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Environmental Assessment
for the
Engineering Building
National Aeronautics and Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia 23337

August 2, 2004

FINAL

PREFACE

This Environmental Assessment for the Engineering Building at NASA Goddard Space Flight Center's Wallops Flight Facility has been developed by EG&G Technical Services, Incorporated (EG&G) for the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center's (GSFC) Wallops Flight Facility (WFF).

This report was prepared by EG&G , a principal subcontractor of The Cube Corporation on the Wallops Institutional Consolidated Contract (WICC), for the exclusive use of WFF. This report was performed in accordance with NASA document NPR 8580.1, NASA Procedural Requirements for Implementing the National Environmental Policy Act and Executive Order 12114.

ENVIRONMENTAL ASSESSMENT FOR THE ENGINEERING BUILDING NASA WALLOPS FLIGHT FACILITY, WALLOPS ISLAND, ACCOMACK COUNTY, VIRGINIA

Lead Agency: NASA Goddard Space Flight Center's Wallops Flight Facility

Proposed Action: Construction and operation of the Engineering Building at the Goddard Space Flight Center's Wallops Flight Facility.

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Abstract: The WFF is proposing to construct and operate the Engineering Building on the Main Base on the corner of Avery and Fulton Streets adjacent to Building E-108 and the parking lot for Buildings E-104, E-105, E-106, E-107, and E-108. The proposed location of the Engineering Building is currently a vacant, grassed lot. The Engineering Building is proposed to be 4,992 square meters (53,738 square feet) and 2 stories in height with an open courtyard in the center. The Engineering Building would increase efficiency for project design and execution by consolidating engineers, designers, and state-of-the-art laboratories into one central location.

The EA discusses the environmental consequences of the proposed action along with mitigating efforts. Various environmental factors were identified that may be affected. These include the following resource areas: land resources, water resources, air quality, noise, radiation, hazardous materials and waste, biological resources, population, employment and income, health and safety, cultural resources, environmental justice, and utilities.

Based on the EA for the Engineering Building at WFF, and review of underlying reference documents, NASA has determined that the environmental impacts associated with the proposed action will not have a significant effect on the quality of the human health or the natural environment. Therefore, NASA has determined a Finding Of No Significant Impact with respect to the proposed construction and operation of the Engineering Building at WFF. An Environmental Impact Statement is not required.

EXECUTIVE SUMMARY

The National Aeronautics and Space Administration (NASA) Goddard Space Flight Center's (GSFC) Wallops Flight Facility (WFF) proposes to construct and operate the Engineering Building on the corner of Avery and Fulton Streets adjacent to Building E-108 and the parking lot for Buildings E-104, E-105, E-106, E-107, and E-108. The proposed location of the Engineering Building is currently a vacant, mown grass lot. The Engineering Building is proposed to be approximately 4,992 square meters (53,738 square feet) and 2 stories in height with an open courtyard in the center. The Engineering Building would increase efficiency for project design and execution by consolidating engineers, designers, and state-of-the-art laboratories into one central location.

Methodology

The purpose of this Environmental Assessment (EA) is to analyze the potential environmental consequences of the proposed action in compliance with National Environmental Policy Act (NEPA) as amended, the Council on Environmental Quality (CEQ) regulations implementing NEPA, and the NASA Procedural Requirements (NPR) 8580.1, Implementing The National Environmental Policy Act and Executive Order 12114 (Reference 1).

Thirteen environmental attributes were evaluated in this EA to provide an understanding of the potential to be affected by the proposed activity. These attributes provide a baseline for understanding the potential effects of the proposed action and a basis for assessing the significance of the potential impacts in the NEPA process. The attributes selected were:

- land resources
- water resources
- air quality
- noise
- radiation
- hazardous materials and waste
- biological resources
- population
- employment and income
- health and safety
- cultural resources
- environmental justice
- utilities

To assess the significance of potential impacts, the description of activities required to accomplish the proposed action was defined and the affected environment was described. The impact of the proposed activity on the environment at the proposed location was analyzed to determine its significance. If a proposed activity was determined to have a potential for causing significant environmental impact, it was analyzed in greater detail in terms of intensity, extent, and context.

Several of the attributes are regulated by Federal and/or State environmental statutes. The standards defined in the statutes provide a benchmark to assist in determining the significance of the environmental impact. The compliance status of each attribute with respect to the applicable statute was included in the information collected on the affected environmental attribute.

Summary of Environmental Analysis

The consequences of each environmental attribute at the proposed locations were assessed. Table ES.1 summarizes the environmental impacts of the proposed activity.

Conclusions

The analysis of the 13 environmental attributes indicated that there would be no significant environmental effects from the construction and operation of the Engineering Building. The potential for cumulative environmental impacts from the construction and operation of the Engineering Building at WFF would be insignificant. Activities at WFF Main Base would remain constant.

Table ES.1.1 Summary of Potential Environmental Impacts

Environmental Attribute	No-Action Alternative	Proposed Action
Land Resources	No impacts	No impacts.
Water Resources	No impacts	No impacts.
Air Quality	No impacts	Insignificant impact due to minor increase in particulate matter emissions during construction and minor impacts from operation of a fume hood for adhesives.
Noise	No impacts	Insignificant impact due to minor increase in noise levels during construction.
Radiation	No impacts	No impacts.
Hazardous Materials and Waste	No impacts	No impact during normal operations. If there is an accidental spill or release of a hazardous material, then hazardous waste would be generated. Work will cease and appropriate measures will be taken if contaminated soils are encountered.
Biological Resources	No impacts	No impacts.
Population	No impacts	No impacts.
Employment and Income	No impacts	No impacts.
Health and Safety	No impacts	Insignificant impacts due to minor increase in safety concerns during construction.
Cultural Resources	No impacts	No impacts. Work will cease and appropriate measures will be taken if archaeological resources are encountered.
Environmental Justice	No impacts	No impacts.
Utilities	No impacts	No impacts.
Cumulative	No impacts	No impacts.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ACOE	Army Corps of Engineers
ACS	Attitude Control Systems
AETD	Applied Engineering and Technology Directorate
ANSI	American National Standards Institute
AOA	Airport Operating Area
APHIS	Animal and Plant Health Inspection Service
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ARISE	Advanced Range Integration and Simulation Environment
AST	Aboveground Storage Tank
BMPs	Best Management Practice
CBOD5	Biochemical Oxygen Demand
CBPA	Chesapeake Bay Preservation Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COTS	Commercial Off-the-Shelf
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB, dBA	Decibels
DCR	Virginia Department of Conservation and Recreation
DEQ	Department of Environmental Quality
DO	Dissolved Oxygen
EA	Environmental Assessment
EG&G	EG&G Technical Services
EJIP	Environmental Justice Implementation Plan
EIS	Environmental Impact Statement
ELV	Expendable Launch Vehicle
EPA	U. S. Environmental Protection Agency
EO	Executive Order
ERD	Environmental Resource Document
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESD	Electrostatic Discharge

FAA	Federal Aviation Adminstration
FMB	Facilities Management Branch
FONSI	Finding of No Significant Impact
FOTW	Federally Owned Treatment Works
FUDS	Formerly Used Defense Site
gpd	gallons per day
GHz	Gigahertz
GPS	Global Positioning System
GSFC	Goddard Space Flight Center
ICP	Integrated Contingency Plan
ICRMP	Integrated Cultural Resources Management Plan
IEEE	Institute of Electrical and Electronics Engineers, Inc.
HAZCOM	Hazard Communication
HAZWOPER	Hazardous Waste and Emergency Response Training
JPTS	Jet Propellant Thermally Stable
kHz	Kilohertz
lpd	liters per day
MBTA	Migratory Bird Treaty Act
MSDS	Material Safety Data Sheets
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NGVD29	National Geodetic Vertical Datum
NRHP	National Register of Historic Places
NOAA	National Oceanic and Atmospheric Administration
NRC	Nuclear Regulatory Commission
NPR	NASA Procedural Requirements
PC	Personal Computer
PCB	Polychlorinated biphenyl
RF	Radio Frequency
RfR	Radio Frequency Radiation
RMA	Resource Management Area
RPA	Resource Protection Area
RPC	Regional Purchase Coefficient
SAA	Satellite Accumulation Area
SWCB	State Water Control Board

TBT	Tributylin
TCE	Trichloroethene
TKN	Total Kjeldahl Nitrogen
TSDF	Treatment, Storage, and Disposal Facility
TSS	Total Suspended Solids
UAV	Unmanned Aerial Vehicle
USDA	U.S. Department of Agriculture
USC	United States Code
USCS	Unified Soil Classification System
UST	Underground Storage Tank
VAC	Virginia Administrative Code
VCP	Virginia Coastal Resources Management Program
VDHR	Virginia Department of Historic Resources
VPDES	Virginia Pollution Discharge Elimination System
WFF	Wallops Flight Facility
WS	Wildlife Services

1.0 PURPOSE AND NEED

1.1 BACKGROUND

The Wallops Flight Facility (WFF) provides resources and expertise to the aerospace, scientific, and technology communities. The WFF uses its research airport, fixed and mobile launch ranges, and orbital tracking facilities to provide cost-effective and quick response flight opportunities and data collection. The project management, design and fabrication capabilities, research and testing abilities, and operations expertise of the WFF workforce, and its partners (i.e. the National Oceanic and Atmospheric Administration (NOAA), the U. S. Navy Surface Combat Systems Center, U. S. Coast Guard, and the Mid-Atlantic Regional Spaceport), enable NASA, other government agencies, and industry to meet prescribed objectives. These objectives include supporting the development and engineering of new technologies to increase the capabilities of launch platforms.

