DRAFT REPORT

ENVIRONMENTAL ASSESSMENT FOR WALLOPS RESEARCH PARK

APRIL 2008

Prepared for

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

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PREFACE

This *Environmental Assessment for Wallops Research Park* has been developed by URS Group, Inc. (URS) and EG&G Technical Services (EG&G) for the National Aeronautics and Space Administration's (NASA) Goddard Space Flight Center's (GSFC) Wallops Flight Facility (WFF).

URS/EG&G have prepared this report for the exclusive use of WFF and the WRP principals in accordance with NASA Procedural Requirements (NPR) 8580.1, *Implementing the National Environmental Policy Act and Executive Order 12114* (NASA, 2001).

ENVIRONMENTAL ASSESSMENT
WALLOPS RESEARCH PARK
WALLOPS FLIGHT FACILITY

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:	Development of the Wallops Research Park
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ABSTRACT

This Environmental Assessment addresses the development of a research park adjacent to the Main Base of the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) Wallops Flight Facility (WFF), which is located on the Eastern Shore of Virginia. The Wallops Research Park (WRP) would be constructed on approximately 202 acres of land owned by NASA, Accomack County, and the Marine Science Consortium (MSC). Portions of the proposed WRP site have been previously developed and currently contain a NASA payload processing facility, open space that is periodically mowed, utility and road infrastructure, nature trails, a playground and baseball field, and a closed county-run landfill. Forested areas also occur within the WRP site.

Upon full build out, WRP would consist of a multi-use development dedicated to non-retail commercial and government space and science research, educational facilities, and public recreational areas. Proposed land use categories within WRP include: 1) research and development/industrial use, 2) aviation use, 3) gateway research and development/industrial use,

and 4) an Accomack County recreational park. Construction in each of the WRP land parcels would include the installation of utilities and the establishment of utility easements.

The Proposed Action would not have an adverse impact to environmental or socioeconomic resources with the exception of adverse impacts to vegetation, wildlife and migratory birds due to the permanent conversion of forest to developed land, and adverse impacts to wetlands due to the filling of approximately one acre of wetlands. Any adverse impacts would be minimized and mitigation measures would be implemented as necessary.

PURPOSE AND NEED FOR THE ACTION

The purpose of the proposed project is to create an integrated business park for aerospace research and development programs, scientific research, commercial space industries, and educational centers to expand the United States space program, and to increase economic development within Accomack County. To meet NASA's mission and commercial space industry needs, the proposed project should be close to usable space facilities such as WFF. The proposed project is consistent with NASA's strategic vision for WFF.

ALTERNATIVE DESCRIPTIONS

No Action Alternative

Under the No Action Alternative, NASA would not participate in the funding or construction of a research park, nor would NASA provide utilities, utility easements, or land for the development of a research park.

Proposed Action

The Proposed Action consists of development of a research park adjacent to the WFF Main Base. The research park would be constructed on approximately 202 acres of land; 85 acres are owned by NASA, 88 acres are owned by Accomack County, and 29 acres are owned by the MSC (the 33-acre MSC campus site is not included in the total WRP acreage). Portions of the proposed WRP site have been previously developed and currently contain a NASA payload processing facility, nature trails, a playground and baseball field, and a closed county-run landfill. Forested areas also occur within the WRP site.

The WRP would consist of a multi-use development dedicated to space and science research, educational facilities, and recreational areas. Proposed land use categories within WRP include: 1) research and development/industrial use, 2) aviation use, 3) gateway research and development/industrial use, and 4) an Accomack County recreational park. Construction in each of the WRP land parcels would include the installation of utilities and the establishment of utility easements.

NASA property would primarily be developed for aerospace activities including payload processing and aircraft operation and maintenance. Hangars are planned for construction on the northwest part of the NASA property. Accomack County property north of Mill Dam Road and east of the closed Accomack County landfill would be developed to accommodate research and development and industrial land use.

The MSC property south of Mill Dam Road would be developed for research and development and industrial use. The MSC owns 59 acres within the WRP site boundary; the MSC campus, which is located on the north side of Mill Dam Road, encompasses approximately 30 of those acres. The MSC campus and any activities related to MSC campus renewal will occur independently and are not considered part of the WRP development.

Accomack County Property north of Mill Dam Road would include construction of education facilities, an incubator building with classrooms and office space, and new roads. A baseball field, playground, and nature trails already exist on the Accomack County property but would be relocated during WRP development.

Alternative One

Alternative One includes the same development as described under the Proposed Action on NASA and MSC property. However, approximately 15 additional acres of Accomack County property South of Mill Dam Road in the WRP would be developed to include research and development and industrial land use. Other than a road and utility easements, no improvements would be built within the footprint of the closed Accomack County landfill.

SUMMARY OF ENVIRONMENTAL IMPACTS

Summarized below are potential environmental impacts resulting from the Proposed Action (development of the Wallops Research Park) and Alternative One. No environmental impacts are anticipated as a result of the No Action Alternative.

Topography and Drainage

Under the Proposed Action and Alternative One, land grading and construction activities would take place for the construction of the WRP. Land grading, new building construction, and building replacement would cause land disturbances, including excavation and an increase in impervious surfaces, which have the potential to alter the proposed site topography and drainage patterns of small seeps and ephemeral tributaries to Little Mosquito Creek.

Impacts to topography and drainage under Alternative One would be the same as described under the Proposed Action, but would also include land grading and construction activities on an additional 15 acres of Accomack County property south of Mill Dam Road.

Impacts to topography and drainage patterns during construction would be minimized by acquiring Virginia Stormwater Management Program (VSMP) permits and by developing and implementing site-specific stormwater pollution prevention plans (SWPPPs) and erosion and sediment control (E&SC) plans. To minimize long-term impacts to topography and drainage patterns, permanent stormwater control measures would be implemented in compliance with Virginia Stormwater Management Law and Regulations to provide adequate drainage within the WRP site and to mitigate the effects of increased runoff from impervious surfaces. Therefore, with permanent stormwater management measures incorporated into the site design, and by implementing stormwater control measures during construction, only minor impacts to topography and drainage are anticipated.

Geology and Soils

Under both the Proposed Action and Alternative One, land grading, clearing, filling, and excavation activities would result in ground surface disturbance and would have the potential to cause soil erosion and the subsequent transport of sediment via stormwater. No impacts to geology are anticipated. Impacts to soils under Alternative One would also include land grading and construction activities on an additional 15 acres of Accomack County property south of Mill Dam Road.

The WRP would minimize negative impacts to soils by acquiring Virginia Stormwater Management Program (VSMP) permits as necessary, and by developing and implementing site-specific SWPPPs and E&SC Plans prior to ground disturbing activities. The WRP tenants would be required to re-vegetate bare soils and incorporate landscaping measures in areas that would be left as pervious surfaces (not paved) when the project is complete. Site-specific SWPPPs would include best management practices for vehicle and equipment fueling and maintenance, and spill prevention and control measures would be implemented to reduce potential impacts to soils during construction.

The potential exists for an accidental release of contaminants into the soil during routine maintenance and fueling activities or an accident that releases liquid fuels to a permeable surface. Any accidental release of contaminants or liquid fuels would be addressed in accordance with WRP emergency management and response plans.

Land Use

Under the Proposed Action and Alternative One, several hangars, a general aviation facility, administration buildings, and other facilities for research and development and industrial use would be constructed. The entire WRP site is zoned as industrial land use. Therefore, the land uses planned for the WRP are compatible with Accomack County zoning policies. According to the WRP Guiding Covenants and Restrictions (NASA, 2008c), all potential tenants would be required to submit development plans to the WRP Site Plan Review Committee to ensure compatibility with land uses set forth by WRP.

Surface Water

Under both the Proposed Action and Alternative One, construction activities associated with the WRP would avoid surface waters to the greatest extent possible including ephemeral streams and swales, seeps, springs, and tributaries to Wattsville Branch. However, up to 1 acre of wetlands would be adversely affected by development on the NASA property north of Mill Dam Road.

Effects to surface water from construction activities would be minimized by acquiring VSMP permits and by developing and implementing site-specific SWPPPs and E&SC plans. Increased impervious area due to the construction of buildings, parking lots, roads, sidewalks, etc., would result in an increase in runoff from the WRP site compared to existing conditions. To minimize the effects to surface waters from the increased runoff, permanent stormwater control measures would be implemented by WRP partners and tenants in compliance with Virginia Stormwater Management Law and Regulations. To minimize water quality effects on surface waters from the activities at the WRP, the WRP would obtain Virginia Pollutant Discharge Elimination System (VPDES) industrial activity stormwater permits as required by Virginia regulations and would

implement measures to reduce impacts to surface waters. With these measures, no adverse impacts to surface water are anticipated.

Impacts to surface waters under Alternative One would be slightly greater than under the Proposed Action due to the development of an additional 15 acres on Accomack County property south of Mill Dam Road.

Wastewater

Wastewater generated under both the Proposed Action and Alternative One would be discharged to the existing WFF wastewater collection system and would be sent to the WFF wastewater treatment plant (WWTP) for treatment. While Alternative One would generate more wastewater than the Proposed Action, the WWTP has the capacity to treat the additional amount of wastewater from the WRP under both the Proposed Action and Alternative One, and development of the WRP would not result in an adverse impact to the WWTP.

Aviation hangars would use fire suppression foam instead of water to put out fires around delicate electronic systems. Each aviation building that utilizes a foam fire suppression system would be equipped with a containment area to treat the foam prior to release to the WFF wastewater treatment plant. Any facility that uses a wash rack for heavy equipment would include an oil/water separator to remove oil from wash water prior to discharge to the wastewater treatment plant.

Stormwater

Under both the Proposed Action and Alternative One, construction activities could result in temporary impacts to stormwater conveyance due to disruptions and changes to the natural drainage. WRP partners and tenants would be required to obtain VSMP construction site stormwater permits and implement site-specific SWPPPs to minimize impacts to stormwater conveyance and stormwater quality during construction.

No long-term impacts are anticipated because WRP partners and tenants would be required to incorporate permanent stormwater control measures into design plans to effectively remove stormwater from the site. All control measures would be designed and constructed in accordance with Virginia Stormwater Management Law and Regulations. Additionally, the WRP Guiding Covenants and Restrictions (NASA, 2008c) state that impervious surfaces should be kept to a minimum, and encourage the addition of new sustainable landscapes that would collect and filter stormwater as well as the use of permeable paving where possible. In addition, Virginia Stormwater Management regulations require the incorporation of measures to protect aquatic resources from the effects of increased volume, frequency, and peak rate of stormwater runoff as well as from increased nonpoint source pollution carried by stormwater runoff.

If required under Virginia regulations because of its activities, WRP would obtain a VPDES industrial stormwater permit, which includes the requirement that a SWPPP be developed for the permitted facility. The SWPPP would identify actual and potential sources of stormwater contamination and would specify structural and non-structural best management practices to reduce the impact of stormwater runoff on receiving streams to the maximum extent practicable and to meet water quality standards.

Groundwater

Water Use

Under both the Proposed Action and Alternative One, NASA would provide potable water to the WRP for drinking water supply, fire suppression, and industrial water use. The estimated potable water demand of the WRP is approximately 991,000 gallons per month under the Proposed Action and 1,098,000 gallons per month under Alternative One.

The combined water demand of WFF and WRP at build-out would be approximately 3,361,000 gallons per month, which is below the 8,153,000 gallons per month limit of WFF's existing ground water withdrawal permit with the Virginia Department of Environmental Quality (DEQ). Therefore, development of the WRP would not result in an adverse impact to ground water resources.

As specified in the Guiding Covenants and Restrictions (NASA, 2008c) the WRP would encourage water use conservation practices in facility design and operation such the use of low consumption water fixtures, the use of native plants in landscaping that are adapted to the local precipitation, and educating employees about water conservation methods.

Water Quality

Operational activities could result in impacts to groundwater if a spill were to occur that contaminated groundwater. The potential for groundwater contamination from spills would be minimized by obtaining VPDES industrial stormwater permits as required under Virginia regulations and by implementing spill response planning, response, and clean-up procedures that are required under the permit. Long-term impacts would also be mitigated by implementing standard operating procedures at all WRP facilities to reduce the likelihood that a spill would occur.

NASA would continue to monitor the water supply wells located at the WFF Main Base to ensure that spills or releases have no adverse effect on the drinking water supply.

Wetlands

Under both the Proposed Action and Alternative One, up to 1 acre of wetlands would be adversely affected due to construction on the northwest side of the NASA property. Current proposals do not directly affect other wetlands. The construction of an aviation hangar would require land grading and the filling of up to 1 acre of wetlands associated with the northern-most unnamed tributary to Wattsville Branch.

Prior to construction, WRP would complete a jurisdictional wetland delineation in accordance with the U.S. Army Corps of Engineers (USACE) 1987 Wetland Delineation Manual (USACE, 1987) to determine the location and size of the wetland area that would be adversely affected. To ensure consistency with Executive Order (EO) 11990 Protection of Wetlands and 14 CFR 1216.2 (NASA regulations on Floodplain and Wetland Management), WRP would avoid and minimize impacts to wetlands. If wetland impacts are unavoidable, WRP would provide compensatory mitigation to offset the impacts and to ensure no net loss of wetlands.

WRP partners or tenants would notify the public and coordinate with applicable agencies including the USACE, the Virginia DEQ, the Virginia Marine Resources Commission (VMRC),

and the Accomack County Wetlands Board, if impact to wetlands cannot be avoided. WRP would obtain necessary permits including Clean Water Act Section 401 and 404 permits. WRP would implement wetland mitigation measures agreed upon through the DEQ permitting and consultation process to protect and restore the natural and beneficial functions of wetlands.

Floodplains

Under both the Proposed Action and Alternative One, construction of aircraft hangars on the western portion of the NASA parcel would take place within a small area of the 100-year floodplain that is associated with an unnamed tributary to Wattsville Branch. Current proposals do not directly affect other floodplains.

For the construction that would take place within the floodplain, WRP partners and tenants would ensure that the action complies with EO 11988 (Floodplain Management) and 14 CFR 1216.2 (NASA regulations on Floodplain and Wetland Management), including notifying the public of actions that would occur within the floodplain. The WRP would obtain any required permits for construction within the floodplain and would minimize floodplain impacts and protect and restore the natural and beneficial functions of floodplains to the maximum extent possible.

Coastal Zone Management

Activities that could affect coastal resources would be consistent with the Coastal Zone Management Act and the Virginia Coastal Resources Management Program. A Coastal Zone Consistency Determination has been performed for WRP; currently Virginia DEQ is reviewing the document. The results of DEQ's review will be included in a later draft of this document.

Air Quality

Under both the Proposed Action and Alternative One, construction activities have the potential to cause temporary, short-term air quality impacts due to the operation of fossil-fuel burning equipment. Impacts to air quality under Alternative One could be slightly greater than the Proposed Action; however, the increase in air quality impacts due to the development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill would be negligible.

Vehicles and equipment used for construction would be maintained in good working order to minimize pollutant emissions. WRP tenants would spray water on construction areas when necessary to reduce fugitive dust emissions. With the implementation of air quality mitigation measures, construction activities would not have an adverse impact to air quality in the project area.

The operation of a payload processing facility (PPF) at the WRP would have the potential to impact air quality because the cleaning of payloads and electronic hardware involves the use of solvents to remove organic contaminants. Small amounts of other chemicals are used in such minor amounts and are of such low toxicity that they present no substantial potential for adverse air quality impacts.

Inadvertent releases of toxic air contaminants are possible as a result of accidents involving hypergolic fuels (such as hydrazine) during payload processing, transportation, and preparation

for launch. The magnitude of air releases from payload accidents would be relatively small. Impacts would be temporary and dispersed, and would therefore have no adverse impact to ambient air quality.

The operation of WRP laboratories may include the use of fume hoods. The release of small quantities of toxic gases through laboratory fume hoods may result in temporary minor impacts to local air quality. Laboratory fume hoods would be included in WRP's or its tenant's air permit and would be maintained to meet permit and regulatory requirements.

Paint spray/coatings booths would be located in the WRP facilities. Emissions of criteria pollutants from painting operations would result in minor impacts to local air quality. WRP partners or tenants would obtain necessary permits from the Virginia DEQ to ensure no adverse impacts to air quality would occur as a result of operations within the WRP.

Noise

Under both the Proposed Action and Alternative One, construction activities have the potential to generate temporary increases in noise levels from heavy equipment operations. WRP 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, both during construction and after the WRP facilities are operational, would be required to wear hearing protection equipment. Therefore, impacts to the occupational health of construction or WRP workers as a result of construction or institutional noise are not expected.

Aircraft operations at the nearby WFF runway (which is located immediately to the north of the WRP site) are a source of noise to the surrounding area. However, airfield activities resulting from the WRP are not expected to increase the number of flights significantly. Flights originating from the WFF runway are expected to be intermittent and noise levels would be temporary. Aircraft using the airfield are prohibited from creating sonic booms over land (NASA, 1999). Therefore, aircraft operations are not expected to result in an adverse impact to human health.

For many of these sources, exposure to noise is either short-term (e.g., fire engines) or can be minimized through use of personal hearing protection. The WRP would be responsible for occupational safety and determining the need for personal hearing protection and would provide oversight to WRP tenants. Impacts to humans due to noise would be slightly greater under Alternative One than the Proposed Action; however, with the implementation of mitigation measures the additional impacts would be negligible.

Hazardous Materials and Hazardous Waste

Under both the Proposed Action and Alternative One, construction activities would include the use of hazardous materials and would result in hazardous waste generation (e.g., solvents, hydraulic fluid, oil, and antifreeze)., Hazardous materials use and the generation of hazardous wastes during construction of the WRP and operation activities of WRP tenants would be slightly greater under Alternative One than under the Proposed Action due to the development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill. With implementation of safety measures and proper procedures for the handling, storage, and disposal of hazardous materials and wastes during construction activities and WRP operation, no adverse impacts are anticipated.

The operation of aircraft at the WRP would result in the use of hazardous materials and generation of hazardous wastes. In addition, hazardous materials would likely be used during scientific research operations at the WRP. Hazardous materials would be managed according to standard safety procedures that include proper containment, separation of incompatible and reactive chemicals, worker warning and protection systems, and handling procedures to ensure safe operations. All personnel who transport, fuel, and maintain aircraft at the WRP would receive training in hazardous waste management.

The greatest potential impact to the environment from the release of hazardous materials would result from an accident at a storage location (e.g., leak, fire, or explosion) or, to a lesser degree, from an accidental release during normal operating activities (e.g., spills or human exposure). The short- and long-term effects of an accident on the environment would vary greatly depending upon the type of accident and the substance(s) involved.

The WRP would develop a contingency plan in accordance with Federal regulations regarding the storage and use of hazardous materials and the disposal of hazardous wastes. Additionally, WRP would obtain an EPA hazardous waste generator number and comply with all requirements of Federal, State, and local regulations.

Radiation

Under both the Proposed Action and Alternative One, the operation of the PPF could result in potential sources of radiation. Any tenant of the WRP using regulated nuclear material would be required to obtain a Nuclear Regulatory Commission license.

Scientific payloads may carry small quantities of encapsulated radioactive materials for instrument calibration or similar purposes. Prior to allowing a radioactive source on a NASA managed mission, the NASA Nuclear Flight Safety Assurance Manager would certify that preparation and launching of payloads that carry small quantities of radioactive materials would not present a substantial risk to public health or safety.

Lasers may also be used for science instrumentation on payloads. Use of lasers at the WRP would be required to meet applicable safety standards, which would mitigate potential impacts to human health. For visible lasers, the WRP would obtain a letter of non-objection from the Federal Aviation Administration for outdoor scientific use of lasers.

Under Alternative One, the potential impacts to human health due to radiation may be slightly more than under the Proposed Action due to the additional construction and operation activities associated with development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill.

Vegetation

Long-term adverse impacts to vegetation would be anticipated due to the permanent conversion of forest to developed land. In order to minimize impacts to vegetation, a vegetative buffer would be maintained around the perimeter of the WRP site. Although most new construction would occur in existing developed areas where vegetation communities exist as maintained landscaping, short-term adverse impacts to vegetation are anticipated due to clearing and grading. The WRP partners and tenants would be required to re-vegetate bare soils after soil disturbing activities, and incorporate landscaping measures in areas that would be left as pervious

surfaces (not paved) when the project is complete. WRP tenants are directed by the WRP covenants to preserve as much existing vegetation as possible.

Impacts to vegetation under Alternative One would be greater than under the Proposed Action due to the removal of vegetation associated with development of approximately 15 acres on Accomack County property south of Mill Dam Road.

Terrestrial Wildlife and Migratory Birds

Under both the Proposed Action and Alternative One, long-term impacts to terrestrial wildlife and migratory birds are anticipated due to the loss of habitat to developed land. However, a vegetated buffer would be retained around the WRP western perimeter and tenants would be encouraged to retain native habitat to the greatest extent practicable. Short-term impacts to wildlife and migratory birds may be anticipated during construction activities due to temporary noise disturbances, especially during spring and fall migrations; however this is no greater than daily operations at the nearby WFF airfield. WFF airfield currently operates an avian deterrent program to keep the aircraft approach zones clear for safety purposes. The program includes the use of sound producing devices and pyrotechnics to discourage birds from congregating near the runways. Any additional noise disruptions caused by WRP operations are expected to be of low frequency, short duration, and comparable to what already exists with the avian deterrent program.

Impacts to terrestrial wildlife and migratory birds under Alternative One would be greater than under the Proposed Action due to the removal of habitat associated with removal of vegetation during development of approximately 15 acres on Accomack County property south of Mill Dam Road

Threatened and Endangered Species

Since no State or Federally listed threatened or endangered species or Federally designated critical habitat occur within the WRP vicinity, no effects to State or Federally threatened endangered species would occur under the Proposed Action or Alternative One.

In accordance with Section 7(a)(2) of the ESA, NASA sent a consultation letter to the U.S. Fish and Wildlife Service (USFWS) requesting concurrence that the Action Alternatives would not adversely affect any special status species occurring within the project area. In a letter dated September 4, 2007, the USFWS concurred that the Proposed Actions “will not adversely affect Federally listed species or Federally designated critical habitat because no Federally listed species are known to occur in the project area.”

Population

Under the Proposed Action, the number of people that are anticipated to be hired by WRP partners and tenants at complete build-out is approximately 708, with 784 new hires anticipated under Alternative One. Build-out is expected to occur within the next 20 years. The estimated number of people moving to the Lower Delmarva Peninsula as a result of the WRP is approximately 2,190 under the Proposed Action and 2,430 under Alternative One over the 20-year period.

Impacts to population are not likely to occur due to the long time period anticipated for increased employment opportunities with WRP partners and tenants. The largest impact to population would occur in Accomack County; the additional population that would result from the WRP is anticipated to comprise approximately 3 percent of Accomack County's population over the next 20 years. The four other counties where new WRP employees are likely to settle would result in a population increase of less than 1 percent per county over 20 years.

The long-term increase in population created by the WRP would not have an impact to public and private schools within the five counties of the Lower Delmarva Peninsula. New student enrollments are anticipated to occur over a 20-year period. Even if Accomack County schools do not increase student capacity in the school system, the WRP would not likely result in adverse impacts to public and private schools. In addition, the increase in taxes generated by the additional WRP-employed families would add to the county's ability to implement upgrades to schools.

Recreation

Under both the Proposed Action and Alternative One, no short-term adverse impacts to recreation are anticipated during construction of the WRP. Although the existing baseball field and playground would be rebuilt in a new location, the old baseball field and playground would remain open to the public while the new ones are being constructed.

Under the Proposed Action, minor impacts to recreation would occur due to increased use of the baseball field, playground, and nature trails on the Accomack County parcel by WRP employees. Increased use would require increased routine maintenance of the facilities and would increase the frequency of unexpected repairs. Residents, employees, and students would benefit from the additional recreational activities that would be provided by the space south of Mill Dam Road and west of the closed Accomack County landfill that would be utilized as a county park and by the construction of a new baseball field and playground.

Under Alternative One, impacts to recreation would be greater than under the Proposed Action due to the development of approximately 15 acres located south of Mill Dam Road and west of the closed Accomack County landfill. This space would not be available to residents, employees, and students for recreation. Minor impacts to existing recreational facilities would occur due to increased use of the existing baseball field, playground, and nature trails. Increased use would require increased routine maintenance of the facilities and would increase the frequency of unexpected repairs.

Employment and Income

Construction of the WRP would result in a benefit to the local economy during construction due to increased numbers of people in Accomack County during business hours and the potential increase in the use of local stores and businesses for purchases. Employment opportunities for construction-related work would also increase as a result of development of the WRP site and result in a beneficial impact to employment within Accomack County.

Under both alternatives, no adverse impacts to employment and income would occur. WRP would create between 708 and 784 new jobs, which would bring approximately 411 to 455 new households to the Lower Delmarva Peninsula. Employment opportunities within the WRP would

likely result in NASA and Accomack County continuing to be among the top five largest employers in Accomack County.

