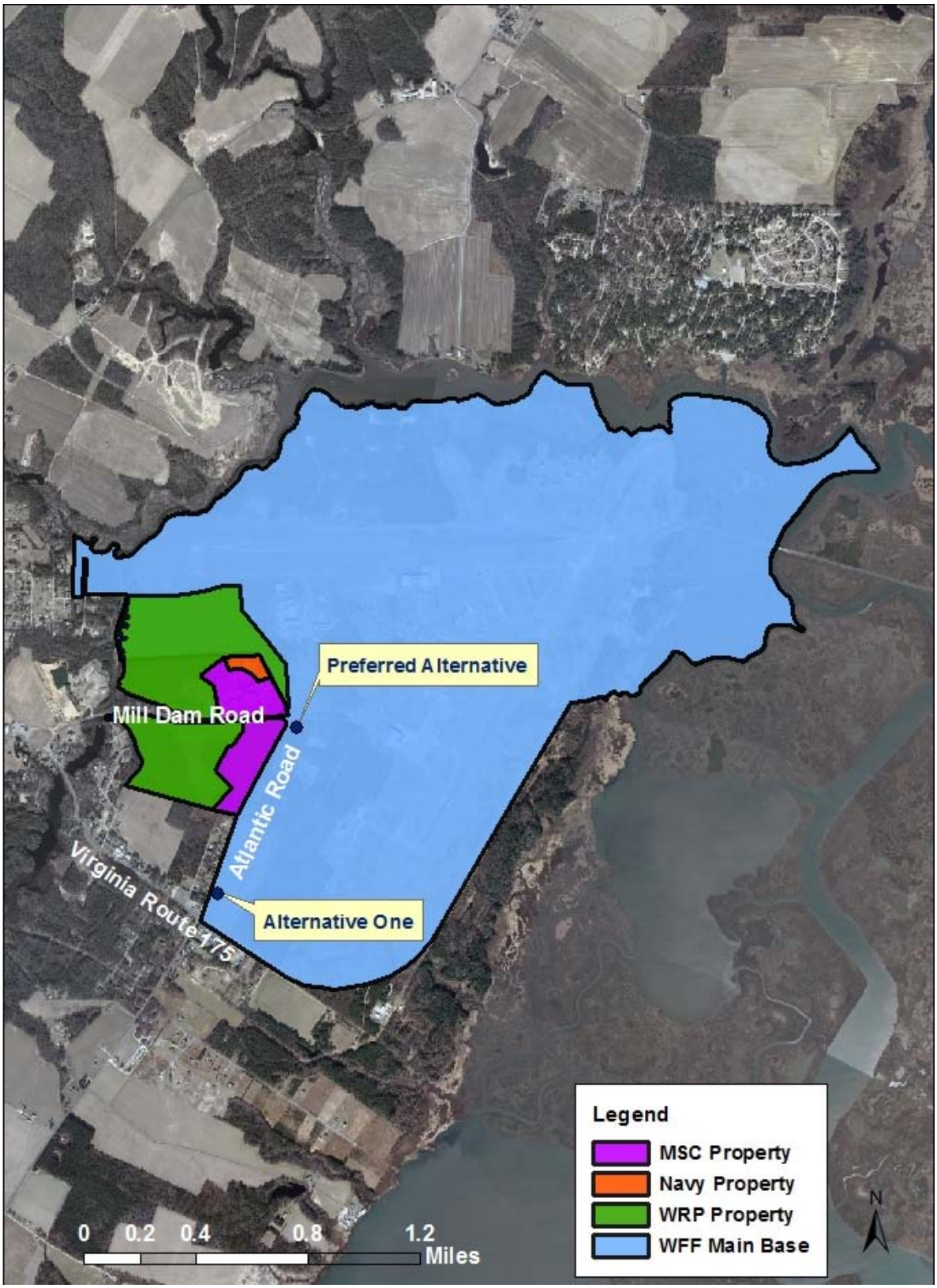


Figure 2-3: Parcels adjacent to WFF main entrance

2.4 Proposed Action/Preferred Alternative

The Proposed Action, NASA's Preferred Alternative, would involve either a two-phased or four-phased construction process, described in detail below. The number of phases would be directly related to available funding, resulting in the same design at final buildout.

2.4.1 Preferred Alternative, Two-Phased Approach

2.4.1.1 Phase I

The first phase of the project would involve construction of a new badge office with an extended canopy and paving a larger badge office parking lot and truck inspection lot in a currently forested area along Atlantic Road, just south of its current location (Figure 2-4). A right-hand turn lane would be constructed near the entrance to the badge office's parking lot on Atlantic Road. Phase I would also include additional security personnel parking south of the current badge office, along with a new sidewalk to the new badge office.

Figure 2-4: Preferred Alternative, two-phased approach, phase I

Badge Office and Parking Lot

Employees at the current badge office perform multiple functions including temporary and permanent badge issuance, fingerprinting, and personal identity verification. The badge office also houses supervisory employees. During peak hours the badge office can become overcrowded, forcing visitors to wait in a line that extends out of the badge office into the parking lot, regardless of weather conditions.

The current badge office parking lot has 16 regular spaces and 2 handicapped spaces, which is not sufficient for the number of visitors using the parking lot on a daily basis. Additionally, visitors who receive escort badges may leave their car in the badge office parking lot for the duration of their visit, resulting in even fewer unoccupied spaces available for other visitors. Its current location creates obscured sightlines for vehicles needing to exit this parking lot and travel to Wallops Island and forces them to make an unsafe maneuver across several traffic lanes (both incoming and outgoing) with obscured sightlines.

The new badge office would still carry out all of the functions performed in the old badge office, and the entrance would be covered by a canopy that would provide protection from inclement weather in the event that visitors are forced to wait outside. The separation of the truck inspection lot from the new badge office lot would inherently increase the safety of visitors and Wallops personnel traversing the parking lot.

The new badge office parking lot would have up to 52 regular spaces and 4 handicapped spaces to better accommodate visitors. Its location on Atlantic Road would eliminate the need for visitors to perform the unsafe maneuver of crossing multiple traffic lanes with obscured sightlines if traveling to Wallops Island. For those entering the badge office parking lot from Atlantic Road, the addition of a right-hand turn lane would also provide a safe means of entering the parking lot and truck inspection area.

Truck Inspection Lanes

There are currently two truck inspection lanes located within the confines of the already overcrowded badge office parking lot. Additional trucks cannot safely maneuver within the parking lot due to space limitations and are forced to block the parking lot entrance for other vehicles when the inspection lanes are occupied (Figure 1-8).

Up to four new truck inspection lanes (each 5 meters x 18 meters [16 feet x 60 feet]) would be part of a separate lot adjacent to the new badge office parking lot (Figure 2-4). This design accommodates more trucks, provides ample room for maneuvering, and provides a way of keeping the trucks separated from other vehicles and pedestrians, resulting in a safer and less congested main entrance. Currently, PSD has one roving guard on duty at all times. This position would be called upon to conduct truck inspections at the proposed location in order to avoid the creation of a new position that would require a minimum of at least 2 new hires.

Security Personnel Parking

The current security personnel parking lot is located just northeast of the guard house. It has 14 regular spaces and no handicapped spaces. There are not enough parking spaces for security personnel POVs or GOVs (used during work hours), resulting, on most days, in a double parking situation behind the current badge office (Figure 1-9). Additionally, the security personnel have to cross both inbound and outbound traffic lanes several times per day in order to get to the badge office, creating a safety hazard.

The new security parking lot would have up to 30 spaces and 4 handicapped spaces to better accommodate both POVs and GOVs of the security personnel. A new sidewalk would provide a safe walkway to the new badge office so security personnel would no longer have to cross traffic lanes several times per day. Security would be maintained by placing a locked gate or turnstile at the fence line north of the new badge office.

Signage Plan

New signage would be added at various locations to help visitors and trucks with the transition to the new badge office and truck inspection location. For example, a sign would be added to Route 175 prior to the intersection with Mill Dam Road, informing all visitors and trucks to take Atlantic Road. The purpose of directing all visitor and truck traffic to Atlantic Road would be to avoid their having to make a left turn (crossing oncoming traffic on Atlantic Road) into the new badging facility. Rather, they would make a safer traffic signal-controlled left turn from Route 175 onto Atlantic Road followed by a right turn into the new facilities.

2.4.1.2 Phase II/Final Buildout

The final buildout of the Preferred Alternative under the two-phased approach would likely be several years later, dependent upon available funding, and would include a new guard house and canopy, reconfiguration of the intersection with Atlantic and Mill Dam Roads, and construction of a new shipping and receiving facility adjacent to the badge office (Figure 2-5).

Figure 2-5: Preferred Alternative, two-phased approach, phase II/final buildout

Guard House

The current guard house area provides no nighttime lighting for security personnel to conduct vehicle inspections or inclement weather protection for visitors or employees who must stand outside of their vehicle during the inspection process.

The current guard house would be demolished and the new guard house would have a large canopy to provide inclement weather protection during inspections. Nighttime lighting would also be added to make inspections conducted after dark safer.

Intersection Reconfiguration

There is currently one inbound traffic lane and one outbound traffic lane at the main entrance to WFF. The inbound single lane merges traffic from Mill Dam and Atlantic Roads via a "Y" intersection before reaching the main entrance. The main road into the main entrance is Mill Dam, which empties east bound traffic from Route 175. Vehicles on Atlantic Road must yield to Mill Dam Road traffic. The single outbound lane supports all traffic exiting the Main Base.

The final buildout of the two-phased approach would replace the 'Y' intersection with a roundabout. Roundabouts, used in place of stop signs and traffic signals, are a type of circular

intersection that can significantly improve traffic flow and safety (Figure 2-6). Roundabouts force drivers to slow down and travel in the same direction. Where roundabouts have been installed, motor vehicle crashes have declined by about 40 percent, and those involving injuries have been reduced by about 80 percent. Because roundabouts improve the efficiency of traffic flow, they also reduce vehicle emissions and fuel consumption (Insurance Institute for Highway Safety, 2010).

The addition of the roundabout would coincide with increasing the single inbound and outbound lanes to dual lanes, eliminating the need for traffic to merge from the incoming Mill Dam and Atlantic Roads, which would improve safety and increase vehicle throughput.

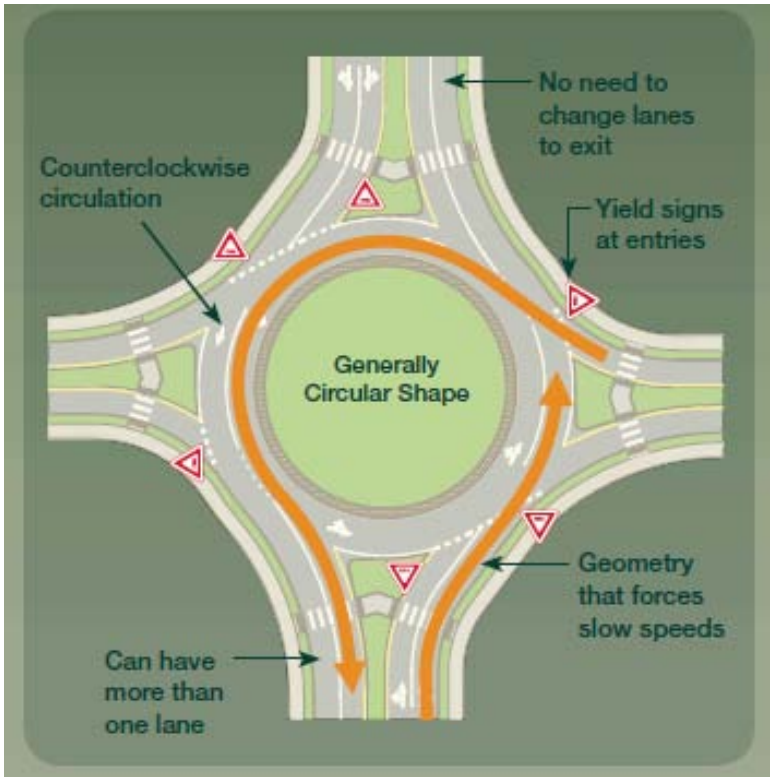


Figure 2-6: Typical roundabout

Truck Inspection Lane Reconfiguration

The current main entrance has two truck inspection lanes located within the badge office parking lot. There are no lanes available to queue trucks that are waiting to be inspected which can lead to traffic congestion when trucks are forced to queue in the available badge office parking lot spaces.

Phase I of the Preferred Alternative, two-phased approach, as discussed above, would create a truck inspection lot adjacent to the new badge office parking lot with approximately four truck inspection lanes (5 meters by 18 meters [16 feet by 60 feet]) with adequate room for truck maneuvers. Upon final buildout of the Preferred Alternative, two-phased approach, this truck

inspection lot would be incorporated into the proposed shipping and receiving facility. The majority of trucks delivering cargo to the Main Base would continue to be inspected in this lot and have their cargo unloaded at the new shipping and receiving facility. Trucks carrying cargo to the Mainland and Wallops Island are currently, and would continue to be, inspected by the officers at the gate located on Wallops Mainland and would not be required to undergo inspection at the main entrance. Under all alternatives, truck inspections would be conducted based on existing security protocols.

Shipping and Receiving Facility

The current shipping and receiving buildings are located inside the Main Base (Buildings D-049 and F-019, Figure 1-10) allowing trucks to travel well within the fence line of the Main Base for unloading at Building F-019.

The new shipping and receiving facility would be approximately 2,800 m^2 (30,000 ft^2) and would be one consolidated facility located near the perimeter of the WFF boundary (Figure 2-5). Delivery trucks would enter the unloading area from Atlantic Road, back up to the building and unload their cargo. Once inside the building, the cargo would be inspected before being loaded onto NASA owned trucks for delivery throughout WFF. This would greatly reduce the number of truck inspections and increase security by preventing a large number of trucks from gaining access to the interior of the Main Base. Trucks would also be loaded with outgoing shipments at this location.

2.4.2 Preferred Alternative, Four-Phased Approach

Another option for the Preferred Alternative would be to complete the project in four phases. Phase I would be identical to the Preferred Alternative, two-phased approach phase I (Figure 2-7). The remaining phases through the final buildout, once completed, would exactly mimic the Preferred Alternative two-phased approach at final buildout. Below is a detailed discussion of how the phasing would occur.

Figure 2-7: Preferred Alternative, four-phased approach, phase I

2.4.2.1 Phase I

The first phase would entail building a new badge office with extended canopy and paving a larger badge office parking lot and truck inspection lot in a currently forested area along Atlantic Road, just south of the current location (Figure 2-7). Additionally, a right-hand turn lane would be added near the entrance to the badge office parking lot on Atlantic Road. Finally, a larger security personnel parking lot would be constructed with a sidewalk and gate connecting it to the new badge office. Signage would be added at various locations along Route 175, Mill Dam Road, and Atlantic Road to help visitors and trucks with the transition to the new badge office and truck inspection location.

The design and functionality of the new badge office, badge office parking lot, truck inspection lot, turn lane, and security parking area would remain the same as those previously described in the Preferred Alternative two-phased approach.

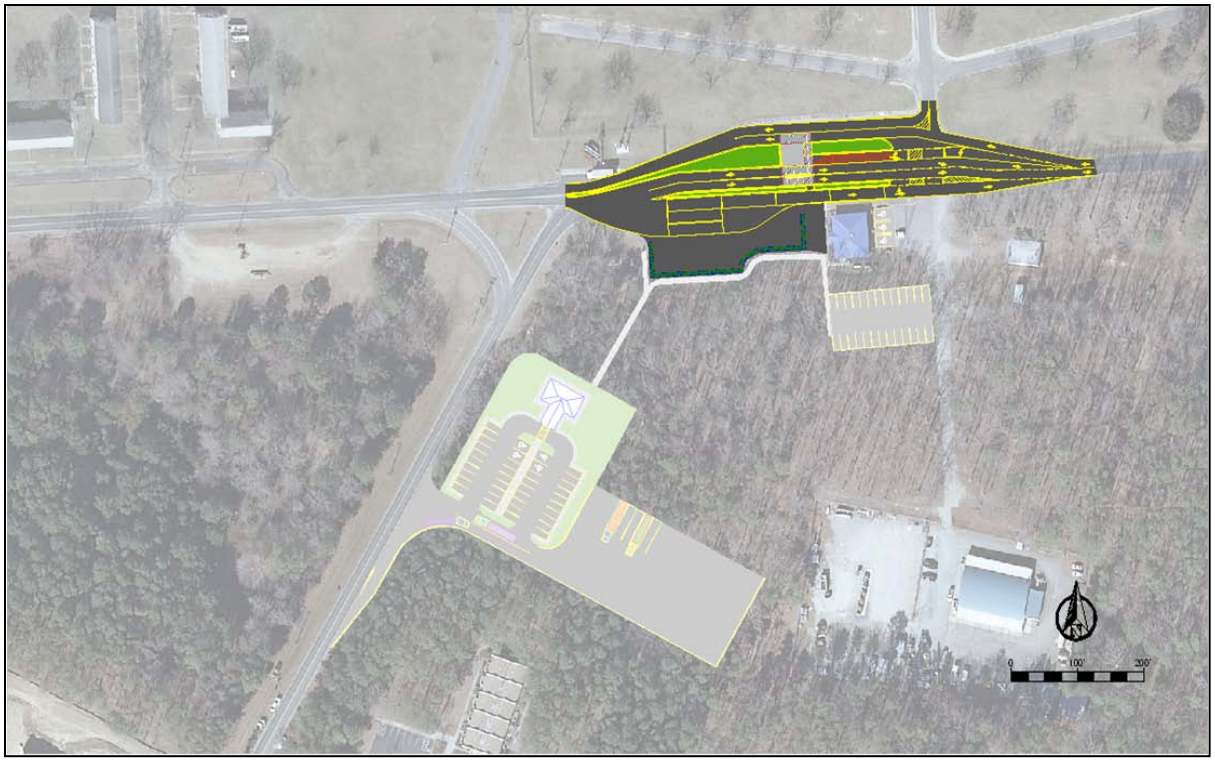


Figure 2-8: Preferred Alternative, four-phased approach, phase II

2.4.2.2 Phase II

The second phase would involve the demolition of the existing guard house followed by construction of a new guard house with an enlarged canopy and nighttime lighting (Figure 2-8). The design and functionality of the guard house would remain the same as previously described in the Preferred Alternative, two-phased approach.

Additionally, the existing inbound and outbound single lanes would be expanded into dual lanes. There is currently one inbound traffic lane and one outbound traffic lane at the main entrance to WFF. The inbound single lane merges traffic from Mill Dam and Atlantic Roads before reaching the main entrance. The single outbound lane supports all traffic exiting the Main Base.