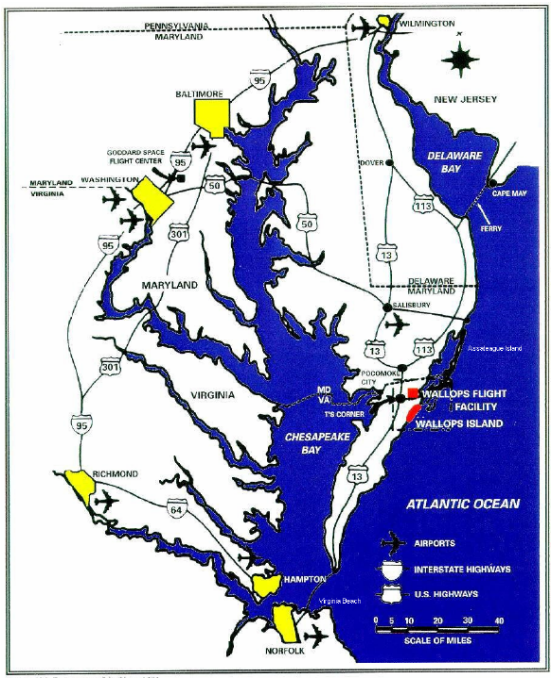


Figure 1.1 Location of Wallops Flight Facility

The WFF is located in the northeastern portion of Accomack County, Virginia, on the Delmarva Peninsula and is comprised of three land masses: the Main Base, the Mainland, and Wallops Island (Figure 1.1). The Main Base includes the airport, most administrative buildings, and some research facilities (Figure 1.2). The Main Base is located off Virginia Route 175, approximately 3.2 kilometers (2 miles) east of U. S. Route 13. The entrance gate for the Mainland and Wallops Island is approximately 9.6 kilometers (6 miles) south of the Main Base. The Mainland facilities include radar, antennas, and transmitter systems and associated buildings. Wallops Island includes the rocket launch range and the U. S. Navy's AEGIS and Ship Self Defense System Facilities.

Figure 1.2 Aerial View of the Main Base

1.2 PURPOSE AND NEED

Currently, the five Branches of the Applied Engineering and Technology Directorate (AETD) at WFF are separated in multiple buildings throughout WFF. The Engineering Building would increase efficiency for project design and execution by consolidating

the engineers, designers, and state-of-the-art laboratories into one building.

1.3 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

The consolidation of the engineers and designers into a new facility which incorporates state-of-the-art laboratories is part of WFFs approved Master Plan. The WFF is currently preparing a Site-wide EA that will analyze the potential impacts of the overall Master Plan as well as current and future operations at WFF. Due to the current time-line for the proposed construction of the Engineering Building, a separate EA is being prepared. The Engineering Building EA has an independent Purpose and Need apart from the Purpose and Need of the Site-wide EA and does not preclude a range of alternatives for the Site-wide EA. This EA describes and addresses the potential environmental impacts associated with the siting, construction, and operation of the Engineering Building at WFF. Additionally, this EA summarizes impacts from the alternatives considered as well as the laws and regulations which apply to the proposed construction and operation of the Engineering Building.

Pursuant to the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 *et seq.*), the President's Council on Environmental Quality (CEQ) NEPA regulations (40 CFR 1500-1508), and consistent with the NASA Procedural Requirements (NPR) 8580.1 Implementing The National Environmental Policy Act and Executive Order 12114 (Reference 1), the scope of this EA is determined by the range of impacts associated with the proposed action and alternatives. The objective of the EA is to provide sufficient analysis to determine whether an Environmental Impact Statement (EIS) or a Finding Of No Significant Impact (FONSI) is appropriate for this action.

The alternative actions considered, including potential impacts, are summarized in Chapter 2.0 "Alternatives Including the Proposed Action." The affected environment is discussed in Chapter 3.0. Much of the information for Chapter 3.0 was provided by the 1999 Environmental Resource Document (ERD) for WFF prepared by Occu-Health, Incorporated. Chapter 4.0 details the potential impacts resulting from the proposed action. Chapters 3.0 and 4.0 are divided into the following resource areas: physical resources such as land resources, water resources, air quality, noise, radiation, hazardous materials, and hazardous waste management; biological resources including vegetation, wildlife, and threatened and endangered species; social and economic resources including population, employment and income, health and safety, cultural resources, and environmental justice; and utilities such as water supply, wastewater and stormwater, energy, solid waste, and transportation.

1.4 Related Environmental Documentation

Other construction activites have been conducted by WFF. The environmental impacts from these activities have already been analyzed and recorded in other environmental documentation; they are not analyzed in this document. However, they would be incorporated by reference. These documents include:

- Environmental Resources Document NASA Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia 23337. 1999. (Reference 2);

- Final Environmental Assessment for a Payload Processing Facility at the National Aeronautics and Space Administration, Goddard Space Flight Center, Wallops Flight Facility, Wallops Island, Virginia 23337, July 2002 (PPF EA). (Reference 3); and
- Preliminary Draft Site-Wide Environmental Assessment National Aeronautics and Space Administration, Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia 23337, July 2004. (Reference 4).

1.5 Permits, Licenses, and Entitlements

The proposed action would disturb greater than 0.8 hectares (1 acre) and would therefore require a Virginia Pollutant Discharge Elimination Sysystem (VPDES) General Stormwater Discharge Permit.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 PROPOSED ACTION

The consolidation of the engineers and designers from various buildings at WFF into one new facility, which incorporates state-of-the-art laboratories, is part of WFFs approved Master Plan. The WFF is currently preparing a Site-wide EA that will analyze the potential impacts of the overall Master Plan as well as current and future operations at WFF. Due to the current time-line for the proposed construction of the Engineering Building, a separate EA is being prepared. The Engineering Building EA has an independent Purpose and Need apart from the Purpose and Need of the Site-wide EA and does not preclude a range of alternatives for the Site-wide EA. The proposed action evaluated in this EA is for the siting, construction, and operation of the Engineering Building (Figure 2.1) located at NASA WFF. The Engineering Building would increase efficiency for project design and execution by consolidating the engineers, designers, and state-of-the-art laboratories into one building.

Figure 2.1 Artist Concept of the Engineering Building

2.1.1 The Applied Engineering and Technology Directorate at WFF

The capabilities of the AETD are extremely diversified and specialized. The Directorate (Code 500) manages five Divisions, four of which operate Branches at WFF: Mechanical Systems Center (Code 540); Electrical Systems Center (Code 560); Information Systems Center (Code 580); and the Mission Engineering and Systems Analysis Center (Code 590).

2.1.1.1 Mechanical Systems Branch

The Mechanical Systems Branch (Code 548) provides mechanical systems mission design and implementation for sub-orbital and special orbital projects and for Earth and space science instrument design and development activities at WFF. Code 548 personnel serve in the Product Design Lead role on key projects and technology development efforts and also provide technical expertise and implementation of integration, testing, and launch operations.

The Mechanical Systems Branch is responsible for the entire life cycle of payload carrier mechanical systems. This includes technical support services in the areas of:

- structural analysis;
- mechanical design;
- thermal engineering;
- materials research and development; and
- assembly, integration, and testing.

The Mechanical Systems Branch also provides management and technical oversight of mechanical engineering and technical support tasks under the WFF engineering

services contract, and maintains responsibility for the development and management of world-class integration and testing facilities at WFF.

2.1.1.2 Electrical Engineering Branch

The Wallops Electrical Engineering Branch (Code 569) is responsible for conception, analysis, design, development, validation, and implementation of electrical/electronic radio frequency (RF), microwave, and millimeter wave components and systems in support of WFF missions, projects, and technology initiatives.