Average salaries of employees of WRP would likely be similar to the average for NASA civil service employees at WFF. Although Accomack County would likely continue to maintain lower income rates as compared with the Commonwealth of Virginia, the average income of people employed by WRP tenants and partners is expected to be well above the average county per capita median household incomes. The higher-than-average salaries of WRP employees would result in positive effects to the local economy.

Health and Safety

Under both the Proposed Action and Alternative One, construction activities at the WRP site could result in short-term impacts to human health and safety and the increased usage of local fire, police, and medical services. Construction safety procedures and appropriate training would be implemented at the WRP to ensure that events that have the potential to adversely impact human health and safety are minimized.

Under both the Proposed Action and Alternative One, the capability of the medical, fire, and police services to handle the additional people in the area is not anticipated to be exceeded; however, since there is an increased demand on these services, minor impacts to health and safety could occur due to the WRP development. Safety procedures and appropriate training would be implemented at the WRP to ensure that events that have the potential to adversely impact human health and safety are minimized.

Cultural Resources

No adverse effects to historic properties would occur under the Proposed Action or Alternative One. Although the MSC campus buildings are greater than 50 years old, NASA determined that the buildings are not listed in or eligible for the National Register of Historic Places (NRHP); the Virginia Department of Historic Resources (VDHR) concurred with this determination.

No archaeological sites are known to occur within the WRP project area; therefore, neither the Proposed Action nor Alternative One would have an effect on archaeological resources.

For all existing and future actions that could affect cultural resources or historic properties determined to be listed in or eligible for the NRHP, WRP would be responsible for complying with Section 106 and Section 110 of the National Historic Preservation Act.

Environmental Justice

There are minority and low-income communities within Accomack County but it is not anticipated that disproportionately high or adverse impacts to low-income or minority populations would occur under the Proposed Action because no displacement of residences or businesses would occur as a result of development of the WRP. The creation of new jobs within Accomack County that are directly and indirectly related to WRP likely could benefit low-income and minority populations.

Transportation

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 WRP. Although a greater amount of traffic would occur under Alternative One compared to the Proposed Action, the additional volume of traffic is not anticipated to result in adverse impacts to transportation.

Traffic lanes may be temporarily closed or rerouted during construction activities, and construction equipment and staging could interfere with pedestrian and vehicle flow. WRP tenants would implement mitigation measures to minimize potential delays

No long-term adverse impacts to transportation are anticipated because the WRP would implement traffic flow mitigation measures including modifying and upgrading existing roads and intersections, and installing additional traffic devices including signal lights and/or stop signs in the vicinity of the WRP, where necessary.

Summary

Adverse impacts to wetlands, vegetation, and terrestrial wildlife and migratory birds would occur under both the Proposed Action and Alternative One. Any adverse impacts would be minimized and mitigation measures would be implemented as necessary. No other adverse impacts would occur to environmental or socioeconomic resources under either Action Alternative.

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ACCN	Accomack County North (land parcel)
ACCS	Accomack County South (land parcel)
amsl	Above mean sea level
ANSI	American National Standard Institute
ASTM	ASTM International
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMA	Coastal Management Area
CO	Carbon monoxide
CWA	Clean Water Act
dB	Decibel
dBA	Decibel weighted to the A-scale
DEQ	Department of Environmental Quality
DNL	Day-Night Level
E&SC	Erosion and sediment control
EA	Environmental Assessment
EG&G	EG&G Technical Services
EJIP	Environmental Justice Implementation Plan
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GSFC	Goddard Space Flight Center
L_{01}	Sound level exceeded 1 percent of the time
L_{10}	Sound level exceeded 10 percent of the time
L_{90}	Sound level exceeded 90 percent of the time
L_{eq}	Time-averaged sound level
MBTA	Migratory Bird Treaty Act
MIST	Maryland Institute of Science and Technology
MSC	Marine Science Consortium
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFSAM	Nuclear Flight Safety Assurance Manager

NHPA	National Historic Preservation Act
NO_2	Nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NPR	NASA Procedural Requirements
NRC	Nuclear Regulatory Commission
NRHP	National Register of Historic Places
O_3	Ozone
OSHA	Occupational Safety and Health Administration
Pb	Lead
PM_{10}	Particulate matter less than or equal to 10 microns
Ppm	Parts per million
PPF	Payload processing facility
REC	Recognized Environmental Condition
SHPO	State Historic Preservation Office
SO_2	Sulfur dioxide
SWPPP	Storm Water Pollution Prevention Plan
URS	URS Group, Inc.
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VAC	Virginia Administrative Code
VCRMP	Virginia Coastal Resources Management Program
VDGIF	Virginia Department of Game and Inland Fisheries
VDHR	Virginia Department of Historic Resources
VMRC	Virginia Marine Resources Commission
VOC	Volatile organic compound
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program
VSM	Vegetation Survey and Mapping for Wallops Research Park Project
WFF	Wallops Flight Facility
WINWR	Wallops Island National Wildlife Refuge
WRP	Wallops Research Park
WWTP	Wastewater Treatment Plant

1.1 WALLOPS RESEARCH PARK MISSION

1.1.1 Site Location

The Wallops Research Park (WRP) site is located in the northeastern portion of Accomack County, Virginia, on the Delmarva Peninsula, adjacent to the National Aeronautics and Space Administration (NASA) Wallops Flight Facility (WFF) Main Base (Figure 1). WFF is comprised of three general areas: the Main Base, which is the location proposed for the WRP, Wallops Mainland, and Wallops Island. The WRP is proposed for construction on land owned by NASA, Accomack County, and the Marine Science Consortium (MSC), which is a nonprofit educational corporation comprised of regional universities and colleges. The WRP is a partnering agreement between these three principals to attract researchers to the area.

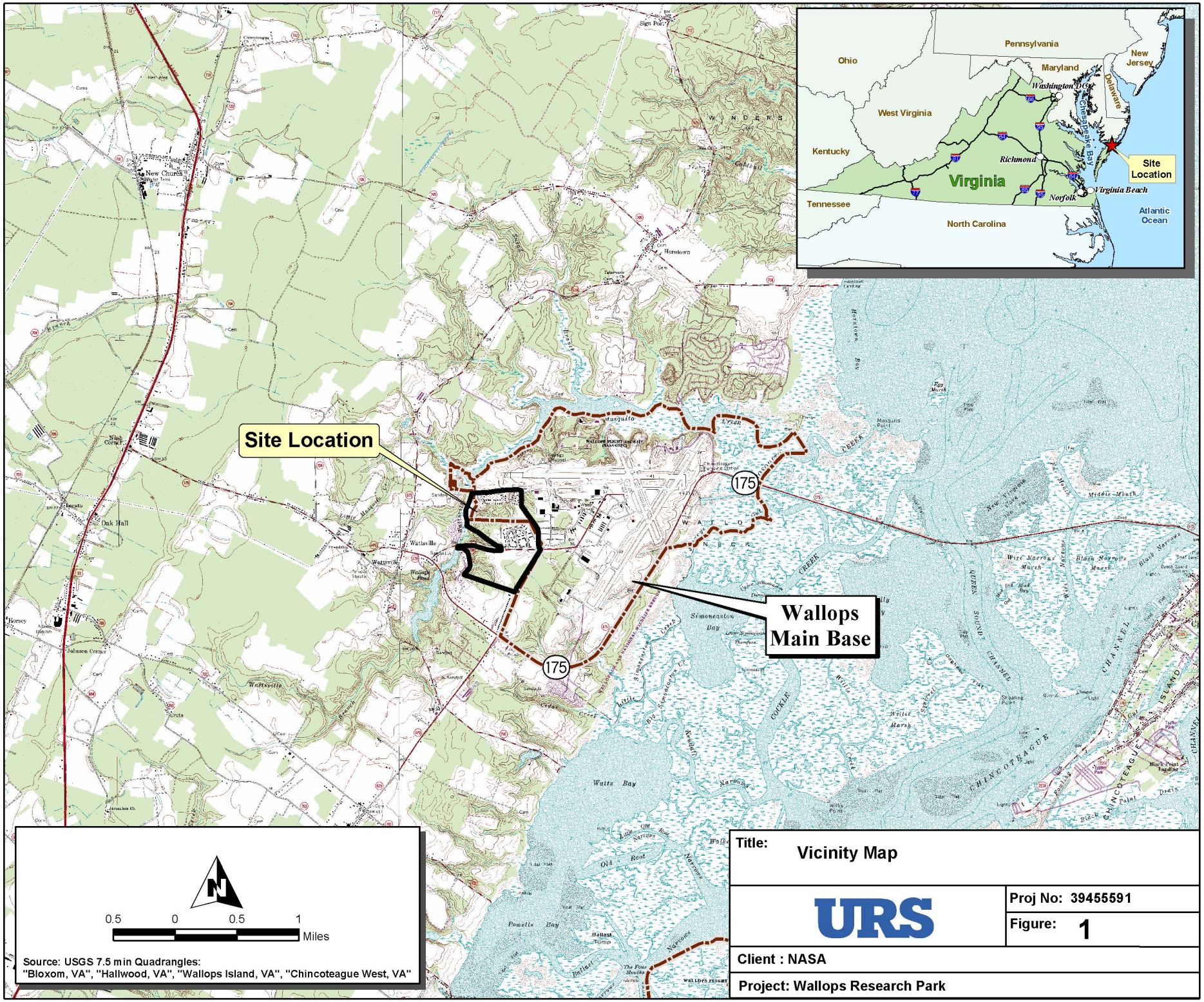
1.1.2 Mission

The mission of the WRP is to provide an environment that attracts and maintains business and academic interests in permanent facilities in the WRP by creating an integrated business park for aerospace research and development programs, scientific research, commercial space industries, and educational centers in order to meet the missions of NASA, Accomack County, and the MSC. The WRP's mission statement includes the following:

- Work with the county and other members of our community on comprehensive planning that protects the value of WFF range from encroachment and enables growth in all sectors;
- Leverage existing Federal facility investment and employment opportunities to spark Wallops area as a regional research and technology area;
- Supplement educational and work force development opportunities on the shore in the scientific and technical fields for increased collaboration, professional development, and outreach;
- Create high tech jobs to retain the shore's best and brightest and attract others with our quality of life; and
- Promote sustainable development that is compatible with our beautiful and sensitive coastal environment.

Accomack County's mission for the WRP is to increase economic development by creating job opportunities. The MSC's mission is commitment to excellence in education and research in the marine and environmental sciences. NASA's mission for the WRP is to enhance NASA's ability to fulfill its mission of low cost access to aerospace and commercial aerospace industry needs.

During its early history, the mission of the NASA Goddard Space Flight Center's (GSFC) 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 vehicles) and mission services.


Site Location
Wallops Main Base
Pennsylvania
Ohio
Maryland
New Jersey
Washington DC
Delaware
West Virginia
Chesapeake Bay
Kentucky
Richmond
Site Location
Virginia
Virginia Beach
Norfolk
Tennessee
Atlantic Ocean
North Carolina
175
175
0.5 0 0.5 1
Miles
Source: USGS 7.5 min Quadrangles:
"Bloxom, VA", "Hallwood, VA", "Wallops Island, VA", "Chincoteague West, VA"
Title: Vicinity Map
URS
Proj No: 39455591
Figure: 1
Client : NASA
Project: Wallops Research Park

The proposed construction of the WRP will supplement economic, educational, and work force development opportunities on the Eastern Shore of Virginia in the scientific and technical fields resulting in increased collaboration, professional development, and outreach.

The WRP principals define business to include only those interests and activities that support Accomack County and MSC interests or research park goals as defined in the WRP agreements between Accomack County, NASA, and MSC. These interests and activities include ancillary commercial and other interests that support WFF but do not include retail and most other general business zoning uses to which the general public requires direct and frequent access.

1.2 BACKGROUND

WFF is a NASA facility under the management of GSFC. 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 a research airport. In addition, Wallops personnel provide mobile range capabilities, range instrumentation engineering, range safety, flight hardware engineering, and mission operations support.

NASA is committed to carrying out research and projects at WFF and WRP in an environmentally sustainable manner. The Wallops Environmental Office (Code 250) ensures that the facility obtains the appropriate environmental permits, prepares documentation for the National Environmental Policy Act (NEPA) and other environmental regulations and Executive Orders (EO), conducts employee and supervisor training, and implements the facility's Environmental Management System (EMS), which 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 conservation, maintenance of natural (green) infrastructure, and sustainable building practices. The strategic vision for WFF is that "Wallops Flight Facility will be a national resource for enabling low-cost aerospace-based science and technology research" (NASA, 2005).

The MSC was founded in 1968 by a consortium of three colleges, under a previous name and has expanded to include 15 Pennsylvania member colleges and universities. In 1971, the MSC was established at its current site at Wallops Island. The MSC property is adjacent to the WFF Main Base, west of the WFF Main Gate and consists of two parcels divided by Mill Dam Road. The MSC's core campus is located north of Mill Dam Road on a 33-acre site that also includes some open space. The 33-acre site is bounded by Federal property to the north and east, Accomack County land to the west, and Mill Dam Road to the south. MSC land south of Mill Dam Road is 28 acres, consists primarily of forested area, and is bounded by Mill Dam Road to the north, Atlantic Road to the east, Accomack County land to the west, and private property to the south.

The 2008 Draft Accomack County Comprehensive Plan (Comprehensive Plan) update was presented to the Accomack County Planning Commission on September 5, 2007. The overall purpose of the Comprehensive Plan is to guide the future social, economic and physical development of Accomack County to ensure the provision of adequate, quality, community facilities and services and the maintenance of a healthy, safe, orderly, and harmonious environment. The Comprehensive Plan contains information, policies, and programs for the county to implement in order to manage development and resources in a manner most beneficial to the citizenry.

Chapter 5, Goals, Objectives, Policies, and Recommended Actions of the 2008 Comprehensive Plan includes Objective 7: Establish a "business friendly" environment that promotes economic development that is compatible with the county's adopted objectives and vision for the future. To meet Objective 7, the Comprehensive Plan incorporates Policy 7-4: Support development of the Wallops Research Park at the NASA Wallops Island facility.

1.3 TENANTS AND OTHER ON-SITE ORGANIZATIONS

Planned tenants of the WRP in addition to the three WRP principals currently include Empire Development and BaySys Technologies, with a potential for other unidentified tenants to join the WRP in the future. Other proposed on-site organizations and regional WRP stakeholders are listed below by state affiliation:

Virginia

- Virginia Department of Housing and Community Development
- Virginia Economic Development Partnership
- Town of Chincoteague
- Old Dominion University
- University of Virginia
- Eastern Shore Community College
- Virginia Space Grant Consortium
- Virginia Space Flight Academy

Maryland

- University of Maryland Eastern Shore
- Salisbury University
- WorWic Community College
- Maryland Space Grant Consortium
- Maryland Institute of Science and Technology (MIST)
- Worcester County Economic Development Administration

Pennsylvania

- Marine Science Consortium (15 Public Universities)

1.4 PURPOSE AND NEED

The purpose of the proposed project is to create an integrated business park for aerospace research and development programs, scientific research, commercial space industries, and educational centers to expand the United States space program, and to increase economic development within Accomack County. To meet NASA's mission and commercial space industry needs, the proposed project should be close to usable space facilities such as WFF. The proposed project is consistent with NASA's strategic vision for WFF.

1.5 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This Environmental Assessment (EA) has been prepared to describe the potential impacts from the Proposed Action, no action, and one alternative. The No Action Alternative provides a baseline for comparing the Proposed Action and alternatives with the existing conditions. This EA has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500 through 1508), and the NASA Policy Requirements (NPR) for implementing NEPA (NPR 8580.1).

Pursuant to NEPA, as implemented by the CEQ regulations and NASA's NPR, NASA has prepared this EA for the Wallops Research Park. After the EA is completed and the environmental and socioeconomic impacts have been analyzed, a determination will be made whether NASA must prepare an Environmental Impact Statement or may issue a Finding of No Significant Impact.

1.6 RELATED ENVIRONMENTAL DOCUMENTATION

Final Site-Wide Environmental Assessment and Finding of No Significant Impact, Wallops Flight Facility, Goddard Space Flight Center. 2005. Prepared by URS-EG&G. January.

Environmental Resources Document. NASA GSFC WFF, Wallops Island, Virginia. 1999. Prepared by Occu-Health, Inc. October.

2.1 NO ACTION ALTERNATIVE

Under the No Action Alternative, NASA would not participate in the funding or construction of a research park, nor would NASA provide utilities, utility easements, or land for the development of a research park.

2.2 PROPOSED ACTION

The Proposed Action consists of developing a research park adjacent to the WFF Main Base. The research park would be constructed on approximately 202 acres of land; 85 acres are owned by NASA, 88 acres are owned by Accomack County, and 29 acres are owned by the MSC (the 33-acre MSC campus site is not included in the total WRP acreage) (Figure 2). Portions of the proposed WRP site have been previously developed and currently contain a NASA payload processing facility (PPF), MSC campus buildings, open space that is periodically mowed, utility and road infrastructure, nature trails, a playground and baseball field, and a closed county-run landfill. Forested areas also occur within the WRP site.

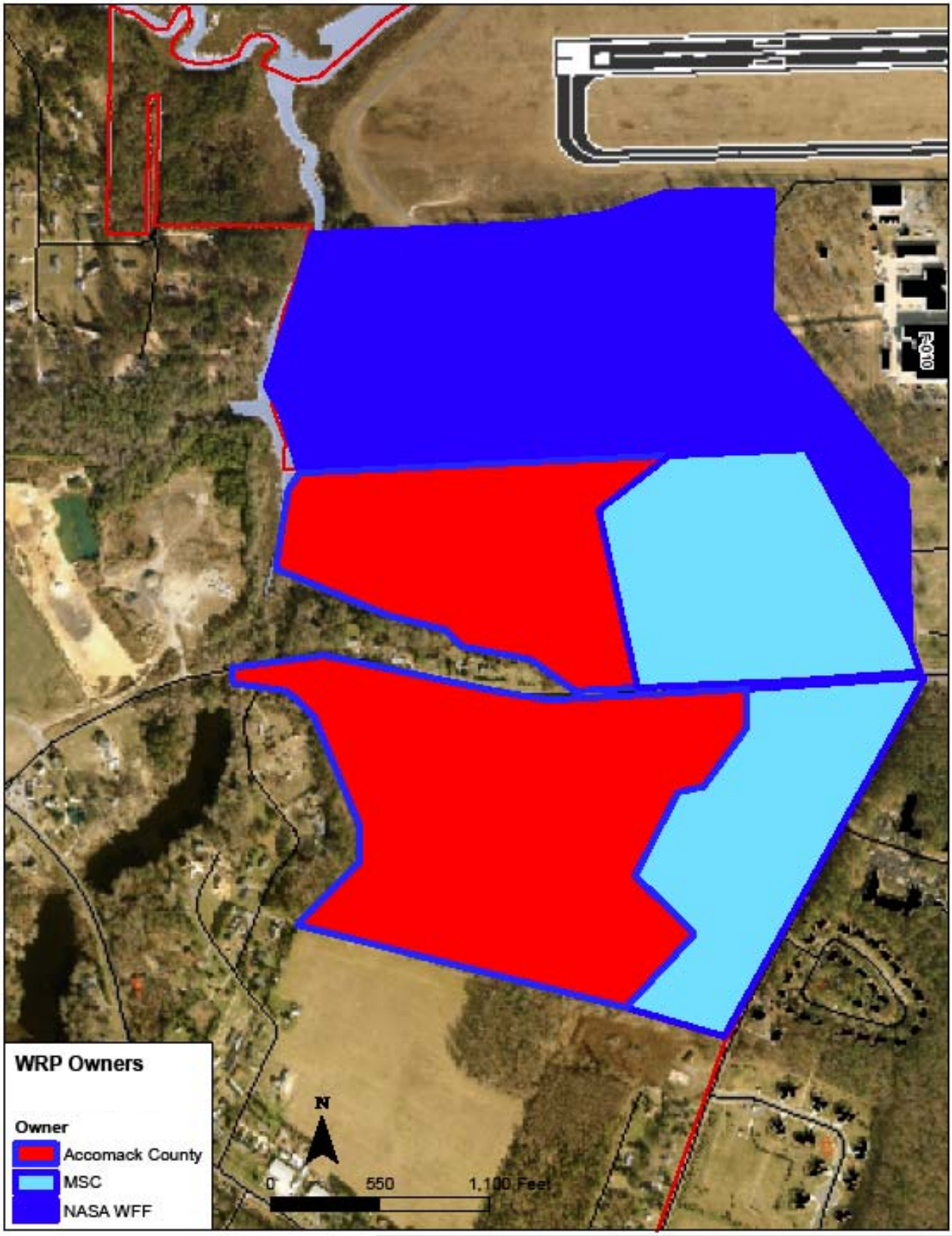
The WRP would consist of a multi-use development dedicated to space and science research, educational facilities, and recreational areas. Proposed land use categories within WRP include: 1) research and development/industrial use, 2) aviation use, 3) gateway research and development/industrial use, and 4) an Accomack County recreational park (Figure 3). Construction in each of the WRP land parcels would include the installation of roads and utilities and the establishment of utility easements. Full build-out of the WRP is anticipated to take approximately 20 years.

Once developed, land owned by NASA within the WRP would be used primarily for aerospace activities including payload processing and aircraft operation and maintenance. Hangars are planned for construction on the northwest part of the NASA parcel. A PPF has been constructed on the NASA property in an area north of the MSC campus. The PPF houses a vertical payload integration and assembly facilities, clean rooms, and project support space.

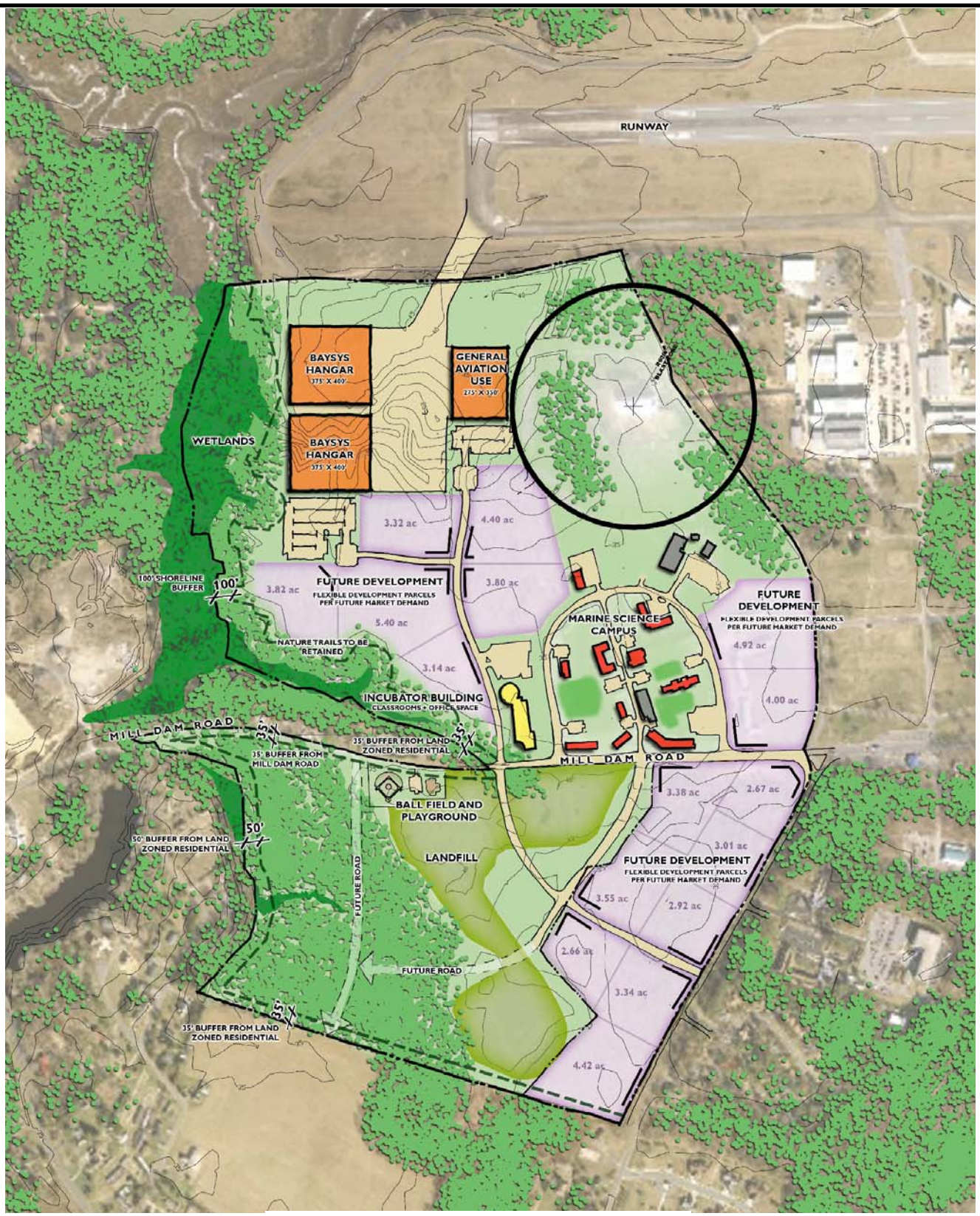
The MSC property south of Mill Dam Road would be developed for research and development and industrial use. The MSC owns 62 acres within the WRP site boundary; the MSC campus, which is located on the north side of Mill Dam Road, encompasses 33 of those acres. The MSC campus and any activities related to MSC campus renewal are independent and not considered part of the WRP development.