Making the single inbound traffic lane a dual lane would eliminate the need for traffic to merge from the incoming Mill Dam and Atlantic Roads while improving safety and increasing vehicle throughput. Increasing the single outbound lane to two lanes would also decrease the amount of time required to exit the Main Base, which would be beneficial in case of an emergency that would require mass exodus.

Figure 2-9: Preferred Alternative, four-phased approach, phase III

2.4.2.3 Phase III

The third phase of the four-phased option would add a roundabout at the current merging point of Atlantic and Mill Dam Roads (Figure 2-9) which would be designed to work synergistically with the dual inbound and outbound lanes discussed in section 2.4.2.2.

The design and functionality of the roundabout would remain the same as previously described in the Preferred Alternative, two-phased approach.

Figure 2-10: Preferred Alternative, four-phased approach, phase IV/final buildout

2.4.2.4 Phase IV/Final Buildout

The final phase would involve the construction of a new shipping and receiving facility adjacent to the new badge office and truck inspection lot on Atlantic Road (Figure 2-10).

The design and functionality of the shipping and receiving facility would remain the same as previously described in the Preferred Alternative, two-phased approach.

2.5 Alternative One

Alternative One is also composed of four phases. The major difference between Alternative One and either of the Preferred Alternative options is the location of the new badge office and parking lot, which would be located further south on Atlantic Road, approximately 0.9 kilometers (0.6 miles) from the existing badge office, immediately west of the existing U.S. Coast Guard family housing, and approximately 0.2 kilometers (0.1 miles) from the intersection of Route 175 and Atlantic Road (Figures 2-11, 2-12, and 2-13). This location is under consideration because of its higher public visibility from Route 175 and its greater geographic distance from the main entrance. Phase I would be similar to the first phase of either of the Preferred Alternative options, with a few minor differences, including the addition of more parking spaces, and locating truck queuing and inspection lanes behind the badge office in a wrap-around

configuration (Figure 2-14). The new employee parking lot would be paved in the same location as in either of the Preferred Alternative options (Figure 2-15).

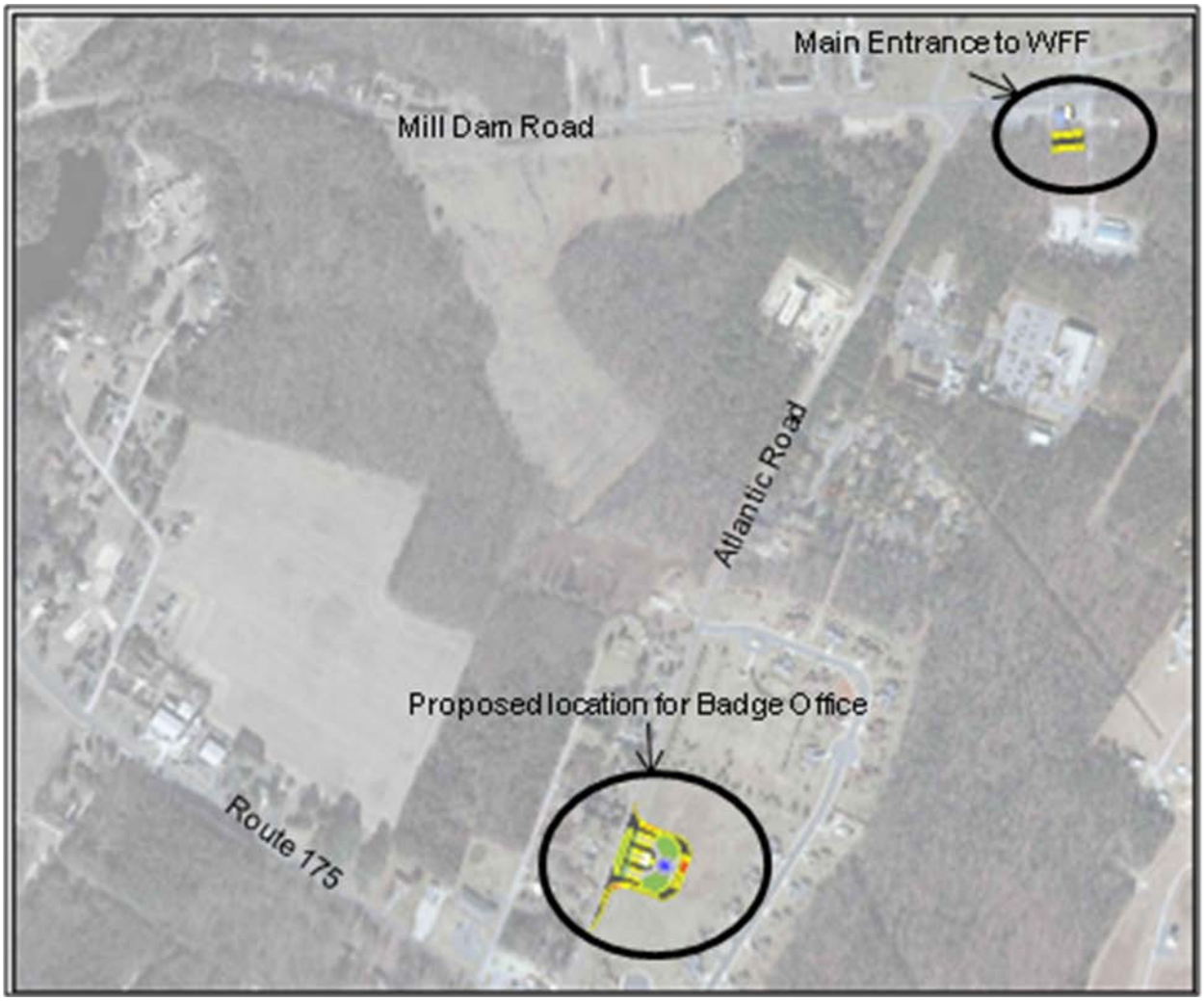


Figure 2-11: Alternative One badge office in reference to WFF main entrance

Figure 2-12: Alternative One badge office site, facing east

Figure 2-13: Area directly across from Alternative One badge office site showing proximity to residential homes and the intersection of Route 175 and Atlantic Road

2.5.1 Phase I

The first phase of Alternative One would involve the construction of a new badge office with an extended canopy on each side, a larger badge office parking lot, and a truck inspection area in an open field in the southwest corner of the NASA property adjacent to Atlantic Road (Figure 2-13).

Additionally, a right-hand turn lane off Atlantic Road would be added near the entrance to the badge office parking lot. Truck queuing and inspection lanes would be paved adjacent to and behind the badge office parking lot. A larger security personnel parking lot would also be constructed next to the old badge office (Figure 2-14). Signage would be added at various locations along Route 175, Mill Dam Road, and Atlantic Road to help visitors and trucks with the transition to the new badge office and truck inspection location.

The design and functionality of the new badge office, badge office parking lot, truck inspection area, turn lane, and security parking area would remain the same as those described under either of the Preferred Alternative options, however, due to distance there would be no sidewalk and gated entrance connecting the new security personnel parking lot with the new badge office.

Employees working at the old badge office (N-127) would park in the new employee parking lot and those employed at the new badge office would park in the new badge office's parking lot which would have 2 additional regular parking spaces in comparison to the Preferred Alternative options.

Figure 2-14: Alternative One, phase I, badge office and truck inspection area

Figure 2-15: Alternative One, phase I, employee parking lot

2.5.2 Phase II

The second phase of Alternative One would entail the demolition of the current guard house, construction of a new guard house with an enlarged canopy and nighttime lighting, and the expansion of the existing inbound and outbound single lanes into dual lanes (Figure 2-16).

The design and functionality of these project components would exactly mimic phase II of the Preferred Alternative, four-phased approach.

Figure 2-16: Alternative One, phase II

2.5.3 Phase III

The third phase of Alternative One would add a roundabout at the current merging point of Atlantic and Mill Dam Roads (Figure 2-17).

The design and functionality of the roundabout would remain the same as described under the Preferred Alternative, either phasing option.

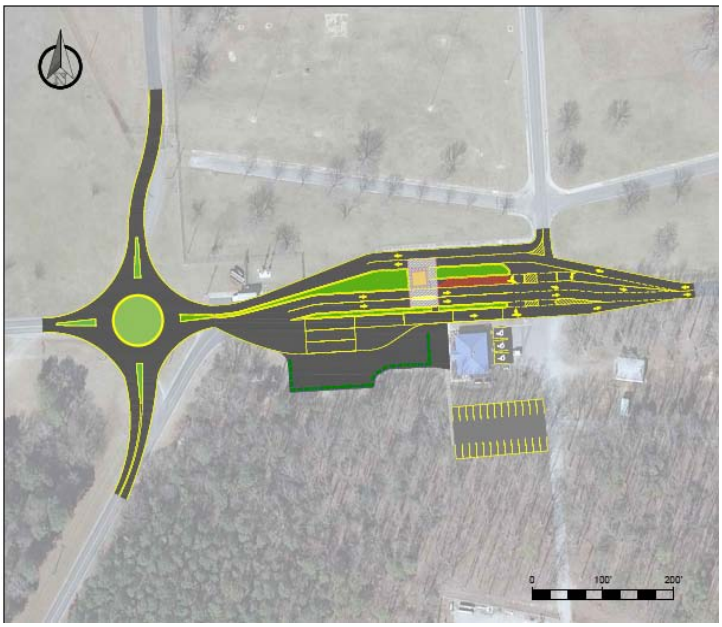


Figure 2-17: Alternative One, phase III

2.5.4 Phase IV/Final Buildout

The final phase of Alternative One would involve the construction of a new shipping and receiving facility just south of the current main entrance to WFF on Atlantic Road (Figure 2-18). In this configuration, the shipping and receiving facility would not be adjacent to the new badge office. Upon its completion, truck inspections would be conducted in the paved lot of the shipping and receiving facility similar to the other Alternatives, and would no longer be conducted behind the badge office.

The design and functionality of the shipping and receiving facility would remain the same as previously described in the Preferred Alternative, either phasing option.

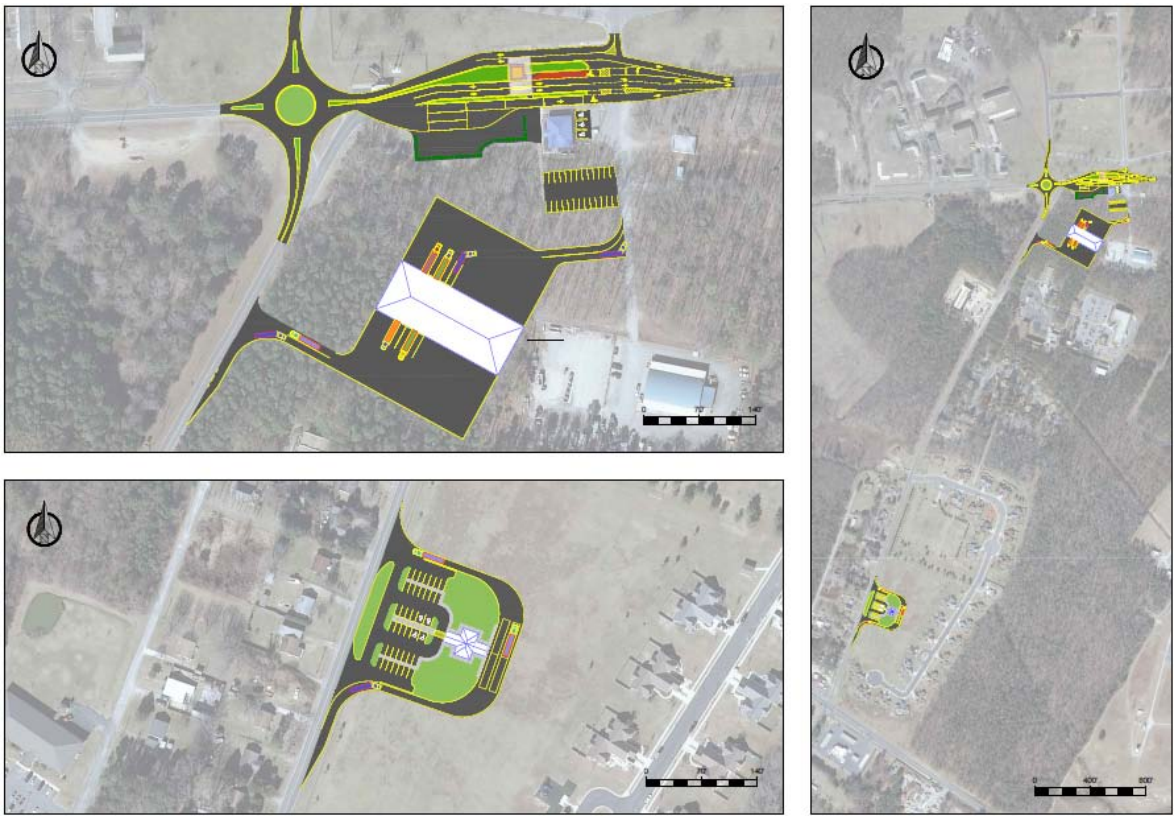


Figure 2-18: Alternative One, phase IV/final buildout

2.6 Comparison Summary for Each Action Alternative

The major differences in construction between the Action Alternatives are the amount of impervious surface added, area of trees removed, and estimated time for construction for each phase. The table below compares each of these aspects individually and presents combined totals for each Action Alternative parameter.

Table 2-1: Comparison summary for Action Alternatives

Preferred Alternative (two-phased)	Impervious Surface Added	Trees Removed	Time[1] (months)
Phase I	0.76 hectares (1.88 acres)	0.83 hectares (2.06 acres)	6
Phase II	0.57 hectares (1.42 acres)	0.57 hectares (1.42 acres)	12
Combined Total	1.33 hectares (3.3 acres)	1.40 hectares (3.48 acres)	**18**
Preferred Alternative (four-phased)	Impervious Surface Added	Trees Removed	Time (months)
Phase I	0.76 hectares (1.88 acres)	0.83 hectares (2.06 acres)	6
Phase II	none	none	6
Phase III	Negligible over existing	none	4
Phase IV	0.57 hectares (1.42 acres)	0.57 hectares (1.42 acres)	12
Combined Total	1.33 hectares (3.3 acres)	1.40 hectares (3.48 acres)	**28**
Alternative One	Impervious Surface Added	Trees Removed	Time (months)
Phase I	0.64 hectares (1.57 acres)	0.09 hectares (0.22 acres)	9
Phase II	none	none	6
Phase III	Negligible over existing	none	6
Phase IV	0.96 hectares (2.38 acres)	0.96 hectares (2.38 acres)	12
Combined Total	1.54 hectares (3.95 acres)	1.05 hectares (2.60 acres)	**33**

[1]Estimated time required (in months) to complete each phase

3 Description of the Affected Environment and Environmental Consequences

NEPA requires focused analysis of the areas and resources potentially affected by an action or alternative. The results of the analysis should be presented in a comparative fashion that allows decision makers and the public to differentiate among the alternatives.

CEQ regulations for implementing NEPA (40 CFR Parts 1500-1508) also require the discussion of impacts in proportion to their significance, with only enough discussion of non-significant issues to show why more study is not warranted. The analysis in this EA considers the current conditions of the affected environment and compares those to conditions that might occur should WFF implement either of the Alternatives.

Affected Environment

The affected environment for this EA includes the area surrounding the current main entrance to WFF, and serves as the baseline against which the Alternatives are evaluated.

Only environmental resources that may be impacted by the Alternatives are analyzed in detail. A complete description of all other WFF resource areas is available in the Site-wide EA or the 2008 WFF Environmental Resources Document (ERD).[2]

Resources Carried Forward for Detailed Analysis

Table 3-1 presents the results of the process of identifying resources to be analyzed in this EA. This assessment evaluates potential impacts to land use; soils; coastal zone; stormwater; air quality; climate change; noise; hazardous materials and hazardous waste; vegetation; terrestrial wildlife and migratory birds; health and safety; transportation; cultural resources; and environmental justice.

Resources Considered but Eliminated from Detailed Analysis

Numerous resources (topography; groundwater; wetlands; floodplains, surface water; threatened and endangered species, marine mammals and fish; population; and employment and income) were assessed but warrant no further examination in this EA. NASA's rationale for eliminating resource areas from detailed study are presented in Table 3-1.

[2] 2008 WFF ERD is available upon request.

Table 3-1: Resources considered in the WFF Main Entrance Reconfiguration EA

Resource		Analyzed in Detail in this EA?	If *Yes*, EA Section If *No*, Rationale for Elimination
Physical Environment	Land Resources		
	Land Use	Yes	Section 3.1.1
	Soils	Yes	Section 3.1.2
	Topography	No	Topography would not change
	Water Resources		
	Coastal Zone	Yes	Section 3.2.1
	Stormwater	Yes	Section 3.2.2
	Groundwater	No	No additional groundwater usage
	Wetlands	No	No wetlands present in project area
	Floodplains	No	Project site elevation above floodplain
	Surface Water	No	No surface water present near project area
	Air Quality	Yes	Section 3.3
	Climate Change	Yes	Section 3.4
	Noise	Yes	Section 3.5
	Hazardous Materials and Hazardous Waste	Yes	Section 3.6
Biological Environment	Vegetation	Yes	Section 3.7
	Terrestrial Wildlife and Migratory Birds	Yes	Section 3.8
	Threatened and Endangered Species	No	No threatened or endangered species present near project area
	Marine Mammals and Fish	No	No in-water work proposed
Social and Economic Environment	Health and Safety	Yes	Section 3.9
	Transportation	Yes	Section 3.10
	Cultural Resources	Yes	Section 3.11
	Environmental Justice	Yes	Section 3.12
	Population	No	No new permanent employees hired to support proposed action
	Employment and Income	No	Minor short-term beneficial impacts during construction only

3.1 Land Resources

3.1.1 Land Use

3.1.1.1 Affected Environment

WFF is located in the northeastern portion of Accomack County, Virginia, on the Delmarva Peninsula. WFF is comprised of the Main Base, Mainland, and Wallops Island.

The Main Base encompasses nearly780 hectares (1,930 acres), which house offices, laboratories, maintenance and service facilities, a NASA-owned airport, air traffic control facilities, hangars, runways, and aircraft maintenance and ground support buildings. In addition, there are water and sewage treatment plants, rocket motor storage magazines, U.S. Navy administration and housing, as well as U.S. Coast Guard housing and other miscellaneous structures.

Rural residential land borders the Main Base to the southwest and small towns and businesses are scattered throughout this area. Horntown is located 4 kilometers (2.5 miles) north of the Main Base; Wattsville is located 1.6 kilometers (1 mile) to the west of the Main Base; and Atlantic is located 4.4 kilometers (2.75 miles) to the southwest of the Main Base. Each of these towns has a population of less than 500 people (NASA, 2008a). Area businesses include fuel stations, retail stores, markets, and restaurants.