The WFF Electrical Engineering Branch provides world-class expertise for development of both flight and ground instrumentation, communication, and radar components and systems for Expendable Launch Vehicles (ELVs), sounding rockets, aircraft, balloons, satellites, shuttle payloads, ocean-borne payloads, Unmanned Aerial Vehicles (UAVs), and support systems.

Design and development is provided for products and systems involving:

- command and data handling systems;
- power generation and distributions systems;
- RF, microwave, and millimeter wave telemetry, radar, and command systems;
- antenna systems;
- communications systems;
- control systems;
- data acquisition and storage systems; and
- pyrotechnic/mechanism deployment electronics.

Code 569 personnel work closely with the flight projects, the Mission Services Ground Network Program (Code 452) and the WFF Test Range to develop these components/systems and the associated infrastructure. Personnel conduct theoretical studies, develop simulations and models, and provide contractor oversight as required.

Code 569 partners with other WFF and Goddard Space Flight Center (GSFC) AETD branches as well as other NASA Centers and Government agencies on these development efforts. Code 569 also works with industry to develop next generation space, airborne, and ground electrical, communication, and radar components and systems.

Code 569's Integration and Test capabilities are provided for technology development efforts, projects, and end-to-end mission system support with skills in flight harness development; flight component electronic packaging; airborne and ground telecommunication, radar, and instrumentation systems; antennas, electromagnetic compatibility, and RF interference analysis; and ground system implementation.

Code 569's Mission Engineering capabilities include:

- spectrum management,
- RF link budget analysis,
- mission planning analysis, and
- consultation for evaluation of mission readiness, and systems operation and maintenance performance.

Representation is provided for membership to NASA Committees, Range Commanders Committees, and the U. S. Air Force Instrumentation Radar Support Program involving spectrum management and range instrumentation. Engineering expertise contributes to the conceptual planning of future missions, experiments, and advancements in technology associated with flight systems and supporting systems enabling experimentation and science activities.

2.1.1.3 Systems Software Engineering Branch

The WFF Systems Software Engineering Branch (Code 589) develops flight and ground data systems for integration and testing operations of Earth and space science missions. Code 589 personnel participate in teams with flight projects, principal investigators, other AETD centers, and other organizations to develop integrated hardware and software systems for real-time mission support. The system functionality includes spacecraft, instrument, and ground system monitoring and control; launch and tracking services; and data display and analysis. Code 589 provides system engineering, system planning, conceptualization, requirements analysis, design, implementation, verification, and mission-life sustaining engineering for its products including assembled Commercial Off-The-Shelf (COTS) systems, custom capabilities, components, and consulting and brokering on behalf of customers. Personnel apply state-of-the-art technologies and COTS products to develop cost-effective data systems to meet customer needs and perform prototyping in collaboration with other NASA and government organizations, universities, and commercial partners to advance the implementation of its functions and related technologies. In addition, Code 589 develops testbeds to prove concepts in an operational environment. It assists in transferring and commercializing technology developments to industry, other government agencies, and academia as appropriate.

2.1.1.4 Guidance, Navigation, and Control Systems Engineering Branch

The Guidance, Navigation and Control Systems Engineering Branch (Code 598) is responsible for the following:

- Fabrication, assembly, and testing of hardware;
- Electronics testing, verification, cleaning, and assembly;
- Assembly of prototype circuit boards;
- Software development and testing;
- Environmental and thermal vacuum chamber testing;
- Mechanical integration of command data module;
- Project Laboratory for prototyping of hardware and software systems;
- Pre-operational testing of hardware and software systems;
- Integrating hardware, such as computer-controllable devices and software systems;
- Testing operating systems;
- Evaluate COTS hardware and software;
- Design and develop flight computers;
- Design and develop control centers; and
- Design of Global Positioning System (GPS) simulators.

During electronics testing and verification the electrical components are tested at the Electrostatic Discharge (ESD) benches and the circuit board electronics are verified to prepare for missions. Modifications are made such as changing chips, microprocessors, resistors, or transistors. Testing and verification is performed for some projects such as the rotator project.

Prototype circuit or bread boards are designed on the computer and a model is made using OVCAD®. The boards are then tested for circuit connections.

Code 598 personnel develop resilient flight control systems, verify software, and test the harware interface for balloon pointing systems and UAV systems.

Employees of Code 598 are involved in the integration of the command data module of the Cosmic Ray and Mass Experiment (CREAM) program balloon aircraft. These operations include assembling and testing of subsystems and thermal materials.

GPS simulation dramatically reduces the need to perform expensive and time-consuming field trials for testing, evaluating or qualifying GPS receiving equipment and software. Situations difficult or impossible to create, such as those found in high dynamics or on orbit, can be simulated for development of equipment or missions. WFF GPS simulators have served successfully as a tool for the development of GPS receiver systems on sounding rockets, high altitude balloons, and aircraft for component selection, mission planning, failure investigation, and for software and algorithm development for ELV termination systems and UAV control design.

2.1.2 Building Design and Operation

In order to consolidate its resources including personnel, the AETD submitted a comprehensive requirements document to the Facilities Management Branch for the use of the Engineering Building (Reference 5). Each branch listed requirements for office space, kitchens, restrooms, conference rooms, storage areas, and antenna locations.

Based upon the requirements, the most efficient proposed design for the Engineering Building would be a stand alone, two story structure with an open interior courtyard. All offices would have windows that either looked into the courtyard or out from the building. Most of the laboratory space would be on the south side of the building on the first floor including the GPS Simulator laboratory, Advanced Range Integration and Simulation Environment (ARISE) Test laboratory and Operations room, Electronics Development laboratory, Attitude Control Systems (ACS) laboratory, Project Assembly and Testing laboratories, Mechanical Prototype and Testing laboratory, and the Fabrication Area. The Project Assembly and Testing laboratories would be two story areas. The south side of the second floor would house the ESD laboratory, Electrical Shop, Microwave Measurements laboratory, Instrumentation and Projects laboratories, Web laboratory, and the Secure Server laboratory. Antenna platforms would be located on the roof. The laboratories and special purpose areas are further described in Tables 2.1 through 2.6 below.

Table 2.1 Code 548 – Mechanical Systems Branch

Space	Purpose
Mechanical Prototype and Testing Laboratory	Tensile, hardness, and stress/strain testing of materials. Tabletop environmental testing of assemblies and components. Fabrication and assembly of mechanical prototypes. Test and storage area for strain gauge equipment. Testing of dynamic subsystem mock-ups.

Table 2.2 Code 569 – Electrical Engineering Branch

Space	Purpose
Microwave Measurement Laboratory	General microwave development, test and measurement laboratory. Workbenches, desktop personal computer (PC), development tools. Should be adjacent to ESD laboratory.

Space	Purpose
Instrumentation/ Projects Laboratory	General electronics laboratory. Non- RF component, subsystem development and test laboratory. Workbenches, desktop PC.
ESD Laboratory	Electrostatic Discharge test area. Should be adjacent to Microwave and Projects laboratory.
Electrical Shop	General electronics fabrication.

Table 2.3 Code 589 – System Software Engineering Branch

Space	Purpose
Secure Server Area	Accommodate multiple servers for WFF internet, intranet, and extranet including databases and archives.
Web Laboratory	Prototyping of web hardware and software systems. Pre-operational testing of web hardware and software systems. Testing of operating systems. Evaluating web COTS hardware and software. Available to all WFF webmasters.
Project Laboratory	Prototyping of hardware and software systems. Pre-operational testing of hardware and software systems. Integrating hardware, such as computer-controllable devices and software systems. Testing operating systems. Evaluating COTS hardware and software. Designing and developing flight computers. Designing and developing control centers.

Table 2.4 Code 598 – Guidance, Navigation and Control Systems Engineering Branch

Space	Purpose
Electronics Development Laboratory	Development and testing of prototype and flight-qualified ground and flight electronics systems such as flight control systems, sensor suites, and data storage and handling systems.
GPS Simulator Laboratory	Performing both bench-level and hardware-in-the-loop testing and flight simulation of GPS and subsystems. Will include a flight dynamics simulator.
Prototype Electronics Environmental Testing	A separate space to house a small, self contained, thermal vacuum chamber for environmental testing of prototype and flight-qualified electronics systems.
ACS Laboratory	Development and testing of ACS for balloons, spacecraft, re-entry vehicles, sounding rockets, etc.
Instrumentation/ Projects Laboratory	General electronics laboratory. Non-RF component, subsystem development and test laboratory. Workbenches, desktop PC.
ESD Laboratory	ESD test area. Should be adjacent to Microwave and Projects laboratory.
Electrical Shop	General electronics fabrication.

Table 2.5 Advanced Range Integration and Simulation Environment (ARISE)

Space	Purpose
Operations Room	Space for users to conduct system tests and simulations.
Test Laboratory	Hardware adjustment and integration area for test articles.