Accomack County Property north of Mill Dam Road would include construction of education facilities, an incubator building with classrooms and office space, and new roads. A baseball field, playground, and nature trails already exist on this property but would be relocated to the parcel south of Mill Dam Road during WRP development.

Additional Accomack County property west of the closed landfill and south of Mill Dam Road would be used for recreational activities and maintained as a county park. No development would occur within the 35-acre footprint of the closed Accomack County landfill.



TITLE	**WRP Owners**	
EG&G		URS PROJECT 39455591
		FIGURE **2**
CLIENT: NASA		
PROJECT: WALLOPS RESEARCH PARK		



TITLE	**WRP Proposed Action**
EG&G	URS PROJECT 39455591
	FIGURE **3**
CLIENT: NASA	
PROJECT: WALLOPS RESEARCH PARK	

2.3 ALTERNATIVE ONE

Alternative One includes the same development as described under the Proposed Action on NASA and MSC property. However, approximately 15 additional acres of Accomack County property in the WRP would be developed to include research and development and industrial land uses (Figure 4). Other than a road, no improvements would be built within the footprint of the closed Accomack County landfill.

2.4 ALTERNATIVES CONSIDERED AND DISMISSED

An alternative to developing the WRP adjacent to the WFF Main Base includes using existing research/industrial parks with Accomack County for research and educational facilities. However, this alternative does not meet NASA's strategic vision for WFF that states, "Wallops Flight Facility will be a national resource for enabling low-cost aerospace-based science and technology research" because it would locate facilities related to the WFF's mission away from WFF. In addition, this alternative does not meet the purpose and need of the project to develop the WRP close to space facilities, and the movement of aircraft from the runway into the hangars would not be possible if the WRP was located away from the WFF Main Base runway. Therefore, this alternative was considered but dismissed.

LEGEND

- R&D/Industrial Use
- Gateway R&D/ Industrial Use
- Aviation Use
- Major Gateway
- Major Access Point

Development Program

R&D/Industrial Use:	58.5+/- AC.
Aviation Use:	15+/-AC.
Gateway R&D/Industrial Use:	8.5+/-AC.

N

Development Framework B:
Medium R&D/ Industrial Use
Medium and Small Users
Wallops Research Park 8.23.07

VHB Vanasse Hangen Brustlin, Inc.
Land Development|Transportation|Environmental Services
115 South 15th Street, Suite 200
Richmond, Virginia 23219-4209
804-343-7100 FAX 804-343-1713

N

0 250 500 Feet

TITLE **WRP Alternative One**

EG&G

URS PROJECT 39455591

FIGURE 4

CLIENT: NASA

PROJECT: WALLOPS RESEARCH PARK

3.1 INTRODUCTION

Section 3 describes existing resources at the proposed WRP site that may be affected by the Proposed Action and Alternative One. This section contains discussions on resources under three main categories: Physical Environment, Biological Environment, and Social and Economic Environment.

3.2 PHYSICAL ENVIRONMENT

3.2.1 Land Resources

Topography and Drainage

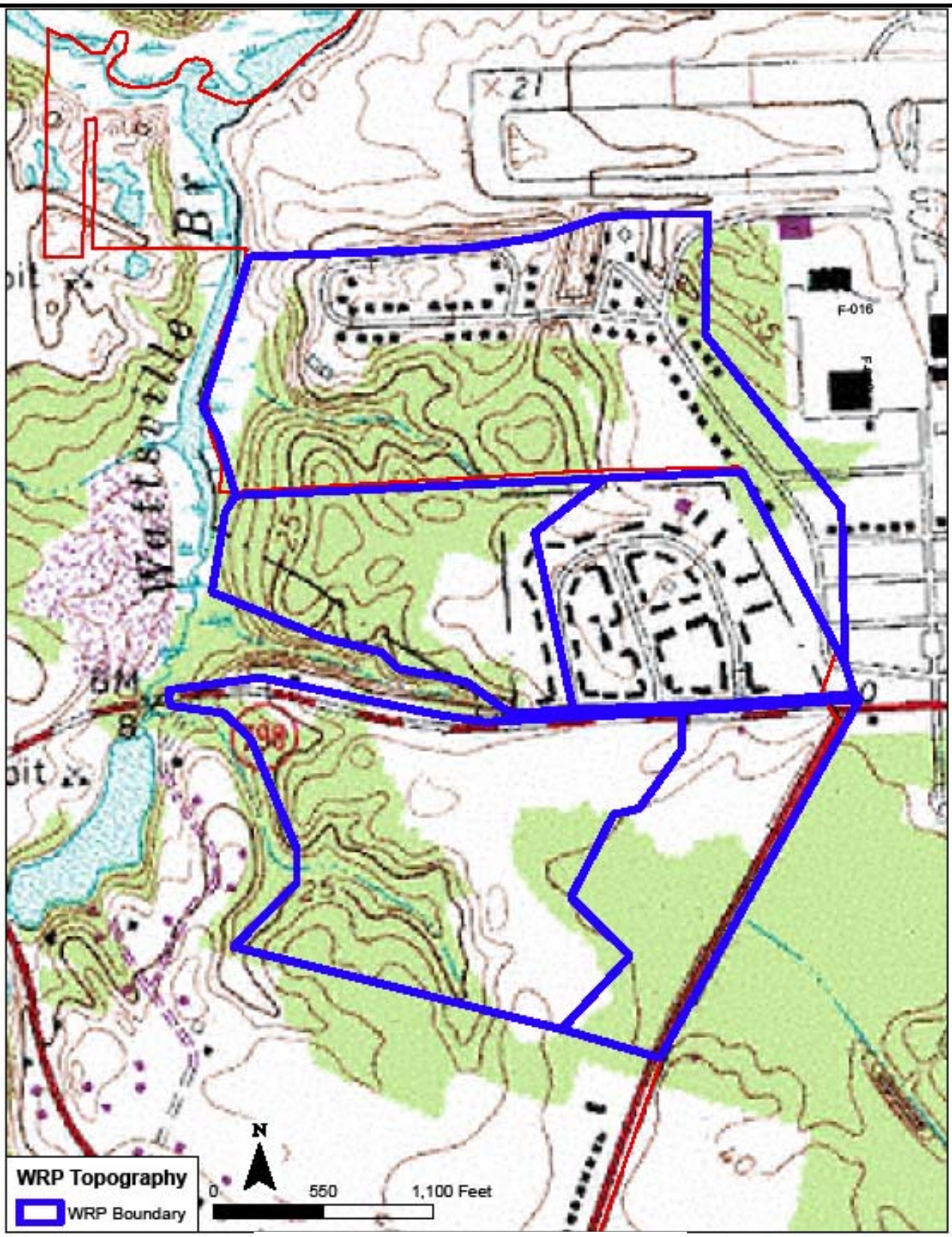
The topography of the WRP site area is relatively flat in the currently developed areas. However, elevations change rapidly immediately to the west of the proposed development, dropping from 40 feet above mean sea level (amsl) on the MSC campus to sea level at Wattsville Branch on the west portion of the WRP site (Figure 5).

The parcel of land north of Mill Dam Road that is owned by Accomack County and referred to as Accomack County North (ACCN), and the NASA parcel are bounded by Wattsville Branch to the west. Wattsville Branch is a tributary of Little Mosquito Creek, which is located north of the WRP area, and is surrounded by wetlands in the low-lying portions. Elevations rapidly reach a high of approximately 35 feet amsl moving east across the ACCN and NASA properties. There are seeps and small ephemeral streams in both the ACCN and NASA parcels, and the elevation drops to approximately 10 feet amsl near these streams and seeps.

The parcel of land to the south of Mill Dam Road that is owned by the MSC is relatively flat and is between 35 and 40 feet amsl. The parcel of land to the south of Mill Dam Road that is owned by Accomack County, referred to as Accomack County South (ACCS), is characterized by relatively rapid changes in elevation from approximately 10 feet amsl near an unnamed tributary of Wattsville Branch on the western side of the ACCS parcel to approximately 30 feet amsl in the relatively flat area east of the unnamed tributary (Figure 5).

Geology

The WRP area is located within the Atlantic Coastal Plain Physiographic Province. This area is underlain by approximately 7,000 feet of sediment that lies on top of crystalline basement rock. The sedimentary section, ranging in age from Cretaceous to Quaternary, consists of a thick sequence of terrestrial, continental deposits overlain by a much thinner sequence of marine sediments. These sediments are generally unconsolidated and consist of clay, silt, sand, and gravel.



TITLE **WRP Site Topography**

EG&G

URS PROJECT 39455591

FIGURE 5

CLIENT: NASA

PROJECT: WALLOPS RESEARCH PARK

The regional dip of the underlying geology is to the east. The two uppermost geologic units at WRP are the Yorktown Formation and the Columbia Group, which is not subdivided into formations. The Yorktown Formation generally consists of fine to coarse, glauconite quartz sand, which is greenish gray, with clay, silt, and shells. The Yorktown Formation occurs at depths of 60 to 140 feet below the ground surface in Accomack County (NASA, 1999).

Soil Types

A Custom Soil Resource Report was generated for the WRP area through the use of an interactive U.S. Department of Agriculture (USDA) Web site and soils database for Accomack County, Virginia (USDA, 2007). Soil types that occur within the WRP area are shown on Figure 6 as 3-letter Map Unit Symbols.

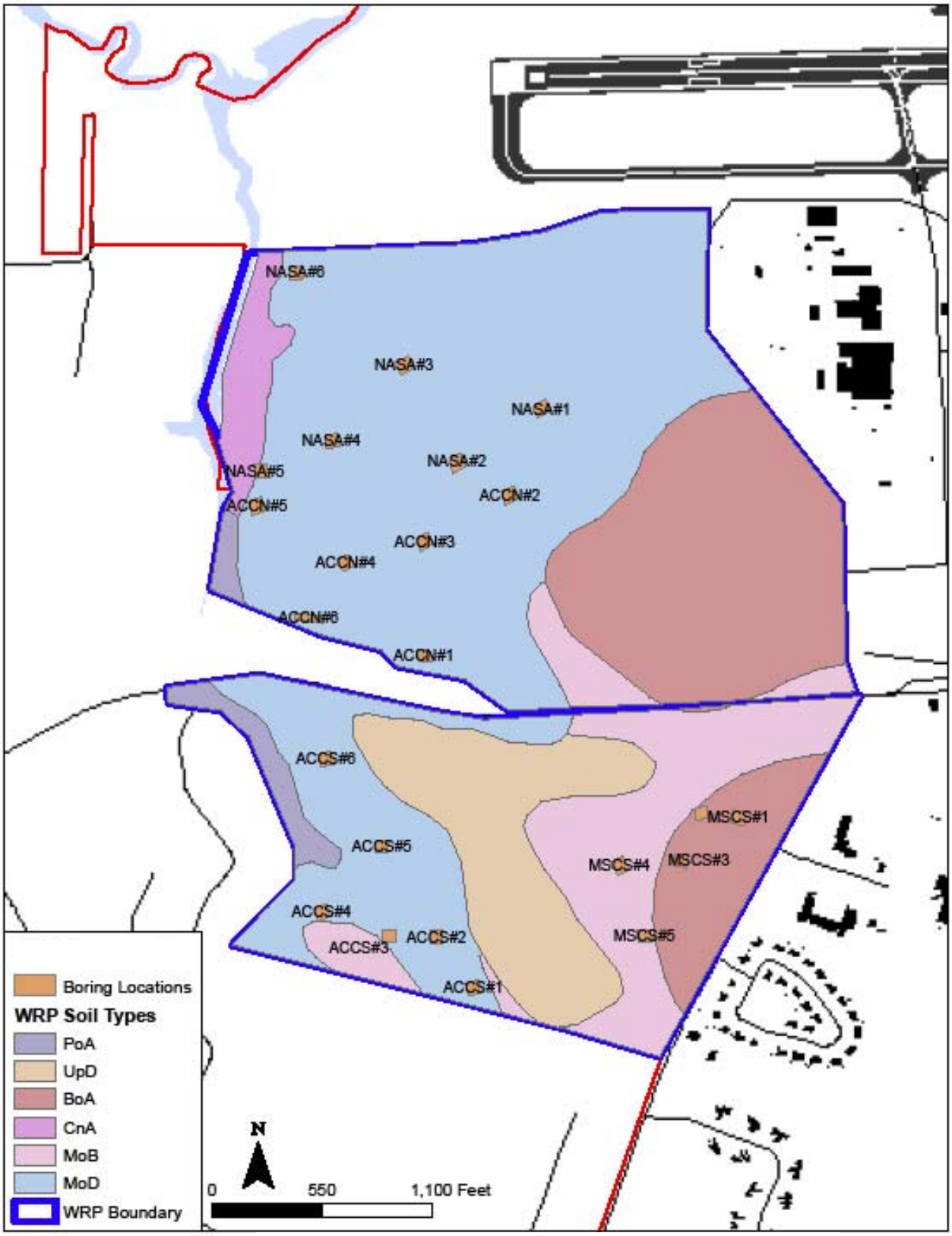
Table 1 includes descriptions of the soil types that occur within the WRP area.

Table 1. Soils in the WRP Area

Map Unit Symbol	Map Unit Name	Approximate Acres Within WRP	Percent of Area Within WRP
BoA	Bojac fine sandy loam, 0 to 2 percent slopes	45	19.2%
ChA	Chincoteague silt loam, 0 to 1 percent slopes, frequently flooded	5	2.3%
MoB	Molena loamy sand, 0 to 6 percent slopes	34	14.8%
MoD	Molena loamy sand, 6 to 35 percent slopes	116	49.8%
PoA	Polawana mucky sandy loam, 0 to 2 percent slopes, frequently flooded	7	3.2%
UpD	Udorthent and Udipsamment soils, 0 to 30 percent slopes	23	10.0%
W	Water	2.0	0.8%
	Total[1]	232	100%

[1]Includes the 30-acre MSC campus

The Molena loamy sand (both MoB and MoD map units) is the predominant soil within the WRP area. MoD can extend very deep from the surface and is somewhat excessively drained. There is severe erosion potential with this type of soil, especially where steep slopes exist (greater than 10 percent slope). Chincoteague silt loam (ChA) and Polawana mucky sandy loam (PoA) soils are associated with wetlands because they are poorly drained. The Bojac fine sandy loam (BoA), which generally occurs in flat areas, is located within the MSC-owned land, particularly near the current MSC campus. BoA is a nearly level, very deep, and well-drained soil. Udorthent and Udipsamment (UpD) soils, which are characterized by weakly developed horizons, occur in the open space land within the ACCS parcel. Soils in the forested or maintained open space (mowed) portions of the WRP area are generally well drained (USDA, 2007). Although the ChA, PoA, and UpD soils are classified as hydric soils, there was little evidence that the meadow in the ACCS open space area held water for a prolonged period during the year (NASA, 2008a).



TITLE	**WRP Project Area USDA Soil Types**
EG&G	URS PROJECT 39455591
	FIGURE **6**
CLIENT: NASA	
PROJECT: WALLOPS RESEARCH PARK	

Soil Chemistry and Texture

Complete information about the chemical and physical characteristics of the soils found on the WRP project area is provided in the Custom Soils Report for the project area (USDA, 2007).

A vegetation survey of the WRP project area that included soil sampling and analysis was conducted on April 5, 2007 and from May 14-16, 2007 (NASA, 2008a). Soil pH values were generally consistent with the published pH values typical of the corresponding soil types with the exception of the Molena loamy sand, which had a slightly lower field pH than the approximated value published by the USDA (NASA, 2008a). Overall, field measurements of soil texture were within the range of expected values.

Land Use

The entire area of the WRP site is zoned as industrial land use. Portions of the proposed WRP site have been previously developed and currently contain a NASA payload processing facility, open space that is periodically mowed, utility and road infrastructure, nature trails, a playground and baseball field, and a closed county-run landfill. Forested areas also occur on both sides of Mill Dam Road within the WRP site.

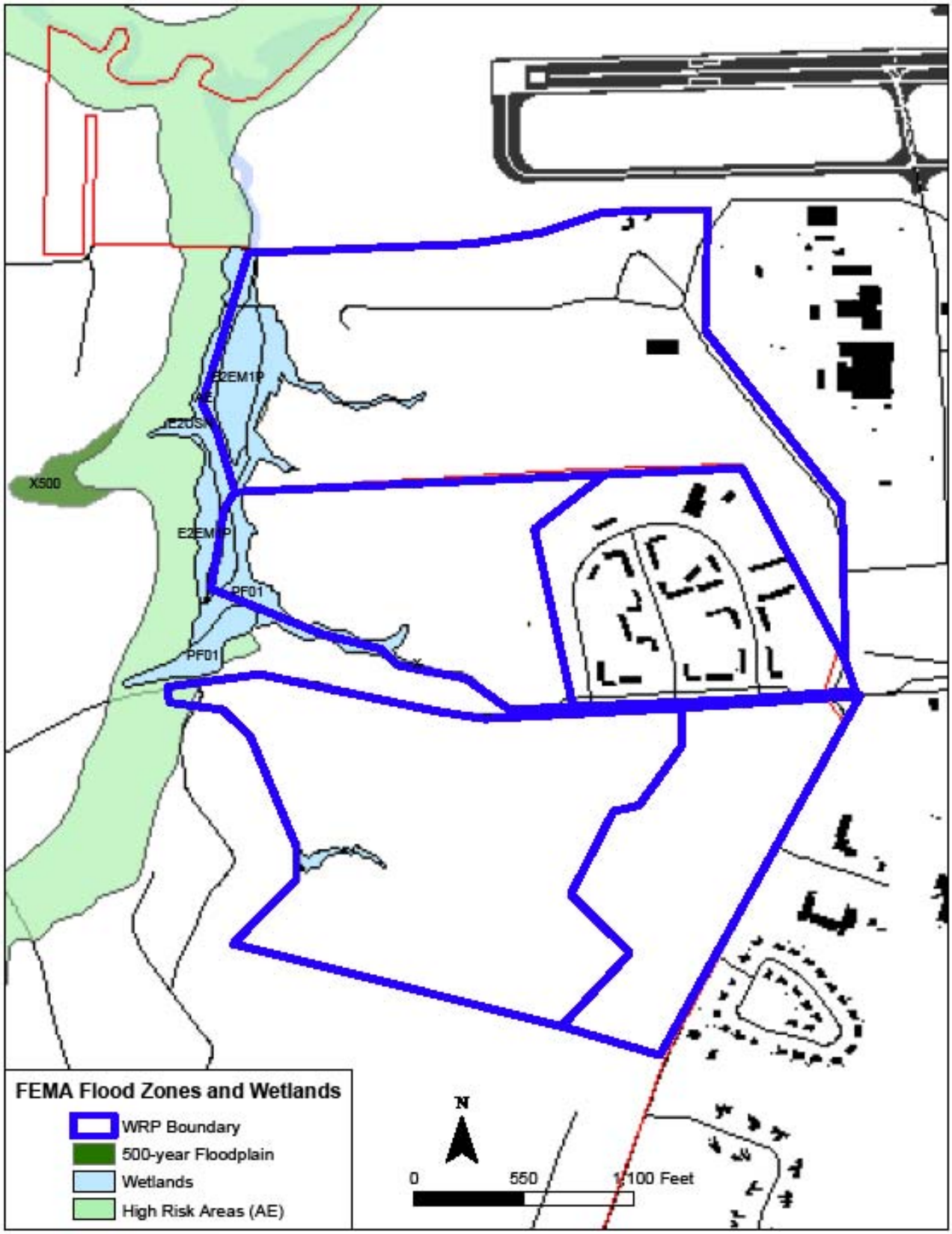
3.2.2 Water Resources

The entire WRP site is located within the Chincoteague Bay watershed. Fresh water within the Chincoteague Bay watershed mixes with Atlantic Ocean water through two inlets. Surface water in the WRP area eventually flows to Chincoteague Bay, which is enclosed by two coastal barriers, Assateague Island and Wallops Island. Ocean water enters the bay through the Ocean City inlet in Maryland and the Chincoteague inlet in Virginia. Since the Chincoteague Bay watershed has a relatively small population, with an average density of less than 40 people per square mile, little topographic relief, and a high water table, a large area of the watershed is comprised of tidal wetlands.

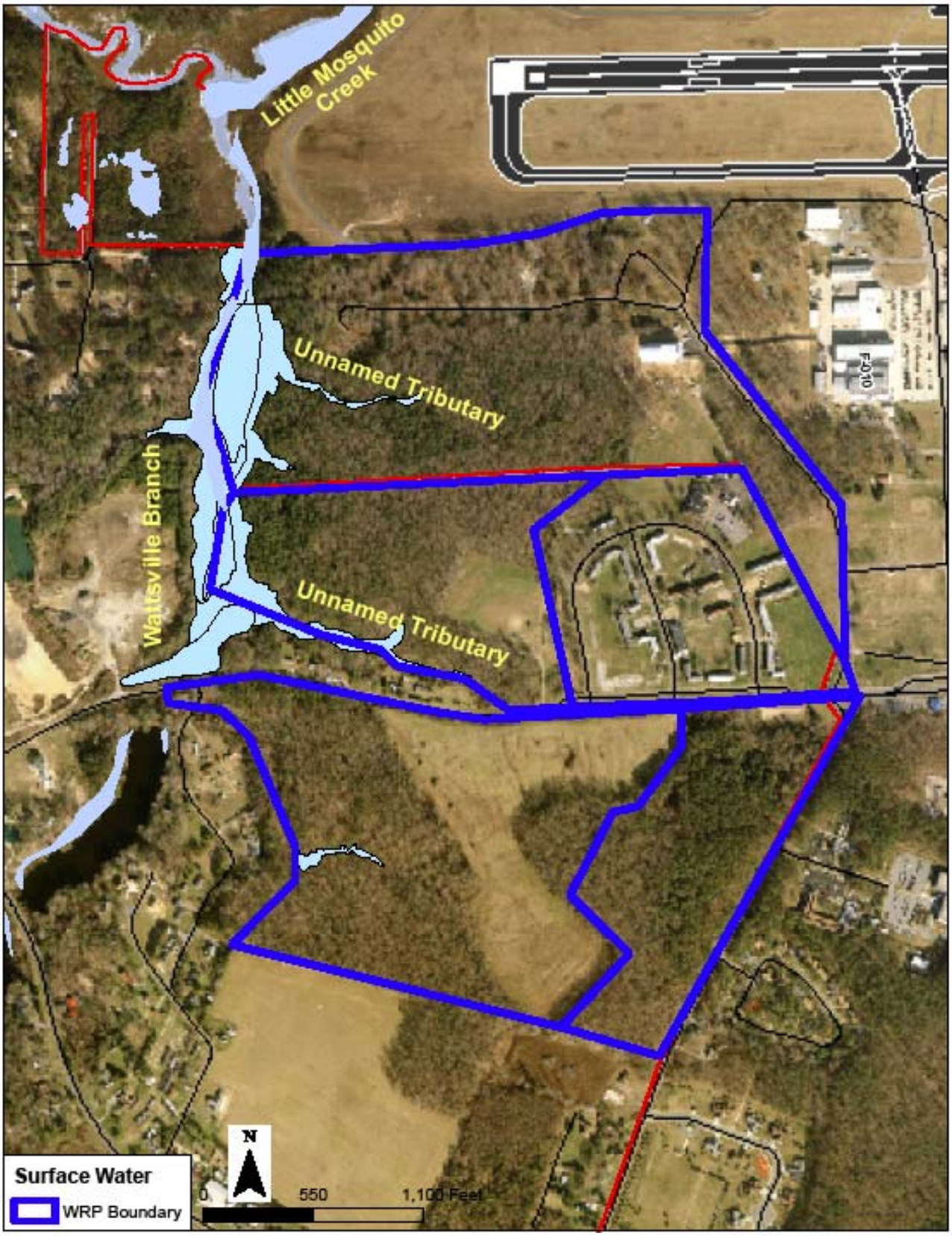
Surface Waters

Little Mosquito Creek is located north of the WRP site and also forms the northern boundary of WFF. The western side of the WRP site is bounded by a tributary to Little Mosquito Creek named Wattsville Branch (Figures 7 and 8). Little Mosquito Creek flows east through Mosquito Creek to Simoneaston Bay, then to Chincoteague Bay and out to the Atlantic Ocean. Several unnamed ephemeral tributaries of Wattsville Branch occur within the western portion of the WRP site. An unnamed tributary to Wattsville Branch that is located on NASA property was observed during a vegetation survey in July 2007 (NASA, 2008a); it was found to be relatively dry and did not contain flowing water.

The Virginia Department of Environmental Quality (DEQ) regulates surface waters in Virginia and has established water quality criteria including limits for minimum dissolved oxygen concentrations, pH, maximum temperature for various surface water classifications, and numerical limits for various potentially toxic parameters.