The residential sites along Atlantic Road are located approximately 600 meters (1,950 feet) from the Preferred Alternative site; U.S. Navy housing is located approximately 320 meters (1,050 feet) south of the site. Alternative One is sited much closer to both residential and U.S. Coast Guard housing, approximately 30 meters (100 feet) and 90 meters (300 feet), respectively.

3.1.1.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, there would be no changes or impacts to land use.

Preferred Alternative, either phasing option

Approximately 100 hectares (250 acres) of the Main Base are currently populated by buildings, roads, runways, and other infrastructure and 175 hectares (430 acres) are forested, leaving approximately 500 hectares (1,235 acres), or 64 percent of the Main Base, as open areas.

The construction of the new facilities and paved areas in a forested area on the Main Base would result in up to 1.40 hectares (3.48 acres) of land unavailable for future uses as well as a change to current land use in the project area. The 1.40 hectares (3.48 acres) of land the Preferred Alternative would occupy at final buildout is about 0.28 percent of the currently unoccupied

land. Improvements under the Preferred Alternative would result in negligible long-term impacts on land use in those specific areas.

The land uses planned for the Main Entrance Reconfiguration Project are consistent with NASA's master plan. The proposed land use change is also consistent with the industrial zoning of the adjacent WRP (directly across Atlantic Road) and therefore would not impact use of the WRP.

Alternative One

The construction of the facilities and paved areas on undeveloped land within the Main Base boundary would result in up to 1.54 hectares (3.95 acres) of land unavailable for future uses as well as a change to current land use in the project area. The 1.54 hectares (3.95 acres) of land Alternative One would occupy is about 0.31 percent of the currently unoccupied land. The placement of the badge office and parking lot in an open field next to U.S. Navy and U.S. Coast Guard housing would reduce the amount of space available for residents' recreational purposes. Additionally, the location of the badge office building under Alternative One would be approximately 90 meters (300 feet) away from civilian housing. The entrance (the right-hand turn lane) to the Alternative One site would be approximately 30 meters (100 feet) or less from the nearest civilian yard. Given the proximity of the badge office to the residences, land use impacts under Alternative One would be classified as moderate and long term.

3.1.2 Soils

3.1.2.1 Affected Environment

The Coastal Plain soils of the Eastern Shore are generally very level, and many soil types are considered to be prime farmland by the U.S. Department of Agriculture (USDA). The dominant agricultural soils in the region are high in sand content, which results in a highly leached condition, an acidic pH, and a low natural fertility. Some of the areas surrounding WFF, as well as parts of the Main Base, contain soil types that are classified as prime or unique farmland by the Natural Resources Conservation Service (USDA, 1994). Because the project site is within an area designated for urban and industrial uses, the Farmland Protection Policy Act (7 U.S.C. 4201 et seq.) does not apply.

A Custom Soil Resource Report was generated for the project area through the use of an interactive USDA website and soils database for Accomack County, Virginia (USDA, 2011). Soils at the Preferred Alternative and Alternative One sites are both bojac fine sandy loam, with 0 to 2 percent slopes; a nearly level, very deep, and well-drained soil.

3.1.2.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, there would be no changes or impacts to soils.

All Action Alternatives

The USDA Soil Survey assigns the project sites' soil type ratings of "low" and "medium" for hazard of water and wind erosion, respectively. Accordingly, soils could be transported off-site during construction by wind or precipitation during storm events. However, considering the soils within the sites are gently sloped and that NASA would implement strict erosion and sediment controls, it is expected that any losses would be minor.

Construction equipment would use small quantities of petroleum-based fuels and lubricants. Inadvertent spills or leaks of these substances would have the potential to adversely affect soils. NASA would require its contractors to implement site-specific Best Management Practices (BMPs) for vehicle and equipment fueling and maintenance as well as spill prevention and control measures.

3.2 Water Resources

3.2.1 Coastal Zone

3.2.1.1 Affected Environment

The Virginia Department of Environmental Quality (VDEQ) is the lead agency for the Virginia Coastal Zone Management (CZM) Program, which is authorized by NOAA to administer the Coastal Zone Management Act of 1972. Any Federal agency development in Virginia's Coastal Management Area (CMA) must be consistent with the enforceable policies of the CZM Program. Although Federal lands are excluded from Virginia's CMA, any activity on Federal land that has reasonably foreseeable coastal effects must be consistent with the CZM Program. Enforceable policies of the CZM Program that must be considered when making a Federal Consistency Determination include:

- **Fisheries Management.** Administered by Virginia Marine Resource Commission (VMRC), this program stresses the conservation and enhancement of shellfish and finfish resources and the promotion of commercial and recreational fisheries.
- **Subaqueous Lands Management.** Administered by VMRC, this program establishes conditions for granting permits to use State-owned bottomlands.
- **Wetlands Management.** Administered by the VMRC and VDEQ, the wetlands management program preserves and protects tidal wetlands.

- **Dunes Management.** Administered by VMRC, the purpose of this program is to prevent the destruction or alteration of primary dunes.
- **Non-Point Source Pollution Control.** Administered by the Virginia Department of Conservation and Recreation (DCR), the Virginia Erosion and Sediment Control Law is intended to minimize non-point source pollution entering Virginia's waterways.
- **Point Source Pollution Control.** Administered by VDEQ, the Virginia Pollutant Discharge Elimination System (VPDES) permit program regulates point source discharges to Virginia's waterways.
- **Shoreline Sanitation.** Administered by the Virginia Department of Health, this program regulates the installation of septic tanks to protect public health and the environment.
- **Air Pollution Control.** Administered by VDEQ, this program implements the Federal Clean Air Act (CAA) through a legally enforceable State Implementation Plan.
- **Coastal Lands Management.** Administered by the Chesapeake Bay Local Assistance Department, the Chesapeake Bay Preservation Act guides land development in coastal areas to protect the Chesapeake Bay and its tributaries.

Because WFF is within Virginia's CMA, its activities are subject to the Federal Consistency requirement.

3.2.1.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, no impacts on the coastal zone would occur.

All Action Alternatives

All activities under the Preferred Alternative (either phasing option) and Alternative One occur within Virginia's CMA as designated by Virginia's CZM Program. Based on the information and analysis in this EA and the Federal Consistency Determination (Appendix B), NASA determined that the Proposed Action is consistent to the maximum extent practicable with the enforceable policies of the CZM Program. NASA submitted its FCD to VDEQ; on May 2, 2011, VDEQ concurred that the project was consistent with Virginia's CZM Program.

3.2.2 Stormwater

3.2.2.1 Affected Environment

WFF is located in the Eastern Lower Delmarva and the Chincoteague watersheds. The entire Main Base is part of the Chincoteague Bay watershed. The Chincoteague Bay watershed has a

relatively small population, with an average density of less than 105 people per square kilometer (40 per square mile), little topographic relief, and a high water table (NASA, 2008a).

Surface waters in the vicinity of WFF are saline to brackish and are influenced by the tides. Outgoing tidal flow is generally north and east to Chincoteague Inlet and out to the Atlantic Ocean; incoming tides flow in the reverse direction. No wild or scenic rivers are located on or adjacent to the Main Base; therefore, the Wild and Scenic Rivers Act (16 U.S.C. 1271–1287) does not apply to this project (NASA, 2008a).

Little Mosquito Creek forms the northwest and northern boundary of the Main Base. The western side of the Main Base is bounded by a tributary to Little Mosquito Creek named Wattsville Branch. Little Mosquito Creek flows east through Mosquito Creek to Simoneaston Bay, then to Chincoteague Bay and out to the Atlantic Ocean. Little Simoneaston Creek and a section of the Virginia Inside Passage (a federally maintained navigational channel frequently used by commercial and recreational boaters) that traverses Simoneaston Bay, is located east of the Main Base.

The majority of WFF Main Base is positioned on a high terrace landform (7.62 to 12.19 meters [25 to 40 feet] above mean sea level [amsl]) with the northern and eastern portions located on low terraces (0 to 7.62 meters [0 to 25 feet] amsl) and tidal marsh. The current location of the main entrance as well as the proposed locations for both the Preferred Alternative and Alternative One are positioned between 10 to 13 meters amsl (35 and 41 feet). Stormwater flows off the Main Base by both natural drainage patterns and stormwater swales and drains which intercept and divert flow. Stormwater inlets are located throughout the developed portion of the Main Base and the majority of stormwater discharges through numerous outfalls into the surrounding waterways, and eventually the Atlantic Ocean. The natural drainage pattern on the western and southwestern portions of the Main Base, where the main entrance is located, is toward a branch of Little Simoneaston Creek.

The Clean Water Act (CWA) (33 U.S.C. §1251 *et seq.*), as amended in 1977, established the basic framework for regulating discharges of pollutants into the waters of the United States.

The CWA National Pollutant Discharge Elimination System (NPDES) (33 U.S.C. 1342) requires permits for stormwater discharges associated with industrial activities. Virginia DEQ is authorized to carry out NPDES permitting under the VPDES (9 Virginia Administrative Code (VAC) 25-151). NASA maintains a site-wide Stormwater Pollution Prevention Plan (SWPPP) to ensure that its operations have minimal impact on stormwater quality (NASA, 2011).

The Virginia Stormwater Management Program (VSMP) regulations in Chapter 3-20 of Title 4 (4 VAC 3-20), administered by DCR, require that construction and land development activities incorporate measures to protect aquatic resources from the effects of increased volume, frequency, and peak rate of stormwater runoff and from increased non-point source pollution carried by stormwater runoff. The VSMP also requires that land-disturbing activities of 0.4

hectares (1 acre) or greater develop a SWPPP and acquire a permit from the Virginia DCR prior to construction. Construction and demolition activities at WFF are subject to VSMP permitting. NASA and its tenants develop site-specific SWPPPs and acquire the necessary permits as part of early project planning.

3.2.2.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, there would be no impacts to stormwater conveyance.

Preferred Alternative, two-phased approach

Under the Preferred Alternative, two-phased approach, construction activities could result in temporary impacts to stormwater conveyance due to disruptions and changes to the natural drainage. NASA would obtain VSMP construction site stormwater permits and implement site-specific SWPPPs to minimize impacts to stormwater conveyance and stormwater quality during construction. The SWPPP would identify all stormwater discharges at the facility, actual and potential sources of stormwater contamination, and would require the implementation of both structural and non-structural BMPs to reduce the impact of stormwater runoff on the receiving stream to the maximum extent practicable, and to meet water quality standards.

Trees affect stormwater runoff through three primary processes: interception, transpiration, and infiltration. Interception is the collection of precipitation on the structure of the tree and the subsequent evaporation of moisture, which would otherwise become runoff. Transpiration is the transfer of water from the soil through the tree and its eventual release in a gaseous form through microscopic pores in the leaves and stems. Infiltration is the movement of surface water through the soil. Tree roots, combined with organic material that typically builds on the soil at the base of trees, promote the infiltration of runoff through shallow subsurface zones, helping to reduce both the rate and volume of stormwater runoff. The permanent removal of up to 1.40 hectares (3.48 acres) trees (and conversion to impervious surface) would increase the volume of water discharging from the site.

No long-term adverse impacts to stormwater conveyance are anticipated because NASA would incorporate permanent stormwater control measures into design plans. Low Impact Development (LID) practices would be incorporated as feasible; including the integration of grass swales around newly paved parking lots, which would slow the flow of stormwater and promote runoff infiltration into the surrounding soils. All control measures to reduce stormwater-carried nonpoint source pollution would be designed and constructed in accordance with VSMP laws and regulations. Additionally, stormwater would flow through approximately 2.35 kilometers (1.50 miles) of vegetated swale to reach the receiving water, an unnamed branch of Little Simoneaston Creek (Figure 3-1). The closest wetlands are approximately 1.50

kilometers (0.95 miles) from the proposed project site. With the exception of severe storm events, stormwater from the site would infiltrate into the swale before reaching the receiving water.

Preferred Alternative, four-phased approach

Impacts to stormwater conveyance would be similar to those described under the Preferred Alternative, two-phased approach. With more phases than the two-phased approach, construction impacts to stormwater could be less due to having less exposed soil at the same time. It is expected that each disturbed area would be re-vegetated prior to moving on to the next phase and its subsequent site disturbance, which would reduce the potential for sediment-laden stormwater runoff.

Alternative One

Impacts to stormwater conveyance under Alternative One would be slightly more than those under the Preferred Alternative two-phased approach due to the addition of approximately 1.54 hectares (3.95 acres) of impervious surface; 0.21 hectares (0.52 acres) more than the Preferred Alternative, two-phased approach. Additionally, stormwater would flow through approximately 1.96 kilometers (1.20 miles) of vegetated swale to reach the receiving water, an unnamed branch of Little Simoneaston Creek. The closest wetlands are approximately 0.75 kilometers (0.46 miles) from the proposed Alternative One site. With the exception of severe storm events, stormwater from the site would infiltrate into the swale before reaching the receiving water.

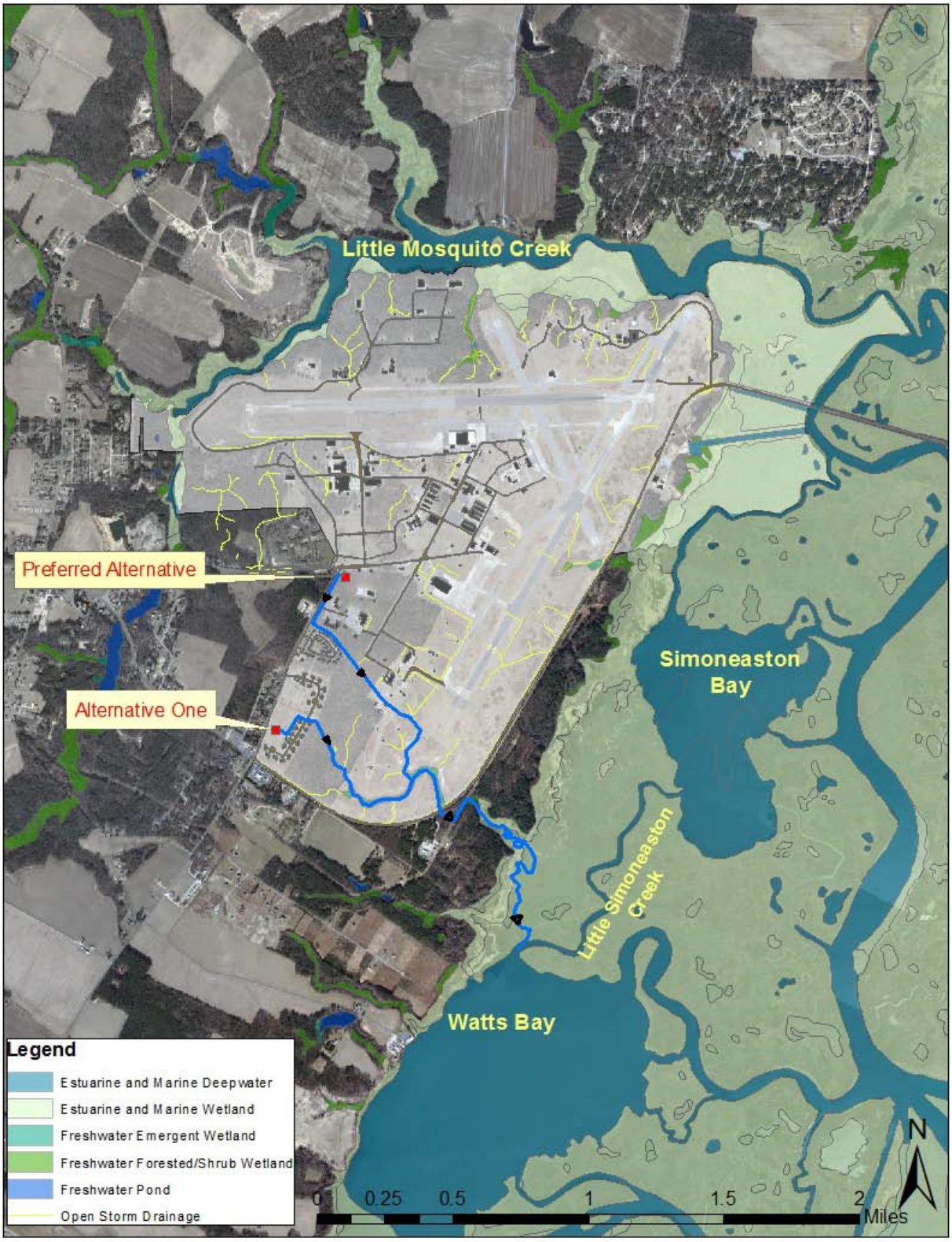


Figure 3-1: Stormwater drainage flow from the Action Alternative sites

3.3 Air Quality

3.3.1 Affected Environment

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. The significance of the pollutant concentration is determined by comparing it to the Federal and State ambient air quality standards. The CAA, and its subsequent amendments, established the National Ambient Air Quality Standards (NAAQS) for seven "criteria" pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 (PM_{10}) and 2.5 ($PM_{2.5}$) microns in diameter, and lead (Pb). These standards represent the maximum allowable atmospheric concentrations that may occur while ensuring protection of public health and welfare, with a reasonable margin of safety.

States have the authority to adopt stricter standards; however the Commonwealth of Virginia has accepted the Federal standards and has incorporated them by reference in 9 VAC 5-30 (NASA, 2010a).

Areas that exceed a Federal air quality standard are designated as non-attainment areas. Wallops Main Base is located in Accomack County, an attainment area (an area considered to have air quality that is as good as or better than the NAAQS) for all seven listed criteria air pollutants; therefore, a General Conformity Review (under Section 176(c) of the CAA) does not apply to Federal actions implemented at WFF.

A synthetic minor source is an air pollution source that has the potential to emit (PTE) air pollutants in quantities at or above the major source threshold levels, but has voluntarily accepted federally enforceable limitations to keep the emissions below these levels. Wallops Main Base is considered a synthetic minor source and has its own facility-wide state operating air permit (Permit Number 40217, amended February 5, 2009) for stationary sources (any building, structure, facility or installation which emits or may emit any listed criteria air pollutant from one, non-moving point [i.e., smoke stack or geographic area]). Major source threshold levels, in an attainment area, are reached if a facility's combined sources have a PTE greater than or equal to:

- 90.7 metric tonnes (100 tons) per year of the criteria pollutants, or
- $\geq$ 9.1 metric tonnes (10 tons) per year of a single Hazardous Air Pollutant (HAP), or
- 23 metric tonnes (25 tons) per year of combined HAPs.