Table 2.6 Common Areas

Space	Purpose
Project Assembly and Testing	Required for assembly of subsystems and small payloads/vehicles that are not of appropriate scale for assembly in larger facilities. One laboratory should be prepared for future clean room capability.
Rooftop Antenna Platform	The Rooftop Antenna Platform would provide mounting locations for small (less than 13.6 kilograms [30 pounds]) flight system antennas while undergoing tests. These tests could be continuous for weeks, and multiple antenna tests would require spacing on the order of 1 meter (3 feet) between antennas. A 3.7 meter by 3.7 meter (12 foot by 12 foot) platform with railings should provide ample mounting space. The antenna platform should be higher than any other major structural portion of the building or of adjacent structures (as much as is practical). Wireways to the platform from the Instrumentation and Projects Laboratory, the Electronics Development Laboratory, the ACS Laboratory, the Microwave Measurement Laboratory, the GPS Simulator Laboratory, the Project Assembly and Testing Laboratories, and the ARISE Equipment Room would be required.
Fabrication Area	Machine tool area to provide quick response to laboratories with small fabrication needs. Should include metal-working and wood-working tools, and possibly a composite material work area. Wood shop is required for quick fabrication of jigs, mass/volume models, and small disposable parts. Composites work is anticipated as advanced materials are more commonly used in flight structures. Partitions may be required to protect machines from dust. Appropriate ventilation for fumes from small quantities of adhesives required.
Material Storage	Required for storage of materials used in fabrication shops. Would accommodate long (~3.7 meter [12 feet]) extrusions and sheets of material up to 1.2 meter by 2.4 meter (4 feet by 8 feet).
Hazardous Material Storage	Sufficient area would be set aside for hazardous material lockers containing a variety of hazardous and flammable materials required for laboratory work.

2.1.3 Construction of the Engineering Building

The Engineering Building would be constructed on the corner of Avery and Fulton Streets adjacent to Building E-108 and the parking lot for Buildings E-104, E-105, E-106, E-107, and E-108 (Figure 2.2). The proposed location of the Engineering Building is currently a vacant, mown grass lot. The site is accessible to all utilities including water, sewer, communications, and steam. All utilities would be connected to the site during site preparation.

Prior to construction, a total of 23 landscaping trees, shrubs, and brush would be cleared from the lot. Approximately 930 square meters (10,000 square feet) of parking area and 640 square meters(6,882 square feet) of sidewalk would be demolished and removed. Roughly 67 meters (219 feet) of sanitary sewer lines and 88 meters (289 feet) of stormwater lines would be rerouted including the relocation of 4 stormwater catchbasins and 1 endsection. A total of approximately 0.8 hectares (2 acres) of land would be disturbed during the demolition and construction process for the Engineering Building.

The Engineering Building is proposed to be approximately 4,992 square meters (53,738 square feet). The facility would be designed with sustainability elements consistent with the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™. LEED is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. LEED provides a complete framework for assessing building performance and meeting sustainability goals. Based on well-founded scientific standards, LEED emphasizes state-of-the-art strategies for sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

2.2 ALTERNATIVE

A design team consisting of members from the Facilities Management Branch (FMB), the Safety Office, and the AETD met to determine the best arrangement and location for the Engineering Building. Four basic siting criteria were identified by the team. Facility siting criteria included the following:

- performance,
- mission safety,
- optimization of resources, and
- unification of the organization.

Each of these criteria were expanded into sub-criteria. The sub-criteria were each assigned a weighting factor based upon their importance to WFF's mission. Two alternatives were considered: renovation and building a laboratory between buildings in the "E-Area" (Figure 2.6), and the preferred alternative, the construction of a new detached building. The two alternatives were then ranked according to the scale in Table 2.7. The higher a site scored, the more appropriate the arrangement or location for construction of the Engineering Building. Refer to Table 2.7, the Site Scoring Spreadsheet below.

The alternative involves the renovation of Building E-108 and the addition of a laboratory between Buildings E-108 and E-107 (Figure 2.3). This site is located on relatively flat, previously disturbed land covered with sidewalks and landscaped with shrubs and trees. The "E-Area" is not within a 100 year floodplain or wetland. No endangered species or remediation sites exist around the "E-Buildings." All utilities are available at this area including water, steam

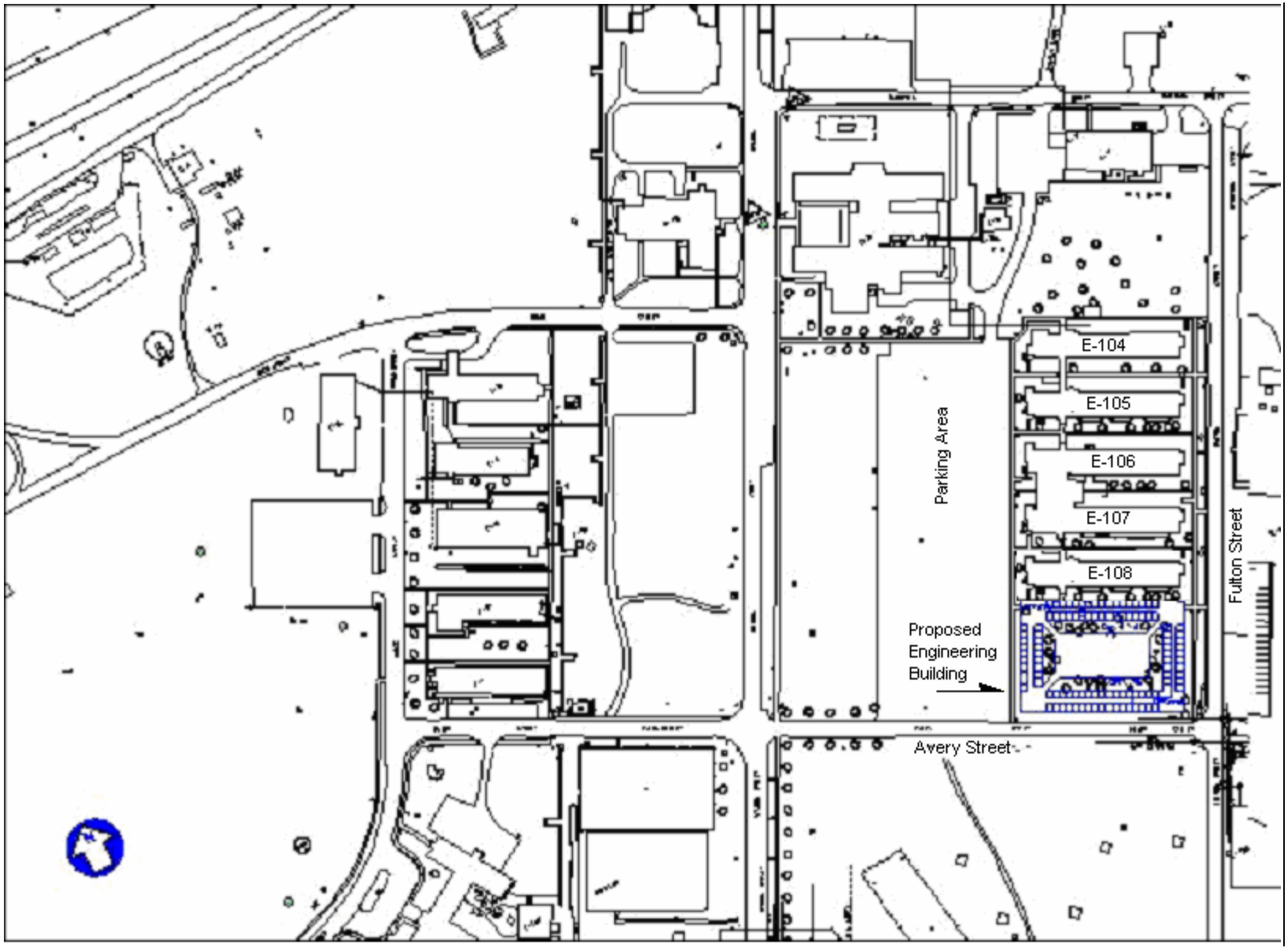


Figure 2.2 Proposed Action Site

heat from the Main Base Central Boiler Plant, electricity, and communication service. This site would include one of the facilities that is currently utilized by the AETD. However, renovating an "E- Building" along with the addition of a laboratory between two buildings scored lower on almost every criteria of the scoring matrix than the preferred alternative of the construction of a new, stand alone building. Since the alternative would involve some construction in the same area of the WFF facility as the preferred alternative and, therefore, potential impacts would be nearly identical, this alternative was not carried through the analysis.