TITLE	**WRP Project Area Floodplains and Wetlands**
EG&G	URS PROJECT 39455591
	FIGURE 7
CLIENT: NASA	
PROJECT: WALLOPS RESEARCH PARK	



TITLE	**WRP Project Area Surface Waters**
EG&G	URS PROJECT 39455591
	FIGURE **8**
CLIENT: NASA	
PROJECT: WALLOPS RESEARCH PARK	

The Virginia DEQ designated the waters around the WRP as Class II – Estuarine Waters (NASA, 1999), for which the saltwater numerical criterion applies. The surface waters of Little Mosquito Creek downstream of the WRP site are listed on Virginia 303(d) list as an impaired water body (Virginia DEQ, 2006). Little Mosquito Creek is listed as impaired for beneficial uses including aquatic life, recreation, and shellfish harvesting due to low dissolved oxygen, elevated enterococcus levels, and elevated fecal coliform levels, respectively.

Wastewater

NASA owns and operates a state-of-the-art 300,000-gallon-per-day wastewater treatment plant (WWTP). The WWTP currently treats flows of approximately 60,000 gallons per day.

Treated wastewater from the WWTP is discharged via a single outfall to an unnamed freshwater tributary to Little Mosquito Creek under Virginia Pollutant Discharge Elimination System (VPDES) permit VA0024457 issued by the Virginia DEQ. The WFF Environmental Office tests the wastewater discharge on a daily basis to ensure discharges do not exceed permitted limits.

Stormwater

Stormwater runoff at the WRP site is discharged directly into Wattsville Branch via overland flow, or is collected on-site by an existing system of storm drains, stormwater lines, ditches, and swales that are currently maintained and permitted by NASA. Runoff then discharges to Little Mosquito Creek via an outfall to the west of the WFF runway that is located north of the WRP site.

The Environmental Protection Agency (EPA) created the National Pollutant Discharge Elimination System (NPDES), which regulates discharges associated with industrial activities. The Virginia DEQ is authorized to carry out NPDES permitting under VPDES. Neither Accomack County nor the MSC currently have VPDES permits for industrial discharges. NASA currently holds a VPDES permit for industrial stormwater discharges (permit number VA0024457) for 12 outfalls located on the WFF Main Base. NASA's VPDES permit requires a Storm Water Pollution Prevention Plan (SWPPP) for WFF that includes best management practices for construction and aerospace-related activities to prevent impacts to soils and water quality.

Virginia stormwater management regulations require that 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 nonpoint source pollution carried by stormwater runoff.

Groundwater

The Virginia DEQ manages groundwater through a program regulating the withdrawals in certain areas called Groundwater Management Areas under the Groundwater Management Act of 1992. The WRP site lies within the Eastern Shore Groundwater Management Area, which includes Accomack and Northampton counties. Any person or entity wishing to withdraw 300,000 or more gallons per month or more in a declared management area must obtain a permit from Virginia DEQ.

Hydrology

The Virginia DEQ has identified four major aquifers on the Eastern Shore of Virginia: the Columbia aquifer and the three aquifers that comprise the Yorktown-Eastover aquifer system.

The Columbia aquifer is known as the water table aquifer, and primarily consists of Pleistocene sediments of the Columbia Group (Richardson, 1992). It is unconfined and typically overlain by wind-deposited beach sands, silts, and gravel. The aquifer occurs between the depths of 5 and 60 feet below the ground surface, with the water table ranging between the depths of 0 and 30 feet below the ground surface. Groundwater generally flows east and north toward local tributaries and streams at the WRP site, and also toward a marsh area that separates Chincoteague Island from the Eastern Shore mainland to the northeast of the WRP site and WFF.

The Yorktown-Eastover system is a multiaquifer unit consisting of late Miocene and Pliocene deposits and is composed of the sandy layers of the Yorktown and Eastover Formations (Meng and Harsh, 1988). The top of the shallowest confined Yorktown-Eastover aquifer in the area of the proposed WRP is found at a depth of approximately 100 feet below the ground surface. It is separated from the overlying Columbia aquifer by a 20- to 30-foot-thick confining layer (aquitard) of clay and silt. The Yorktown-Eastover aquifers are classified as the upper, the middle, and the lower Yorktown-Eastover aquifers. Correspondingly, each Yorktown-Eastover aquifer is overlain by the upper, middle, and lower Yorktown-Eastover aquitards.

In general, the water table (Columbia) aquifer on the Delmarva Peninsula is recharged by surface waters or infiltration of precipitation. The confined aquifers are recharged by the same process, but from areas located beyond the immediate vicinity of the WRP site.

Groundwater Appropriation

Groundwater from the Columbia and Yorktown-Eastover Multiaquifer System is the sole source of potable water for the vicinity of the WRP. No major streams or other fresh surface water supplies are available as alternative sources of water for human consumption. The Columbia and Yorktown-Eastover Multiaquifer System is designated and protected by the EPA as a sole source aquifer (EPA, 2003). A sole source aquifer is a drinking water supply located in an area with few or no alternative sources to the groundwater resource, and where if contamination occurred, using an alternative source would be extremely expensive. The designation protects an area's groundwater resource by requiring the EPA to review any proposed projects within the designated area that are receiving Federal financial assistance. All proposed projects receiving Federal funds are subject to review to ensure they do not endanger the water source. Additionally, the Accomack-Northampton Planning District Commission has established a groundwater management program for the entire Eastern Shore that includes a Groundwater Committee, established in 1990, that monitors usage and ensures that an optimal balance exists between groundwater withdrawals and recharge rates. This balance helps to minimize the problems of water quality due to saltwater intrusion, aquifer de-watering, and well interference in the general area (NASA, 1999).

NASA operates five supply wells on the WFF Main Base that are several hundred feet deep. Four wells withdraw water from the Middle Yorktown-Eastover aquifer and one well withdraws water from the Upper Yorktown-Eastover aquifer. The potable water system for the WRP site would be supplied by NASA.

Industrial and public water users withdrawing at least 300,000 gallons of ground water per month are required to obtain a ground water withdrawal permit from Virginia DEQ. WFF is permitted by Virginia DEQ to withdraw up to 8,153,000 gallons per month. Actual WFF withdrawals are approximately 3,000,000 gallons per month (NASA, 1999).

Groundwater Quality

WFF's chemical laboratory performs routine analytical sampling of WFF's water systems in accordance with Federal and State requirements and submits the results to the State for review. Recent sampling of the drinking water system found that lead concentrations are above regulatory limits. These contaminants are from corrosion of the supply pipes rather than contaminants present in the groundwater.

In February 2008, NASA notified users of the drinking water system that monitoring had detected lead levels above the action level and provided them with guidance on reducing their exposure to lead. NASA has instituted a comprehensive treatment program to reduce lead and copper concentrations and will continue monitoring the drinking water system. If the treatment program does not successfully reduce the lead concentrations, then NASA is required to replace components of the distribution system that contribute to lead concentrations of more than 15 parts per billion (ppb).

Past contamination at three sites on the Main Base has affected groundwater quality at WFF. Chemical releases at the Former Fire Training Area, Waste Oil Dump, and Old Aviation Fuel Tank Farm resulted in contaminant plumes that have locally affected groundwater quality in the Columbia aquifer. Water quality in the underlying Yorktown aquifer has not been affected by contamination due to the presence of a geologic layer that prevents groundwater movement from the Columbia aquifer downward into the Yorktown aquifer. The principal chemicals in the contaminant plumes included components of fuels and oils (in all three plumes) and solvents (chiefly in the Former Fire Training Area plume) (NASA, 2005).

The water supply wells located at WFF Main Base that supply the WRP have not been affected by the contaminant plumes. All of the supply wells are located in the Yorktown aquifer, which is isolated from the overlying contamination. NASA regularly samples the water supply wells and area groundwater to ensure that the contaminant plumes are not expanding and that there is no adverse affect on the drinking water supply. NASA is working with Federal and State environmental agencies to ensure that the plumes do not expand and to restore groundwater to natural conditions.

Wetlands

EO 11990 (Wetland Protection) directs Federal agencies to minimize the destruction, loss, and degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetland communities. In accordance with the Clean Water Act (CWA) (33 U.S.C. §1251 et seq.), projects at the WRP that involve dredging or filling wetlands would require Section 404 permits from the U.S. Army Corps of Engineers (USACE). NASA is also directed to minimize wetland impacts under 14 CFR 1216.2 (NASA regulations on Floodplain and Wetland Management).

In addition, activities that occur in Virginia wetlands require State permits from the Virginia DEQ, which administers the Virginia Water Protection Permit program and Section 401 of the

CWA, and from the Virginia Marine Resources Commission (VMRC), which administers the Virginia Tidal Wetlands Act of 1972. The Accomack County Wetlands Board also oversees activities that occur in or affect tidal wetlands (it does not oversee non-tidal wetlands).

In order to define the extent and quality of wetlands, a non-jurisdictional wetlands characterization of the WRP property was performed during a 2007 vegetation survey (NASA, 2008a). Tidal marsh wetlands occur in conjunction with Wattsville Branch on the west side of the WRP site (Figure 7). Wetlands also occur both north and south of Mill Dam Road within and around unnamed tributaries to Wattsville Branch.

Floodplains

EO 11988 (Floodplain Management) requires Federal agencies to take action to minimize occupancy and modification of the floodplain. Specifically, EO 11988 prohibits Federal agencies from funding construction in the 100-year floodplain unless there are no practicable alternatives. As shown on the Flood Insurance Rate Maps (FIRMs) produced by the Federal Emergency Management Agency (FEMA), the 100-year floodplain designates the area inundated during a storm having a 1 percent chance of occurring in any given year. The 500-year floodplain designates the area inundated during a storm having a 0.2 percent chance of occurring in any given year.

FIRM Community Panels 5100010070B (FEMA, 1984) and 5100010100C (FEMA, 1992) show that the western part of the WRP site is included in the 100-year floodplain and the 500-year floodplain, as designated by Zone AE on Figure 7. The floodplain extends upstream along some of the unnamed tributaries to Wattsville Branch within the WRP site.

Coastal Zone Management

The Virginia DEQ is the lead agency for the Virginia Coastal Resources Management Program, which is authorized by the National Oceanic and Atmospheric Administration, 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 Virginia Coastal Resources Management Program (VCRMP). 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 VCRMP (Virginia DEQ, 2008a).

Enforceable policies of the Virginia Coastal Resources Management Program that must be considered when making a Coastal Zone Consistency Determination include:

- Fisheries Management – Administered by the 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 the VMRC, this program establishes conditions for granting permits to use State-owned bottomlands
- Wetlands Management – Administered by the VMRC and the DEQ, the wetlands management program preserves and protects tidal wetlands
- Dunes Management – Administered by the VMRC, the purpose of this program is to prevent the destruction and/or alteration of primary dunes

- Non-point Source Pollution Control – Administered by the Virginia Department of Conservation and Recreation, 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 the State Water Control Board, the NPDES permit program regulates point source discharges to Virginia's waterways
- Shoreline Sanitation – Administered by the Department of Health, this program regulates the installation of septic tanks to protect public health and the environment
- Air Pollution Control – Administered by the State Air Pollution Control Board, this program implements the Federal Clean Air Act 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.

3.2.3 Air Quality

The Clean Air Act (CAA), as amended, requires the EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The CAA established two types of NAAQS, primary and secondary standards. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA has set NAAQS for six principal pollutants that are called "criteria" pollutants. They include: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), particulate matter less than or equal to 10 microns (PM_{10}), and sulfur dioxide (SO_2). The Ambient Air Quality Standards published by the Commonwealth of Virginia must be equal to or more stringent than the NAAQS. The Virginia DEQ oversees the State Air Pollution Control Board, which regulates air quality standards within Virginia. Virginia's standards are contained in Section 9 VAC 5-30 for the Control and Abatement of Air Pollution. Primary standards for protection of human health, and secondary standards for protection of public welfare, are included in Section 9 VAC 5-30 for criteria pollutants.

Section 176(c) of the CAA requires Federal agencies to ensure that actions undertaken in non-attainment or maintenance areas are consistent with the CAA and with Federally enforceable air quality management plans. The Commonwealth of Virginia defines an Air Quality Maintenance Area as "any area which, due to current air quality or projected growth rate or both, may have the potential for exceeding any ambient air quality standard (for criteria pollutants) within a subsequent 10-year period" (Virginia DEQ, 2008b). Aircraft are exempt from the Commonwealth of Virginia regulations that govern emissions standards for mobile sources (9 VAC 5-40-5680).

The WRP area is located in an attainment area for all criteria pollutants as regulated under Virginia's Ambient Air Quality Standards. Accomack County is not designated as an Air Quality Maintenance Area. Because the Virginia DEQ considers the Eastern Shore of Virginia to be an attainment area for ozone, indicating compliance with primary and secondary standards, it does not currently perform ambient air quality monitoring in the vicinity of the WRP site. WFF

currently holds a permit from the Virginia DEQ State Air Pollution Control Board that allows it to maintain emissions for criteria pollutants and hazardous air pollutants below major source thresholds.

Paint Spray/Coatings Booths

Paint booths are regulated by the Virginia DEQ through a permitting process and cannot exceed 9.1 metric tonnes (10 tons) of volatile organic compound (VOC) emissions per year. Activities in these booths would be similar or identical to painting activities currently performed at NASA WFF. In 1990, WFF submitted data to the Virginia DEQ regarding operations of the NASA paint booth facilities, including paint usage information. The Virginia DEQ found, through modeling, that WFF emits 33 non-criteria toxic air pollutants. Of those pollutants, 21 are exempt from regulations. The remaining 12 non-criteria pollutants are subject to regulation. A summary of Virginia DEQ's findings for WFF is presented in Tables 2 and 3.

Table 2. Summary of Emissions from Paint Spray Booths for Exempt Non-Criteria Air Pollutants

Pollutant Name	CAS Number	Uncontrolled Emission Rate kg/hr (lb/hr)	Exempting Rate kg/hr (lb/hr)
n-Butyl acetate	123-86-4	2.4 (5.2)	57.5 (126.77)
n-Butyl alcohol	71-63-3	2.9 (6.4)	5.8 (12.90)
Ethyl benzene	100-41-4	0.4 (0.8)	28.8 (63.51)
Ethyl benzene	107-21-1	0.5 (1.1)	5.8 (12.9)
Ethylene glycol monopropyl ether	2807-30-9	2.1 (4.7)	28.8 (63.51)
Isobutyl acetate	110-19-0	0.2 (0.4)	57.5 (126.7)
Isobutyl alcohol	78-83-1	0.1 (0.2)	5.8 (12.90)
Isopropyl alcohol	67-63-0	4.7 (10.3)	57.5 (126.77)
Magnesium naphthenate	1336-93-2	0.05 (0.1)	0.34 (0.76)
Methyl ethyl ketone	78-93-3	0.2 (0.5)	57.5 (126.77)
Methyl isobutyl ketone	108.10-1	1.72 (3.8)	5.85 (12.90)
Mica	12003-38-2	0.05 (0.1)	0.34 (0.76)
Nitroethane	79-24-3	0.54 (1.2)	28.8 (63.51)
2-Nitropropane	79-46-9	1.04 (2.3)	2.98 (6.58)
Polypropylene glycol monomethyl ether	107-98-2	0.77 (1.7)	28.8 (63.51)
Polypropylene glycol monomethyl ether acetate	108-65-6	1.54 (3.4)	57.5 (126.77)
Stoddard solvent	8052-41-3	0.14 (0.3)	57.5 (126.77)
Toluene	108-88-3	2.4 (5.3)	28.8 (63.51)
Trimethyl benzene	25551-13-7	0.14 (0.3)	5.85 (12.90)
VM&P naphtha	8032-32-4	5.49 (12.1)	57.5 (126.77)
Xylene	1330-20-7	4.98 (10.8)	28.8 (63.51)

CAS Number = Chemical Abstract System identification number.
Uncontrolled Emission Rate = Emission rate of facility modeled.
Exempting Rate = Maximum allowable emission rate.
VM&P = Varnish Maker's and Painter's
Source: NASA, 1999

Table 3. Summary of Emissions from Paint Spray Booths for Regulated Non-Criteria Air Pollutants				
Pollutant Name	**CAS Number**	**Emission Rate kg/day (lb/day)**	**Predicted Ambient Concentration (µg/m^3)**	**Significant Ambient Concentration (µg/m^3)**
Aluminum oxide	1344-28-1	34.9 (77.0)	14.9	166.7
Aluminum silicate	1335-30-4	8.3 (18.4)	3.6	166.7
Barium metaborate monohydrate	13701-59-2	4.0 (8.8)	1.7	8.3
Calcium carbonate	13 17-65-3	14.0 (30.8)	6.0	166.7
Cobalt naphthenate	61789-51-3	0.45 (1.0)	0.2	1.7
Iron oxide	1309-37-1	4.35 (9.6)	1.9	83.3
Magnesium silicate	14807-96-6	5.99 (13.2)	2.6	166.7
Phosphoric acid	7664-38-2	8.3 (18.3)	3.6	16.7
Silica, amorphous (fused)	60676-86-0	1.8 (4.0)	0.8	1.7
Silica, diatomaceous (earth)	68855-54-9	12.6 (27.9)	5.4	166.7
Titanium dioxide	13463-67-7	17.4 (38.4)	7.5	166.7
Zinc borate	1332-07-5	3.9 (8.7)	1.7	166.7

Predicted Ambient Concentration – Concentration of toxic pollutant in ambient air based on modeling and emission rate data.
Significant Ambient Concentration – Concentration of a toxic pollutant in the ambient air which if exceeded may have the potential to injure human health.
µg/m^3 – micrograms per cubic meter
Source: NASA, 1999

3.2.4 Noise

The EPA's Noise Control Act of 1972 and as amended by the Quiet Communities Act of 1978, states that it is the policy of the United States to promote an environment for all Americans free from noise that jeopardizes their health or welfare.

Noise Standards and Criteria

Noise is defined as any loud or undesirable sound. The standard measurement unit of noise is the decibel (dB), generally weighted to the A-scale (dBA), corresponding to the range of human hearing. Since sounds in the outdoor environment are usually not continuous, a common unit of measurement is the $L_{eq,}$ which is the time-averaged sound energy level. The L_{10} is the sound level exceeded 10 percent of the time and is typically used to represent peak noise levels. Similarly, the L_{01} and L_{90} are the noise levels exceeded 1 percent and 90 percent of the time, respectively. The 1-hour L_{eq} is the measurement unit used to describe monitored baseline noise levels in the vicinity of WFF. It conforms to the requirements in 23 CFR, Part 772, and is a descriptor recommended by the Federal Highway Administration for describing noise levels during peak traffic periods.

EPA guidelines state that outdoor sound levels in excess of 55 dB day night level (DNL) are "normally unacceptable" for noise-sensitive land uses such as residences, schools, or hospitals. There are no noise-sensitive land uses within 4.5 miles of the proposed project area.

Aircraft operations are a source of noise to the surrounding area. A variety of military and non-military aircraft use the NASA airfield and its airspace. Some examples of the types of aircraft that use the facility and their associated noise levels are included in Table 4. The aircraft using the airfield are prohibited from creating sonic booms (NASA, 1999).

Table 4. Aircraft Noise Levels				
	TAKEOFF		LANDING	
AIRCRAFT TYPE	dBA	(EPNdB)	dBA	(EPNdB)
727, 737, DC9, BAC1 11	94-100	92-96	85-90	97-104
707, 720, DC8	100-105	--	94-100	--
F-18	155	--	--	--
DC10, L1011	90	95-106	84	99-108
DC3, Propeller	8 5-90	--	75-82	--
Single-Engine Propeller	76-90	77-78	67-77	87-88
Multipropeller	79-93	--	70-80	--
Executive Jet	93-97	83-94	81-87	92-101
OH58 (Ranger Helicopter)	84	--	72	--
UH1 (Huey Helicopter)	77	--	77	--
C141 (Cargo Plane)	134	--	117	--
C-5 Galaxy Class	106.2	--	98.4	--

EPNdB: Effective Perceived Noise Level
Source: NASA, 1999

The total number of flights at WFF is approximately 530 per month, or approximately 6,400 per year (NASA, 2005). Aircraft operations from the WFF airfield are intermittent. In many cases, flight patterns are over marshland or farmland, and primary periods of use are during daylight hours. Personnel exposed to aircraft noise during airfield operations are required to wear hearing protection.

3.2.5 Hazardous Materials and Hazardous Waste

Hazardous Materials

The Federal regulations that govern hazardous materials at a facility are found at 29 CFR 1910, Subpart H. Hazardous materials may exist in the form of explosives, flammable and combustible substances, poisons, and radioactive materials that are most often released as a result of transportation or chemical plant accidents (FEMA, 2008).

Environmental concerns or issues are referred to as “recognized environmental conditions” (RECs) in accordance with the ASTM International (ASTM) Standard E1527-05, which includes EPA’s standards for All Appropriate Inquiries. A REC is defined by the ASTM as, “The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater or surface water of the property” (ASTM, 2005).

LandMark Design Group performed a Phase I Environmental Site Assessment for proposed project site (LandMark, 2001). The objective of the Phase I Environmental Site Assessment was to evaluate environmental concerns that may be associated with the WRP site. LandMark determined that there are no known hazardous wastes and/or hazardous materials within the WRP site that could result in an REC.

Hazardous Waste Management

The regulations that govern hazardous waste management are found at 40 CFR 2 60-270 (Federal) and 9 VAC 20-60 (Commonwealth of Virginia). The WFF Environmental Office manages NASA's hazardous waste generation, including inspection, onsite transportation, storage, and shipment of all hazardous waste. This office is responsible for tracking manifests and certificates of disposal for hazardous wastes that leave WFF. The WFF Environmental Office also provides annual hazardous waste training to all contractor and civil service employees that handle hazardous wastes.

3.2.6 Radiation

Radiation-emitting materials and equipment are used in space flight research, earth sciences research, atmospheric research, testing, and integration of space flight hardware, and communications. Radiation-emitting materials and equipment can be classified as either ionizing or non-ionizing radiation. Ionizing radiation is any type of radiation capable of directly or indirectly producing ions as it passes through a medium. In general, ionizing radiation has considerably greater kinetic energy than non-ionizing radiation. Non-ionizing radiation is not strong enough to produce free ions as it passes through media.

Ionizing Radiation

The Federal Nuclear Regulatory Commission (NRC) licenses the use and storage of ionizing source material, special nuclear material, and byproduct material. Source material is any radioactive material that contains at least 0.05 percent by weight of uranium and/or thorium, excluding special nuclear material. Special nuclear material is plutonium, uranium 233, or uranium-enriched in the isotope 233 or 235. Byproduct material is any radioactive material derived from production or use of special nuclear material.

Sources of ionizing radiation include radioactive materials for science instruments and experiments and for instrument calibration.

Non-Ionizing Radiation

Lasers, radars, microwaves, and ultraviolet and high-intensity lamps produce non-ionizing radiation. Laser radiation sources include pulsed or continuous wave systems capable of producing laser light from ultraviolet to the far infrared. Lasers produce an intense, coherent, directional beam of light by stimulating electronic or molecular transitions to lower energy levels. The lasers may be used for research and testing, as well as communication and atmospheric research. Laser devices may also be used in a variety of experiments in both laboratories and payloads.

Per the United States Occupational Safety and Health Administration (OSHA) Directive STD 01-05-001 - PUB 8-1.7 "Guidelines for Laser Safety and Hazard Assessment" and Chapter 6 "Laser Hazards" of Section III "Health Hazards" of OSHA Technical Manual TED 01-00-015 (TED 1-0.1 5A), all laser operators must be trained in the proper use of the class of lasers they use. All lasers can be classified into one of four categories based on use and light intensity in compliance with the American National Standard Institute (ANSI) standard 7136.6:

- Class I lasers are considered exempt and are typically enclosed in a protective device. Control measures are not required for the operation of a Class I laser
- Class II lasers are low-power visible continuous wave and high pulse-rate frequency lasers. These lasers are incapable of producing eye injury within the duration of a blink. If a user stares directly into the laser beam, eye injury can occur
- Class III lasers are medium-power lasers. These lasers can cause serious eye injury if the user looks directly into the beam
- Class IV lasers are high-power lasers and are usually only found in controlled research laboratory settings. These lasers can present serious skin and eye hazards and can ignite flammable targets, create hazardous airborne contaminants, and have a potentially lethal, high-current, high-voltage power supply.

Other sources of non-ionizing radiation include high-intensity light sources such as compact arc lamps, tungsten-halogen lamps, and electronic flash lamps. Some high-intensity light sources may produce ultraviolet, visible, and/or infrared radiation.

Sources of radio-frequency radiation that produce power densities greater than 100 milliwatts per square centimeter are also potentially hazardous. Sources of radio frequency at NASA facilities that may fall into this category often include radar units, microwave ovens, diathermy units, induction heating devices, and radio-frequency generators.