Table 3-2 provides the actual emissions of criteria pollutants for calendar year (CY) 2009 at WFF based on the 2009 Annual Update Forms (NASA, 2011).

Table 3-2: WFF criteria pollutant emissions for CY 2009

2009 WFF Emission Statement	Main Base tonnes/tons yr
VOC	0.54 (0.59)
NOx	16.60 (18.30)
SO_2	23.70 (26.13)
PM_{10}	2.30 (2.54)
Pb	0.49 (0.54)
CO (Optional)	1.73 (1.91)
$PM_{2.5}$ (Optional)	N/A
NH_3 (Optional)	N/A

VOC = Volatile Organic Compounds
NOx = Nitrogen Oxides
NH_3 = Ammonia

3.3.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, there would be no impacts to air quality.

Preferred Alternative, two-phased approach

The proposed location for main entrance reconfiguration would be in an attainment area for all criteria pollutants; therefore, NASA is not required to perform a general conformity review for the Preferred Alternative.

Construction activities would generate fugitive dust from clearing, trenching, backfilling, grading, and traffic on paved and unpaved areas, as well as combustion emissions from construction equipment. To minimize impacts during construction, site-specific dust suppression methods would be implemented to minimize windblown and vehicular-borne fugitive dust generated from the construction site areas (e.g., daily watering of disturbed surfaces and soil stockpiles, covering stockpiles, implementing track-out controls). The internal combustion engines powering most of the construction equipment and vehicles would burn diesel fuel and the remaining vehicles would burn gasoline. Equipment that would be used for construction activities is anticipated to include earthmoving equipment, pickup trucks, and compressors. Vehicles and equipment used for construction would be maintained in good working order. Effective June 2010, non-road diesel engines are required by law to utilize ultra low-sulfur diesel, which must meet a 15 parts per million (ppm) sulfur maximum. Additionally, idling of construction equipment would be prohibited when feasible. Construction-related impacts are expected to be short-term and limited to the duration and area of the construction activities.

The criteria pollutant emissions, except VOCs, from the construction phase were estimated using the modeling tool developed for the U.S. Air Force, called Air Conformity Applicability Model (ACAM), version 4.3.3 (Air Force Center for Environmental Excellence, 2005). VOC emissions were calculated based upon limitations set forth in 9 VAC 5-40-5510D (Emission Standards for Asphalt Paving Operations [Rule 4-39]) which states "…annual average of volatile organic compound content for all emulsified asphalts used does not exceed 6% of volatile organic compounds by volume." The emissions summary is shown in Table 3-3. NASA would take all reasonable precautions to limit emissions of VOCs and NO_x.

Table 3-3: Criteria pollutant emissions, Preferred Alternative, two-phased approach (tonnes/tons)

Phase	CO	NO_x	SO_2	VOC	PM_{10}	$PM_{2.5}$
Phase 1	0	0	0	0.1 / 0.1	3.0 / 3.3	0
Phase 2	< 0.1 / < 0.1	0	0.3 / 0.3[1]	0	0	0
Total	< 0.1 / < 0.1	0	0.3 / 0.3	0.1 / 0.1	3.0 / 3.3	0

[1]SO_2 emissions may be measurable in the two-phased approach because construction would take place in a compressed time frame. The remaining alternatives may have SO_2 emissions but as these actions occur over a longer time period, the resultant emissions would be below 0.1 tonnes (0.1 tons).

Preferred Alternative, four-phased approach

Similar to the Preferred Alternative two-phased approach, reviews for general conformity would not be necessary. The same BMPs described under the Preferred Alternative two-phased approach to reduce construction emissions would reduce air quality impacts from the construction, grading, paving, and tree removal activities for the four-phased approach. Criteria pollutant emissions summaries estimated using ACAM 4.3.3 and the method described above for VOCs are listed in Table 3-4. Construction-related impacts are expected to be short-term and limited to the duration and area of the construction activities.

Table 3-4: Criteria pollutant emissions, Preferred Alternative, four-phased approach (tonnes/tons)

Phase	CO	NO_X	SO2	VOC	PM_{10}	$PM_{2.5}$
Phase 1	0	0	0	0.1 / 0.1	0.7 / 0.8	0
Phases 2 and 3	0	0	0	0	3.0 / 3.3	0
Phase 4	< 0.1 / < 0.1	0	0	0.3 / 0.3	0	0
Total	< 0.1 / < 0.1	0	0	0.4 / 0.4	3.7 / 4.1	0

Alternative One

Similar to the Preferred Alternative two-phased approach, reviews for general conformity would not be necessary. The same BMPs described under the Preferred Alternative two-phased approach to reduce construction emissions would reduce air quality impacts from the construction, grading, paving, and tree removal activities for Alternative One. Criteria pollutant emissions summaries estimated using ACAM 4.3.3 and the method described above for VOCs are listed in Table 3-5. Construction-related impacts are expected to be short-term and limited to the duration and area of the construction activities.

Table 3-5: Criteria pollutant emissions, Alternative One (tonnes/tons)

Phase	CO	NO_X	SO2	VOC	PM_{10}	$PM_{2.5}$
Phase 1	0	0	0	0.2 / 0.2	1.5 / 1.6	0
Phases 2 and 3	0	0	0	0	3.0 / 3.3	0
Phase 4	< 0.1 / < 0.1	0	0	0.3 / 0.3	0	0
Total	< 0.1 / < 0.1	0	0	0.4 / 0.5	4.5 / 5.0	0

3.4 Climate Change

3.4.1 Affected Environment

Historically, greenhouse gases (GHGs) have not been regulated pollutants under the CAA. On December 7, 2009, the Environmental Protection Agency (EPA) Administrator signed a final action finding that six GHGs constitute a threat to public health and welfare and that the combined emissions from motor vehicles cause and contribute to the climate change problem. On April 1, 2010, EPA and the National Highway Traffic Safety Administration (NHTSA) issued the first national rule limiting GHG emissions from cars and light trucks. The requirements of the GHG light duty vehicle rule took effect on January 2, 2011. EPA's *Mandatory Reporting of Greenhouse Gases Rule* also became effective on January 2, 2011, requiring large stationary sources in the U.S. to report GHG emission data. In general, the rule, codified in 40 CFR Part 98, requires that facilities that emit 25,000 tonnes (27,500 tons) or more per year of GHGs are required to submit annual reports to EPA.

EPA and the NHTSA announced their joint Proposed Rule for *Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles* on November 30, 2010 in 75 Federal Register 74152 and have announced a Notice of Intent for *Setting Future Greenhouse Gas and Fuel Economy Standards for Passenger Cars and Light*

Trucks, in October 2010. NASA will comply with all provisions of these rules as they become finalized.

On December 21, 2007, Virginia's former governor, Timothy Kaine, issued EO 59, creating the Governor's Commission on Climate Change and setting a target of reducing statewide GHG emissions to 30% below business as usual (2000 levels) by 2025. On January 2, 2011, Virginia passed its Final Rule on reporting of GHG emissions from stationary sources (9 VAC 85 *et seq*.). The regulation mandates controls on stationary sources of air pollutants but does not address mobile (e.g., construction equipment) sources. In this regulation, Virginia defines "significant" as 68,000 tonnes (75,000 tons) per year of Carbon Dioxide equivalent (CO_2e) emissions.

There is additional Federal climate change-related legislation such as EO 13514, *Federal Leadership in Environmental, Energy and Economic Performance*. Signed October 2009, the EO calls on the Federal government to lead by example towards building a clean energy economy, including measuring, reporting, and reducing GHG emissions from direct and indirect activities. It requires Federal agencies to "establish and report to the CEQ Chair and Office of Management and Budget Director a comprehensive inventory of absolute GHG emissions, including scope 1, scope 2, and specified scope 3 emissions." CEQ is responsible for issuing Federal guidance for this task.

GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), O_3, and several hydro- and chlorofluorocarbons. Each GHG is assigned a global warming potential (GWP), which is the ability to trap heat, and is standardized to CO_2, which has a GWP value of 1. For example, N_2O has a GWP of 310, meaning it has a global warming effect 310 times greater than CO_2 on an equal-mass basis. For simplification, total GHG emissions are often expressed as a CO_2e. The CO_2e is calculated by multiplying each GHG emission by its GWP and adding the results to produce a combined rate to represent all GHGs emitted by an activity.

GHG emissions were calculated for WFF Main Base and Wallops Mainland/ Island to estimate NASA's contribution in calendar year 2008. These emissions resulting from mobile (government-owned vehicles and rocket launches) and stationary source operations at WFF in 2008 will be referred to as the "baseline" condition for the analysis in this EA.

Table 3-6 lists the GHG emissions for WFF based on the 2008 Annual Update Forms. Emission factors from the EPA's AP-42 and Environment Canada's National Inventory Report Annex 13 were used in conjunction with the WFF fuel consumption rates to calculate annual GHG emissions for boilers/heating equipment and emergency generators.

Table 3-6: CY 2008 GHG emissions at WFF Main Base by pollutant (tonnes/tons)[a]

Pollutant	WFF Main Base
CO_2	7,978 / 8,794
CH_4	<1
N_2O	<1
CO_2e	7,993 / 8,811

[a] Source: NASA, 2010a

Deforestation

Trees capture CO_2 by taking it into their cells through photosynthesis. They then store the carbon in their bodies; a tree is comprised of about 50 percent carbon. Some carbon gets released back into the atmosphere through respiration, but the net effect is tremendous carbon storage (Johnson, 2009).

Permanent woodland conversion contributes to releases of carbon stored in vegetation and soils to the atmosphere. Emissions depend on both the rate of deforestation and changes in carbon stock per hectare (acre) after deforestation, with changes in carbon stocks varying with land use, region, ecosystem, and use of the removed forest biomass. For example, burning results in immediate releases of forest carbon, whereas unburned organic matter releases carbon more slowly during the decay process. Loss of carbon may take place over 100 years or more for some wood products (Sohngen and Beach, 2006). Brent Sohngen and Robert H. Beach estimate that 120 tonnes of carbon are released per hectare (50 tons/acre) of deforestation.

3.4.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, emissions would remain at present levels as described in Table 3-6.

Preferred Alternative, either phasing option

Upon final buildout of the Preferred Alternative, up to 1.40 hectares (3.48 acres) of trees would be removed. Trees consume CO_2, a major contributor to the greenhouse effect; leaves also absorb other air pollutants—such as O_3, CO, and SO_2—and give off oxygen. By removing these trees, approximately 168 tonnes (185 tons) of carbon would be released into the atmosphere (Sohngen and Beach, 2006) resulting in a negligible adverse impact.

The addition of asphalt and use of diesel-fuel-consuming construction equipment would also contribute to GHG emissions. Construction equipment burns diesel fuel at a typical rate of 15 liters (4 gallons) per hour. The EPA's Office of Transportation and Air Quality has calculated that every 3.8 liters (1 gallon) of diesel fuel burned emits 10 kg (22 pounds) of CO_2e.[3] Table 3-7 compares the CO_2e emissions for construction equipment from initial construction through final buildout among the Action Alternatives.

According to Alexander Brown, Canadian Regional Engineer of the Asphalt Institute (Brown, 2009), the carbon footprint of pavement needs to take into account the initial construction, maintenance, and construction equipment use. Brown calculated the CO_2e conversion factor for hot mix asphalt (HMA) as 0.0103; meaning that for a given volume of HMA, 0.0130 times that volume of CO_2e will be emitted. Table 3-8 compares the GHG emissions from the paving of the parking areas among each phase of the Action Alternatives.

Brown also stated that the carbon footprint from paving must consider the 50-year life cycle emissions from maintenance of the paved surface (e.g., sealing and paving cracks, coating). Table 3-9 is based upon a 90 mm (3.5 inch) thick layer of HMA (over a gravel sub-base) and compares the life cycle maintenance emissions among the alternatives. Note that these emissions would be spread over the 50-year life cycle.

Alternative One

Final buildout of Alternative One would remove the least amount of trees, 1.05 hectares (2.60 acres); releasing approximately 126 tonnes (140 tons) of carbon, a minor adverse impact. The use of diesel-fuel-consuming construction equipment would be expected to make impacts similar to the Preferred Alternative. The addition of 0.24 hectares (0.59 acres) more asphalt (compared to the Preferred Alternative) would be expected to have slightly greater impacts to climate change, but would still be a negligible adverse impact (see Tables 3-7 through 3-9).

Summary Comparison Tables

In summary, it is anticipated that GHG emissions from all Action Alternatives would be transient and have a negligible adverse impact on global warming.

Table 3-7: GHG emissions from construction equipment through final buildout

Alternative	Tonnes CO_2e	Tons CO_2e
Preferred Alternative, two-phased	70.33	63.94
Preferred Alternative, four-phased	109.40	99.46
Alternative One	128.94	117.22

[3] EPA's Emission Facts can be accessed at http://www.epa.gov/otaq/climate/420f05001.htm

Table 3-8: GHG emissions for asphalt paving

Alternative	Asphalt Paving	
	Tonnes CO_2e	**Tons CO_2e**
Preferred Alternative, two-phased		
Phase I	16.94	18.63
Final Buildout/Phase II	12.80	14.08
TOTAL	29.74	32.71
Preferred Alternative, four-phased		
Phase I	16.94	18.63
Phase II	0	0
Phase III	0	0
Final Buildout/Phase IV	12.80	14.08
TOTAL	29.74	32.71
Alternative One		
Phase I	14.15	15.56
Phase II	0	0
Phase III	0	0
Final Buildout/Phase IV	21.45	23.59
TOTAL	35.60	39.15

Table 3-9: 50-year life cycle GHG emissions from maintenance of paved surfaces

Alternative	Tonnes CO_2e	Tons CO_2e
Preferred Alternative, two-phased	127.79	140.57
Preferred Alternative, four-phased	127.79	140.57
Alternative One	152.96	168.25

3.5 Noise

3.5.1 Affected Environment

The EPA's Noise Control Act of 1972 (42 U.S.C. 4901 to 4918) as amended by the Quiet Communities Act of 1978, states that the policy of the United States is to promote an environment for all Americans free from noise that jeopardizes their health or welfare.

Noise is defined as any loud or undesirable sound. Sound is quantified in units called decibels (dB). The dB scale used to describe sound is a logarithmic scale that provides a convenient system for considering the large differences in audible sound intensities. On this scale, a 10 dB increase represents a perceived doubling of loudness to someone with normal hearing. Therefore, a 70 dB sound level will sound twice as loud as a 60 dB sound level. However, a doubling of sound energy only results in a 3 dB increase in sound level. For example, adding together two identical noise sources of 60 dB results in a total noise level of 63 dB (60 dB + 60

dB = 63 dB). Under ideal listening conditions, people generally cannot detect differences of 1 dB, while differences of 2 or 3 dB can usually be detected by people with normal hearing. In the outside environment, and especially near complex noise sources such as roads, sound level changes of 2 or 3 dB might not be noticeable to most people, while a 5 dB change would likely be perceived as a clear and noticeable change.

An adjustment, or weighting, of the high and low-pitched sounds is made to approximate the way that an average person hears sounds. The adjusted sounds are called "A-weighted levels" (dBA). The A-weighted decibel scale begins at zero. This represents the faintest sound that can be heard by humans with very good hearing. The loudness of sounds (that is, how loud they seem to humans) varies from person to person, so there is no precise definition of loudness. Table 3-10 provides some typical noise levels for familiar noise sources.

Since sounds in the outdoor environment are usually not continuous, a common sound level measurement unit, the Equivalent Sound Level (L_{eq}), is used to measure average environmental noise levels to which people are exposed over a given time period. More specifically, the L_{eq} is a single value of sound level for any desired duration, which includes all of the time-varying sound energy within the measurement period. For example, an L_{eq} of 58 dBA indicates that the amount of sound energy recorded during a specified time period (e.g. one hour), including the highs and lows, is equivalent to the energy in a continuous sound of 58 dB for the studied time period (e.g., one hour) (EPA, 1974).

Table 3-10: Typical noise levels of familiar noise sources and public responses

Thresholds/Noise Sources	Sound Level (dBA)	Subjective Evaluation[a]	Possible Effects on Humans[a]
Human threshold of pain	140	Painful	Continuous exposure to levels above 70 dBA can cause hearing loss in the majority of the population
Siren at 100 feet Loud rock band	130		
Jet takeoff at 200 feet Auto horn at 3 feet	120		
Chain saw Noisy snowmobile	110	Very Loud	
Lawn mower at 3 feet Noisy motorcycle at 50 feet	100		
Heavy truck at 50 feet	90		
Pneumatic drill at 50 feet Busy urban street, daytime	80	Loud	
Normal automobile at 50 mph Vacuum cleaner at 3 feet	70		Speech interference
Air conditioning unit at 20 feet Conversation at 3 feet	60	Moderate	
Quiet residential area Light auto traffic at 100 feet	50		Sleep interference
Library / Quiet home	40	Faint	
Soft whisper at 15 feet	30		
Slight rustling of leaves	20	Very Faint	
Broadcasting studio	10		
Threshold of Human Hearing	0		

[a]Both the subjective evaluations and the physiological responses are continuums without true threshold boundaries. Consequently, there are overlaps among categories of response that depend on the sensitivity of the noise receivers.
Source: EPA, 1974 (NASA, 2010a).

Construction Noise

The U.S. Occupational Safety and Health Administration (OSHA) regulates noise impacts to workers. OSHA regulations on noise standards ensure that workers are not exposed to noise levels higher than 115 dBA. Exposure to 115 dBA is limited to 15 minutes or less during an 8-hour work shift. Exposure to impulsive or impact noise (loud, short duration sounds) is not to exceed 140 dB peak sound pressure level (NASA, 2011).

Traffic Noise

Traffic noise depends on three factors; the volume of traffic, the speed of traffic, and the number of trucks in the flow of traffic. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds, and greater numbers of trucks. Vehicle noise is a combination of the noises produced by the engine, exhaust, and tires.

The loudness of traffic noise can also be increased by defective mufflers or other faulty equipment on vehicles. Any condition (such as a steep incline) that causes heavy laboring of vehicle engines will also increase traffic noise levels. In addition, there are other more complicated factors that affect the loudness of traffic noise. For example, as a person moves away from a highway, traffic noise levels are reduced by distance, terrain, vegetation, and natural and manmade obstacles. Traffic noise is not usually a serious problem for people who live more than 150 meters (500 feet) from heavily traveled freeways or more than 30 to 60 meters (100 to 200 feet) from lightly traveled roads (WSDOT, 2010).

As discussed above, a doubling of a noise source (e.g., twice as much traffic on a road) produces a 3 dB increase in average roadway noise. Such an increase would not be perceived as a doubling in noise loudness (which requires a 10 dB increase). For example, if 350 vehicles produced an average noise level of 55 dB over a sixty minute time range, then 700 vehicles would produce an average noise level of 58 dB over the same time range.