2.3 NO ACTION

Under the No Action Alternative, the Engineering Building would not be constructed at WFF. Engineers and designers will remain scattered throughout the facility. The state-of-the-art research and fabrication laboratories would not be constructed. Selection of this alternative would jeopardize WFF's capability to compete in the commercial space and Earth science research market, and support the scope of government, commercial, and academic space and earth science research activities for which it is suited. Impacts from operations at WFF would continue to remain at current levels and no new impacts would be created.

Table 2.7 Evaluation of "E-Buildings" Concepts

MP Center Level Mission Goals	**Evaluation Criteria**		*Plan "New"*		*Plan "Rehab"*	
		WF	Score	W Score	Score	W Score
Focus on Performance	Facility siting to optimize mission performance	*5*	2	10	1	5
	Promotes Quality of Work Life	*3*	2	6	1	3
	Minimizes impact to Mission if plan halted/delayed due to lack of funding	*5*	2	10	2	10
	Minimizes impact to Mission during construction	*5*	2	10	1	5
	Supports Core/Ops/Commercial land use concept & assoc. infrastructure quality/renewal strategy	*2*	2	4	1	2
	Increases facility reliability	*4*	2	8	1	4
Mission Success Starts with Safety	Institutional safety review	*5*	1	5	1	5
	Security review	*5*	2	10	1	5
Optimize Center Resources	Relative cost (Note: New - $42m, Rehab - $38m)	*3*	0	0	0	0
	Realism of phasing plan	*4*	2	8	1	4
	Provides space for reimbursable projects	*4*	1	4	1	4
	Promotes commercialization of non-mission critical activities	*3*	0	0	0	0
	Supports sustainability concepts	*3*	2	6	1	3
Unify the Organization	Development of neighborhood/sector planning for organizational effectiveness	*2*	1	2	1	2
	Total Score			83		52

Weighting Factor Scale

5: Critical
4:
3:
2:
1: Minor

Plan Score Scale

2: Strongly meets intent of Master Plan goal
1: Meets intent of Master Plan goal
0: Neutral or not applicable
-1: Contrary to intent of Master Plan goal
-2: Strongly violates intent of Master Plan goal

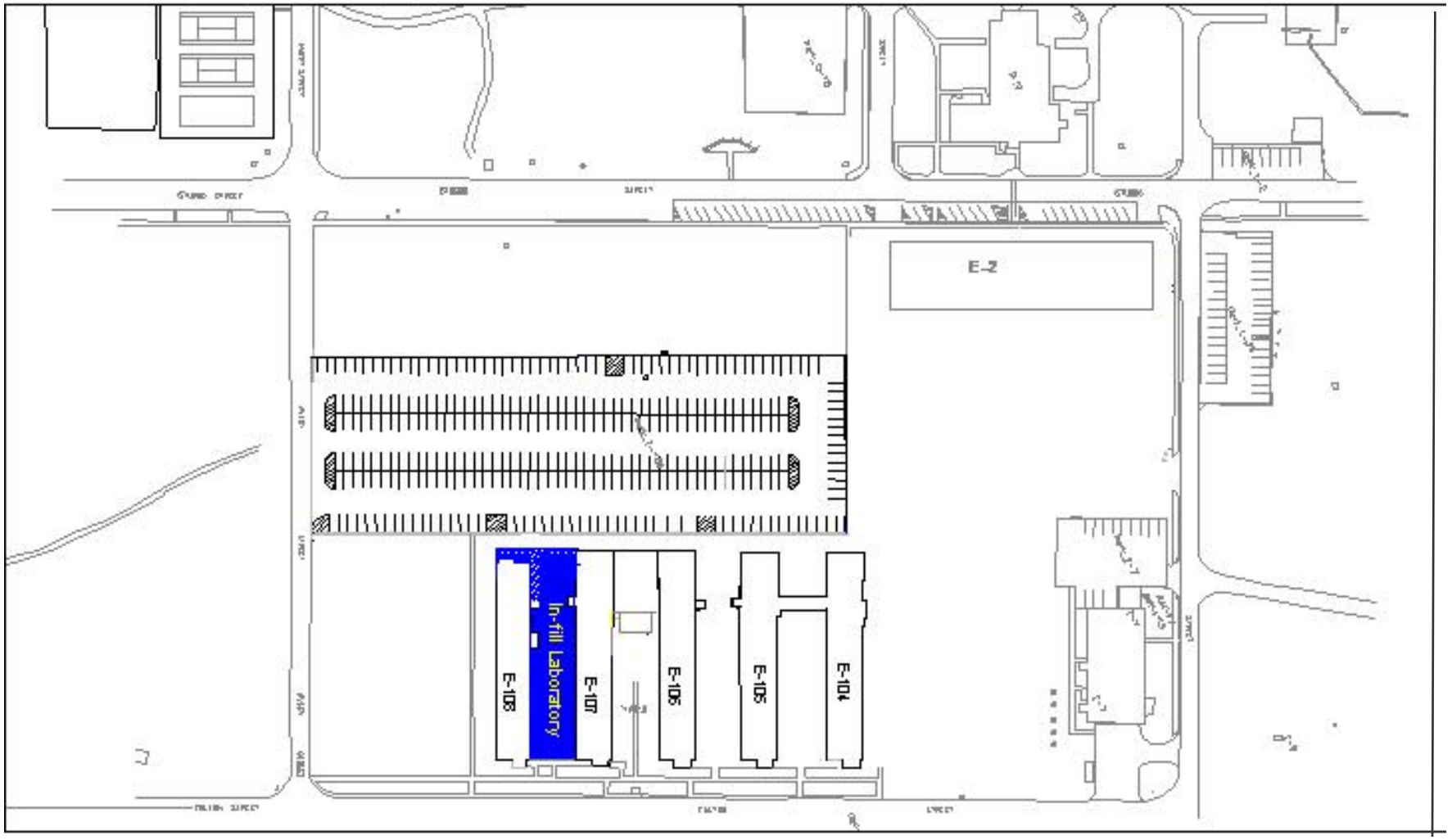


Figure 2.3 Alternative: Renovate and Remodel Current "E-Area" Buildings

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

Wallops Flight Facility is a multifaceted research and development center with particular expertise in launching and utilizing aeronautical systems. Used for aeronautics research since 1945, WFF maintains three runways, an active launch range, communications and radar tracking systems, and 556 buildings or structures on approximately 26.3 square kilometers (6,500 acres).

This section provides information with respect to the existing environmental resources on or in the vicinity of WFF that may be affected by the proposed action. Environmental conditions at WFF have been discussed in detail in the following documents:

- Environmental Resources Document NASA Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia 23337. 1999. (Reference 2);
- Final Environmental Assessment for a Payload Processing Facility at the National Aeronautics and Space Administration, Goddard Space Flight Center, Wallops Flight Facility, Wallops Island, Virginia 23337, July 2002 (PPF EA). (Reference 3).
- Preliminary Draft Site-Wide Environmental Assessment National Aeronautics and Space Administration, Goddard Space Flight Center, Wallops Flight Facility, Wallops Island, Virginia 23337, July 2004. (Reference 4).

Based upon the assessment, it was determined that there is a potential for the following resources to be affected: physical, biological, socioeconomic, and utilities.

3.2 PHYSICAL ENVIRONMENT

3.2.1 Land Resources

3.2.1.1 Topography and Drainage

The topography of WFF is typical of the Mid-Atlantic coastal region, which is mostly flat without unusual features. The maximum elevation on the Main Base is approximately 12.2 meters (40 feet) above mean sea level. The runway area resembles a plateau in that it is extremely flat and at a higher elevation than most of the Main Base. The plateau effect from the runway area diminishes as the topography approaches the waterways (Reference 2).

The architectural and engineering firm of Davis, Bowen, and Friedel prepared an on-site topographic survey of the proposed location. Ground elevation across the proposed site ranges from 10.26 to 10.87 meters (33.66 to 35.67 feet) above mean sea level (National Geodetic Vertical Datum established in 1929 (NGVD29)). Surrounding elevations to the north, east, and south are comparable to those across the site.

3.2.1.2 Geology and Soils

Located within the Atlantic Coastal Plain physiographic province, WFF is underlain by approximately 2,000 meters (7,000 feet) of sediment. This sediment lies atop 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. The regional dip of the units is to

the east, toward the shore (Reference 2).

The soil classifications for the proposed site are based on the Accomack County Soil Conservation Service's soil classification map. Bojac fine sandy loam soils with a 0 to 2 percent slope cover the entire site. These soils are described as nearly level, very deep, well drained soils (Reference 2).

A geotechnical survey is under development by Davis, Bowen, and Friedel at the time of this printing and will serve as the baseline for understanding the geological resources at the proposed site.