3.3 BIOLOGICAL ENVIRONMENT

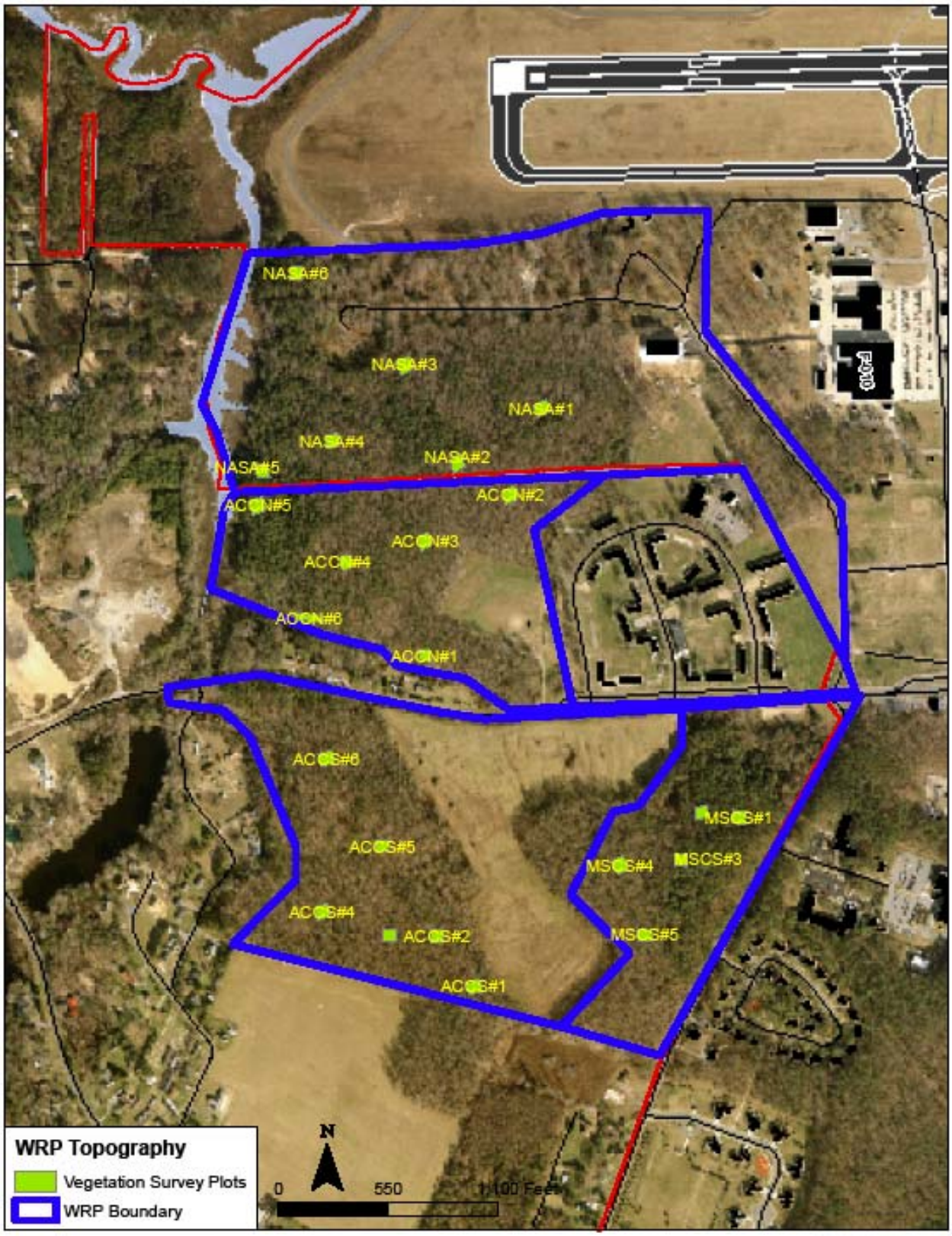
The WRP site is characterized by a diverse ecosystem with a range of habitats due to the mixing of Atlantic Ocean water with fresh water from the Chincoteague Bay watershed, including the fresh waters of Wattsville Branch (Figure 8).

3.3.1 Vegetation

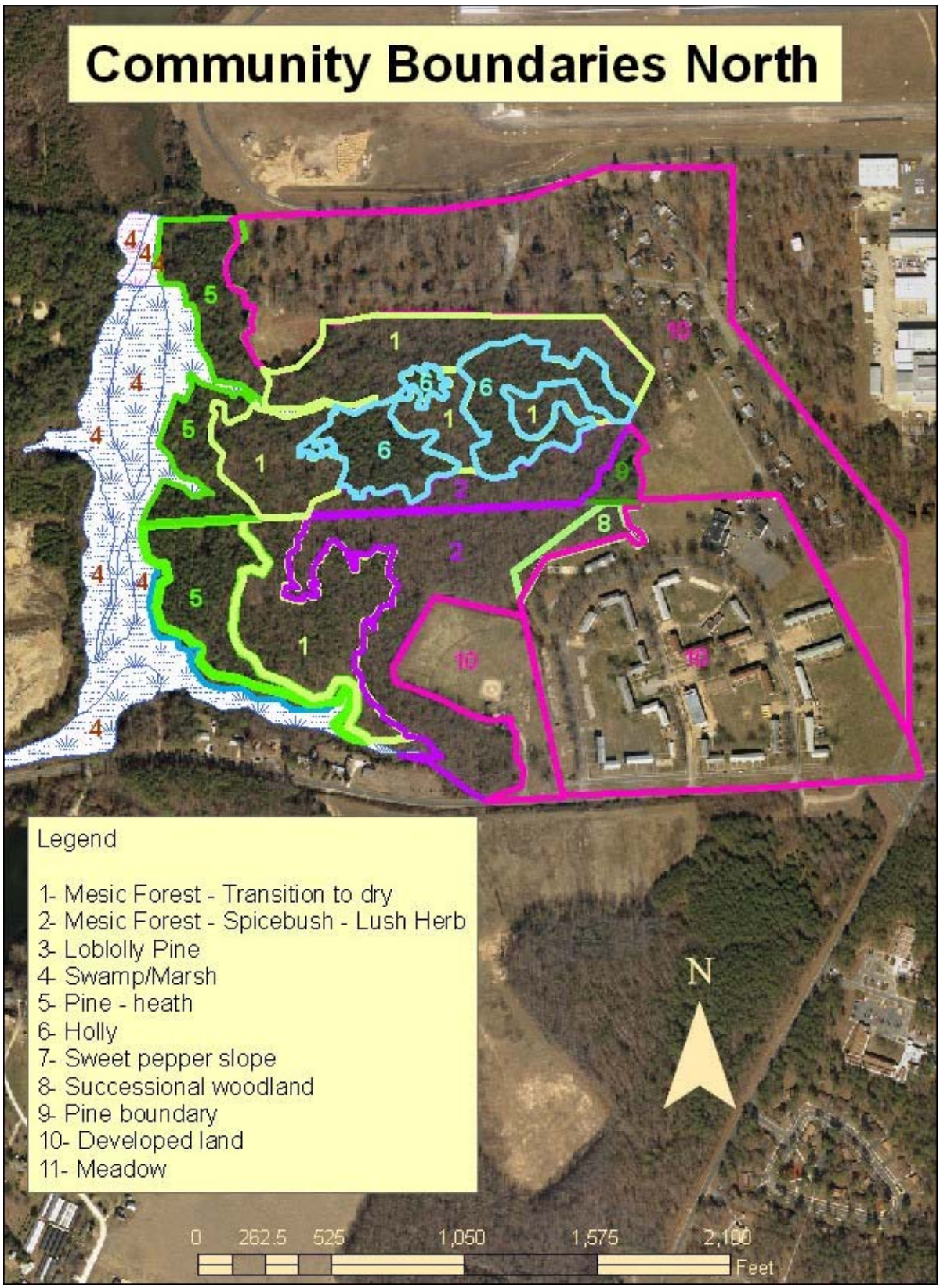
A vegetation study was conducted at the WRP site to provide information on plant species and plant community inventory and location (Vegetation Survey and Mapping [VSM] for Wallops Research Park Project) (NASA, 2008a). The VSM project included 23 survey plots across the WRP site (Figure 9). The WRP site includes land that is currently developed, land that was previously developed and is now maintained by mowing, and natural habitats.

Results of the survey revealed that the WRP site supports a diverse variety of plant species within several distinguishable plant communities (Figures 10 and 11). Plant species were identified and grouped into four different habitat or plant community categories: 1) wetlands, 2) mesic forest, 3) dry forest, and 4) meadow. These 4 plant communities are further broken down into 11 different community types as shown on Figures 10 and 11.

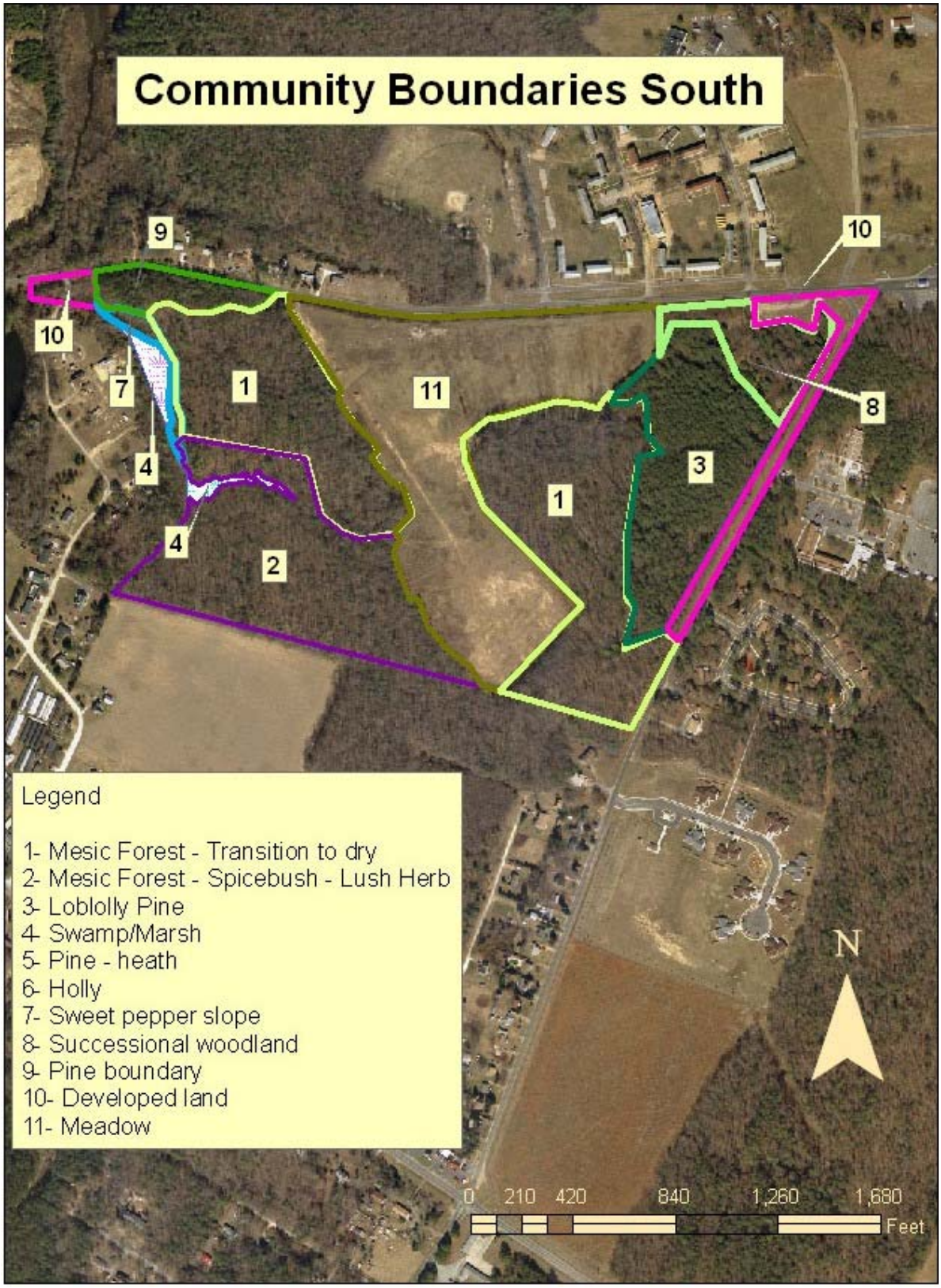
According to the VSM project, the WRP site contains approximately 115 acres of mixed forest (mesic and dry forest combined), 82 acres of developed land, 24 acres of meadow, and 10 acres of wetlands.



TITLE	**WRP Site Vegetation Survey Plots**
EG&G	URS PROJECT 39455591
	FIGURE **9**
CLIENT: NASA	
PROJECT: WALLOPS RESEARCH PARK	



TITLE **WRP Project Area Plant Communities North**	
EG&G	URS PROJECT 39455591
	FIGURE **10**
CLIENT: NASA	
PROJECT: WALLOPS RESEARCH PARK	



TITLE **WRP Project Area Plant Communities South**	
EG&G	URS PROJECT 39455591
	FIGURE **11**
CLIENT: NASA	
PROJECT: WALLOPS RESEARCH PARK	

The wetland habitat includes marshes dominated by herbaceous vegetation and swamps and seeps that include both herbaceous and woody plants. The mesic forest is characterized by a rich herb layer that includes mayapple *(Podophyllum peltatum)* and a shrub layer with abundant spicebush *(Lindera benzoin)*. Wetlands were identified in the marsh area of Wattsville Branch in the ACCS, ACCN, and NASA parcels (Figure 7). Meadows include areas that are occasionally mowed.

The dry forest habitat is dominated by oak and pine, and in some areas includes shrubs in the heath family, or has little to no shrub or herb layer. The forest communities represent a mature ecosystem that is evidenced by a fully developed forest structure including canopy, subcanopy, shrub, and herb layers, and the presence of mature trees of many species. The forest and wetland communities within the WRP site are representative of mature communities that were once common on the Eastern Shore, but now are unusual for their maturity and intact condition.

No Federally or State-protected plant species were identified by the VSM project team during visits to the project area in April and May 2007.

Currently, the vegetation communities are disturbed to some degree by human activities including the use of all-terrain-vehicles along trails, particularly in the ACCN parcel, and the use of the forested area adjacent to the ball field as a dumping ground for trash by residents of Accomack County. Hikers also use the nature trails on Accomack County property.

3.3.2 Terrestrial Wildlife and Migratory Birds

Several vertebrate species are common to the WRP area, including the species that were noted during the VSM project which are shown in Table 5. Both living specimens and empty shells of eastern box turtle *(Terrapene carolina carolina)* were seen on seven occasions. The team observed a five-lined skink and individuals of two species of snake. White tailed deer were seen on several occasions.

Table 5. Vertebrate Species Observed during Vegetation Survey and Mapping Project, 2007

Species	Common Name	Occurrences	Alive	Dead
Terrapene carolina carolina	Eastern box turtle	7	5	2
Odocoileus virginianus	White-tailed deer	9	8	1
Elaphe obsoleta obsoleta	Black rat snake	1	--	1
Coluber constrictor constrictor	Black racer	2	2	--
Eumeces fasciatus	Five lined skink	1	1	--

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 Wallops Island National Wildlife Refuge (WINWR), comprising approximately 373 acres of salt marsh, grassland, brush habitat, and woodlands. WINWR is located approximately 1.2 miles east of the WRP site, 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). Additionally, approximately 3,000 acres of the NASA-owned portion of Wallops Island proper is reserved for research and management of declining wildlife in need of protection (USFWS, 2008). Some of these migratory bird species may utilize the wetlands at the WRP site.

3.3.3 Threatened and Endangered Species

Under Section 7 of the Federal Endangered Species Act (ESA), as amended, Federal agencies, in consultation with the USFWS and the National Marine Fisheries Service, are required to evaluate the effects of their actions on special status species of fish, wildlife, and plants, and their habitats, and to take steps to conserve and protect these species. Special status species are defined as plants or animals that are candidates for, proposed as, or listed as sensitive, threatened, or endangered by the USFWS.

The Virginia Endangered Species Act (VAC, Sections 29.1-563 – 29.1-570) is administered by the Virginia Department of Game and Inland Fisheries (VDGIF) and prohibits the taking, transportation, processing, sale, or offer for sale of any State or Federally listed threatened or endangered species. As a Federal agency, NASA voluntarily complies with Virginia's Endangered Species Act.

Table 6 shows the State and Federally listed threatened or endangered species in the WFF area.

Table 6. Threatened and Endangered Species in the WFF Area

Scientific Name	Common Name	Status
Dermochelys coriaces	Leatherback Sea Turtle	Federally Endangered
Eretmochelys imbricate	Hawksbill Sea Turtle	Federally Endangered
Lepidechelys kempi	Kemp's Ridley Sea Turtle	Federally Endangered
Charadrius melodus	Piping Plover	Federally Endangered
Caretta caretta	Loggerhead Sea Turtle	Federally Threatened
Chelonia mydas	Atlantic Green Sea Turtle	Federally Threatened
Charadrius wilsonia	Wilson's Plover	State Endangered
Falco peregrinus	Peregrine Falcon	State Endangered
Bartramia longicauda	Upland Sandpiper	State Threatened
Sterna nilotica	Gull-billed Tern	State Threatened

No individuals or populations of plant species that are listed on the State or Federal threatened and endangered species lists were found during the three visits to the project area in April, May, and July. The turtle species listed in Table 6 do not occur in the immediate vicinity of the WRP site because they utilize beach habitat types, which are located east of the WRP site. Additionally, the piping plover and its designated critical habit do not occur within the immediate vicinity of the WRP site; the piping plover occurs on Wallops Island and utilizes beach and dune habitats.

3.4 SOCIAL AND ECONOMIC ENVIRONMENT

3.4.1 Population

The WRP site is located in Accomack County, Virginia, approximately 5 miles west of the town of Chincoteague. In 2000, the U.S. Census Bureau reported that the population of the Commonwealth of Virginia was about 7.1 million and Accomack County's population was 38,305, with a population density of 84.1 people per square mile (U.S. Census Bureau, 2000). The WRP site is located in a rural area with a lower population density.

Wattsville and Horntown are the closest residential communities to WFF and are located approximately 0.75 miles west and 2 miles north of the WRP site, respectively. There are no specific census data available for these communities because they are unincorporated residential areas. Chincoteague is the most densely populated area in Accomack County. According to the U.S. Census Bureau, in 2000 the year-round population of Chincoteague was 4,317 people (U.S. Census Bureau, 2000). The population increases during the summer months due to tourism and vacationers, with daily populations reaching up to 15,000 people and special events drawing crowds of up to 40,000.

Table 7 lists the 2000 U.S. Census population of towns in Accomack County.

Table 7. Town Population and Housing Units in Accomack County

Location	Population	No. of Housing Units
Accomack Town	547	234
Atlantic Town	539	272
Belle Haven Town	480	257
Bloxom Town	395	180
Chincoteague Town	4,317	3,970
Hallwood Town	290	120
Keller Town	173	87
Melfa Town	450	210
Onancock Town	1,525	725
Onley Town	496	273
Painter Town	246	114
Parksley Town	837	404
Saxis Town	337	194
Tangier Town	604	272
Wachapreague Town	236	229

Source: U.S. Census Bureau, 2008

The MSC contributes to seasonal population increases through educational sessions. During the spring and fall, educational sessions average two to three days in length, while summer educational sessions average two to three weeks. In total, approximately 4,000 students per year participate in educational sessions at MSC from March through November.

In 2007, WFF employed a total of 1,574 people; 998 of those worked for NASA (including 245 civil service personnel and 753 contractors), and the remainder worked for either the National

Oceanic and Atmospheric Administration or the U.S. Navy (NASA, 2007a). WFF employees live within three Virginia counties and two Maryland counties that make up the Lower Delmarva Peninsula. Fifty-eight percent of WFF employees live in Accomack County, 2 percent in Northampton County, 14 percent in Wicomico County, 5 percent in Somerset County and 20 percent in Worcester County (Silbert, 2008).

3.4.2 Recreation

Many tourists and vacationers visit Accomack County throughout the late spring, summer, and early fall. Regional attractions include the Assateague Island National Seashore and Chincoteague National Wildlife Refuge. Winter hunting season draws people to hunt local game including dove, quail, deer, fox, and many types of geese and ducks. The coast of Virginia is a popular area for recreational and sport fishing as well.

Accomack County also offers an assortment of recreational opportunities. Three county park facilities support many recreation activities, including basketball, football, golf, soccer, softball, and volleyball. Tennis courts, public beaches, a roller rink, and indoor movie theaters also provide sources of recreation and entertainment throughout the area.

The Accomack County property in the WRP contains a baseball field, playground, and nature trails. Currently, the MSC and NASA properties do not provide on-site recreation facilities.

3.4.3 Employment and Income

This section provides general background information on employment and income data for the Commonwealth of Virginia, Accomack County, and town of Chincoteague. This includes Census 2000 data on the employment, unemployment, income, and poverty characteristics of the region and data complied by the Virginia Employment Commission (2008) and by the Virginia Polytechnic Institute (2007).

The unemployment rate in Virginia was 3.0 percent in 2006 (Virginia Employment Commission, 2008). In 2006, Accomack County had an unemployment rate of 4.1 percent. Employment fluctuates seasonally in Accomack County and Chincoteague with decreased unemployment occurring from June through October (Virginia Employment Commission, 2008). Overall, the unemployment rates in Virginia and Accomack County have been declining since 2000.

Table 8 lists the distribution by broad occupational categories for Virginia, Accomack County, and Chincoteague, as reported by the U.S. Census Bureau.

Table 8. Occupational Distribution (percent)

Category	Virginia	Accomack County	Chincoteague
Management, professional, and related occupations	38	24	26
Sales and office occupations	26	22	26
Production, transportation, and material moving occupations	13	20	9
Service occupations	14	17	17
Construction, extraction, and maintenance occupations	10	11	15
Farming, fishing, and forestry occupations	1	6	7

Source: U.S. Census Bureau, 2000

Table 9 shows the income and poverty rates of the Commonwealth of Virginia, Accomack County, and Chincoteague. Accomack County and Chincoteague both have a higher percentage of families below the poverty level and a lower per capita income than Virginia as a whole; however, Accomack County and Chincoteague do not include major urban centers.

Table 9. Income and Poverty

Region	Median Household Income (1999)	Per Capita Income (1999)	Percent of Families Below Poverty Level (1999)
Virginia	$46,667	$23,975	7.0
Accomack County	$30,250	$16,309	13.0
Chincoteague	$33,425	$20,367	9.7

Source: U.S. Census Bureau, 2000

By 2004, Accomack County's per capita income had risen to approximately $22,256, and the median household income was $31,256, compared to a median household income for the Commonwealth of Virginia in 2004 of $51,130 (Virginia Tech, 2007). The mean salary of NASA civil service employees in January 2008 was $83,462 (NASA, 2008b). The higher-than-average salaries of WFF employees create positive contributions to the local economy.

The Accomack County property in the WRP site supports part-time employment for grounds maintenance. NASA employment categories at WFF consist largely of managerial, professional, and technical disciplines with salaries higher than the regional average. WFF employed 1,574 people in 2007. The Virginia Employment Commission reported that in 2006 NASA was the fifth largest employer in Accomack County and Accomack County was the fourth largest employer (Virginia Employment Commission, 2008).

3.4.4 Health and Safety

Health Facilities

Three local emergency health services are located in the vicinity of the WRP. WFF has its own health unit with a full-time nursing staff and a full-time physician to provide first aid and immediate assistance to patients in emergency situations. The WFF Health Unit operates from 8:00 a.m. to 4:30 p.m. After-hours emergency medical care is provided by Emergency Medical Services staff of the WFF Fire Department. The Chincoteague Medical Center on Chincoteague Island and the Atlantic Medical Center in Oak Hall, Virginia, also provide emergency assistance, and both are located within 5 miles of the WRP site. The nearest hospital is the Peninsula Regional Medical Center in Salisbury, Maryland, which is located about 30 miles north of the WRP site. If additional trauma care is needed, Sentara Norfolk General Hospital is 19 minutes away (by helicopter) from the Shore Memorial Hospital in Nassawadox, Virginia, which is located approximately 43 miles south of the WRP site. Accomack County Health Departments offer clinical services.

Fire and Police Protection

Local fire companies that are closest to the WRP site include the Fire Departments of WFF, Atlantic, and New Church, and the Fire and Police Department associated with Chincoteague. The WFF Fire Department has a Mutual Aid Agreement with the Accomack-Northampton Fireman's Association for any outside assistance needed at the facility. Fire company personnel are housed in two buildings on the facility, one on Wallops Island and one on the Main Base.

There is 24-hour fire protection, and personnel are trained as first responders for hazardous materials, waste, and oil spills.

Police protection for the surrounding areas is supplied by town, county, and State personnel. The Commonwealth of Virginia's police force employs 23 officers in the area, while the Accomack County Sheriff's Office has approximately 34 officers. Several towns also have their own police forces, including Chincoteague (Eastern Shore Chamber of Commerce, 2004).