To protect the citizens in the Commonwealth and provide for consistency in the application of noise abatement measures, the Virginia Department of Transportation (VDOT) adopted a Noise Abatement Policy based upon Federal Highway Administration (FHWA) regulations. The Commonwealth noise abatement policy is adopted under Section 33.1-12 of the Code of Virginia.

According to the FHWA, noise impacts occur when projected highway noise levels:

- Approach (reach one decibel less than) or exceed the Noise Abatement Criteria (NAC) contained in 23 CFR 772 (see Table 3-11), or
- Exceed existing noise levels by a substantial amount (10 dB or more).

Table 3-11: FHWA NAC for determining potential noise impacts from a project

Activity Category	$L_{eq}(h)$[1]	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D		Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

[1] L_{eq} (h)-The hourly value of Leq (Source 23 CFR Part 772)

Baseline Traffic Noise Analysis

A baseline noise analysis was performed in 1992 for WFF during both peak and off-peak traffic periods. The 1-hour L_{eq} was used to describe monitored baseline noise levels in the area surrounding WFF. Noise sources included vehicular traffic, aircraft activities, and natural environmental sounds. Near the Main Base, sensitive receptors included homes, a campground/marina, and portions of the Wallops Island National Wildlife Refuge (WINWR) (NASA, 2005). This study determined noise ranges for homes along intersections and roadways adjacent to the Main Base, which generally experienced noise levels of 56 to 61 dBA during peak traffic periods, and 54 to 58 dBA during off-peak traffic periods. Noise levels at homes in relatively quiet areas (away from the roadways) ranged from 49 dBA to 58 dBA, depending on the variety of background noises. Higher noise levels were found at the intersections of Virginia Route 175 and Atlantic Road where noise levels ranged from 64 to 67 dBA during both peak and off-peak periods (NASA, 2005).

Because traffic volumes around the Main Base have grown since 1992, NASA performed additional field measurements during the last week of May and the first week of June in 2011 to reassess baseline noise levels near the locations of the Alternatives. A noise meter was placed

415 meters (1360 feet) north of the intersection of Atlantic Road and Route 175, approximately 10 meters (33 feet) from the centerline of Atlantic road, on the east side of the road.

Baseline day time (7:00 a.m. to 10:00 p.m.) noise levels ranged from of 49 to 69 dBA L_{eq}, with an average 1-hour L_{eq} of 59 dBA. Night time (10:00 p.m. to 7:00 a.m.) noise levels ranged from 38 to 61 dBA L_{eq}, with an average 1-hour L_{eq} of 48 dBA (Figure 3-2).

The data on Figure 3-2 show there was greater variability in noise levels during daylight hours; this is expected given that the dominant daytime noise is produced by human activities. As such, hourly sound levels can vary from day to day even under similar traffic conditions. For example, passage of vehicles with louder mufflers or drivers operating vehicles at different speeds can skew measured results. Therefore, the results of NASA's monitoring effort are presented as averages.

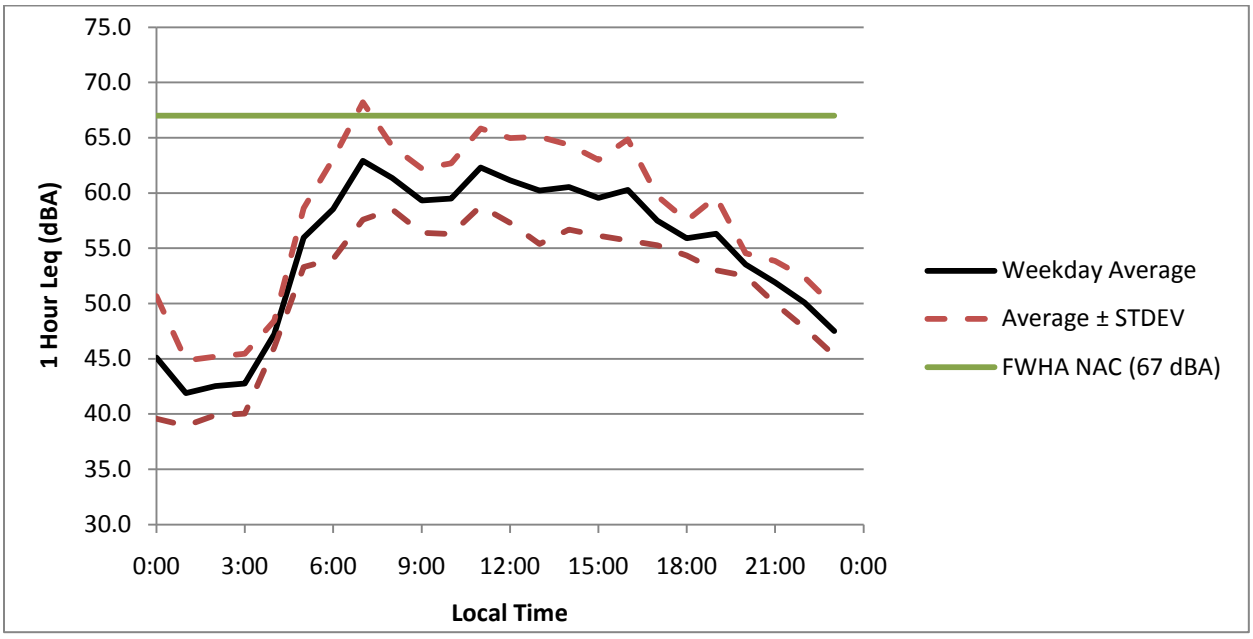


Figure 3-2: Average measured noise levels at Atlantic Road and Route 175[4]

To correlate noise levels with traffic volumes, traffic counts were collected at the intersection of Atlantic Road and Route 175 during peak morning and afternoon hours on two different weekdays during the field measurements (refer to section 3.10.1 for more on the traffic analysis). This location was chosen because the most sensitive noise receptors – residential homes – are along this segment of Atlantic Road, across from the proposed location for Alternative One. The

[4] The Standard Deviation (± STDEV) is a statistical measure of how widely spread the values are in a series of numbers. So, showing the Standard Deviation is an effective way of knowing what is typical, and what is extra large or extra small. One standard deviation away from the mean in either direction accounts for approximately 68 percent of the measured values.

traffic study determined a peak traffic count of approximately 250 vehicles per hour[5] at the intersection. This traffic count was used to generate a model of the noise using FWHA's Traffic Noise Model (TNM) with the assumptions of an even distribution of medium and heavy trucks, an 80 kilometer per hour (kph) (50 miles per hour [mph]) average speed (which is 8 kph [5 mph] above the posted speed limit), and an asphalt road surface. The FHWA's NAC (Table 3-11) was used as a standard to analyze the modeling results against. Since the conditions around the Main Base fall under "Activity Category B" the exterior (or outside) L_{eq} should not exceed 67 dBA. With the current peak traffic count of 250 vehicles per hour and the assumptions listed above, the TNM depicts that a noise level of 67 dBA is reached approximately 5.5 meters (18 feet) from the centerline of Atlantic Road.

3.5.2 Environmental Consequences

Construction Noise Analysis

The FHWA has developed an analysis tool, the Roadway Construction Noise Model (RCNM), which acts as a basic screening tool that can be used for the prediction of construction noise during the various stages of project development and construction (FHWA, 2010). The results of the RCNM for each Alternative were compared to the 67 dBA to determine the potential noise impact.

Traffic Noise Analysis

WFF has experienced a marked increase in vehicular traffic due to a surge in construction. It is anticipated that this peak in visitors and traffic will eventually plateau, and future growth can be conservatively estimated at a linear 5 percent which equates to 25 percent growth per 5 years, resulting in a doubling of baseline traffic counts at 20 years, the design-life of the project. The FWHA's TNM was used to calculate what the noise levels around the Action Alternatives may be 20 years from now. Based on this doubling and the above assumptions, the TNM results were used to determine at what distance from the centerline of Atlantic Road noise levels would equal the NAC for Activity Category B.

If, after analyzing design-life project noise levels, impacts are identified per the above criteria (Table 3-11), FHWA policy prescribes a defined set of abatement criteria. It should be noted that for this project, NASA is not adopting FHWA's policies literally; rather it has used FHWA's NAC as a proxy for measuring the potential significance of noise effects.

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, current noise levels would remain the same. Assuming a 5 percent linear growth in local traffic volume over the next 20 years to 500 vehicles during the peak morning hour,

[5] Please note that the actual traffic count number was 245. The number was rounded up for conservative analysis.

the TNM predicted that noise levels would drop below 67 dBA at distances greater than 9.75 meters (32 feet) from the centerline of Atlantic Road.

Preferred Alternative, either phasing option

Both phasing options would present similar effects. Construction activities (tree clearing, grading, paving, etc.) for reconfiguring the main entrance have the potential to generate temporary increases in noise levels. NASA would comply with local noise ordinances and State and Federal standards and guidelines for potential impacts on humans caused by construction activities. No significant noise-producing activities would be routinely conducted before 7:30 a.m. or after 4:30 p.m., typical hours of construction. Any activities outside of typical work hours that could create disruptive noise levels would be coordinated directly with the persons affected by the planned activity.

Parameters were entered into the RCNM for the Preferred Alternative two-phased approach and the results indicate that the closest sensitive receptor (U.S. Navy family housing at 320 meters [1050 feet]) would not experience an increase in noise levels above the NAC level of 67 dBA, therefore impacts from construction noise would be minor and temporary.

Workers near activities producing unsafe noise levels, according to OSHA regulations, would be required to wear hearing protection equipment. Therefore, impacts on the occupational health of construction workers as a result of construction noise are not expected.

In the long term, the loading and unloading of trucks at the combined shipping and receiving facility would increase background noise levels during normal daytime business hours, however levels are not expected to exceed those produced during construction, and accordingly would not be expected to perceptibly alter levels currently experienced at the closest sensitive receptor, U.S. Navy family housing.

The rerouting of traffic to Atlantic Road under the Preferred Alternative, would result in an additional 84 vehicles over baseline conditions during the peak morning hour at year 20 (refer to Section 3.10.2). Given these conditions, the TNM modeled that noise levels would drop below 67 dBA at distances greater than 11.5 meters (38 feet) from the centerline of Atlantic Road.

Alternative One

The center of the Alternative One project site (and location of most construction activity) is located much closer to sensitive receptors (residential homes at 90 meters [300 feet]) than the Preferred Alternative. The FHWA's RCNM indicated that, during construction, residents would experience an increase in noise levels above baseline that would exceed the NAC level by up to 7 dB, if all equipment were operating simultaneously; however, it is highly unlikely that all construction equipment would be operating at the same time. That scenario was chosen for input into the RCNM to ensure a conservative analysis. Construction noise levels at a particular receptor or group of receptors can be difficult to predict. Heavy construction vehicles, the major

source of noise during construction projects, are constantly moving in unpredictable patterns, therefore no one receptor is expected to be exposed to construction noise of long duration.

To mitigate potential impacts, no significant noise-producing activities would be routinely conducted before 7:30 a.m. or after 4:30 p.m., the typical hours of construction. Any activities outside of typical work hours that could create disruptive noise levels would be coordinated directly with the persons affected by the planned activity. The impacts from construction noise would be greater under Alternative One in comparison to the Preferred Alternative (two- or four-phased approach) but would be moderate and short-term.

Assuming trucks and visitors follow signage indicating that they must use Atlantic Road, locating the badge office on Atlantic Road as proposed under this alternative would result in a certain increase in traffic and accompanying noise levels directly in front of residences both on and off NASA property. Calculations of 20 year growth in local traffic volume yielded 684 vehicles during the peak morning hour (refer to Section 3.10.2). At this volume of traffic, the TNM predicted that noise levels would drop below 67 dBA at distances greater than 12.5 meters (41 feet) from the centerline of Atlantic Road.

Due to the similar nature of the Action Alternatives, the types of impacts and mitigation measures for occupational noise would be the same as those described for reconfiguration of the main entrance under the Preferred Alternative, either phasing option.

Summary Comparison Tables

In summary, Alternative One would generate the highest noise levels both during construction and in the long term. However, for all action alternatives, construction noise levels would be short-term and could be mitigated by restricting work to daytime hours. Long-term traffic related noise would increase, however impacts would not be substantial, as even under a highly conservative TNM modeling scenario, those areas exposed to sound levels of 67 dBA or greater would not exceed the first 8 meters (25 feet) of nearby residents' properties. Within these areas are driveways and vegetation (trees, shrubs); no homes or recreational structures (e.g., porches, gazebos, etc.) are located within the modeled 67 dBA contour.

Table 3-12: Highest noise levels during construction at closest receptor

Alternative	Closest Receptor	Noise Level, dBA
No Action Alternative	Homes along Atlantic Road	N/A[6]
Preferred Alternative	U.S. Navy Housing	< 67
Alternative One	Homes along Atlantic Road	74

[6] Noise level not applicable because no construction would occur under the No Action Alternative. For range of background noise levels please refer to Figure 3-2.

Table 3-13: 20 year projected sound levels with distances from the centerline of Atlantic Road

Alternative	Vehicles during peak morning hour	Distance to 67 dBA (meters/feet)
No Action Alternative	500	9.75 / 32
Preferred Alternative	584	11.5 / 38
Alternative One	648	12.5 / 41

3.6 Hazardous Materials and Hazardous Waste

3.6.1 Affected Environment

Hazardous Materials Management

The WFF Integrated Contingency Plan (ICP), developed to meet the requirements of 40 CFR 112 (Oil Pollution Prevention and Response), 40 CFR 265 Subparts C and D (Hazardous Waste Contingency Plan), and 9 VAC 25-91-10 (Oil Discharge Contingency Plan), serves as the facility's primary guidance document for the prevention and management of oil, hazardous material, and hazardous waste releases.

Hazardous Waste Management

The regulations that govern hazardous waste management are the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. 6901 et seq.) and Virginia's Hazardous Waste Management Regulations (9 VAC 20-60). All hazardous wastes are classified as solid wastes. A solid waste is any material that is disposed, incinerated, treated, or recycled except those exempted under 40 CFR 261.4. NASA uses licensed hazardous waste transporters to transport hazardous waste off site to licensed treatment, storage, and disposal facilities.

3.6.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, there would be no effects from hazardous materials and generation of hazardous waste.

All Action Alternatives

Impacts from all Action Alternatives would be expected to be equivalent. Construction activities would include the use of hazardous materials and may generate hazardous waste (i.e., solvents, hydraulic fluid, oil, and antifreeze) from the construction equipment. Prior to commencing work, contractors would be required to submit a Health and Safety Plan for approval by the WFF Safety Office. All construction and demolition debris would be characterized in accordance with *Virginia Hazardous Waste Management Regulations* and disposed of at an appropriate facility.

If stained or malodorous soil should be encountered, the contractor would stop work and immediately notify the Wallops Environmental Office. Any soil that is suspected of contamination or wastes that are generated during construction-related activities would be tested and disposed of in accordance with applicable Federal, State, and local laws and regulations.

Contractors would be encouraged to limit the use of contractor owned mobile aboveground storage tanks (ASTs) on the facility. Contractors would be required to notify WFF of ASTs brought to the facility with a capacity greater than 208 liters (55 gallons), and tanks of 3,785 liters (660 gallons) or greater must have FMB approval and include an SWPPP or other approved spill response plan. If the tank would be in use on WFF for more than 120 days, the contractor would be required to provide proof that the tank is registered with the DEQ. Possible releases from these tanks must be addressed in the contractor's Hazardous Materials Spill Plan or other approved spill response plan. WFF requires that impermeable secondary containment with 110 percent capacity be provided for all ASTs brought onto the facility by a contractor.

NASA would require its contractors to manage all hazardous materials and wastes in accordance with the WFF (ICP) and Federal, State, and local regulations. Therefore, no impacts on human health or the environmental are expected from the use or management of hazardous materials and waste.

3.7 Vegetation

3.7.1 Affected Environment

The vegetative zones from east to west on the Main Base are marsh, thicket, landscaped and mown areas, and upland forest. Inland communities such as fresh and brackish marsh, xeric and mesic shrub, patches of open ground, areas completely covered by pine and pine-deciduous mixed woodlands are often separated from one another by a sharp topographic change. Small rich remnants of upland forests and swamps occur on the Main Base, as well as tidal marshes. Dominant species in the upland forest include loblolly pine (*Pinus taeda),* various oaks (*Quercus sp*.), hickory (*Carya sp.),* tulip-poplar (*Liriodendron tulipifera*), dogwood (*Cornus florida*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and sassafras (*Sassafras albidum*). Black willow (*Salix nigra*) and red maple are dominant species in the swamps. Fields, pine forests, lawns, buildings, and pavement are present throughout the Main Base.

A vegetation survey (August 2010) was conducted on the forested area that would be the location of the new badge office for the Preferred Alternative, two- or four-phased approach, to provide information on plant species and their approximate inventory by percentage. According to the survey, loblolly pine is the most abundant tree type in the forested area. The majority of trees in the area are mature and have been there for as long as 80 years, with signs of successional growth visible only at the fringes (Figure 3-3). A few oaks along the fence

line (Figure 3-4) have been estimated to be up to 200 years old or more (Ailes, Navy, personal comm.).

Table 3-14: Vegetation survey results

Tree	Scientific name	Percentage (%)
American Holly	*Ilex opaca*	12.7
Black Oak	*Quercus velutina*	10.8
Dogwood	*Cornus florida*	3.9
Loblolly pine	*Pinus taeda*	30.4
Northern Red Oak	*Quercus rubra*	3.3
Pignut Hickory	*Carya glabra*	10.5
Sassafras	*Sassafra albidum*	3.9
Southern Red Oak	*Quercus falcata*	2.1
Sweet Gum	*Liquidambar styrafolia*	3.6
Tulip Tree	*Liriodendron tulipfera*	13.2
White Oak	*Quercus alba*	5.4

Figure 3-3: Vegetation at Preferred Alternative site, facing south

Figure 3-4: Hardwoods near the perimeter of the Preferred Alternative site

3.7.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, there would be no impact to vegetation.

Preferred Alternative, either phasing approach

Long-term adverse impacts to vegetation would be anticipated due to the permanent conversion of forest to developed land. The Preferred Alternative at final buildout would result in the loss of up to 1.40 hectares (3.48 acres) of trees. All land clearing activities would employ Virginia Department of Forestry-recommended BMPs as feasible, such as:

- Using mats to minimize soil compaction and mechanical injury to plants;
- Avoiding parking heavy equipment or stacking construction materials near trees (which could damage root systems by compacting the soil);
- Stockpiling soil away from trees to avoid killing the root systems;
- Marking and fencing trees at least to the dripline, or end of the root system, whichever extends farther from the tree stem; and
- Marking trees with highly visible ribbon so equipment operators can easily identify protected areas.