3.2.1.3 Land Use

The Main Base, Mainland, and Wallops Island are zoned industrial by Accomack County, with one exception. The County has designated the land between Wallops Island and the Mainland as marshland. Facilities on the Main Base include runways, hangars, offices, and housing. The Mainland facilities include radar, antennas, and transmitter systems and associated buildings. Testing facilities, launch facilities, storage buildings, and office buildings are located on Wallops Island. Activities and studies undertaken at WFF include rocket launches, radar testing, radar tracking, and aircraft testing. More detailed information is available in Chapter 4.0 of the 1999 ERD (Reference 2).

Primarily agricultural land areas and single family, residential housing surround More detailed information is available in Chapter 4.0 of the 1999 ERD (Reference 2).

3.2.2 Water Resources

3.2.2.1 Surface Water

Surface waters in the vicinity of WFF are saline to brackish and tidally influenced due to the coastal location. The surface waters in the vicinity of WFF are designated as Class II (Estuarine Waters) by the Commonwealth of Virginia's Department of Environmental Quality (DEQ). The Atlantic Ocean, which lies to the east of Wallops Island, is designated as Class I (Open Ocean). These classifications include water quality standards for dissolved oxygen, pH, and maximum temperature. In addition, numerical water quality standards are applied according to water classification. For Class I and II waters, the saltwater numerical standards apply. These standards are listed in the Virginia Administrative Code (VAC) regulations 9VAC25-31-110. These standards, as well as effluent limitations on point source discharges, are mechanisms used by DEQ to protect and maintain surface water quality. Simoneaston Bay, the nearest body of surface water to the site, lies east of the proposed site.

Generally, data is available to characterize the existing background surface water quality in the vicinity of WFF. However, the tidal nature of the surrounding surface waters and the migratory nature of organisms in these ecosystems make background classification difficult. Data collected to date has been used primarily for limited site investigation purposes.

3.2.2.2 Ground Water

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

The water table aquifer, known as the Columbia aquifer, primarily consists of Pleistocene sediments of the Columbia Group (Reference 6). It is unconfined and typically overlain by wind-deposited beach sands, silts, and gravel. The aquifer occurs between depths of 1.5 to 18.3 meters (5 and 60 feet) below the ground surface. The water table ranges from depths of 0 to 9.1 meters (0 to 30 feet) below the ground surface. Groundwater flow is generally east and north toward nearby creeks and the marsh area that separates Chincoteague Island from the mainland.

The Yorktown-Eastover aquifer system is a multiaquifer unit consisting of late Miocene and Pliocene deposits and is composed of the sandy facies of the Yorktown and Eastover Formations (Reference 7). The top of the shallowest confined Yorktown-Eastover aquifer at WFF is found at depths of approximately 30.5 meters (100 feet) below the ground surface. It is separated from the overlying Columbia aquifer by a 6.1 to 9.1-meter (20 to 30-foot) 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 the Wallops area the Lower Yorktown-Eastover aquifer contains the freshwater/saltwater interface, which occurs at a depth of approximately 300 feet below mean sea level.

WFF contains 14 water supply wells that are screened in the Columbia and Yorktown-Eastover Multiaquifer System, which is protected by the EPA as a sole source aquifer (Reference 8). Five of the wells are operated by NASA, one well is operated by the NOAA, and eight wells are operated under easement by the Town of Chincoteague. Most of the supply wells are several hundred feet deep and are constructed to withdraw water from one of the Yorktown-Eastover Aquifers. Three of the wells that are operated by the Town of Chincoteague (located near the eastern boundary of the Main Base) are 18.3 meters (60 feet) or less in depth and withdraw water from the Columbia Aquifer (Reference 9). The WFF Chemical Laboratory, in accordance with State and Federal requirements, performs routine analytical sampling of WFF's water systems and submits the results to state authorities for review.

3.2.2.3 Wetlands

Extensive marsh wetland systems border all three portions of WFF. Tidal and non-tidal wetlands are located along the perimeter of the Main Base. These wetlands appear in association with Mosquito Creek, Jenneys Gut, Simoneaston Bay, and Simoneaston Creek. Non-tidal wetlands are located in the interior of Wallops Island and marsh wetlands frame the western edge. Marsh wetlands also fringe the Mainland along Arbuckle Creek, Hog Creek, and Bogues Bay. Wetlands at WFF are delineated in Figure 3.2. Refer to Table 3.1 for the wetlands key. Table 3.2 defines the wetlands key.

Projects at WFF involving dredging or filling of tidal or non-tidal waters or wetlands require Federal dredge and fill permits (Clean Water Act [CWA] Section 404 permit, and River and Harbors Act Section 10 permit) from the Army Corps of Engineers (ACOE). Projects involving the use or development of tidal water or wetlands also require a State wetland permit. The Accomack County Wetlands Board manages the wetlands program for both non-vegetated and vegetated tidal areas.

The proposed location for the proposed Engineering Building is currently uplands, consisting of mowed lawns and a paved parking area.

3.2.2.4 Floodplains

Wallops Island is entirely within the 100-year floodplain. The 100-year and 500-year floodplains surround the perimeter of the Main Base, along Mosquito Creek, Jenneys Gut, and Simoneaston Creek. On the Mainland, the 100-year and 500-year floodplains border the eastern edge along Arbuckle Creek and Hog Creek. Chapter 4.0 of WFF's ERD (Reference 2) delineates the boundaries of the floodplains. The proposed site is not located within the 100-year floodplain.

3.2.2.5 Coastal Zone

The coastal zone is rich in natural, commercial, recreational, ecological, industrial, and aesthetic resources. As such, it is protected by legislation for the effective management of its resources. The Coastal Zone Management Act (CZMA) of 1972 (16 USC § 1451, *et seq.*, as amended) provides assistance to states, in cooperation with Federal and local agencies, for developing land and water use programs in the coastal zone. This includes the protection of natural resources and the management of coastal development.

The policy of the CZMA is implemented in the respective state coastal zone management programs. Federal lands are excluded from the jurisdiction of these state coastal zone management programs, but activities on Federal lands are subject to CZMA Federal consistency requirements if the Federal activity would affect any land or water or natural resource of the state's coastal zone, including reasonably foreseeable effects.

The landward boundaries of the coastal zone vary by state, reflecting both the natural and built environment. The seaward boundaries generally extend to the outer limits of the jurisdiction of the state, but not more than 5.6 kilometers (3 nautical miles) into the Atlantic Ocean.