3.4.5 Cultural Resources

Cultural resources include: historic buildings and structures; archaeological and historical objects, sites, and districts; cultural landscapes; and sites and resources important to Native American and other ethnic groups. The National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470), outlines Federal policy to protect historic or cultural resources in cooperation with State, local, and native tribal governments. In addition, regulations implementing NEPA stipulate that Federal agencies consider the consequences of their undertakings on historic and cultural resources (40 CFR Part 1502.16[g]). Section 106 of the NHPA requires Federal agencies to consider the effects of their actions on historic resources that are listed, or eligible for listing, in the National Register of Historic Places (NRHP; 30 CFR Part 60.4). Section 110 of the NHPA outlines the obligations Federal agencies have with regard to historic resources under their ownership. Regulations for the Protection of Historic Properties (36 CFR Part 800) implement the NHPA by defining a process for demonstrating consideration of the effects of an undertaking through consultation with State Historic Preservation Office (SHPO), Tribal Historic Preservation Office, the Advisory Council on Historic Preservation, and other interested parties.

In November 2003, WFF prepared a Cultural Resources Assessment of Wallops Flight Facility, Accomack County, Virginia (NASA, 2003). The study was completed to assist WFF in meeting its obligations under Sections 106 and 110 of the NHPA. The study resulted in an assessment of historic structures and selective reconnaissance level survey of structures on the WFF. In addition, a predictive model was developed to identify areas of archaeological potential at WFF.

Historic Structures

The MSC campus is comprised of several buildings that are greater than 50 years old. Initially named the Toms Cove Apartments 306 Title Housing Units NAAS, the MSC buildings originally served as U.S. Navy and NASA housing and transitioned to use as part of the University of Virginia system in the 1960s, and were transferred to the MSC in 1971. Originally there were thirty-seven buildings in the MSC complex. Twenty-eight of the original buildings remain in situ, with 13 of the 28 retaining the original exterior envelope; 8 of the 13 buildings have had substantial interior rehabilitation. The MSC plans on demolishing these buildings over the next five years.

Archaeology

The portion of the WRP project area that falls within the WFF was subject to predictive modeling during the 2003 study (NASA, 2003). Using this predictive model, areas of the WRP site that fall outside of the WFF boundary were assessed for their potential to contain archaeological resources. Of the 232-acre project area (which includes the MSC campus), 100 acres were determined to have moderate to high potential for prehistoric and historic archaeological resources. Based on this predictive model, James River Institute for Archaeology, Inc. (NASA, 2007b) conducted a Phase I archaeological survey of the 100-acre archaeologically sensitive area. JRI excavated 1,698 shovel test pits and identified three historic isolated finds (brick, rusted iron fragment, and whiteware shard) in the vicinity of the former landfill. These isolated finds were determined to be associated with landfill activities and were not associated with a historic domestic site. Because these are isolated finds and not archaeological sites, they were not eligible for consideration for the NRHP.

3.4.6 Environmental Justice

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."

WFF has prepared an Environmental Justice Implementation Plan (EJIP) to comply with EO 12898 (NASA, 1996). The percentage of minority, low-income, and poverty in Accomack County are shown in Table 10. The EJIP defined minority communities as exceeding a 50 percent minority population.

Table 10. Environmental Justice Data for Census Tracts in the WFF Area, Accomack County, VA

Tract	Location	Percent Minority 2000	Percent Low-Income 2000	Percent Poverty 2000
9901	MD/VA line south including Fisher's Point.	1.97 percent	51.53 percent	12.80 percent
9902	MD/VA line south including Wallops Island to Assawoman Inlet.	41.75 percent	49.96 percent	16.38 percent
9903	West of 9902 and 9904, MD/VA line south to Ann's Cove Road.	24.66 percent	55.94 percent	19.28 percent
9904	East of Mears Station Road, south of 9902 south to Horseshoe Lead.	59.14 percent	51.61 percent	27.14 percent

Source: U.S. Census 2004

Low-income and minority communities occur in the vicinity of WRP. Although Census Tract 9902, which includes the WRP site, does not include minority or low-income communities, low-income and minority communities do occur within Accomack County to the south of the WRP site in Census Tract 9904. No nursing homes, hospitals, or schools are located within a 2-mile radius of the WRP site.

3.4.7 Transportation

The Eastern Shore of Virginia is connected to the rest of the state by the Chesapeake Bay Bridge-Tunnel. The primary north-south route that spans the Delmarva Peninsula is U.S. Route 13, a four-lane divided highway. Local traffic travels by arteries branching off U.S. Route 13. Access to WFF is provided by Route 175, a two-lane secondary road.

The WRP site is located around a portion of Mill Dam Road, which intersects with Route 175 approximately 0.5 mile west of the WRP site. Mill Dam Road runs east-west and approximately bisects the WRP site into northern and southern portions (Figure 3). Mill Dam Road is the main egress/ingress route to the WRP and also for the WFF Main Base. Because Mill Dam Road connects directly to the WFF main gate, it receives WFF traffic, including employees and all visitors to WFF.

Traffic in the region varies with the seasons. During the winter and early spring, traffic is minimal; during the summer and early fall, traffic increases due to the number of tourists in the area.

NASA and most organizations at WFF own and maintain a variety of vehicles ranging from sedans and vans to trucks; however, there is no organized transportation. Many WFF employees carpool to and from the facility.

A traffic impact assessment of the WRP area was conducted during August 2007 in order to obtain information on existing traffic operations and volumes. Existing and historical traffic volumes in the WRP area were assessed by performing vehicle counts in the study area at the intersections of Chincoteague Road and Route 13, Chincoteague Road and Fleming Road, Chincoteague Road and Mill Dam Road, Chincoteague Road and Atlantic Road, and Mill Dam Road and Atlantic Road during peak traffic periods in the middle of the summer. Peak traffic hours on Mill Dam Road are 7:15 to 8:15 a.m. and 4:00 to 5:00 p.m., Monday through Friday. There is minimal pedestrian and bicycle traffic in the area.

According to the traffic impact analysis, data dating back to 2001 indicates that traffic volumes have grown by 3 percent each year (Vanasse Hangen Brustlin, Inc., 2007). The traffic study conducted analysis for a 20-year future growth period in order to assess traffic operations in the WRP vicinity after construction of WRP is complete.

4.1 INTRODUCTION

Section 4 presents the potential impacts to existing resources at the WRP that may be affected by the Action Alternatives. This section discusses potential impacts to resources under the three main categories of Physical Environment, Biological Environment, and Social and Economic Environment.

4.2 PHYSICAL ENVIRONMENT

4.2.1 Land Resources

4.2.1.1 Topography and Drainage

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no impacts to topography and drainage.

Proposed Action

Construction Impacts

Under the Proposed Action, land grading and construction activities would take place for the construction of the WRP. Land grading, new building construction, and building replacement would cause land disturbances, including excavation and an increase in impervious surfaces, which have the potential to alter the proposed site topography and drainage patterns of small seeps and ephemeral tributaries to Little Mosquito Creek. Construction of hangars on the western side of the NASA property would involve filling of a tributary to Wattsville Branch; the area would be drained, filled, and then graded, which would result in a change to the topography and drainage of that area.

The WRP would minimize impacts to topography and drainage patterns by acquiring Virginia Stormwater Management Program (VSMP) permits and by developing and implementing site-specific SWPPPs and erosion and sediment control (E&SC) plans prior to land disturbing activities.

Operational Impacts

Permanent stormwater control measures would be implemented in compliance with Virginia Stormwater Management Laws and Regulations to provide adequate drainage within the WRP site and to mitigate the effects of increased runoff from impervious surfaces. Therefore, with permanent stormwater measures incorporated into site design, only minor impacts to topography and drainage are anticipated.

Alternative One

Impacts to topography and drainage would be the same as described under the Proposed Action, but would also include land grading and construction activities on approximately 15 acres of Accomack County land that is located south of Mill Dam Road and west of the closed Accomack

County landfill. Implementation of site-specific SWPPPs, E&SC Plans, and permanent stormwater control measures would minimize impacts to topography and drainage. Therefore, Alternative One would result in minor impacts to topography and drainage.

4.2.1.2 Geology and Soils

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no impacts to geology and soils.

Proposed Action

Construction Impacts

Under the Proposed Action, land grading and construction activities would take place at the WRP site. Grading, clearing, filling, and excavation activities would result in disturbance of the ground surface and would have the potential to cause soil erosion and the subsequent transport of sediment via stormwater. Since the uppermost geologic layer occurs at a depth of 60 feet below the ground surface, and excavation would not occur below a depth of 30 feet below ground surface, no impacts to geology are anticipated.

The WRP would minimize negative impacts to soils by acquiring VSMP permits as necessary, and developing and implementing site-specific SWPPPs and E&SC Plans prior to ground disturbing activities. The WRP tenants would be required to re-vegetate bare soils and incorporate landscaping measures in areas that would be left as pervious surfaces (not paved) when the project is complete.

Other possible impacts to soils during construction include spills or leaks of pollutants from vehicles or equipment. Site-specific SWPPPs would include best management practices for vehicle and equipment fueling and maintenance, and spill prevention and control measures would be implemented to reduce potential impacts to soils during construction.

Operational Impacts

Once the WRP is constructed, it would support payload processing, piloted aircraft use, scientific research, and educational programs. These proposed activities are not expected to adversely impact soils at the project area because they would take place on impervious surfaces (i.e., concrete, tarmac, asphalt). There is potential for an accidental release of contaminants into the soil resulting from routine maintenance and fueling activities or an accident that releases liquid fuels to a permeable surface. Any accidental release of contaminants or liquid fuels would be addressed in accordance with existing emergency management and response plans.

Alternative One

Impacts to soils and geology would be the same as described under the Proposed Action, but would also include land grading and construction activities on approximately 15 acres of Accomack County land that is located south of Mill Dam Road and west of the closed Accomack County landfill. The WRP would minimize negative impacts to soils by acquiring VSMP permits

as required, and developing and implementing site-specific SWPPPs and E&SC Plans prior to ground disturbing activities.

4.2.1.3 Land Use

No Action Alternative

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

Proposed Action

Under the Proposed Action, several hangars, a general aviation facility, administration buildings, and other facilities for research and development and industrial use would be constructed. The construction of these facilities on undeveloped land would result in a change to current land use in the project area.

The entire area of the WRP site is zoned industrial; therefore, the land uses planned for the WRP are compatible with Accomack County zoning policies. Before WRP partners and tenants would be approved to implement land use changes, WRP would consult the Accomack County Building and Zoning Board regarding appropriate measures for WRP to be in compliance with county zoning policy, and would review the WRP Guiding Covenants and Restrictions (NASA, 2008c) to ensure compatibility with land uses set forth by the WRP.

Alternative One

Impacts to land use would be the same as described under the Proposed Action, but would also include land use changes to approximately 15 acres of Accomack County land that is located south of Mill Dam Road and west of the closed Accomack County landfill. Before WRP partners and tenants would be approved to implement land use changes, WRP would consult the Accomack County Building and Zoning Board regarding appropriate measures for WRP to be in compliance with county zoning policy, and would review the WRP Guiding Covenants and Restrictions (NASA, 2008c) to ensure compatibility with land uses set forth by the WRP.

4.2.2 Water Resources

4.2.2.1 Surface Water

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, no impacts to surface waters would occur.

Proposed Action

Construction Impacts

Under the Proposed Action, construction activities associated with the WRP would avoid surface waters to the greatest extent possible including ephemeral streams and swales, seeps, springs, and tributaries to Wattsville Branch. Under the Proposed Action up to 1 acre of wetlands would

be adversely affected by development on NASA property north of Mill Dam Road. Impacts to wetlands are discussed in Section 4.2.2.4, Wetlands.

Operational Impacts

Increased impervious area due to construction of buildings, parking lots, roads, sidewalks, etc., would result in an increase in runoff from the WRP site compared to existing conditions. To mitigate the effects on surface waters due to increased runoff from impervious surfaces, permanent stormwater control measures would be implemented by WRP partners and tenants. To minimize water quality impacts to surface waters, the WRP and WRP tenants would obtain VPDES industrial activity stormwater permits as required and would implement pollution prevention best management practices in compliance with the permits. With these measures, no adverse impacts to surface water are anticipated.

Alternative One

Impacts to surface water may be the slightly more under Alternative One than under the Proposed Action due to development of an additional 15 acres of Accomack County land that is located south of Mill Dam Road and west of the closed Accomack County landfill. However, it is not anticipated that any additional wetlands would be affected under Alternative One compared to the Proposed Action.

4.2.2.2 Wastewater

Proposed Action

Wastewater generated by WRP would discharge to existing WFF wastewater collection lines and would be sent to the WFF WWTP for treatment. The estimated volume of wastewater that would be discharged to the WWTP from the WRP is 28,000 gallons per day. The permitted maximum capacity of the wastewater facility is 300,000 gallons per day. The amount of wastewater that is currently treated is approximately 60,000 gallons per day (Bundick, 2008); therefore, the WWTP has the capacity to treat the additional amount of wastewater from the WRP and development of the WRP would not result in an adverse impact to the WWTP.

Aviation hangars would use fire suppression foam instead of water to put out fires around delicate electronic systems. The fire suppression foam includes chemicals that are harmful to aquatic systems and must be treated to remove contaminants prior to being discharged into the wastewater discharge lines. Each aviation building that uses a foam fire suppression system would be equipped with a containment area to treat the foam prior to release to the WWTP.

Any facility that uses a wash rack for heavy equipment would include an oil/water separator to remove oil from wash water prior to discharge to the wastewater treatment plant. Accumulated oil in the oil/water separators would be removed from the site according to guidelines outline in Section 4.2.5 Hazardous Materials and Hazardous Wastes and in accordance with the VPDES permit for the WWTP.

Alternative One

The amount of wastewater generated under Alternative One would be greater than under the Proposed Action due to development of an additional 15 acres of Accomack County land that is

located south of Mill Dam Road and west of the closed Accomack County landfill. The estimated volume of wastewater that would be discharged to the WWTP from the WRP under Alternative One is 31,000 gallons per day. The maximum capacity of the wastewater facility is 300,000 gallons per day. The amount of wastewater that is currently treated is approximately 60,000 gallons per day (Bundick, 2008); therefore, the WWTP has the capacity to treat the additional amount of wastewater from the WRP under Alternative One and development of the WRP would not result in an adverse impact to the WWTP.

4.2.2.3 Stormwater

No Action Alternative

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

Proposed Action

Construction Impacts

Under the Proposed Action, construction activities could result in temporary impacts to stormwater conveyance due to disruptions and changes to the natural drainage. WRP partners and tenants would be required to obtain VSMP construction site stormwater permits and implement site-specific SWPPPs to minimize impacts to stormwater conveyance and stormwater quality during construction.

Operational Impacts

No long-term impacts are anticipated because WRP partners and tenants would be required to incorporate permanent stormwater control measures into design plans to effectively remove stormwater from the site. All control measures would be designed and constructed in accordance with VSMP laws and regulations. Additionally, the WRP Guiding Covenants and Restrictions (NASA, 2008c) state that impervious surfaces should be kept to a minimum, and encourage the addition of new sustainable landscapes that would collect and filter stormwater as well as the use of permeable paving where possible. In addition, Virginia Stormwater Management Law and Regulations require the incorporation of measures to protect aquatic resources from the effects of increased volume, frequency, and peak rate of stormwater runoff and from increased nonpoint source pollution carried by stormwater runoff.

WRP partners and tenants would be required to obtain a VPDES industrial stormwater permit, which includes the requirement that a SWPPP be developed for the permitted facility. 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 best management practices to reduce the impact of stormwater runoff on the receiving stream to the maximum extent practicable, and to meet water quality standards.

Alternative One

Impacts to stormwater conveyance would be slightly greater than under the Proposed Action due to development of an additional 15 acres of Accomack County land that is located south of Mill Dam Road and west of the closed Accomack County landfill.

4.2.2.4 Groundwater

No Action Alternative

Under the No Action Alternative, NASA would not provide potable water for use by WRP partners and tenants and development of the WRP would not occur; therefore, there would be no impacts to groundwater.

Proposed Action

Construction Impacts

Construction activities could result in temporary impacts to groundwater if a spill were to occur that contaminated groundwater. WRP partners and tenants would implement SWPPPs that would include spill prevention, control, and cleanup measures related to construction activities.

Operational Impacts

Water Use

Under the Proposed Action, NASA would provide potable water to the WRP partners and tenants for drinking water supply, fire suppression, and industrial water use. The estimated potable water demand of the WRP is approximately 991,000 gallons per month.

Because WFF would supply all of the potable water to the WRP, water demand for the WRP would be covered under WFF's existing ground water withdrawal permit with the Virginia DEQ. WFF's ground water withdrawal permit allows WFF to withdraw up to 8,153,000 gallons per month from the Columbia and Yorktown-Eastover Multiaquifer System. Currently, WFF withdraws approximately 2,370,000 gallons per month (Bundick, 2008). The combined water demand of WFF and WRP would be approximately 3,361,000 gallons per month, which is below the 8,153,000 gallons per month limit. Therefore, development of the WRP would not result in an adverse impact to ground water resources.

The WRP Guiding Covenants and Restrictions (2008c) encourages water use conservation practices in facility design and operation such the use of low consumption water fixtures, the use of native plants in landscaping that are adapted to the local precipitation, and educating employees about water conservation methods, etc.

Water Quality

Operational activities could result in impacts to groundwater if a spill were to occur that contaminated groundwater. WRP would require tenants to obtain a VPDES industrial stormwater permit as necessary and implement a SWPPP that would include spill prevention, and response planning procedures and spill clean-up procedures. Long-term impacts would be mitigated by implementing procedures at all WRP facilities to reduce the likelihood that a spill would occur.

NASA would continue to monitor the water supply wells located at the WFF Main Base to ensure that spills or releases do not have an adverse effect on the drinking water supply. NASA would continue working with Federal and State environmental agencies to ensure that the existing plumes do not expand and to restore groundwater to natural conditions. If the potable water supply was found to be contaminated, NASA would notify users of the drinking water system

that monitoring had detected contaminant levels above the action level, would provide them with guidance on reducing their exposure to the contaminants, and pursue corrective actions.

Alternative One

Construction Impacts

Construction activities could result in temporary impacts to groundwater if a spill were to occur that contaminated groundwater. WRP partners and tenants would implement SWPPPs that would include spill prevention, control, and cleanup measures related to construction activities.

Operational Impacts

Water Use

Ground water withdrawal rates would increase compared to the Proposed Action due to the additional potable water demand from development of approximately 15 acres of Accomack County land that is located south of Mill Dam Road and west of the closed Accomack County landfill. The estimated total potable water demand for the WRP under Alternative One is 1,098,000 gallons per month.

Because WFF would supply all of the potable water to the WRP, water demand for the WRP would be covered under WFF's existing ground water withdrawal permit with the Virginia DEQ. Currently, WFF withdraws approximately 2,370,000 gallons per month (Bundick, 2008). The combined water demand of WFF and WRP would be approximately 3,468,000 gallons per month, which is below the 8,153,000 gallons per month limit. Therefore, development of the WRP would not result in an adverse impact to ground water resources.

The WRP Guiding Covenants and Restrictions (NASA, 2008c) encourages water use conservation practices in facility design and operation such the use of low consumption water fixtures, the use of native plants in landscaping that are adapted to the local precipitation, and educating employees about water conservation methods, etc.

Water Quality

Under Alternative One, the potential for a spill to occur (construction and operational) that could contaminate ground water is greater than the Proposed Action due to the additional development of approximately 15 acres of Accomack County land that is located south of Mill Dam Road and west of the closed Accomack County landfill. WRP partners and tenants would be required to obtain construction and industrial stormwater permits, and implement construction and industrial SWPPPs as necessary that would include spill prevention and response measures.

4.2.2.5 Wetlands

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no impacts to wetlands.

Proposed Action

Construction Impacts

Under the Proposed Action, up to 1 acre of wetlands would be adversely affected due to construction on the northwest side of the NASA property. Currently, no other proposals impact wetlands in the WRP. The construction of an aviation hangar would require land grading and the filling of up to 1 acre of wetlands associated with the northern-most unnamed tributary to Wattsville Branch that is shown on Figure 7.

Prior to construction, WRP would complete a jurisdictional wetland delineation in accordance with the USACE 1987 Wetland Delineation Manual (USACE, 1987) to determine the location and size of the wetland area that would be adversely affected. In accordance with EO 11990 and 14 CFR 1216.2 (NASA regulations on Floodplain and Wetland Management), WRP partners and tenants would avoid and minimize impacts to wetlands. If wetland impacts are unavoidable, WRP would provide compensatory mitigation to offset the impacts and to ensure no net loss of wetlands.

WRP would notify the public and coordinate with applicable agencies including the USACE, the Virginia DEQ, and the VMRC. The Accomack County Wetlands Board would be notified of potential impacts to wetlands at WRP by the VMRC through the Joint Permit Application process – if any jurisdictional tidal wetlands would be affected, WRP would be required to coordinate with the Accomack County Wetlands Board. However, if the jurisdictional wetlands are determined to be non-tidal, then WRP would not need to coordinate with the Accomack County Wetlands Board. WRP would obtain necessary permits including Section 404 and/or Section 10 permits. WRP would implement wetland mitigation measures agreed upon through the USACE and Virginia DEQ consultation process to protect and restore the natural and beneficial functions of wetlands.

Loss of vegetation during construction activities may cause soil erosion and subsequent leaching of sediments, particulate matter, and nutrients that may eventually discharge into wetland areas, causing a potential negative impact to benthic species in the wetland system (NASA, 1999). To avoid potential impacts to surface waters including wetlands, a 100-foot vegetative buffer would be maintained around the perimeter of the existing wetland shoreline within the WRP site. WRP tenants are directed by the WRP covenants to preserve as much existing vegetation as possible (NASA, 2008c).

Operational Impacts

There would be no impacts to wetlands as a result of operational activities at WRP. A 100-foot-wide vegetative buffer would be maintained around the perimeter of wetland shorelines in order to protect wetlands within the WRP site.

Alternative One

Impacts to wetlands would be the same as described under the Proposed Action. The development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill is not anticipated to result in additional impacts to wetlands. However, if wetlands would be impacted by the development south of Mill Dam

Road and west of the closed Accomack County landfill, WRP would follow the consultation, coordination, and mitigation measures described under the Proposed Action.

4.2.2.6 Floodplains

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no impacts to the floodplain.

Proposed Action

Construction Impacts

Under the Proposed Action, construction of BaySys Technologies facilities and hangars would take place within a small area of floodplain associated with an unnamed tributary to Wattsville Branch on the western portion of the NASA property. No other construction activities are currently proposed to occur within the floodplain.

For the construction that would take place within the floodplain, WRP would ensure that the action complies with EO 11988 (Floodplain Management) and 14 CFR 1216.2 (NASA regulations on Floodplain and Wetland Management), including notifying the public of actions that would occur within the floodplain. The WRP would obtain any required permits and would minimize floodplain impacts and protect and restore the natural and beneficial functions of floodplains to the maximum extent possible.

Operational Impacts

There would be no impacts to the floodplain a result of operational activities at WRP.

Alternative One

Impacts to the floodplain would be the same as described under the Proposed Action. The development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill is not anticipated to result in additional impacts to the floodplain. However, for any development that would occur within the floodplain, WRP would follow the consultation, coordination, and mitigation measures described under the Proposed Action.

4.2.2.7 Coastal Zone Management

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no impacts to the coastal zone.

Proposed Action

The WRP site occurs within the Coastal Management Zone as designated by the VCRMP. It is not anticipated that the Proposed Action would result in negative impacts to the coastal zone or be inconsistent with current VCRMP laws. A letter was sent to the Virginia DEQ requesting review

of NASA's determination that the WRP is consistent with the VCRMP; the Virginia DEQ is currently reviewing NASA's determination.

Alternative One

Alternative One is not anticipated to result in adverse impacts to the coastal zone or be inconsistent with current VCRMP laws. A letter was sent to the Virginia DEQ requesting review of NASA's determination that the WRP is consistent with the VCRMP; the Virginia DEQ is currently reviewing NASA's determination.

4.2.3 Air Quality

No Action Alternative

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

Proposed Action

Construction Impacts

Construction activities have the potential to cause temporary, short-term air quality impacts due to the operation of fossil-fuel burning equipment. Vehicles and equipment used for construction would be maintained in good working order to minimize pollutant emissions. WRP tenants would water down construction areas when necessary to reduce dust emissions. With the implementation of air quality mitigation measures, construction activities would not have an adverse impact to air quality in the project area.

The WRP site is located in an attainment area for all criteria pollutants as regulated under Virginia's Ambient Air Quality Standards; therefore, WRP is not required to complete the CAA conformity process for the WRP site.

Operational Impacts

Increased air emissions could result from the use of landscaping equipment, including mechanical vehicles (riding lawn mowers), fuel-powered chainsaws, weed-eaters, etc., and increased volumes of vehicular traffic in the WRP area. Equipment would be maintained in good working order to minimize emissions. Landscaping activities would generate a small amount of emissions and would not have a negative impact to air quality. The emissions generated by an increase in vehicular traffic to the WRP site would be negligible to the overall air quality of the attainment area; therefore, no adverse impacts are anticipated as a result.

The application of herbicides could increase emissions of VOCs, Federally listed hazardous air pollutants, or State toxic air contaminants. Use of EPA-approved herbicides in accordance with manufacturer specifications would result in negligible emissions.