The Preferred Alternative site has some of its older trees located on the fringes of the site near the fence line. Orange tape would be tied around any hardwoods that could be spared and the contractor would be made aware to avoid the marked trees during tree removal. The contractor would be instructed to only clear the path necessary for the project's footprint and no more. Since the majority of the area cleared would be paved, little revegetation would be possible. Aesthetics would be maintained through planting native landscaping and grasses on any remaining bare soil. Vegetation growth would be monitored until well established.

Alternative One

Impacts to vegetation under Alternative One would be similar, however slightly less than, those under the Preferred Alternative due to the removal of approximately 1.05 hectares (2.60 acres) of trees; 0.35 hectares (0.86 acres) less than the Preferred Alternative.

3.8 Terrestrial Wildlife and Migratory Birds

3.8.1 Affected Environment

Terrestrial fauna comprise the upland biotic communities on the Main Base. Large mammals including whitetail deer (*Odocoileus virginianus*) and red fox (*Vulpes fulva*) are known to inhabit the areas at WFF. Medium and small mammals in the area include raccoon (*Procyon lotor*), opossum (*Didelphis marsupialis*), grey squirrel (*Sciurus carolinensis*), white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pensylvanicus*), and cotton tail rabbit (*Sylvilagus floridanus*) (NASA, 2005).

The Migratory Bird Treaty Act (MBTA) was enacted to ensure the protection of shared migratory bird resources. The MBTA prohibits the take and possession of any migratory bird, their eggs, or nests, except as authorized by a valid permit or license. A migratory bird is any species that lives, reproduces, or migrates within or across international borders at some point during its annual life cycle.

On July 10, 1975, the U. S. Fish and Wildlife Service (USFWS) and NASA developed the WINWR, comprising approximately 151 ha (373 acres) of salt marsh, grassland, brush habitat, and woodlands. WINWR is located approximately 1.5 kilometers (0.9 miles) east of the Preferred Alternative site and 1.3 kilometers (0.8 miles) east of Alternative One, and contains habitat for a variety of migratory birds (snow geese, black ducks, snowy egrets, black-crowned night herons, dunlin, dowichers, shorebirds, northern harriers, osprey, and great horned owls). Some of the migratory bird species that find refuge in these areas (wood warblers, vireos, kinglets, thrushes, wrens, creepers, nuthatches, woodpeckers and cuckoos) may utilize the forest at the Preferred Alternative site (NASA, 2008b).

3.8.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, there would be no impact to terrestrial wildlife.

Preferred Alternative, either phasing option

Short-term adverse impacts to wildlife and migratory birds may be anticipated during construction activities due to temporary noise disturbances, especially during spring and fall migrations; however most of the area surrounding the proposed project site is developed and is currently affected by human-related noise including the Main Base airfield. Current noise disruption caused by WFF operations are of low frequency and short duration and already exist.

The permanent removal of up to 1.40 hectares (3.48 acres) of trees would adversely affect wood-dwelling species. The terrestrial wildlife and/or migratory birds mentioned above would likely be permanently displaced from the area. Less mobile animals (such as invertebrates, amphibians, reptiles, and small mammals) within the construction footprint could be crushed or buried during clearing, grubbing and grading activities. Larger or more mobile animals and birds within or close to the construction footprint would likely migrate to the remaining forested area nearby, or to another suitable habitat in close proximity. Currently, there are no bald eagle's nests in the project area. However, before initiating each future project phase, NASA would consult with resource agencies regarding the location of any new eagle nests. If nearby active nests are identified, NASA's preferred mitigation would be to employ protective buffers within which no work would occur such that nesting activities are not disturbed. NASA would only consider consulting with USFWS for authorized take or inactive eagle nest removal (50 CFR § 22.26-27) if no other practicable mitigation to avoid or reduce the impact existed.

Under the Preferred Alternative two-phased approach, long-term adverse impacts to terrestrial wildlife or migratory birds would be anticipated due to the loss of forested land to developed land. However, given the amount of suitable habitat nearby, impacts would not be substantial.

Alternative One

Impacts to terrestrial wildlife under Alternative One would be similar but slightly less than those under the Preferred Alternative due to the removal of approximately 1.05 hectares (2.60 acres) of trees; 0.35 hectares (0.86 acres) less than the Preferred Alternative.

3.9 Health and Safety

3.9.1 Affected Environment

This section addresses safety concerns created by the current configuration of the main entrance. As traffic (both vehicular and pedestrian) increases, the safety situation will continue to worsen.

The current configuration of the main entrance (Figure 1-2) has security personnel parking their POVs and GOVs in a lot just northeast of the guard house. From this lot, security personnel must cross both inbound and outbound traffic lanes several times per day to access the badge office. It is estimated that each officer crosses traffic anywhere from 25 to 100 times per shift in order to perform multiple functions such as badge checks and vehicle inspections.

With 16 regular spaces and 2 handicapped spaces, the parking lot for the badge office can become dangerously congested. There are also two truck inspection lanes within the confines of this same parking area. The combination of trucks, vehicles, and people in one small space conducting multiple operations has deteriorated into a safety hazard, with the recent increase in visitors only worsening the situation.

All visitors to WFF must go through the badge office, however most visitors utilizing the badge office parking lot are not continuing onto the Main Base. Currently a large volume of construction is taking place on Wallops Island, approximately 11.3 kilometers (7 miles) southeast. Visitors needing to exit the badge office parking lot and travel to Wallops Island (estimated to be nearly 80%) must make a maneuver across several traffic lanes (both incoming and outgoing) with obscured sightlines due to the location of the truck inspection lanes and the existing guard house.

Safety Response Capabilities

WFF maintains 24-hour fire protection on the Main Base and on Wallops Island. Response personnel are trained in hazardous materials emergency response, crash rescue, and fire suppression.

3.9.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur, resulting in an adverse impact to health and safety of WFF personnel and visitors. If the current configuration remains the same, the safety issues inherent with the current configuration would not be addressed. Vehicles would not be separated from trucks and employees would continue to cross active traffic lanes to get to work. Additionally, vehicles needing to exit the badge office parking lot and travel to Wallops Island would continue to make a highly unsafe maneuver across several traffic lanes (both incoming and outgoing) with

obscured sightlines due to the location of the truck inspection lanes and the existing guard house. The number of visitors to WFF would continue to increase and the ability of the current configuration of the main entrance to be able to handle and process additional personnel, vehicles and trucks would continue to decrease, a long-term adverse impact.

All Action Alternatives

Construction related activities, including welding, climbing ladders, heavy lifting, and operation of machinery could result in worker injuries with a resulting minor increased usage of local fire, police, and medical services. To mitigate potential adverse impacts, NASA would implement mandatory construction safety procedures on the jobsite; including requiring all workers to wear proper personal protective equipment, conducting regularly scheduled safety meetings, and requiring workers to have appropriate training before starting work.

Safety is the top long-term priority of this project; as such the site would be designed to maximize the safety of employees, visitors, construction workers, and nearby civilian residents. Under either Action Alternative, safety would improve markedly following the first phase of construction. Vehicles would be separated from trucks, employees would no longer have to cross active traffic lanes, and exiting the new badge office parking lot would no longer be a dangerous maneuver.

3.10 Transportation

3.10.1 Affected Environment

Primary access to WFF is provided by Route 175, a two-lane secondary road. Atlantic Road (Route 798) has a two-lane cross section that runs north-south and culminates at the Y intersection with Mill Dam Road directly west of the main entrance to WFF. Traffic entering the main entrance merges from Atlantic Road and Mill Dam Road into a single lane directly before the badge office parking lot and guard house area.

Hard surface roads provide access to most buildings at WFF and are maintained by NASA and its tenants. Most organizations at WFF own and maintain a variety of vehicles ranging from sedans and vans to trucks. There is no public transportation on the facility. Many WFF employees carpool to and from the facility.

A traffic impact assessment of the WRP area was conducted during August 2007 to obtain information on existing traffic operations and volumes (VHB, 2007). The area studied lies directly in front of the main entrance to WFF. The study concluded that peak traffic hours on Mill Dam and Atlantic Roads are between 7:15 to 8:15 a.m. and 4:00 to 5:00 p.m., Monday through Friday.

The 2007 WRP Traffic Study that reviewed traffic along Route 175, Atlantic Road, and Mill Dam Road, determined that minimal pedestrian and bicycle travel occurred in the area due to the

nature of roadway corridors. Additional pedestrian and bicycle traffic were not expected to be generated by the WRP development and, therefore, were not included in the 2007 analysis. The Main Entrance Reconfiguration Project is also not anticipated to increase either bicycle or pedestrian traffic and, again, they have not been included in this analysis.

To verify the current traffic trends at WFF, NASA had new traffic counts taken at the main entrance (NASA, 2010b). Assessment of the 2010 traffic count data found that Atlantic Road is the main ingress/egress route to the WFF Main Base, accounting for approximately 60% of the traffic, while Mill Dam Road carries the balance, approximately 40%.[7] It is assumed that visitors follow this same general split.

Using 2011 visitor badge data, an average of 105 visitor badges are issued per weekday. Assuming the 60/40 split mentioned above, approximately 63 of these visitors currently utilize Atlantic Road, while the remaining 42 use Mill Dam Road on a daily basis. Approximately 30 percent of visitors (32) need to be escorted by a current NASA employee. This results in an average of 137 people utilizing the badge office each day (NASA, 2010b).

The 2007 WRP Traffic Study concluded that traffic volumes have grown by 3 percent each year since 2001. However, more recently (2006 to present), WFF has experienced a marked increase in vehicular traffic due to a surge in construction. It is anticipated that this peak in visitors and traffic will eventually plateau, and future growth can be conservatively estimated at a linear 5 percent (Table 3-15). In summary, a linear growth of 5 percent per year equates to 25 percent growth per 5 years, resulting in a doubling of the baseline at 20 years.

Table 3-15: Distribution of weekday visitor-related traffic at WFF main entrance

Year	Atlantic Road	Mill Dam Road	NASA Escorts	Total Vehicles
Baseline	63	42	32	137
+ 5 Years	79	53	40	171
+ 10 Years	95	63	48	206
+ 15 Years	110	74	56	240
+ 20 Years	126	84	64	274

Under the Proposed Action, traffic volumes would increase along Atlantic Road due to re-routing all visitors and trucks. Accordingly, NASA performed traffic counts at the intersection of Atlantic Road and Route 175 during peak morning and afternoon hours on two different weekdays. This location was chosen because it provides insight into traffic volumes (and potential effects of the alternatives) along the segment of Atlantic Road most used by non-NASA related drivers.

[7] It should be noted that the distribution of main entrance traffic differs from what was presented in the Draft EA; the Draft EA stated that at the current time more traffic entered via Mill Dam Road. Following the release of the Draft EA, NASA collected additional traffic information that prompted the change.

To identify peak hour, traffic counts were taken over the busiest morning and afternoon hours, 7:00 a.m. to 9:00 a.m. and 3:00 p.m. to 5:00 p.m., respectively. The peak hour for traffic heading north (toward the WFF main entrance) was identified as 7:00 a.m. to 8:00 a.m., whereas the peak hour for south-heading traffic was between 4:00 p.m. and 5:00 p.m., which is consistent with the results of the 2007 WRP Traffic Study. Table 3-16 presents a summary of the data. The values shown in the table are averages of the two days of traffic counts.

Table 3-16: Atlantic Road peak morning and afternoon traffic volumes, 5/26/2011 and 6/1/2011

Time	Northbound	Southbound	Total
7:00 -8:00	181	53	234
8:00-9:00 a.m.	105	64	169
2-Hour Total	286	117	403
3:00-4:00 p.m.	61	109	170
4:00-5:00 p.m.	37	180	217
2-Hour Total	98	289	387

3.10.2 Environmental Consequences

As the re-routing of traffic under each action alternative would most notably increase volumes during morning hours when visitors are most likely to arrive, the 20 year projection of growth only includes the morning. It is assumed that when departing the facility in the afternoon, visitors would follow the same distribution along either Mill Dam or Atlantic Roads independent of this project; the only "shifting" of traffic from existing to proposed conditions would be when vehicles are entering the facility for the first time. To be conservative, the largest volumes for northbound and southbound traffic were selected from Table 3-16, even if it was not recorded during the officially identified 'peak hour', as representative baselines for growth estimation in Table 3-17.

Table 3-17: Estimated Atlantic Road traffic volume growth during the peak morning hour

Year	Northbound	Southbound	Total
Baseline	181	64	245
+ 5 Years	227	80	307
+ 10 Years	272	96	368
+ 15 Years	317	112	429
+ 20 Years	362	128	490

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur, resulting in an adverse impact to transportation at WFF. Traffic congestion at the main entrance would increase and the Y-intersection would continue to contribute to traffic delays and an increasing risk of vehicular accidents. Morning peak hour traffic would grow as summarized in Table 3-17 above.

Preferred Alternative, either phasing option

Impacts from initiation through final buildout for both phased approaches would be generally the same. Temporary impacts to traffic flow would occur during construction activities due to an increase in the volume of construction-related traffic on roads in the immediate vicinity of the proposed project site. Traffic lanes may be temporarily closed or rerouted during construction and paving, and construction equipment and staging could interfere with pedestrian and vehicle flow. NASA would coordinate all transportation activities that would have the potential to affect public roads, including closures, traffic control, safety issues, etc. with Accomack County and the VDOT Accomac Residency Office. To mitigate potential delays, NASA would:

- Provide adequate advance notification of upcoming activities for all areas that would be affected by construction-related traffic, temporary closures, or re-routing;
- Coordinate any traffic lane or pedestrian corridor closures with all appropriate officials;
- Place construction equipment and vehicle staging so as to minimize hindrances to traffic and pedestrian flow; and
- Minimize the use of construction vehicles in residential areas.

After completion of the first phase of construction, signage would be placed along Route 175 to direct all incoming visitor and truck traffic to take Atlantic Road to access the new badge office. This would result in additional traffic along Atlantic Road and would slightly reduce traffic on Mill Dam Road. Of the estimated 74 additional vehicles traveling on Atlantic Road during weekdays of the baseline year, only 42 of those would be incoming (northbound) vehicles traveling the road's entire length; the remaining 32 escort vehicles would only travel a short distance (less than 100 meters [300 feet]) south along Atlantic until turning left into the badge office. At 20 year growth, this would equate to 84 more northbound vehicles on Atlantic Road compared to the No Action Alternative (Table 3-18). The subsequent increase in traffic would be minor when compared to the estimated 446 vehicles that would be traveling northbound on Atlantic Road during the peak morning traffic hour of 7:00 a.m. – 8:00 a.m. at year 20. It should be noted that this assessment and comparison is conservative because in reality visitors would arrive over the course of the day, which would more evenly distribute the resulting growth, and many visitors carpool to the facility, decreasing the number of vehicles even further. Furthermore, the addition of a right-hand turn lane on Atlantic road at the entrance of the new badge office would facilitate traffic entering the facility in a safe and efficient manner.

VDOT Consultation

Early in project planning, NASA consulted with VDOT to discuss the preferred strategy for reconfiguring the WFF main entrance. The VDOT land use engineer approved of the overall design strategy and confirmed that moving the badge office would reduce traffic conflicts, but would not alone eliminate morning traffic queues. The engineer suggested adding a second inbound lane and replacing the current Y intersection with a roundabout.

Relocation of the badge office and the new shipping and receiving facility onto Atlantic Road would redistribute existing traffic. Since there would be no new traffic generation associated with the proposed project a full Traffic Impact Analysis would not be required by VDOT (Weidenhammer, VDOT, personal comm.). However, the development of a comprehensive signage plan was suggested to direct traffic to the appropriate destinations from various entry points to the gate area.

As project designs matured, NASA again consulted with VDOT regarding transportation study needs for the relocation of the badge office. VDOT responded that its primary concern was evaluation of the need for a left turn lane on Atlantic Road. Accordingly, NASA analyzed the need for a turn lane and found that it would not be necessary. On May 10, 2011, VDOT concurred with NASA's analysis (Appendix A).

It should be noted that all detailed VDOT consultations cannot be completed without detailed design information. Accordingly, all future phases of this project within the VDOT right of way, including turn lanes or entrance connections, would require plan review and approval, and ultimately the issuance of a Land Use Permit to perform construction activities within the right of way. NASA would continue to consult with VDOT as future phases are designed such that all specifications meet VDOT standards.

Alternative One

Alternative One from initiation through final buildout would result in similar impacts to transportation as those under the Preferred Alternative phased approaches. However, Alternative One would locate the badge office in an open field directly across from a number of residential homes and close to a major intersection.

Given that the badge office would be further south along Atlantic Road, more vehicles would travel along its entire length; this would be comprised of the 42 re-routed visitors as well as the expected 32 NASA escort vehicles at the baseline year. At year 20, there would be approximately 98 more northbound vehicles and 64 more southbound vehicles during the peak morning hour when compared to the No Action alternative (Table 3-18). As under the Preferred Alternative, this assessment should be considered conservative as in reality visitor traffic would be distributed over the course of the day and many visitors carpool to the facility. To mitigate

potential impacts during construction, NASA would coordinate closely with VDOT; these measures are discussed in more detail above under the Preferred Alternative.

Moreover, any improvements within the VDOT right of way, including turn lanes or entrance connections, would require plan review and approval, and ultimately the issuance of a Land Use Permit to perform construction activities within the right of way.

In the long term, the badge office parking lot would be sized appropriately to contain all trucks, visitor vehicles and security personnel vehicles anticipated to be on-site at any given time. Additionally a right-hand turn lane would be incorporated to help with traffic flow. No vehicles would be stopped on Atlantic Road or Route 175 queuing to enter the Alternative One site, therefore no impacts to traffic along Route 175 from this project are expected.

Summary Table

Table 3-18 below provides a summary comparison of how each alternative would affect traffic volumes on Atlantic Road during the peak morning hour (7:00 a.m. to 8:00 a.m.). Between the Action Alternatives, Alternative One would result in the greatest volume of vehicle trips.

Table 3-18: Summary comparison of Atlantic Road peak morning hour traffic levels

	Northbound			Southbound		
	No Action	**Preferred Alternative**	**Alternative One**	**No Action**	**Preferred Alternative**	**Alternative One**
Baseline	181	223	230	64	64	96
+5 Years	227	279	288	80	80	120
+10 Years	272	335	345	96	96	144
+15 Years	317	391	403	112	112	168
+20 Years	362	446	460	128	128	192
Projected 20 year vehicle increase compared to No Action Alternative		84	98	n/a	0	64

3.11 Cultural Resources

3.11.1 Affected Environment

The National Historic Preservation Act (NHPA) of 1966, (P.L. 89-665; 16 U.S.C. 470 et seq.) as amended, outlines Federal policy to protect historic properties and promote historic preservation in cooperation with other nations, Tribal governments, States, and local governments. The NHPA established the National Register of Historic Places (NRHP) and designated the State Historic Preservation Officer as the individual responsible for administering State-level programs. The NHPA also created the Advisory Council on Historic Preservation, the Federal agency responsible for overseeing the Section 106 process and providing commentary on Federal activities, programs, and policies that affect historic properties.