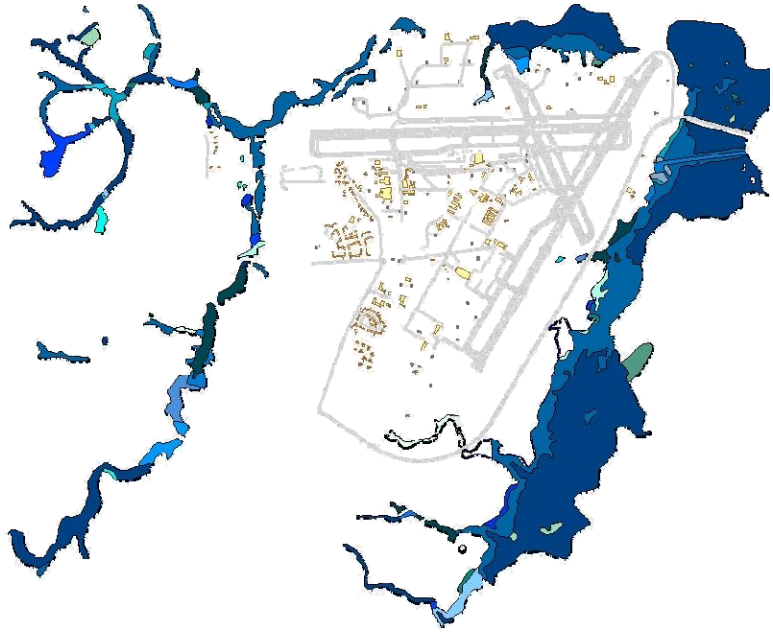
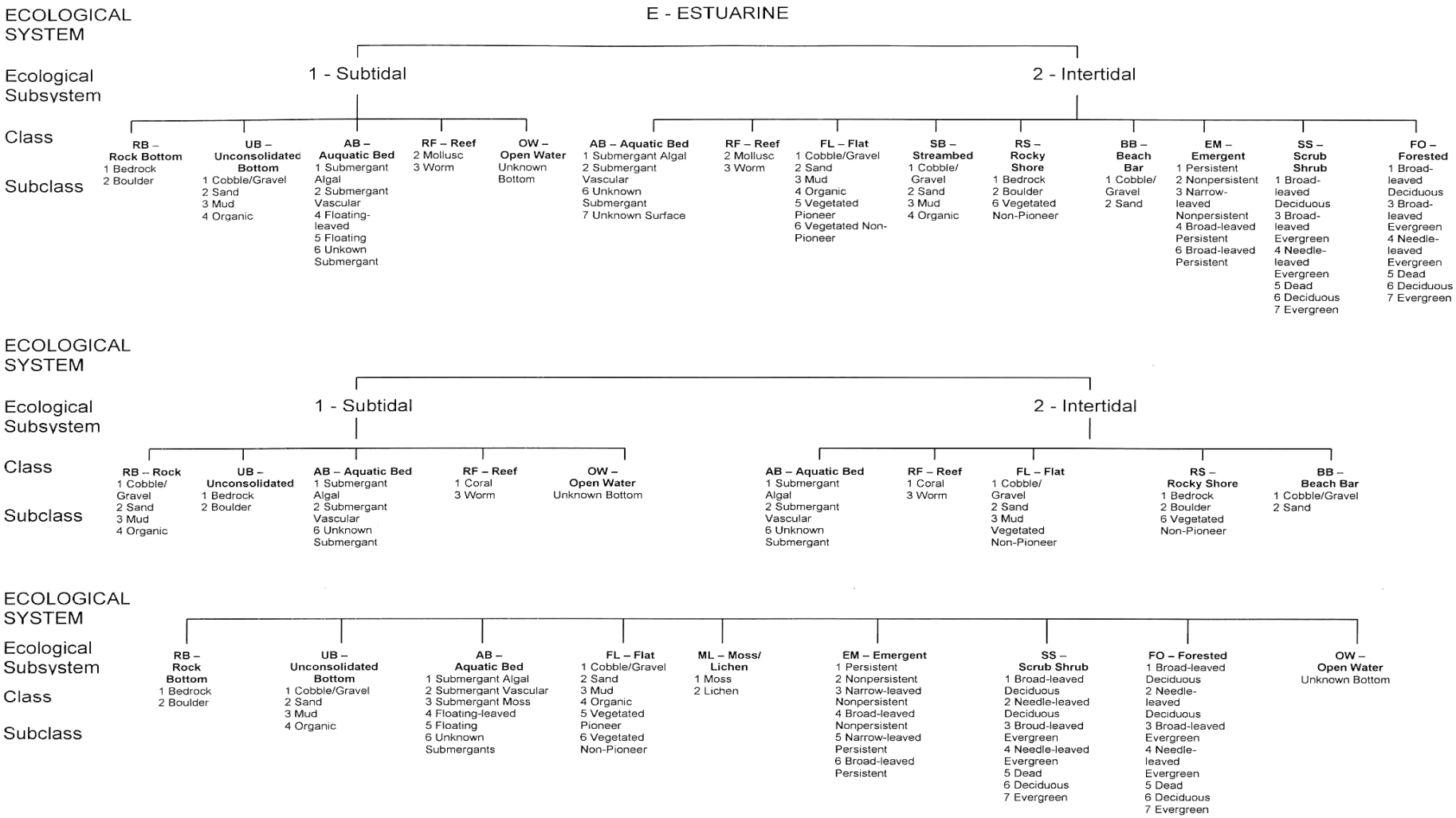


Figure 3.1 Main Base Wetlands

Table 3.1 Wetland Key

E2USU
E2US4N
E2US4M
E2SS4P
E2SS3P6
E2SS3P
E2SS1P
E2SS1/EM1P6
E2SS1/EM1P
E2EM1U
E2EM1P
E2EM1/SS3P
E2EM1/SS1P6
E1UBLx
E1UB4L

Table 3.2 Wetland Delineation Key



WATER REGIME				WATER CHEMISTRY			SOIL	SPECIAL MODIFIERS
Non-Tidal		Tidal		Coastal Halinity	Inland Salinity	pH Modifiers For All Fresh Water	g Organic	b Beaver
A Temporary	H Permanent	K Artificially Flooded	R Seasonal Tidal				n Mineral	d Partially Drained/Ditched
B Saturated	J Intermittently Flooded	L Subtidal	S Temporary Tidal					f Farmed
C Seasonal	K Artificial	M Irregularly Exposed	T Semiperm Tidal	1 Hyperhaline	7 Hypersaline	a Acid		h Diked/Impounded

The Commonwealth of Virginia has developed and implemented a federally approved Virginia Coastal Resources Management Program (VCP) describing current coastal legislation and enforceable policies. The VCP is a networked program with several agencies administering the enforceable policies, which are listed as follows:

- Fisheries management
- Subaqueous lands management
- Wetlands management
- Dunes management
- Non-point source pollution control
- Point source pollution control
- Shoreline sanitation
- Air pollution control
- Coastal lands management

Advisory policies for geographic areas of particular concern recommended for consideration by Virginia include coastal natural resource areas, coastal natural hazard areas, and waterfront development areas.

The Virginia Chesapeake Bay Preservation Act and the Chesapeake Bay Preservation Area Designation and Management Regulations establish a cooperative program between state and local governments to reduce non-point source pollution. The objectives of the program are to improve water quality in Chesapeake Bay and its tributaries, and promote sound land use planning and management practices on environmentally sensitive lands, known as Chesapeake Bay Preservation Areas (CBPAs). CBPAs are classified into two categories:

- **Resource Protection Areas (RPAs),** within which development is limited to water dependent uses and redevelopment. RPAs include tidal wetlands, nontidal wetlands connected by surface flow and contiguous to tidal wetlands or perennial streams, tidal shores, and 30-meter (100-foot) vegetated buffers adjacent to these features and along both sides of perennial streams (riparian buffers).
- **Resource Management Areas (RMAs),** where development is permitted in accordance with performance criteria contained in the regulations and incorporated in local ordinances. RMAs include floodplains, highly erodible soil (including steep slopes), highly permeable soil, nontidal wetlands not included in RPAs, and any other lands the locality deems necessary to protect the quality of state waters.

3.2.3 Air Quality

3.2.3.1 Ambient Air Quality

The Ambient Air Quality Standards published by DEQ are equal to, or more stringent than National Ambient Air Quality Standards (NAAQS).

Wallops Flight Facility is located in the Environmental Protection Agency's (EPA) Air Quality Control Region 4 and Administrative Region 3. The WFF is located in an attainment area for the NAAQS. The Standards are contained in 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.

Accomack County is not designated as an Air Quality Maintenance Area in the regulations for the Control and Abatement of Air Pollution. An Air Quality Maintenance Area is defined 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" (Reference 2).

3.2.3.2 Climate and Meteorology

Wallops Flight Facility is located in the climatic region known as the humid continental warm summer climate zone. Large temperature variations during the course of a single year and lesser variations in average monthly temperatures typify the region. The climate is tempered by the proximity of the Atlantic Ocean to the east and the Chesapeake Bay to the west. Also affecting the climate is an air current, known as the Labrador Current, which originates in the polar latitudes and moves southward along the Delmarva coastline. The current creates a wedge between the warm Gulf Stream off shore and the Atlantic coast. (Reference 2).

The climate of the region is dominated in winter by polar continental air masses and in summer by tropical maritime air masses. Clashes between these two air masses create frontal systems, resulting in thunderstorms, high winds, and precipitation (Reference 2).

Temperature and precipitation in this climate zone vary seasonally. Four distinct seasons each demonstrate characteristic temperatures. In winter, sustained snowfall events are rare. Spring is wet with increasing temperatures. Summer is hot and humid with precipitation occurring primarily from thunderstorm activity. Autumn is characterized by slightly decreasing temperatures and strong frontal systems with rain and sustained winds (Reference 2).

The WFF Meteorological Office maintains climatological records for the facility.

3.2.3.3 Emission Sources

Wallops Flight Facility maintains two separate Stationary Source Permits to Modify and Operate Designated Equipment Subject to New Source Review. One permit is for the Main Base and the other for Wallops Island. The Main Base Permit Regulatory Number is 40217 AIRS and Identification Number 51-001-0005. Under this permit the WFF Main Base has annual pollutant emission limitations. These limitations, listed in Table 3-3, range from 88 tonnes (97.2 tons) per year of sulfur oxides, to 11.34 tonnes (12.5 tons) per year of particulate matter less than 10 microns in diameter (PM-10).

Table 3.3 Main Base Stationary Source Emissions

Pollutant	Permit Limit, tonnes (tons)	FY2003, tonnes (tons)
Sulfur dioxide	88 (97.2)	23.96 (26.41)
Nitrogen oxides	85.7 (94.5)	22.23 (24.50)
PM-10	11.34 (12.5)	1.37 (1.51)
Carbon monoxide	14.2 (15.6)	2.97 (3.27)
Volatile Organic Compounds	86.4 (95.2)	0.53 (0.58)

Principal emission sources on WFF include the operation of a Central Boiler Plant and numerous individual boilers, aircraft flight operations, support activities (e.g., paint booths, fume hoods, construction, etc.); vehicular emissions; rocket and target launches; and operation of an off-specification, rocket motor Open Burn area located at the south end of Wallops Island.