Aircraft operating from the WRP would generally have reciprocating, turbo-prop, or jet engines. These aircraft would use JP-5 fuel and small amounts of 100-octane low-lead gasoline (NASA, 1999). A portion of those emissions may contain VOCs, which are associated with the generation of ground-level ozone. The operation of aircraft out of the WRP site is anticipated to be

relatively small, and the area is considered to be an attainment area for ozone levels (NASA, 1999). Therefore, no impacts to air quality as a result of operation of aircraft are anticipated.

The operation of a PPF at the WRP would have the potential to impact air quality because the cleaning of payloads and electronic hardware involves the use of solvents to remove organic contaminants. The standard solvent used is isopropyl alcohol, and approximately 55 gallons are used per mission. Ethyl alcohol may also be used for optical surfaces, but in very small quantities. Small amounts of other chemicals are used in such minor amounts and are of such low toxicity that they present no substantial potential for adverse air quality impacts.

Loading of hypergolic propellants (such as hydrazine) is performed either in the principal PPF or an auxiliary facility. If necessary, a portable air scrubber would be used at the PPF during hazardous fueling operations to ensure that fumes from fueling do not harm WRP staff or the local air quality. If small leaks occur during propellant loading, immediate steps would be taken to stop loading, correct the leakage, and clean up leaked propellant with approved methods before continuing. Propellant vapors left in the loading system would be routed to air emission scrubbers. Liquid propellant left in the loading system would be either drained back to supply tanks or into waste drums for disposal as hazardous waste.

Although some fuels are classified as hazardous air pollutants, the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations under Title III of the CAA have not yet established control standards. The packed bed scrubber systems usually used are considered Best Available Control Technology and should be considered acceptable when NESHAP regulations are promulgated (NASA, 2002).

Inadvertent releases of toxic air contaminants are possible as a result of accidents involving hypergolic fuels during payload processing, transportation, and preparation for launch. The largest releases would result from the spillage of the entire quantity of liquid propellants. Lesser releases would result from fires or explosions that would consume significant fractions of the propellants. Safety procedures would be implemented at the WRP PPF to ensure that these events are unlikely to occur. In addition, spill response planning procedures are in place to minimize spill size and duration, as well as possible exposure to harmful air contaminants. The magnitude of air releases from payload accidents would be relatively small. Impacts would be temporary and disperse, and therefore have no adverse impact to ambient air quality.

The operation of WRP laboratories would include the use of fume hoods. The release of small quantities of toxic gases through laboratory fume hoods may result in temporary minor impacts to local air quality. Laboratory fume hoods would be included in the WRP's air permit and would be maintained to meet permit and regulatory requirements.

The WRP may contain welding or other work/maintenance shops. Operations at these shops could potentially result in emissions of regulated pollutants; however, these emissions would occur in such minor amounts that they present no substantial potential for adverse air quality impacts.

Paint spray/coatings booths would be located in the WRP hangars on NASA property. Paint booths are regulated by the Virginia DEQ through a permitting process and cannot exceed 10 tons of VOC emissions per year. Activities in these booths would be similar or identical to painting activities currently performed at NASA WFF. In 1990, WFF submitted data to the Virginia DEQ regarding operations of the NASA paint booth facilities, including paint usage

information. The Virginia DEQ found, through modeling, that WFF emits 33 non-criteria toxic air pollutants. Of those pollutants, 21 are exempt from regulations. The remaining 12 non-criteria pollutants are subject to regulation. Emissions of criteria pollutants from painting operations would result in minor impacts to local air quality.

If other WRP facilities utilize paint spray/coating booths, WRP would consult with the Virginia DEQ to ensure no adverse impacts to air quality would occur as a result of operations within the WRP.

Alternative One

Impacts to air quality could be slightly greater than those described under the Proposed Action; however, the increase in air quality impacts due to the development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill would be negligible. Therefore, Alternative One would result in temporary and minor impacts to local and regional air quality with implementation of mitigation measures described under the Proposed Action.

4.2.4 Noise

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no increase in noise levels at the WRP site, and no impacts to humans or wildlife from noise.

Proposed Action

Construction Impacts

Under the Proposed Action, construction activities have the potential to generate temporary increases in noise levels from heavy equipment operations. Special precautions may be required when construction occurs near housing or occupied facilities in the WRP site, such as noise suppression systems for heavy equipment. WRP partners and tenants would comply with local noise ordinances and State and Federal standards and guidelines for potential impacts to humans caused by construction activities.

OSHA limits noise exposure for workers to 115 dBA for a period of no longer than 15 minutes in an 8-hour work shift and to 90 dBA for an entire 8-hour shift. Workers near activities producing unsafe noise levels, both during construction and after the WRP facilities are operational, would be required to wear hearing protection equipment. Therefore, impacts to the occupational health of construction workers as a result of construction noise are not expected.

Operational Impacts

Aircraft operations at the nearby WFF runway (which is located immediately to the north of the WRP site) are a source of noise to the surrounding area. The WRP is expected to add approximately 15 flights per year to the existing WFF runway volume of approximately 6,400 flights per year; the additional WRP flights would have a negligible increase in noise that is generated by the existing volume of aircraft using the WFF runway. In addition, flights

originating from the WFF runway are expected to be intermittent and noise levels would be temporary. The aircraft using the airfield are prohibited from creating sonic booms (NASA, 1999). Therefore, aircraft operations are not expected to result in an adverse impact to human health.

For many of these sources, exposure to noise is either short-term (e.g., fire engines) or can be minimized through use of personal hearing protection. The WRP would be responsible for occupational safety and determining the need for personal hearing protection and would provide oversight and services to WRP tenants. The WRP would conduct baseline surveys for new operations, and conduct walk-through surveys to monitor and evaluate noise hazards, and would work with WRP tenants to provide recommendations to workers regarding appropriate means of controlling noise exposures.

Alternative One

Impacts to humans due to noise would be slightly greater than those described under the Proposed Action; however, the increase in noise levels due to the development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill would be negligible when compared to the Proposed Action. Therefore, human health and safety would not be adversely affected by noise with implementation of mitigation measures described under the Proposed Action.

4.2.5 Hazardous Materials and Hazardous Waste

No Action Alternative

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

Proposed Action

Construction Impacts

Under the Proposed Action, construction activities would include the use of hazardous materials and hazardous waste generation (i.e., solvents, hydraulic fluid, oil, and antifreeze).

With implementation of safety measures and proper procedures for the handling, storage, and disposal of hazardous materials and wastes during construction activities, no adverse impacts are anticipated during construction. In addition, WRP would require site-specific SWPPPs to be developed prior to the start of construction activities that would contain best management practices related to spill prevention and clean-up procedures for hazardous materials and wastes.

Operational Impacts

Aircraft fueling operations would be a potential source of hazardous waste and materials. Mobile tankers would be used to fuel some aircrafts. The largest tanker has a capacity of 7,000 gallons; if a tanker were to rupture on the apron, a potential release of 7,000 gallons of fuel oil could enter surface waters in the vicinity of WFF via the stormwater inlets that would be located in the WRP. A study by the WFF Environmental Office that simulated spill exercises on the WFF runway immediately north of the WRP site concluded that spill recovery operations may be

implemented within a reasonable response time in order to diminish or eliminate the likelihood of a spill impacting State waters (NASA, 2005).

The operation of aircraft at the WRP would result in the use of hazardous materials and generation of hazardous wastes. Hazardous materials in use as part of flight operations include solvents, hydraulic fluid, oil, antifreeze, and paint. In addition, hazardous materials would likely be used during scientific research operations at the WRP. Hazardous materials would be managed according to standard safety procedures that include proper containment, separation of incompatible and reactive chemicals, worker warning and protection systems, and handling procedures to ensure safe operations. All personnel who transport, fuel, and maintain aircraft at the WRP would receive training in hazardous waste management.

The greatest potential impact to the environment due to the release of hazardous materials would result from an accident at a storage location (e.g., leak, fire, or explosion) or, to a lesser degree, from an accidental release during normal operating activities (e.g., spills or human exposure). The short- and long-term effects of an accident on the environment would vary greatly depending upon the type of accident and the substance(s) involved.

NASA has implemented various controls to prevent or minimize the effects of an accident involving hazardous materials on NASA property, including the following:

- NASA has prepared an Integrated Contingency Plan
- NASA has prepared emergency plans and procedures designed to minimize the effect an accident has on the environment
- GSFC maintains an online database (MSDSPro®) of hazardous materials and the associated buildings where they are stored or used that would be updated to include WRP facilities
- Training is provided annually for all users of hazardous materials

Sources of hazardous wastes have the potential to adversely impact the environment. Hazardous waste would be stored in accumulation areas for less than 90 days. NASA uses licensed contractors to transport and dispose of hazardous waste at permitted off-site facilities. The WRP would require tenants to implement various controls to prevent or minimize the potential for and effect of an accident involving hazardous waste. NASA and WRP tenants on NASA property would implement the following list of controls for actions occurring on NASA property:

- All wastes are stored in closed containers, and accumulation areas have the capability of containing a leak or spill
- The containers are inspected for leaks on a scheduled basis
- All civil service and contractor personnel who handle hazardous waste as part of their job are trained in hazardous waste management procedures
- A communication/alarm system is in place that is capable of providing immediate emergency instructions to facility personnel in the event of an accident and summoning emergency assistance
- Fire extinguishers and fire control equipment are available on site

- An Integrated Contingency Plan with annual training has been developed to deal with release of hazardous waste

Each WRP tenant that uses hazardous materials or generates hazardous waste would be required to develop a contingency plan and an employee training program in accordance with Federal regulations regarding the storage and use of hazardous materials and the disposal of hazardous wastes. Each WRP tenant that generates hazardous wastes would be required to obtain an EPA hazardous waste generator number and comply with all requirements in accordance with Federal, State, and WFF regulations.

Alternative One

Under Alternative One, hazardous materials and hazardous wastes during construction of the WRP and operation activities of WRP tenants would be used slightly more than under the Proposed Action due to the development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill. Each WRP tenant that uses hazardous materials or generates hazardous waste would be required to develop a contingency plan and an employee training program in accordance with Federal regulations regarding the storage and use of hazardous materials and the disposal of hazardous wastes. Each WRP tenant that generates hazardous wastes would be required to obtain an EPA hazardous waste generator number and comply with all requirements in accordance with Federal, State, and WFF regulations.

With implementation of safety procedures, training, and mitigation measures, including spill prevention and response, no adverse impacts to human and environmental health due to hazardous materials and wastes are anticipated.

4.2.6 Radiation

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no effects from radiation.

Proposed Action

Construction Impacts

Construction activities are not anticipated to result in a potential source of radiation; therefore no impacts to human health or the environment from radiation are expected to occur during construction.

Operational Impacts

Operation of the PPF and handling of payloads could result in a potential source of radiation. Any tenant of the WRP using regulated nuclear material would be required to obtain an NRC license.

Payloads may carry small quantities of encapsulated radioactive materials for instrument calibration or similar purposes. The amount and type of radioactive material that can be carried on NASA missions is strictly limited by the approval authority level delegated to the NASA Nuclear Flight Safety Assurance Manager (NFSAM) (NASA, 2005). The NFSAM would certify that

preparation and launching of payloads that carry small quantities of radioactive materials would not present a substantial risk to public health or safety.

Lasers may be used for science instrumentation on payloads. Admissible safety analysis techniques are well established based on ANSI standards. According to ANSI standard Z136.6-2000, the maximum permissible exposure values are below known injury levels; therefore, use of lasers at the WRP would be required to meet the safety standards set forth by ANSI, which would mitigate potential impacts to human health. Since the energy threshold for skin damage exceeds that for eye injury, any system found to be eye-safe would not present a substantial hazard to skin, structures, or plants.

In addition, ANSI standard Z136.6-2000 also requires visible lasers that are used outdoors not to cause interference with spacecraft and aircraft operations. For visible lasers, WRP would obtain a letter of non-objection from the Federal Aviation Administration for outdoor scientific use of lasers.

Alternative One

Under Alternative One, the potential impacts to human health due to radiation may be slightly more than under the Proposed Action due to the additional construction activities and operations activities associated with development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill. With implementation of safety procedures, training, and mitigation measures associated with the use of materials containing radiation, no adverse impacts to human health are anticipated.

4.3 BIOLOGICAL ENVIRONMENT

4.3.1 Vegetation

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no impacts to vegetation.

Proposed Action

Construction Impacts

Although most new construction would occur in existing developed areas where vegetation communities exist as maintained landscaping, short-term adverse impacts to vegetation are anticipated due to clearing and grading. The WRP partners and tenants would be required re-vegetate bare soils after soil disturbing activities, and incorporate landscaping measures in areas that would be left as pervious surfaces (not paved) when the project is complete. WRP partners and tenants are directed by the WRP covenants to preserve as much existing vegetation as possible (NASA, 2008c).

Long-Term Impacts

Long-term adverse impacts to vegetation would be anticipated due to the permanent conversion of forest to developed land. The current proposed construction of the WRP would result in the

removal of approximately 50 to 100 acres of trees. In order to minimize impacts to vegetation, a vegetative buffer would be maintained around the perimeter of the WRP site. Vegetative buffers would consist of: 100 feet on the western edge of the WRP, 35 feet on the southern edge of the WRP, and a minimum of 35 feet on both sides of Mill Dam Road. In addition, no construction or development would be allowed in a 100-foot vegetative buffer surrounding wetlands.

Alternative One

Impacts to vegetation under Alternative One could be greater than under the Proposed Action due to the removal of vegetation associated with development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill.

Long-term adverse impacts to vegetation would be anticipated due to the permanent conversion of forest to developed land. In order to minimize impacts to vegetation, a vegetative buffer would be maintained around the perimeter of the WRP site. Buffers would consist of: 100 feet on the western edge of the WRP, 35 feet on the southern edge of the WRP, and a minimum of 35 feet on both sides of Mill Dam Road. In addition, no construction or development would be allowed in a 100-foot vegetative buffer surrounding wetlands.

4.3.2 Terrestrial Wildlife and Migratory Birds

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no impacts to terrestrial wildlife or migratory birds.

Proposed Action

Construction Impacts

Short-term impacts to wildlife and migratory birds may be anticipated during construction activities due to temporary noise disturbances, especially during spring and fall migrations; however this is no greater than daily operations at the nearby WFF airfield. Most of the area surrounding the WRP site is developed and is currently affected by human-related noise. The WFF property located adjacent to the north side of the WRP site carries out launch and flight operations, which causes noise disruption; however, any noise disruption caused by WFF operations are of low frequency and short duration and already exist.

Operational Impacts

Under the Proposed Action, long-term adverse impacts to terrestrial wildlife or migratory birds may be anticipated due to the loss of habitat to developed land. Impacts would be greatest on migratory birds during spring and fall migrations. The construction of the WRP would result in the removal of approximately 50 to 100 acres of trees. Terrestrial wildlife and/or migratory birds may be permanently displaced from this area. Up to 75 acres of forested land, but no less than 25 acres, within the WRP site would remain upon completion of the WRP and would continue to provide habitat for terrestrial wildlife and migratory bird species.

Most of the area surrounding the WRP site is developed and is currently affected by human-related noise. The WFF airfield located adjacent to the north side of the WRP site currently operates an avian deterrent program to keep the aircraft approach zones clear for safety purposes. The program includes the use of sound producing devices and pyrotechnics to discourage birds from congregating near the runways. Any additional noise disruptions caused by WRP operations are expected to be of low frequency, short duration, and comparable to what already exists with the avian deterrent program.

A vegetated buffer would be retained around the WRP western perimeter and tenants would be encouraged to retain native habitat to the greatest extent practicable. The WRP would discourage any features such as stormwater retention ponds, reflective ponds, fountains, or other ornamental water features that might attract waterfowl to the WRP site because of its proximity to an active aircraft operating area. In addition, fencing must be approved by the WRP Site Plan Review Committee on a case-by-case basis.

Alternative One

Short-term impacts to wildlife and migratory birds from construction activities would be the same as described under the Proposed Action.

Long-term impacts to terrestrial wildlife and migratory birds under Alternative One would be greater than under the Proposed Action due to the removal of habitat associated with removal of vegetation for the development of approximately 15 acres on Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill.

4.3.3 Threatened and Endangered Species

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur, therefore, no impacts to State or Federally listed threatened or endangered species or federally designated critical habitat would occur.

Proposed Action

Since no State or Federally listed threatened or endangered species or Federally designated critical habitat occur within the WRP vicinity, no effects to State or Federally threatened endangered species would occur.

In accordance with Section 7(a)(2) of the ESA, NASA sent a consultation letter to the USFWS requesting concurrence that the Proposed Actions of the WRP would not adversely affect any special status species occurring within the project area. In a letter dated September 4, 2007, the USFWS concurred that the "Proposed Action will not adversely affect Federally listed species or Federally designated critical habitat because no Federally listed species are known to occur in the project area" (Appendix A).

Alternative One

Since no State or Federally listed threatened or endangered species or Federally designated critical habitat occur within the WRP vicinity, no effects to State or Federally threatened endangered species would occur.

The USFWS concurred with NASA's determination that Proposed Actions of the WRP "will not adversely affect Federally listed species or Federally designated critical habitat because no Federally listed species are known to occur in the project area" (Appendix A).

4.4 SOCIAL AND ECONOMIC ENVIRONMENT

4.4.1 Population

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur, therefore, there would be no impacts to population.

Proposed Action

Under the Proposed Action, the number of people that are anticipated to be hired by WRP partners and tenants is approximately 708. Using the Census 2000 estimate of 3.04 people per household in Virginia and 3.12 people per household in Maryland (U.S. Census Bureau, 2000), the estimated number of people ultimately moving to the Lower Delmarva Peninsula at full build-out of the WRP is approximately 2,190. Full build-out of the WRP is anticipated to be obtained over the next 20 years.

Table 11 lists the estimated number of people moving to the area over the next 20 years as a result of WRP, by county, along with county populations. The distribution of WRP employees by county was assumed to be similar to the distribution of WFF employees in the 5-county area (see Section 3.4.1).

Table 11. WRP Employees and People Anticipated to Move to the Lower Delmarva Peninsula Under the Proposed Action

County	Population[1]	Distribution of WRP Employees by Percent[2]	No. of Employees Moving to County	No. of People Moving to County (Percent of County Population)[1,3]
Accomack	38,305	58	411	1,250 (3.3 %)
Northampton	13,093	2	14	41 (<1 %)
Wicomico	84,644	14	99	319 (<1 %)
Worcester	24,747	5	35	116 (<1 %)
Somerset	46,453	21	149	466 (1 %)
TOTAL	207,242	100	708	2,191 (1 %)

[1]Source: U.S. Census Bureau, 2000
[2]Source: Silbert, 2008
[3]Includes entire household and is based on 3.04 people per household in Virginia, 3.12 people per household in Maryland

The largest impact to population would occur in Accomack County, with approximately 1,250 people relocating to the county over time (3 percent of the population) as a result of 708 jobs

created by the WRP. The four other counties where WRP employee households are likely to settle would result in a population increase of less than 1 percent per county.

New student enrollments are anticipated to occur over a 20-year period. To determine the impact to schools within Accomack County since it receives approximately 58 percent of the new households, an average of one child per household (Silbert, 2008) was used and the total of 411 children was equally divided among four age groups; preschool, elementary school, middle school, and high school, resulting in approximately 103 new student enrollments for each age group. Not all children attend preschool, so impacts to preschools were not determined.

Accomack County has five elementary schools, two middle schools, and six high schools. There is also one private school in the county that could receive a few new students. Accomack County elementary schools would receive approximately 20 new students per school, middle schools would receive approximately 51 students per school, and high schools would receive 17 new students per school over a 20-year period. Therefore, even if Accomack County schools do not increase student capacity, the WRP would not result in adverse impacts to public and private schools. In addition, the increase in taxes generated by the additional WRP-employed families would add to the county's ability to implement upgrades to schools.

Impacts to population are not likely to occur due to the long lead time anticipated for increased employment opportunities with WRP partners and tenants.

Alternative One

Under the Alternative One, the number of people that are anticipated to be hired by WRP partners and tenants is approximately 784 over the next 20 years. Using the Census 2000 estimates of 3.04 people per household in Virginia and 3.12 people per household in Maryland (U.S. Census Bureau, 2000), the estimated number of people moving to the Lower Delmarva Peninsula as a result of the WRP is approximately 2,430.

Table 12 lists the estimated number of people moving to the area over a 20 year period as a result of Alternative One, by county, along with county populations. The distribution of WRP employees by county was assumed to be similar to the distribution of WFF employees in the 5-county area (see Section 3.4.1).

Table 12. WRP Employees and People Anticipated to Move to the Lower Delmarva Peninsula Under Alternative One

County	Population[1]	Distribution of WRP Employees by Percent[2]	No. of Employees Moving to County	No. of People Moving to County (Percent of County Population)[1,3]
Accomack	38,305	58	455	1,385 (3.6 %)
Northampton	13,093	2	16	45 (<1 %)
Wicomico	84,644	14	110	354 (<1 %)
Worcester	24,747	5	39	128 (<1 %)
Somerset	46,453	21	165	516 (1 %)
TOTAL	207,242	100	784	2,427 (1 %)

[1]Source: U.S. Census Bureau, 2008
[2]Source: Silbert, 2008
[3]Includes entire household and is based on 3.04 people per household in Virginia, 3.12 people per household in Maryland

The number of people estimated to relocate to the Lower Delmarva Peninsula as a result of employment opportunities of the WRP is slightly greater for Alternative One than the Proposed Action. Because Accomack County is anticipated to receive approximately 58 percent of the households that relocate due to a family member becoming employed by WRP, the greatest impacts would occur within Accomack County. Approximately 3.6 percent of the county's population, 1,385 people, would be attributed to WRP-related households. Over a 5-year period, Accomack County elementary schools would receive approximately 22 new students per school, middle schools would receive approximately 57 new students, and high schools would receive approximately 19 new student enrollments per school.

The development of approximately 15 acres of Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill would increase the numbers of new employees and thus households and new students to the Lower Delmarva Peninsula; however, the impacts would be similar to the Proposed Action, therefore, no adverse impacts to population are likely to occur due to increased employment opportunities with WRP partners and tenants under Alternative One. In addition, the increase in taxes generated by the additional WRP-employed families would add to the county's ability to implement upgrades to schools.

4.4.2 Recreation

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no impacts to recreation.

Proposed Action

Construction Impacts

No short-term adverse impacts to recreation are anticipated during construction of the WRP. Although the existing baseball field and playground would be rebuilt in a new location, the old baseball field and playground would remain open to the public while the new ones are being constructed.

Long-Term Impacts

Under the Proposed Action, minor impacts to recreation would occur due to increased use of the baseball field, playground, and nature trails the Accomack County property by employees and students of Accomack County and the MSC, and NASA employees. Increased use would require increased routine maintenance of the facilities and increase the frequency of unexpected repairs. Residents, employees, and students would benefit from the additional recreational activities associated with the space south of Mill Dam Road and west of the closed Accomack County landfill that would be utilized as a county park and by the construction of a new baseball field and playground.

Alternative One

Under Alternative One, impacts to recreation would be greater than under the Proposed Action due to the development of approximately 15 acres located south of Mill Dam Road and west of the closed Accomack County landfill. This space would not be available to residents, employees,

and students for recreation. Minor impacts to existing recreational facilities would occur due to increased use of the existing baseball field, playground, and nature trails. Increased use would require increased routine maintenance of the facilities and increase the frequency of unexpected repairs.

4.4.3 Employment and Income

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no impacts to employment and income.

Proposed Action

Construction Impacts

Construction of the WRP would result in a long-term benefit to the local economy during construction due to increased numbers of people in Accomack County during business hours and the potential increase in the use of local stores and businesses for purchases. Employment opportunities for construction-related work would also increase as a result of development of the WRP site and result in a beneficial impact to employment within Accomack County.

Operational Impacts

Under the Proposed Action, no adverse impacts to employment and income would occur. WRP would create 708 new jobs, which would bring approximately 411 new households and approximately 2,200 people over the next 20 years to the Lower Delmarva Peninsula. Employment opportunities within the WRP would result in NASA and Accomack County continuing to be among the top five largest employers in Accomack County.

Average salaries of employees of WRP would likely be similar to the 2008 average NASA WFF salary of $83,462 (NASA, 2008b). Although Accomack County would likely continue to maintain lower income rates as compared with the Commonwealth of Virginia, the average income of people employed by WRP tenants and partners is expected to be well above the 2004 average county per capita income of $22,256 and median household income of $31,256 (Virginia Tech, 2007). Due to greater average salaries of WRP employees, the WRP would contribute positively to the local economy.

Alternative One

Construction Impacts

Construction-related impacts are the same as for the Proposed Action.

Operational Impacts

The impacts under Alternative One are similar to the Proposed Action - no adverse impacts to employment and income would occur. Under Alternative One, WRP would create 784 new jobs, which would bring approximately 455 new households and approximately 2,430 people to the Lower Delmarva Peninsula over the next 20 year time period. Employment opportunities within

the WRP would result in NASA and Accomack County continuing to be among the top five largest employers in Accomack County.

Beneficial impacts to average salaries of Accomack County residents would occur, and the WRP would contribute positively to the local economy, as described under the Proposed Action.