Section 106 of the NHPA and its implementing regulations (36 CFR 800) outlines the procedures for Federal agencies to follow to take into account their actions on historic properties. The Section 106 process applies to any Federal undertaking that has the potential to affect historic properties, defined in the NHPA as those properties that are listed in or eligible for listing in the NRHP. Under Section 106, Federal agencies are responsible for identifying historic properties within the Area of Potential Effects for an undertaking, assessing the effects of the undertaking on those historic properties, if present, and considering ways to avoid, minimize, and mitigate any adverse effects. Because Section 106 of the NHPA is a process by which the Federal government assesses the effects of its undertakings on historic properties, it is the primary regulatory framework that is utilized in the NEPA process to determine impacts on cultural resources.

Section 110 of the NHPA calls for Federal agencies to establish historic preservation programs to ensure the identification, protection, and use of historic properties. To that end, in November 2003, WFF prepared a *Cultural Resources Assessment (CRA) of Wallops Flight Facility, Accomack County, Virginia* that established a predictive model for understanding the archaeological potential over the entire WFF property (NASA, 2011).

Among the cultural resources identified at WFF in the CRA are six archaeological sites, four of which are historic sites on the Main Base, but none are located within the areas of either the Preferred Alternative or Alternative One. Neither the Preferred Alternative location nor the location of Alternative One is within an area modeled to have an increased sensitivity for archaeological resources. In a letter dated December 4, 2003, the Virginia Department of Historic Resources (VDHR) concurred with the findings of the CRA and accepted the predictive model for archaeology at WFF (NASA, 2005).

3.11.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore cultural resources would not be impacted.

Preferred Alternative, either phasing option

No structures would be impacted by either of the Preferred Alternative phased approaches. The proposed badge office site would be located in a well established forest with minimal potential for archaeological sensitivity. However, if unanticipated archaeological artifacts or remains would be identified during construction of the new badge office, the contractor would be required to halt work and immediately contact the WFF Historic Preservation Officer who would then consult with the VDHR to determine the significance of the resource and the effects of the undertaking on the resource, and to identify the appropriate avoidance or mitigation measures.

Alternative One

No structures would be impacted by Alternative One. Alternative One proposes a new badge office be built further south on Atlantic Road in comparison to the Preferred Alternative badge office location. This area, which is currently an open field, has previously been surveyed for archaeological significance. In 1990, the U.S. Navy proposed to construct additional housing units on the southern portion of the Main Base. During the EA process for this construction, the Chesapeake Division of the Naval Facilities Engineering Command conducted a phase I archaeological survey of approximately 25 hectares (60 acres) on the southwestern portion of the Main Base, including the area of Alternative One. Site 44AC103 (directly north of the U.S. Navy's proposed project site), the Matthews House (VDHR ID# 01-0155), ca. 1788, had been identified previously in the southeastern portion of WFF. The Matthews House was a late 18th century domestic site and associated grave/cemetery that was disturbed by the U.S. Navy in the1950s during construction of the runway in the southeastern portion of the Main Base. Although the house had been removed, it was unknown at the time of the EA if intact or undisturbed archaeological deposits related to the house remained at the site. The phase I investigation included surface survey and a program of shovel test pits.

One archeological site, 44AC405, was identified during the investigation. Located in a cultivated field, this artifact scatter may be associated with site 44AC103, as this was probably a farmstead during the late 18th and 19th centuries, and trash dumping in agricultural fields during these periods has been well-documented in archaeological records. The badge office under Alternative One would be approximately 300 meters (1,000 feet) from Site 44AC405 (Figure 3-5). No impacts to this resource or other cultural resources are anticipated. If archaeological remains are identified during construction, work would stop immediately and the WFF Historic Preservation Officer would consult with the VDHR to determine the significance of the resource and the effects of the undertaking on the resource, and to identify the appropriate avoidance or mitigation measures.

Section 106 Consultation

Pursuant to Section 106 of the NHPA, NASA consulted with VDHR and the Virginia Council on Indians (VCI) regarding potential effects to cultural and historic resources. In an April 18, 2011 correspondence, VDHR concurred with NASA's determination that no historic properties would be affected by either action alternative. Also on April 18, 2011, VCI indicated that it had reviewed the project and did not have any comments to offer.

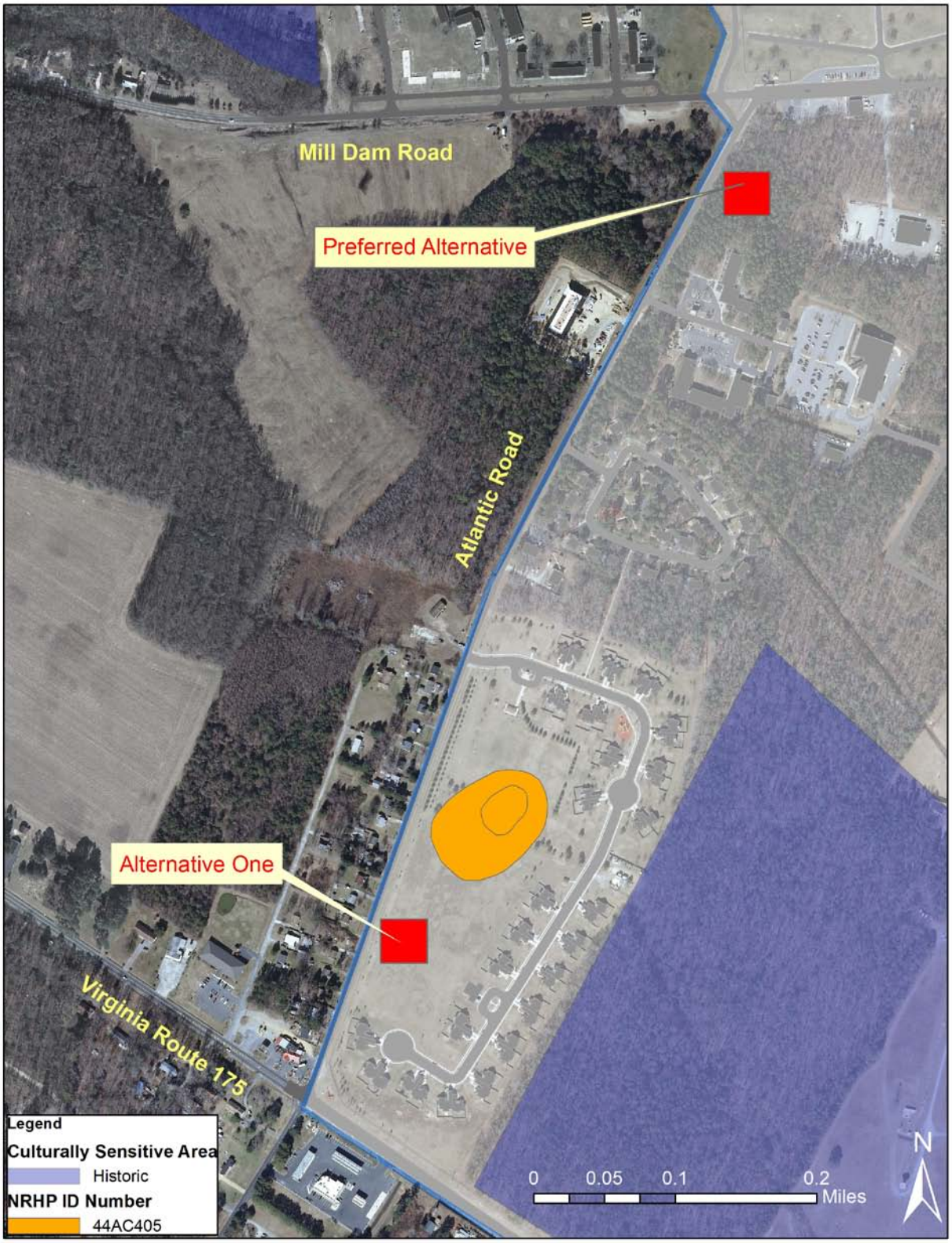


Figure 3-5: Site 44AC405

3.12 Environmental Justice

3.12.1 Affected Environment

The goal of environmental justice from a Federal perspective is to ensure fair treatment of people of all races, cultures, and economic situations with regard to the implementation and enforcement of environmental laws and regulations, and Federal policies and programs. EO 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low Income Populations*, (and the February 11, 1994, Presidential Memorandum providing additional guidance for this EO) requires Federal agencies to develop strategies for protecting minority and low-income populations from disproportionate and adverse effects of Federal programs and activities. The EO is "intended to promote non-discrimination in Federal programs substantially affecting human health and the environment."

Accomack County is on the lower end of income measures in the region, with a 2009 median family income of $40,343. As a result, the county is also on the higher end of poverty levels in the region based on U.S. Census Bureau data reports. The per capita income in Accomack County in 2009 was reported to be $22,013, with an estimated 16.3 percent of people below the poverty level (U.S. Census Bureau, 2011). The per capita income in the Commonwealth of Virginia in 2009 was reported to be $31,606, with an estimated 10.1 percent of people below the poverty level statewide (U.S. Census Bureau, 2011).

To ensure compliance with EO 12898, NASA prepared an Environmental Justice Implementation Plan (EJIP) in 1996. NASA evaluated the demographic information in the vicinity of WFF and identified areas that have a higher concentration of minority persons and low-income persons based on Federal guidelines. The EJIP also includes an evaluation of all programs at WFF, including tenant activities that could potentially affect human health and the environment. The EJIP demonstrates that NASA will continue to incorporate environmental justice in all its activities and monitor all programs to determine any potential environmental justice impacts on persons in the area.

The WFF Main Base is located in Accomack County Census Tract 9902 (Figure 3-6). Tables 3-19 and 3-20 compare the 2000 Census Tract minority and poverty data, respectively, to Accomack County and Commonwealth of Virginia census data to show how the areas around WFF measure up to these larger-scale benchmarks. Census tract 9902 has a 2.27 percent and 7.87 percent higher minority population than Accomack County and the Commonwealth of Virginia, respectively. This tract also demonstrates a 4.22 percent lower and 6.18 percent higher population below the poverty level when compared to the County and the State, respectively. Accordingly, NASA considers this tract to contain populations needing Environmental Justice consideration during project planning.

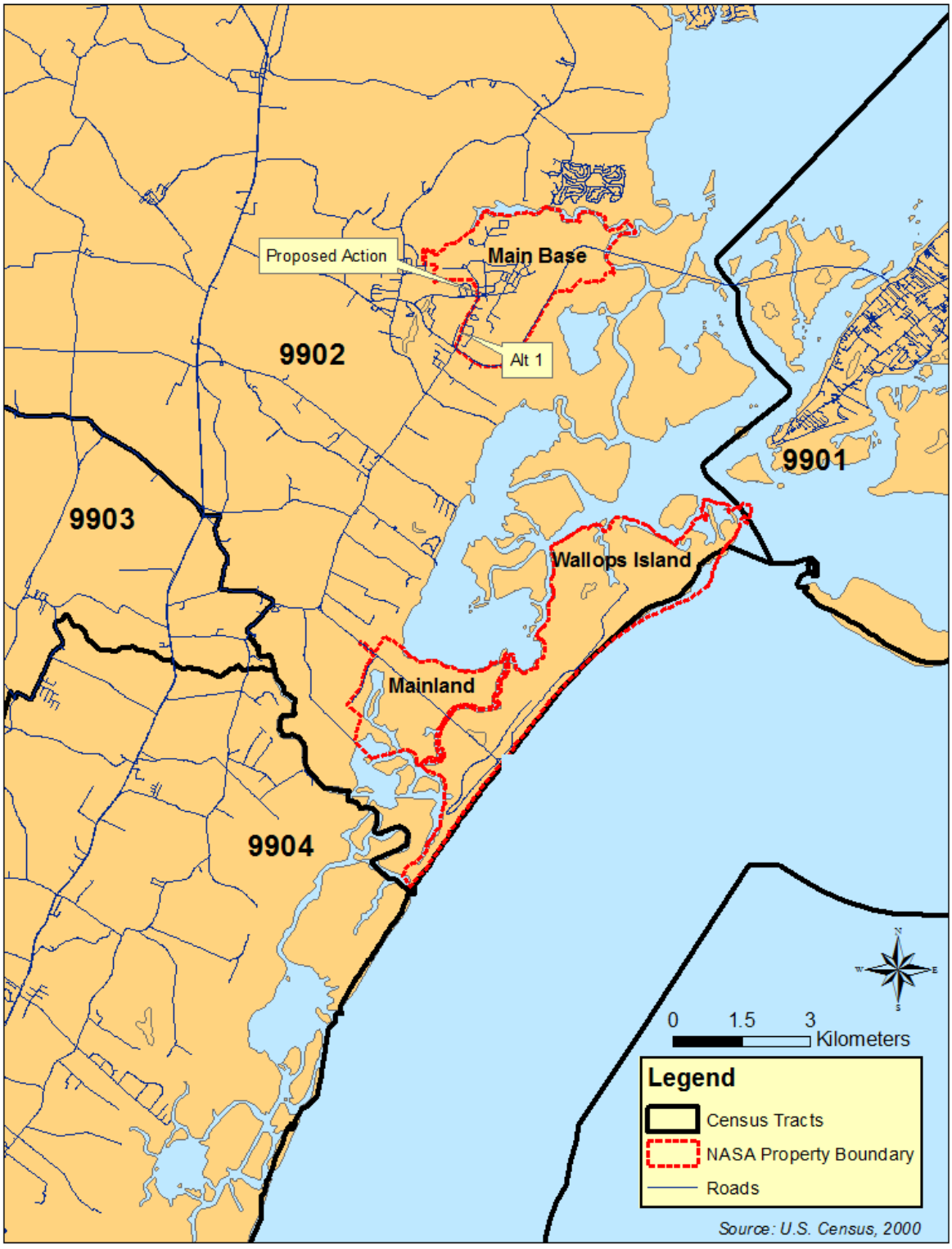


Figure 3-6: Accomack County census tracts in the vicinity of WFF

Table 3-19: Minority population data – by census tract, Accomack County, VA

Tract	Location	Percent Minority, 2000[1]	Compared to Accomack County (39.3%, 2009)[2]	Compared to Virginia (33.7%, 2009)[2]
9901	Maryland/Virginia line south including Fisher's Point (includes Chincoteague)	1.97	Lower than County	Lower than State
9902	Maryland/Virginia line south including Wallops Island to Assawoman Inlet (includes WFF)	41.75	Higher than County	Higher than State
9903	West of 9902 and 9904, Maryland/Virginia line south to Ann's Cove Road	24.66	Lower than County	Lower than State
9904	East of Mears Station Road, South of 9902 south to Horseshoe Lead	59.14	Higher than County	Higher than State

Sources:
[1]*NASA, 2008*
[2]*U.S. Census Bureau, 2011*

Table 3-20: Poverty data – by census tract, Accomack County, VA

Tract	Location	Percent Poverty, 2000[1]	Compared to Accomack County (20.6%, 2008)[2]	Compared to Virginia (10.2%, 2008)[2]
9901	Maryland/Virginia line south including Fisher's Point (includes Chincoteague)	12.80	Lower than County	Higher than State
9902	Maryland/Virginia line south including Wallops Island to Assawoman Inlet (includes WFF)	16.38	Lower than County	Higher than State
9903	West of 9902 and 9904, Maryland/Virginia line south to Ann's Cove Road	19.28	Lower than County	Higher than State
9904	East of Mears Station Road, South of 9902 south to Horseshoe Lead	27.14	Higher than County	Higher than State

Sources:
[1]*NASA, 2008*
[2]*U.S. Census Bureau, 2011*

A key component of NASA's Environmental Justice program is its continuing outreach activities. During project planning, NASA regularly holds public meetings and issues announcements to ensure that members of the public are aware of upcoming activities. These announcements are published through a variety of outlets including the internet, local radio, local (free) newspapers, and local town hall meetings. This outreach effectively ensures that people of all income and ethnicities have the opportunity to provide input on NASA's activities.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, encourages Federal agencies to consider the potential effects of Federal policies, programs, and activities on children. The closest day care centers, schools, camps, nursing homes, and hospitals are addressed within the EJIP and are greater than 3 kilometers (2 miles) from the proposed project sites.

3.12.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, there would be no disproportionately high or adverse impacts on low-income or minority populations.

All Action Alternatives

The type and intensity of effects on minority or low-income persons from either Action Alternative would be the same as those affecting persons of all other ethnicities or income. These effects are discussed in detail in each resource area's section in this EA, with the most notable being related to higher noise levels or temporary traffic delays during construction. In summary, any effects on minority or low-income populations would not be disproportionately high.

To ensure that members of the public are involved in planning for this project, NASA published a Notice of Availability (NOA) of this Draft EA in two local newspapers, one of which is a free weekly publication. Additionally, NASA posted copies of this Draft EA on the internet and distributed NOAs directly to all persons living or owning property on Mill Dam Road or Atlantic Road such that they were aware of this proposal and had the opportunity to comment on it.

4 Cumulative Effects

The CEQ defines cumulative effects as the "impact on the environment which results from the incremental impact of the action(s) when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1500). Sections 3.1 – 3.12 of this EA describe the potential impacts from the Proposed Action evaluated for the Main Entrance Reconfiguration Project. Cumulative effects can result from actions that overlap spatially and temporally. Past, present, and reasonably foreseeable future actions that may result in cumulative effects when combined with the Main Entrance Reconfiguration Project's Preferred Alternative are described below.

4.1 Wallops Main Base

From colonization to World War II, the area of the Main Base had been farm and woodlands. During World War II, the U.S. Navy took over the property and established the Chincoteague Naval Auxiliary Air Station, primarily as a training field for naval aviation. NASA acquired the facility in June 1959, and has expanded facilities since then. Currently, the Main Base comprises 780 hectares (1,930 acres), approximately 100 hectares (250 acres) of which are impervious surfaces covered by offices; laboratories; radar antennas, maintenance and service facilities; an airport with air traffic control facilities, hangars, runways, aircraft maintenance, and ground support buildings; and tenant administration buildings and housing. Roads, parking areas, the airfield, and the water and sewage treatment plants, are interconnected with storm drainage systems. All of this has impacted the topography, drainage, land use, wetlands, surface water, and biological resources of the Main Base area.