4.4.4 Health and Safety

No Action Alternative

Under the No Action Alternative, no impacts to health and safety would occur. The development and use of the Accomack County and MSC properties is not anticipated to increase the demand for medical services or fire and police protection services.

Proposed Action

Construction Impacts

Construction activities at the WRP site could result in short-term impacts to human health and safety and the increased usage of local fire, police, and medical services. Construction safety procedures and appropriate training would be implemented at the WRP to ensure that events that have the potential to adversely impact human health and safety are minimized.

Operational Impacts

Under the Proposed Action, the estimated number of people moving to the Lower Delmarva Peninsula as a result of the WRP is approximately 2,200 over 20 years. According to current distributions of WFF employee households among the five counties of the Lower Delmarva Peninsula, the 2,200 people anticipated to move to the Lower Delmarva Peninsula would be distributed as follows: 1,250 in Accomack County, 41 in Northampton County, 319 in Wicomico County, 116 in Somerset County, and 466 in Worcester County.

The capability of the medical, fire, and police services to handle the additional people in the area is not anticipated to be exceeded; therefore, since the increased demand on these services is anticipated over a 20 year time period, no impacts to health and safety would occur due to the WRP development. Safety procedures and appropriate training would be implemented at the WRP to ensure that events that have the potential to adversely impact human health and safety are minimized.

Alternative One

Under Alternative One, the estimated number of people moving to the Lower Delmarva Peninsula as a result of the WRP is approximately 2,430 over a 20 year period. According to current distributions of WFF households among the five counties of the Lower Delmarva Peninsula, the 2,430 people anticipated to move to the Lower Delmarva Peninsula would be distributed as follows: 1,385 in Accomack County, 45 in Northampton County, 351 in Wicomico County, 128 in Somerset County, and 516 in Worcester County.

Although more people would be relocated to the Lower Delmarva Peninsula compared to the Proposed Action, the additional number of people is not anticipated to result in a large increase on the demand for medical services or fire and police protection over the Proposed Action. The

capability of the medical, fire, and police services to handle the additional people in the area is not anticipated to be exceeded; therefore, since the increased demand on these services is anticipated over a 20 year time period, no impacts to health and safety could occur due to the WRP development. Safety procedures and appropriate training would be implemented at the WRP to ensure that events that have the potential to adversely impact human health and safety are minimized.

4.4.5 Cultural Resources

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no effects on cultural resources, and NASA would not be required to undertake Section 106 consultation.

Proposed Action

Because construction of new industrial facilities for the WRP would occur all around the MSC campus, NASA examined the MSC campus buildings and reviewed available documentation to determine whether or not the remaining buildings or landscape of the MSC campus are eligible for the NRHP. NASA determined that the MSC buildings, although greater than 50 years of age, are not historically significant and are ineligible for listing in the NRHP. The buildings and landscape do not meet the National Register Criteria for Evaluation, nor are they associated with a significant event or individual at the local, state, or national level. The buildings and landscape, although representative of a post-war building typology, do not remain as a unique example. Though locally significant to the Lower Delmarva Peninsula, the architecture of the buildings and landscape neither represents a work of a master nor possesses high artistic values. Moreover, the buildings and landscape do not have the potential for providing additional information on the history or prehistory of the area.

In a letter dated February 22, 2008, the Virginia Department of Historic Resources (VDHR) concurred with NASA's determination that the Proposed Action will have no adverse effect on historic properties (Appendix A).

The Phase I archaeological survey (NASA, 2007b) identified no archaeological sites within the WRP project area; therefore, NASA determined that the Proposed Action would have no effect on archaeological resources. In a letter dated February 22, 2008, the VDHR stated that they did not have any concerns with regard to archaeological properties for the WRP site (Appendix A).

However, if unanticipated archaeological remains are identified during construction of the WRP, consultation with the VDHR would be required 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, as appropriate.

Alternative One

Under Alternative One, impacts to historic properties and archaeology would be the same as the Proposed Action.

4.4.6 Environmental Justice

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, there would be no disproportionately high or adverse impacts to low-income or minority populations.

Proposed Action

There are minority and low-income communities within Accomack County but it is not anticipated that disproportionately high or adverse impacts to low-income or minority populations would occur under the Proposed Action, because no displacement of residences or businesses would occur as a result of development of the WRP. The creation of new jobs within Accomack County that are directly and indirectly related to WRP would benefit low-income and minority populations.

In addition, the Proposed Action would include similar activities as those conducted at WFF, and the EJIP found that current WFF actions do not disproportionately affect low-income or minority populations (NASA, 1996).

Alternative One

The impacts under Alternative One are the same as for the Proposed Action.

4.4.7 Transportation

No Action Alternative

Under the No Action Alternative, development of the WRP would not occur; therefore, no impacts to transportation would occur.

Proposed Action

The WRP development would occur north and south of Mill Dam Road, and on both sides of a new road that would be built approximately 200 feet west of Kearsage Circle (which provides access off Mill Dam Road to the MSC campus). The new road west of Kearsage Circle would run north-south to provide access to NASA property north of Mill Dam Road and to Accomack County property south of Mill Dam Road. The new road would connect to Atlantic Road, which serves as the eastern boundary of the WRP site south of Mill Dam Road. Small driveways and spur roads would be constructed off of new roads to provide direct access to specific buildings.

Construction Impacts

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 WRP. Traffic lanes may be temporarily closed or rerouted during construction, and construction equipment and staging could interfere with pedestrian and vehicle flow. Accomack County would be responsible for implementing road improvements and mitigation measures. To mitigate potential delays, Accomack County 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 not hinder traffic and pedestrian flow; and
- Minimize the use of construction vehicles in residential areas.

Long-Term Impacts

Under the Proposed Action, no long-term adverse impacts to transportation are anticipated because Accomack County would implement traffic flow mitigation measures including modifying and upgrading existing roads and intersections, and installing additional traffic devices including signal lights and/or stop signs in the vicinity of the WRP, where necessary.

The WRP development would generate an increase in traffic on Mill Dam Road. However, the traffic analysis concluded that effective traffic operations in the WRP area would be maintained once the WRP development is completed (Vanasse Hangen Brustlin, Inc., 2007).

In addition, existing traffic operations are projected to operate more efficiently upon completion of WRP with implementation of signals with optimal signal timings at currently unsignaled intersections (Vanasse Hangen Brustlin, Inc., 2007).

Alternative One

Under Alternative One, the difference in impacts to transportation due to the development of approximately 15 acres of Accomack County property south of Mill Dam Road and west of the closed Accomack County landfill would be negligible when compared to impacts to transportation under the Proposed Action.

Although an increase in traffic would occur compared to the Proposed Action, the additional volume of traffic is not anticipated to result in adverse impacts to transportation with implementation of the mitigation measures described under the Proposed Action.

4.5 CUMULATIVE EFFECTS

The Council on Environmental Quality 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).

Within the boundary of the WRP site, the MSC is planning on completing a campus renewal project that would include demolition of existing buildings, construction of new facilities (maintenance building and yard, pre-college dorms, staff and instructor housing, laboratories, an administration building, and a campus parking lot), and updates to existing facilities. Demolition that would occur for the MSC campus renewal would not change the land use because facilities with similar functions and needs (i.e., laboratory and housing facilities) would be reconstructed. The MSC campus renewal project started in 2007 and is projected to continue through the year 2012.

Several residential developments are planned for construction or being constructed within Accomack County. The closest development to the WRP site is a 201-acre, 99-lot subdivision called Olde Mill Pointe that is located on the opposite side of Little Mosquito Creek to the northwest of the WRP site. Other residential projects include Historic Corbin Hall at Chincoteague Plantation that is located on Chincoteague Bay approximately 1 mile north of the WRP site and encompasses approximately 150 acres, and Captain's Cove that is also located on Chincoteague Bay and is approximately 3 miles north of the WRP.

With implementation of the minimization and mitigation measures described in Section 4, the following resource areas would not be adversely affected by cumulative impacts resulting from development of the WRP along with the MSC campus renewal activities and on-going development within Accomack County and the Chincoteague Bay watershed: topography and drainage, geology and soils, land use, surface water, stormwater, coastal zone management, noise, hazardous materials and hazardous waste, radiation, threatened and endangered species, recreation, employment and income, cultural resources, environmental justice, and transportation.

Below is a description of the potential cumulative impacts for each resource area that could be adversely impacted by the development of the WRP when combined with the potential impacts from the MSC campus renewal activities and the on-going development within Accomack County and the Chincoteague Bay watershed.

Groundwater

The projected potable water demand of the MSC campus is 34,000 gallons per day, based on proposed future wastewater flows of WRP Study Area from County of Accomack Water and Wastewater Feasibility Study (Accomack County, 2006). The WFF is currently permitted to withdraw 8,153,000 per month from the Columbia and Yorktown-Eastover Multiaquifer System sole source aquifer. The combined WRP, WFF, and MSC water demand rates under the Alternative One scenario would be approximately 3,502,000 gallons per month. The combined water demands of the Town of Chincoteague, WFF, MSC, WRP, and other public and private entities are currently unknown, however, it is not anticipated that the WRP, the MSC and WFF would contribute to adverse impacts to the sole source aquifer. WFF would monitor ground water withdrawal rates to ensure continued compliance with WFF's Virginia DEQ ground water withdrawal permit.

Wetlands

If other projects within the Chincoteague Bay watershed would result in the loss of wetlands, adverse impacts to wetlands could occur as a result of the cumulative impacts of the WRP project combined with other wetland losses. The MSC campus renewal activities would not result in any impacts to wetlands. No other projects that would result in a loss of wetlands within the Chincoteague Bay watershed are known at this time. The Virginia Water Protection Permit Program Regulation (9 VAC 25-210) includes a "no net loss" policy that states: "The plan of mitigation for impacts to wetlands must include, in accordance with current federal regulations: the means by which compensation will be accomplished to achieve no net loss of wetland acreage and functions or stream functions and water quality benefits." If wetland losses cannot be avoided, they shall be mitigated by creation or restoration of wetlands at a 1:1 ratio as

geographically close to and within the same watershed as the original wetland that is being affected.

The WRP would notify the public and coordinate with applicable agencies including the USACE, the Virginia DEQ, and the VMRC, and would obtain necessary permits including Section 404 and/or Section 10 permits for the disturbance of 1 acre of wetlands. The WRP would implement wetland mitigation measures agreed upon through the USACE and Virginia DEQ consultation process to protect and restore the natural and beneficial functions of wetlands in order to minimize the potential for adverse impacts to wetlands within the Chincoteague Bay watershed.

Floodplains

The MSC campus renewal activities would not result in construction within a floodplain. Cumulative impacts to the floodplain could result from the combination of the WRP floodplain development (anticipated to impact approximately 1 acre within the floodplain) along with development of other floodplains within Accomack County. No other projects that involve development within the floodplain of the Chincoteague Bay watershed are known at this time.

For the construction that would take place within the floodplain, WRP would ensure that the action complies with EO 11988 (Floodplain Management) and 14 CFR 1216.2 (NASA regulations on Floodplain and Wetland Management), including notifying the public of actions that would occur within the floodplain. The WRP would minimize floodplain impacts and protect and restore the natural and beneficial functions of floodplains to the maximum extent possible.

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 WRP development could contribute to temporary impacts to air quality.

Depending on the air quality of the area surrounding the WRP site, the operational activities of WRP partners and tenants could result in short-term adverse impacts to air quality due to inadvertent releases of toxic air contaminants as a result of accidents involving hypergolic fuels or operation of fume hoods. Impacts would be temporary and would disperse, and therefore are not anticipated to result in long-term adverse impacts to ambient air quality.

Paint spray/coatings booths that would be located in the WRP would result in minor impacts to local air quality and could contribute to cumulative impacts when combined with other air pollutants resulting from other facilities and activities within Accomack County. WRP would consult with the Virginia DEQ to ensure no adverse impacts to air quality would occur as a result of operations of the WRP.

Vegetation, Terrestrial Wildlife, and Migratory Birds

Long-term adverse impacts to vegetation and terrestrial wildlife and migratory birds are anticipated due to the permanent conversion of forest to developed land within the WRP. In addition, water features are discouraged at the WRP site so that waterfowl are not attracted to an active aircraft area.

The residential developments described above would likely result in losses of vegetation and habitat in the foreseeable future; however, loss of vegetation and habitat in the surrounding areas often occurs in small amounts and is undocumented (especially on private property) so that cumulative impacts to vegetation as a result of development within Accomack County, when combined with the WRP, are unknown.

In order to minimize impacts to vegetation and habitat, vegetative buffer would be maintained around the perimeter of the WRP site and around streams and wetlands. In addition, WRP tenants are directed by the WRP covenants to preserve as much existing vegetation as possible.

Population

Minor impacts to population would occur due to increased employment opportunities within the WRP. Addition of new residences and businesses within Accomack County and additional staff and students at the MSC campus would result in an increase in the population of Accomack County and the surrounding areas; when combined with the WRP population impacts, cumulative impacts to population would increase within the Lower Delmarva Peninsula.

Health and Safety

Due to an increase on the demand for medical, fire and police services from development of the WRP along with additional staff and students at the MSC and population and employment increases within Accomack County, adverse cumulative impacts to human health and safety could occur if existing capacity of medial, fire, and police services are exceeded. Safety procedures and appropriate training would be implemented at the WRP to ensure that events that have the potential to adversely impact human health and safety are minimized.

4.5.1 Climate Change

The U.S. government has established a comprehensive policy to address climate change including the establishment of major government-wide programs to advance climate technologies and improve climate science. WRP would comply with Federal climate change policy including EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, which instructs Federal agencies to conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner. EO 13423 also directs Federal agencies to implement sustainable practices for energy efficiency and reductions in greenhouse gas emissions, and for the use of renewable energy. The Federal Energy Policy Act requires Federal agencies to increase the usage of renewable sources by 3 percent between 2007 and 2009, 5 percent between 2010 and 2012, and by 7.5 percent for 2013 and beyond.

Because WRP would receive its power from WFF, WRP would administer WFF's Environmental Management System that has identified the following goals that meet WFF's mission while complying with climate change policy including EO 13423 and the Federal Energy Policy Act, and promoting environmental stewardship and accountability:

- Reducing impacts on the natural environment by consuming energy from a source that provides zero greenhouse gas emissions,

- Reducing WFF's annual operating cost by consuming continual, low-cost power from a renewable and sustainable natural resource, and
- Setting an example for responsible stewardship of natural resources by a Federal agency.

WFF is currently evaluating a project that would utilize wind and/or solar energy to reduce greenhouse gas emissions by reducing the use of fossil fuels to generate electricity. Although the WRP would result in additional energy demands at WFF, the implementation of the WFF alternative energy project would decrease WFF's overall greenhouse gas emissions.

WRP is committed to complying with all of the Federal policies that address climate change and would implement measures to reduce greenhouse gas emissions and promote sustainable energy and resource use practices; therefore, cumulative impacts from the Proposed Action that would adversely impact global climate change when added to other known and foreseeable regional actions are not anticipated.

4.6 PERMITS, LICENSES, AND APPROVALS

The following list of potential permits, licenses, and approvals for the Proposed Actions is preliminary. 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, development of the WRP would not occur; therefore, no permits, licenses, or approvals would be required.

Proposed Action and Alternative One

- Clean Water Act Section 404 Permit, USACE
- Virginia Water Protection Permit (Section 401 Permit), Virginia DEQ
- Virginia Marine Resources Commission Permits for activities disturbing wetlands, VMRC
- Accomack County Wetlands Board (if wetlands are determined to be tidal)
- National Marine Fisheries Service (if wetlands are determined to be tidal)
- Virginia Department of Historic Resources Consultation
- VSMP Stormwater General Permit for Construction Activities, Virginia Department of Conservation and Recreation
- Erosion and Sediment Control Permit, Accomack County
- VPDES Permit for Industrial Stormwater Discharges, Virginia DEQ
- EPA Hazardous Waster Generator Identification Number, Virginia DEQ
- Virginia Air Pollution Control Board permits, Virginia DEQ Division of Air Quality

- EO 11988 (Floodplain Management), EO 11990 (Wetland Protection) and 14 CFR 1216 (NASA regulations on Floodplain and Wetland Management)
- EO 12898 Environmental Justice

List of URS and EG&G Preparers:

EG&G

Shari Silbert, Wallops Environmental Office, EG&G

URS

Suzanne Richert, Senior Environmental Scientist, URS Co-Project Manager

Janet Frey, Senior Environmental Scientist, URS Co-Project Manager

Emily Smith, Environmental Scientist

Kristine Sinkez, Environmental Scientist

Elizabeth Vashro, Biologist

Kathy Furgerson, Senior Archaeologist

Fred Holycross, Senior Principal Historian

Linda Mackey, Architectural Historian

Jeffrey Reidenauer, Internal Technical Reviewer

Initial coordination letters were sent to the following agencies:

Federal Agencies:

U.S. Fish and Wildlife Service
6669 Short Lane
Gloucester, VA 23061

State Agencies:

Office of Environmental Impact Review
Virginia Department of Environmental Quality
629 East Main Street, Room 631
Richmond, VA 23219

Virginia Department of Historic Resources
Federal Review and Compliance Coordinator
2801 Kensington Avenue
Richmond, VA 23221

NASA is the lead Federal agency for conducting the NEPA compliance process for this EA. The lead agency's goal is to expedite the preparation and review of NEPA documents while meeting the intent of NEPA and complying with all NEPA provisions including NHPA, EO 12114, EO 11988, EO 11990, Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act.

NASA will publish a public notice in the Eastern Shore News and the Chincoteague Beacon advertising the availability of this EA. The EA will be available at the following locations:

NASA WFF Technical Library
Building E-105
Wallops Island, Virginia 23337
(757) 824-1065
Hours: Mon – Fri: 8 a.m. - 4:30 p.m.

Island Library
4077 Main Street
Chincoteague, Virginia 23336
(757) 336-3460
Hours: Mon: 10 a.m. - 2 p.m.
Tues: 10 a.m. - 5 p.m.
Wed, Fri, Sat: 1 p.m. - 5 p.m.

Eastern Shore Public Library
23610 Front Street
P.O. Box 360
Accomac, VA. 23301
Hours: Mon, Tues, Wed, Fri.: 9 a.m. - 6 p.m.
Thurs.: 9 a.m. - 9 p.m.
Sat.: 9 a.m. - 1 p.m.

NASA solicited public and agency review and comment on the environmental impacts of the action alternatives through:

1. A notice of availability of the draft EA published in the Eastern Shore News and the Chincoteague Beacon;
2. Publication of the draft EA on the WFF Environmental Office Web site;
3. Consultations with local, State, and Federal agencies; and
4. Direct mailing of the draft EA to interested parties.

The draft EA can be viewed on the WFF Environmental Office Web site:
http://sites.wff.nasa.gov/code250/docs/WRP_DEA.pdf

A limited number of copies of the draft EA are available by contacting:

Joshua A. Bundick
NEPA Program Manager
Wallops Flight Facility, Code 250.W
Wallops Island, VA 23337

Phone: (757) 824-2319
Fax: (757) 824-1819

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Appendix A
Agency Coordination

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
6669 Short Lane
Gloucester, VA 23061

Date: September 4, 2007

Project name: Wallops Research Park

Project number: 2007-TA-0491 City/County Accomack Co., VA

The U.S. Fish and Wildlife Service (Service) has reviewed your request for information on federally listed or proposed endangered or threatened species and designated critical habitat for the above referenced project. The following comments are provided under provisions of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*)

✓ We have reviewed the information you have provided and believe that the proposed action will not adversely affect federally listed species or federally designated critical habitat because no federally listed species are known to occur in the project area. Should project plans change or if additional information on listed and proposed species becomes available, this determination may be reconsidered.

_____ We recommend that you contact **both** of the following State agencies for site specific information on listed species in Virginia. Each agency maintains a different database and has differing expertise and/or regulatory responsibility:

Virginia Dept. of Game & Inland Fisheries
Environmental Services Section
P.O. Box 11104
Richmond, VA 23230
(804) 367-1000

Virginia Dept. of Conservation and Recreation
Division of Natural Heritage
217 Governor Street, 2nd Floor
Richmond, VA 23219
(804) 786-7951

If either agency indicates a federally listed species **is present**, please resubmit your project description with letters from both agencies attached.

_____ If **appropriate habitat may be present**, we recommend surveys within appropriate habitat by a qualified surveyor. Enclosed are county lists with fact sheets that contain information the species' habitat requirements and lists of qualified surveyors. If this project involves a Federal agency (Federal permit, funding, or land), we encourage the Federal agency to contact this office if appropriate habitat is present and if they determine their proposed action may affect federally listed species or critical habitat.

_____ Determinations of the presence of waters of the United States, including wetlands, and the need for permits are made by the U.S. Army Corps of Engineers. They may be contacted at: Regulatory Branch, U.S. Army Corps of Engineers, Norfolk District, 803 Front Street, Norfolk, Virginia 23510, telephone (757) 441-7652.

Our website http://virginiafieldoffice.fws.gov contains many resources that may assist with project reviews. Point of contact is Mike Drummond at (804) 693-6694, ext. 114.

Sincerely,

Karen L. Mayne

Karen L. Mayne
Supervisor
Virginia Field Office

COMMONWEALTH of VIRGINIA

L. Preston Bryant, Jr.
Secretary of Natural Resources

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

Kathleen S. Kilpatrick
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
TDD: (804) 367-2386
www.dhr.virginia.gov

February 22, 2008

Ms. Shari Silbert
NASA/Wallops Flight Facility
Code 250
Wallops Island, VA 23337

Re: Wallops Research Park
DHR File # 2007-1229

Dear Ms. Silbert:

We have received for review a copy of the report *Phase I Cultural Resources Survey of Approximately 100 Acres for a Proposed Research Park at Wallops Island, Accomack County, Virginia* (JRIA 2007) as well as information regarding several existing architectural properties located adjacent to the proposed research park. We are pleased to inform you that the report meets the Secretary of the Interior's *Standards and Guidelines for the Documentation of Archaeological Sites* (48 FR 44734-44742) and our Department's *Survey Guidelines* (in revision).

Archaeological survey of the project area resulted in the identification of three isolated finds. Such finds are, by definition, not eligible for inclusion in the National Register of Historic Places. We further understand that a large portion of the project area is occupied by a former landfill, and that the landforms generally exhibit varying degrees of disturbance associated with construction, logging and clearing. Based upon the information provided, we have no further concerns with regard to archaeological properties.

With regard to architectural properties, we are unable to provide you with recommendations regarding the Marine Science Consortium buildings (formerly the Toms Cove Apartments) based upon the information provided. Please complete reconnaissance-level survey of the complex to DHR standards. This survey should include a site plan and photographs of all extant buildings, as well as completed Data Sharing System forms. For more information regarding survey standards, please contact Amanda Lee, Architectural Historian, at 804-367-2323 x. 122/amanda.lee@dhr.virginia.gov. For information about our DSS, please contact Jeff Smith, Data Manager, at extension 118/jeff.smith@dhr.virginia.gov. We will complete our review upon receipt of this information.

If you have any questions about our comments or the Section 106 process, please call me at (804) 367-2323, Ext. 140.

Sincerely,

Joanna Wilson, Archaeologist
Office of Review and Compliance

Administrative Services
10 Courthouse Avenue
Petersburg, VA 23803
Tel: (804) 863-1624
Fax: (804) 862-6196

Capital Region Office
2801 Kensington Ave.
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

Tidewater Region Office
14415 Old Courthouse Way, 2nd Floor
Newport News, VA 23608
Tel: (757) 886-2807
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Roanoke Region Office
1030 Penmar Ave., SE
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COMMONWEALTH of VIRGINIA

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Secretary of Natural Resources

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February 22, 2008

Ms. Shari Silbert
NASA/Wallops Flight Facility
Code 250
Wallops Island, VA 23337

Re: Wallops Research Park
DHR File # 2007-1229

Dear Ms. Silbert:

We have received additional information regarding the Marine Science Consortium/Toms Cove Apartments buildings. Our comments are as follows.

We understand that the proposed 232-acre Wallops Research Park (WRP) is adjacent to NASA Wallops Flight Facility (WFF) and is planned to be constructed on properties owned by NASA, Accomack County, and the Marine Science Consortium (MSC). While NASA, the County, and the MSC are participating in the development of WRP, the land owned by the MSC is private property and that organization will execute its Master Plan independent of WRP activities. The information regarding the architectural resources on the MSC property was provided to DHR for review for potential effect to an adjacent resource.

Upon a review of the additional information regarding adjacent architectural resources, DHR concurs that the Tom Cove Apartments, located on the MSC property, do not appear to be eligible for inclusion in the National Register of Historic Places. While the buildings are over fifty years of age, the complex as a whole no longer appears to retain integrity of design, setting, materials, workmanship, or feeling due to the loss of buildings, ball fields and recreation areas, designed landscaping, and architectural details and materials (doors, windows, siding) to name a few. Based upon the information provided, and with reference to our comments provided on February 22, 2008, we concur with NASA's determination that the project will have No Adverse Effect upon historic properties.

If you have any questions about our comments or the Section 106 process, please call me at (804) 367-2323, Ext. 140.

Sincerely,

Joanna Wilson, Archaeologist
Office of Review and Compliance

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