4.2 Wallops Research Park

The goal of the WRP project is to create an integrated business park for aerospace research and development programs, scientific research, commercial space industries, and educational centers. Development of the WRP is taking place adjacent to the Main Base over an expected 20-year period; some development has occurred, but the majority of the Proposed Action has not yet been constructed. WRP would consist of a multi-use development created for non-retail commercial, government space, science research, educational facilities, and public recreation areas. Please refer to the 2008 WRP EA[8] for more information (NASA, 2008b).

4.3 Residential Developments

Several residential developments are planned for construction or are being constructed within Accomack County. The closest development to the Main Entrance Reconfiguration Project's Preferred Alternative site is an 81 hectare (201 acre), 99-lot subdivision called Olde Mill Pointe

[8] http://sites.wff.nasa.gov/code250/docs/WRP_FEA.pdf

that is located on the opposite side of Little Mosquito Creek to the northwest of the Main Base. Other residential projects include Historic Corbin Hall at Chincoteague Plantation that is located on Chincoteague Bay approximately 1.6 kilometers (1 mile) north of the Main Base and encompasses approximately 60 hectares (150 acres), and Captain's Cove, also located on Chincoteague Bay, approximately 4.8 kilometers (3 miles) north of the Main Base.

4.4 Potential Cumulative Impacts

Below is a description of the potential cumulative impacts for each resource area that could be adversely impacted by the development of the Main Entrance Reconfiguration Project's Preferred Alternative when combined with the potential impacts from the actions described above in Sections 4.1-4.3. For each resource area, the geographic scope is defined as depicted on Figure 4-1. The temporal scope for future actions is twenty years.

4.4.1 Water Resources

Agricultural runoff contributes to water quality degradation, and although commercial and residential areas make up less than 3 percent of the watershed surrounding WFF, they contribute to water quality degradation via sedimentation and stormwater runoff. The watershed around WFF is primarily agricultural and marshlands with agricultural runoff being a primary contributor to water quality degradation. Effects of these activities include burial of shellfish from sediment runoff and an increased risk of harmful algal blooms from excess nutrients, which can eventually lead to a reduction in dissolved oxygen content.

Past, present and proposed actions at WFF would cumulatively affect the amount and patterns of stormwater runoff due to increases in impervious surfaces and changes in drainage. Additionally, construction activities including grading, clearing, filling, and excavation for future projects would result in disturbance of the ground surface and would have the potential to cause soil erosion and the subsequent transport of sediment or nutrients into waterways via stormwater.

NASA has and would continue to minimize impacts on water quality by acquiring construction and industrial VSMP permits and by developing and implementing site-specific SWPPP and erosion and sediment control plans prior to land disturbing activities. Although activities within the local watersheds (agricultural runoff, sedimentation) result in water quality degradation of the areas surrounding WFF, the Main Entrance Reconfiguration project would result in minor, temporary impacts on water quality. Therefore, no long-term adverse cumulative impacts on surface waters from stormwater runoff would occur when the Main Entrance Reconfiguration Project activities are considered in combination with other WFF projects and non-NASA development and agricultural activities within the surrounding watershed, which can be expected but not quantified. Additionally, Accomack County recently passed the Chesapeake Bay Protection Act which established buffer restrictions on the Atlantic Ocean side of the Eastern Shore, requiring setbacks and reductions in vegetation clearing that will produce long-term benefits to water quality.

4.4.2 Air Quality

Construction activities have the potential to cause temporary, short-term air quality impacts due to the operation of fossil-fuel burning equipment. When combined with other air quality impacts as a result of construction activities within the attainment area, the Main Entrance Reconfiguration Project could contribute to temporary impacts to air quality.

4.4.3 Vegetation, Terrestrial Wildlife, and Migratory Birds

Long-term adverse impacts to vegetation, terrestrial wildlife, and migratory birds are anticipated due to the permanent conversion of forest to developed land within the Main Entrance Reconfiguration Project's footprint.

Past infrastructure development adjacent to the proposed project site, including the construction of the U.S. Navy Housing and Administrative complex, U.S. Coast Guard Housing, NASA facilities, related access roads, and utility corridors have contributed cumulatively to a permanent loss of available foraging and refuge areas for birds and terrestrial wildlife, including white-tailed deer, gray squirrel, opossum, and red fox. Loss of habitat has most likely caused individuals to flee the area for feeding or refuge in adjacent suitable habitat. Additionally, due to the introduction of vehicular traffic within the affected area, occasional vehicle-related mortalities, particularly of small mammals, occur. Another persistent long-term effect is the exposure to noise associated with adjacent WFF operations, including vehicular traffic and aircraft overflights. Exposure to elevated noise levels could illicit flee responses, thereby driving species present to an adjacent, quieter refuge.

The proposed construction of the WRP would result in the removal of approximately 20 to 40.5 hectares (50 to 100 acres) of trees. The Main Entrance Reconfiguration Project would remove up to 1.40 hectares (3.48 acres) of trees. Assuming the most conservative WRP development scenario that would remove 40.5 hectares (100 acres) of trees, combined with the 1.40 hectares (3.48 acres) potentially removed for the Main Gate Reconfiguration project, approximately 19% of forested area in the analysis area could be removed, given the total acreage of forested land over the WRP and the Main Base, resulting in a long-term adverse impact to vegetation and forest-dwelling wildlife due to the permanent conversion of forest to developed land (Table 4-1).

Table 4-1: Cumulative biological impacts analysis

	Total Area		Forested Area		% Forested	Forested Area Impacted		% of Forest Impacted
	hectares	acres	hectares	acres	%	hectares	acres	%
WRP	82	202	46.5	115	57	40.5	100	87
MB	779	1925	175	432	22	1.4	3.5	1
Total	861	2127	221.5	547	26	41.9	103.5	19

However, the habitat within the cumulative analysis area can be considered lower in ecological value (as compared to an equally-sized tract in a more remote location) given that it has been subject to regular human-induced disturbance (e.g., mowing, vehicular noise, aircraft overflight) for over 60 years. Moreover, no special status species (i.e., threatened or endangered) inhabit either the Main Base or WRP forested areas. Additionally, landscape within the Main Base is specifically managed to deter terrestrial wildlife from taking residence near the active WFF airfield.

The WRP would mitigate the impacts to forest resources through a combination of maintaining a vegetated buffer, promoting preservation of existing native vegetation through a rigorous site plan review process, implementation of BMPs during land clearing activities, and gradual reforestation on available Accomack County property. WRP partners and tenants are directed by the WRP Guiding Covenants and Restrictions to preserve as much existing vegetation as possible (NASA, 2008b).

Even after full buildout of both projects (estimated to take at least 20 years for WRP), nearby areas of mature forest and open grassland would remain and could provide shelter for affected species. Agricultural fields, forests, and the USFWS-managed WINWR are all adjacent to the WFF Main Base and the WRP and provide an abundance of habitat for feeding and reproduction. Accordingly, no substantial cumulative impacts on vegetation, migratory birds, or terrestrial wildlife are anticipated.

4.4.4 Noise

Growth of the WRP, the residential areas, and the main entrance would all involve construction activities that have the potential to generate temporary increases in noise levels from heavy equipment operations. WRP and NASA projects would comply with local noise ordinances and State and Federal standards and guidelines for potential impacts to humans caused by construction activities. Workers near activities producing unsafe noise levels would be required to wear hearing protection equipment. No significant noise-producing activities would be routinely conducted before 7:30 a.m. or after 4:30 p.m., typical hours of construction. Any activities outside of typical work hours that could create disruptive noise levels would be coordinated directly with the persons affected by the planned activity. Therefore, impacts to construction workers or the public as a result of construction noise are not expected.

Future growth in local traffic volumes can be conservatively estimated at a linear 5 percent which equates to 25 percent growth per 5 years, resulting in a doubling of baseline traffic counts during the peak morning hour (500 trips) at 20 years. The Preferred Alternative would generate approximately 84 more trips over baseline at twenty years during the peak morning hour. Trip generation estimates were performed for the WRP at full buildout, which has been approximated to be at twenty years. The project is expected to generate an additional 643 total trips (both Atlantic and Mill Dam Roads), using the most conservative estimate of peak hour traffic (NASA,

2007). Assuming the traffic follows the same 60/40 split down Atlantic/Mill Dam Roads, the WRP would generate an additional 386 vehicles traveling northbound on Atlantic Road during the peak morning hour.

Combining the approximate traffic generation volumes for the abovementioned projects (584 and 386) results in 970 cars during the peak morning hour at 20 years. Based on this traffic volume, the FWHA's TNM was used to calculate what the noise levels around Atlantic Road may be at that time. The TNM predicted that noise levels would drop below 67 dBA at distances greater than 16 meters (52 feet) from the centerline of Atlantic Road, which would not exceed the first 11 meters (36 feet) of nearby residents' properties. Within these areas are driveways and vegetation (trees, shrubs); no homes or recreational structures (e.g., porches, gazebos, etc.) are located within the modeled 67 dBA contour. Long-term adverse cumulative impacts from increased noise levels would be expected, however, they would not be substantial as traffic noise would mostly occur during the weekdays during normal operating business hours, with peak noise expected to be during the 7:00 a.m. to 8:00 a.m. and 4:00 p.m. to 5:00 p.m. hours.

4.4.5 Transportation

Under the proposed project, new signage directing all NASA visitors to enter the new badge office would send more traffic to Atlantic Road, thereby removing some of the traffic from Mill Dam Road. The WRP development would increase traffic on both Atlantic and Mill Dam Roads. When considered together, these projects would result in a cumulative increase in traffic volumes. No long-term adverse, cumulative impacts to traffic volumes are anticipated because NASA and the WRP would implement traffic flow mitigation measures that could include the following:

- establishing appropriate signage along Route 175, Atlantic Road, and Mill Dam Road;
- adding a second inbound lane between Mill Dam Road and the guard house;
- replacing the current Y intersection between Mill Dam and Atlantic Roads with a roundabout;
- adding a right-hand turn lane on Atlantic road at the entrance of the new badge office; and
- installing additional traffic devices including signal lights and/or stop signs in the vicinity of the WRP.

The WRP and NASA would coordinate all transportation activities including closures, traffic control, safety issues, etc. with Accomack County and the Virginia Department of Transportation Accomac Residency Office prior to their implementation. To mitigate potential delays, both projects would:

- Provide adequate advance notification of upcoming activities for all areas that would be affected by construction-related traffic, temporary closures, or re-routing;

- Place construction equipment and vehicle staging so as to minimize hindrances to traffic and pedestrian flow; and
- Minimize the use of construction vehicles in residential areas.

In summary, although traffic volumes would increase on both Atlantic and Mill Dam Roads, the abovementioned traffic flow mitigation measures would ensure continued transportation safety.

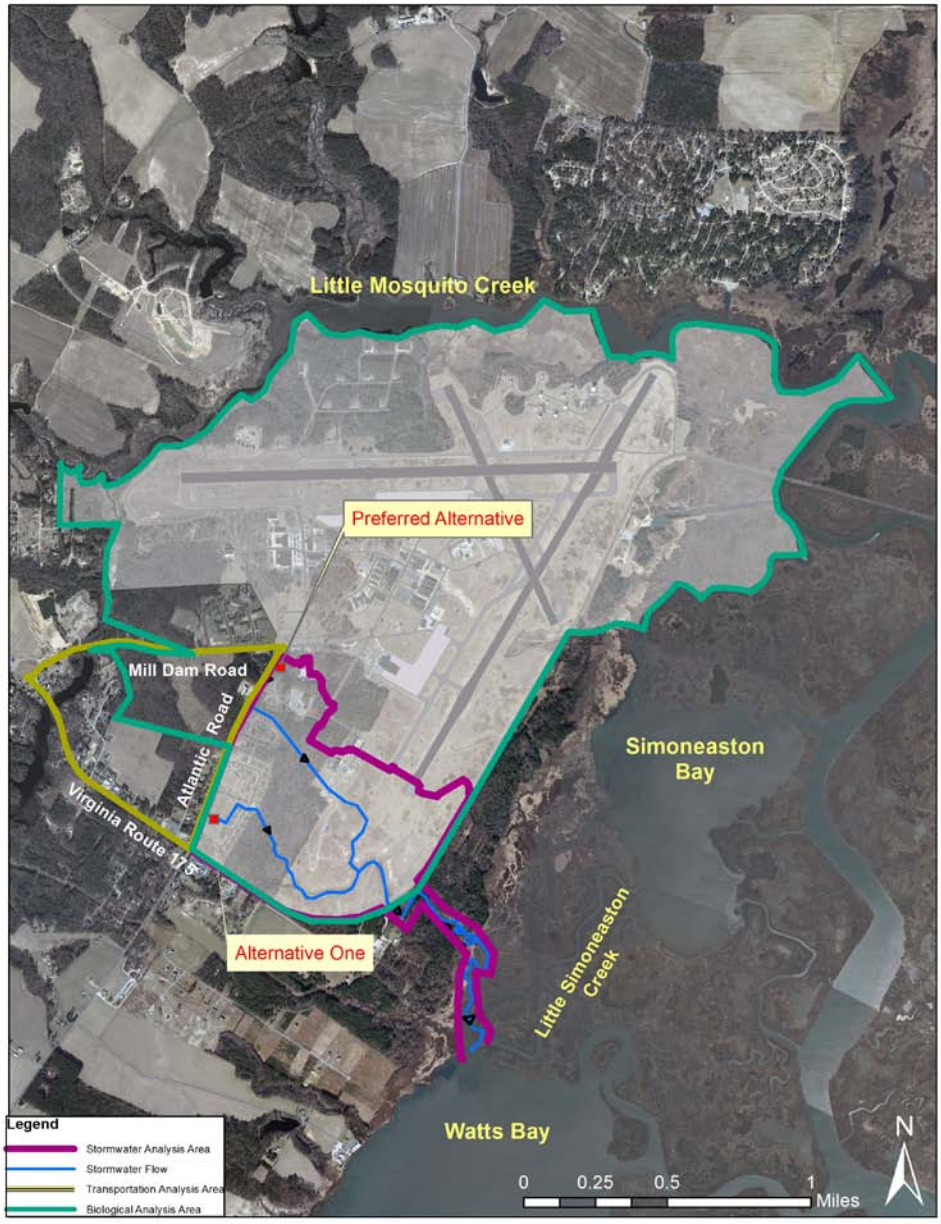


Figure 4-1: Cumulative effects analysis areas

4.5 Permits, Licenses, and Approvals

The following is a list of potential permits, licenses, and approvals that would be required for the Proposed Action. The agency responsible for each is included after the identified permit, license, or required consultation. Any required permits, licenses, or approvals would be obtained prior to construction.

No Action Alternative

Under the No Action Alternative, reconfiguration of the main entrance would not occur; therefore, no permits, licenses, or approvals would be required.

All Action Alternatives

- VSMP Stormwater General Permit for Construction Activities; Virginia Department of Conservation and Recreation
- Erosion and Sediment Control Plan; NASA WFF
- Stormwater Prevention Pollution Plan; NASA WFF
- Land Use Permit; Virginia DOT

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6 Agencies and Persons Consulted

Copies of the Draft EA were sent to the following agencies, organizations, and individuals. Notices of availability were also sent to all residential addresses on Mill Dam Road and those along the portion of Atlantic Road north of Route 175.

Name	Organization
Federal Agencies	
Ms. Barbara Rudnick	EPA, Region III
Ms Trish Kicklighter	NPS Assateague Island National Seashore
Mr. Doug Crawford	NOAA, Command and Data Acquisition Station
Mr. Steven Gibson	USACE Norfolk District
LT Mark Merriman	USCG Chincoteague Group
CDR John Keegan	U.S. Navy, Surface Combat Systems Center
Mr. Louis Hinds, III	USFWS Chincoteague National Wildlife Refuge
Ms. Cindy Schulz	USFWS Virginia Field Office
State Agencies	
Mr. Richard Baldwin	Mid-Atlantic Regional Spaceport
Ms. Deanna Beacham	VCI
Ms. Ellie Irons	VDEQ, Office of Environmental Impact Review[9]
Ms. Amanda Lee	VDHR
Local Government	
Mr. Steven Miner	Accomack County Administration
Mr. Grayson Chesser	Accomack County Board of Supervisors
Ms. Wanda Thornton	Accomack County Board of Supervisors
Mr. Ronald Wolff	Accomack County Board of Supervisors
Mr. David Fluhart	Accomack County Building and Zoning
Ms. Elaine Meil	Accomack-Northampton Planning District Commission

[9] The VDEQ received the Main Gate Reconfiguration Project Draft EA and sent it out for a consolidated review by fourteen other agencies.

Name	Organization
Mr. Robert Ritter	Town of Chincoteague, Virginia
Mayor John Tarr	Town of Chincoteague, Virginia
Other Organizations & Individuals	
Ms. Kathy Phillips	Assateague Coastal Trust
Mr. Nick Olmstead	BaySys Technologies, Inc.
Ms. Suzanne Taylor	Chincoteague, Virginia Chamber of Commerce
Mr. Denard Spady	Citizens for a Better Eastern Shore
Mr. Jim Rapp	Delmarva Low Impact Tourism Experiences
Ms. Jean Hungiville	Eastern Shore Chamber of Commerce
Mr. Peter Bale	Eastern Shore Defense Alliance
Ms. Donna Bozza	Eastern Shore of Virginia Tourism Commission
Ms. Amber Parker	Marine Science Consortium
Mr. Dave Wilson, Jr.	Maryland Coastal Bays Program
Mr. Joseph Fehrer	The Nature Conservancy
Mr. Stephen Parker	The Nature Conservancy, Virginia Coast Reserve
Mr. Randy Fox	Trails End Campground
Federal & State Elected Officials	
Honorable Mr. Lynwood Lewis, Jr.	Virginia House of Delegates
Honorable Mr. Ralph Northam	Virginia Senate

7 Preparers and Contributors

Name	Education and Experience	Areas of Responsibility in EA
URS (Contractor to NASA)		
Shari Silbert	Environmental Scientist, B.S. Chemistry, B.S. Biology, 16 years experience	NEPA Project Manager, Document Development and Review
Valerie Speidel	Environmental Analyst/Specialist, M.S. Food Science and Technology, 7 years experience	Document Development and Review
NASA		
Paul Bull	Civil Engineer, BS Civil Engineering, Master of Engineering (Civil), P.E., 16 years experience	Project Manager, Development of Alternatives, Document review
Joshua Bundick	Environmental Protection Specialist, B.A. Environmental Sciences; 8 years experience	NEPA Manager, Alternatives Screening, Document Review, Biological Resources, Cumulative Impacts
David Adams	Supervisory Security Specialist, 19 years experience	Development of Alternatives, Document review