3.2.4 Noise

Mechanical noise sources from daily operations at WFF include aircraft operations, vehicular traffic, stationary and

portable generators, pumps, fire engines, heating and air conditioning units, and equipment used in industrial shops. 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 Range Safety Office is responsible for occupational safety and determining the need for personal hearing protection.

Cannon-like noises generated by a propane tank are used for bird control in the vicinity of the runways. The use of firearms by United Stated Department of Agriculture (USDA) certified sharpshooters for deer and bird control is sometimes necessary. Human exposures to noise from the firearms, which can be addressed by personal hearing protection, are infrequent and of short duration.

Industrial Hygenists from GSFC conduct baseline surveys of each new operation, conduct annual walk-through surveys, monitor and evaluate noise hazards, and recommend appropriate means of controlling noise exposures.

Areas near the ends of the airport runways sometimes experience noise due to aircraft operations that exceeds the 67 dBA criteria when occurring for an extended time period. The worst-case situation is represented by extended touch-and-go activities with one touch-and-go every 10 minutes. Under these conditions, the 1-hour L_{eq} is 80.5 dBA several hundred feet from the end of a runway (Figure 3.3). This level would be experienced at the Trails End Campground and Dublin Farms north of the Main Base, the Wallops Island National Wildlife Refuge adjacent to the eastern boundary of the Main Base, homes along State Route 175 south of the Main Base, and some homes along Fleming Road west of the Main Base.

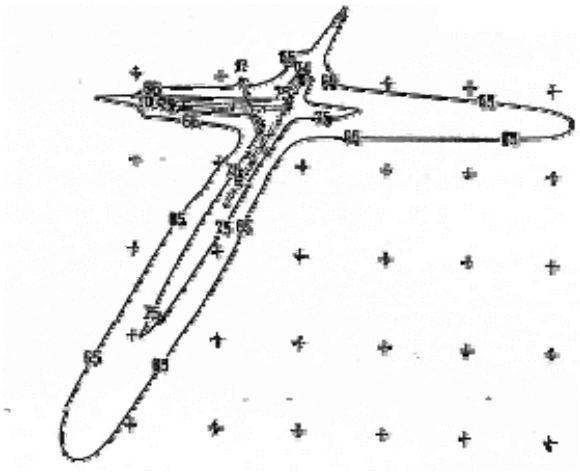


Figure 3.2 Noise Profile of WFF Runways

3.2.5 Radiation

Sources of ionizing radiation at WFF include: x-ray producing equipment and radioactive materials used for instrument calibration. Equipment in use at WFF that produces non-ionizing radiation includes: lasers, radars, microwaves, and ultraviolet and high-intensity lamps.

3.2.5.1 Ionizing Radiation

Radiation-emitting materials and equipment are used and/or stored at WFF under a comprehensive radiation protection program. NASA's Safety Office administers the program, and the Radiation Safety Committee provides oversight. The Radiation Safety Committee governs the use of both ionizing and non-ionizing radiation sources, which are used primarily at GSFC and WFF, but can also be used at temporary NASA project sites throughout the United States and the world.

The Federal Nuclear Regulatory Commission (NRC) licenses use and storage of ionizing source material, special nuclear material, and byproduct material. Source material is any radioactive material, except special nuclear material, which contains at least 0.05 percent

by weight of uranium and/or thorium. Special nuclear material includes plutonium, uranium 233, or uranium enriched in the isotope 233 or 235. Byproduct material is any radioactive material, except special nuclear material, that is derived from production or use of special nuclear material (Reference 2).

The NRC does not license sources of electromagnetic radiation, which may be either ionizing or non-ionizing. Electromagnetic radiation is energy from electric and magnetic fields which includes: x-rays and gamma rays (both ionizing), ultraviolet, visible, infrared, and radio frequency waves (all non-ionizing). These different forms of radiation occupy various portions of the electromagnetic spectrum and differ only in frequency and wavelength (Reference 2).

The NRC has issued license number 19-05748-02 to NASA for some types of ionizing radiation in use at WFF, including the many byproduct materials used as calibration sources (Reference 2). License 19-05748-02 is held at the Greenbelt facility since use and storage of the majority of sources occurs at that facility. Occasionally, however, the sources are brought to WFF for instrument calibration and other research needs.

3.2.5.2 Non-Ionizing Radiation

3.2.5.2.1 Radio Frequency

Radio-frequency radiation (RfR) refers to the emission and propagation of electromagnetic waves in the frequency range of 3 kilohertz (kHz) to 300 Gigahertz (GHz). Such waves are characterized as non-ionizing radiation because the intrinsic electro-magnetic energy absorbed by a body at any frequency within this range is much too low to ionize (eject electrons) from molecules of the body. Radio-frequency radiation is produced by such transmitting devices as radar, telemetry, and radios. Wallops Flight Facility operates more than 100 radio-frequency radiation devices that represent the majority of non-ionizing radiation sources at the facility (Figure 3.4).

Figure 3.3 Mobile Command System 1A, Mobile Telemetry 7-Meter S-Band System, and Mobile Power System #2

NASA's radio-frequency radiation exposure procedure accounts for power density, the height of the beam above the ground level, the azimuth or elevation at which the device would be oriented, the local terrain, all occupied areas in the vicinity of the operation, and the operating plan for the device. An evaluation of NASA’s procedure using Institute of Electrical and Electronics Engineers, Inc. (IEEE) Standard C95.1, 1999 Edition, entitled “For Safety Levels with respect to human exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, indicated controls should be in place to protect both onsite, visitors and offsite personnel from the hazards of Radio Frequency electromagnetic fields..

3.2.5.2.2 Lasers

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 (Reference 2). The lasers at WFF are used for research and testing, as well as communication and atmospheric research.

NASA classifies all lasers into one of four categories based on American National Standard for the Safe Use of Lasers, American National Standards Institute (ANSI) Z136.1. NASA institutes control measures consistent with the class of laser and the recommended control measures found in the ANSI Standard. All of NASA's laser operators must be trained in the proper use of their respective class of lasers. The safety program describes techniques for the control of the hazards for each class of laser rather than placing limits on the power or intensity.

Class I lasers are considered "exempt" and are typically enclosed in a protective device. Class II lasers are low power visible continuous wave and high pulse-rate frequency lasers. Class III lasers are medium power lasers and laser systems. Class IV lasers are "high power" lasers and are usually only found in controlled research laboratory settings.

3.2.6 Hazardous Materials and Hazardous Waste

3.2.6.1 Hazardous Materials

The greatest potential impact to the environment due to the presence of hazardous materials would result from an accident at a storage location (leak, fire, explosion) or during the use of the substance (spills, human exposure). The short-term and long-term effect of the accident on the environment would vary greatly depending upon the type of accident and the substance(s) involved such as petroleum based products, organic solvents, compressed gases, and others.

In May of 2001, the DEQ issued its formal approval of the WFF's Integrated Contingency Plan (ICP) (Reference 10). WFF developed and implemented the ICP to minimize hazards to human health and the environment that could occur as the result of an accidental release of hazardous materials. The ICP identifies the locations of hazardous material storage areas, outlines spill prevention, control, response and remediation procedures, and training protocols for personnel who work with hazardous materials. Strict compliance with the ICP should minimize the risk of accidental releases of hazardous materials impacts and minimize impacts should an accidental release occur.

Wallops Flight Facility labels each container of hazardous chemical in English with the following minimal descriptions: the name of the chemical material and all appropriate hazard warnings.

Wallops Flight Facility maintains Material Safety Data Sheets (MSDS) in each work area for each hazardous chemical used on site. Each MSDS is written in English and contains all required information. The WFF Environmental Office has created an electronic chemical inventory that contains links to appropriate MSDS. The MSDS-Pro® software, which is maintained by the Safety Office, is online and is accessible to all WFF personnel, through the GSFC intranet.

Individual WFF support contractor offices train their personnel on the applicable hazardous communication pertinent to the requirements for each employee.

3.2.6.2 Hazardous Waste Management

Approximately 11.2 kilometers (7 miles) of public roadway separates the Main Base from Wallops Island/Mainland. Therefore, to prevent unauthorized transportation of hazardous wastes, the EPA has assigned each landmass a separate identification number (i.e., VA8800010763 for the Main Base and VA7800020888 for the Main Land and Wallops Island combined). In addition, Wallops Island has an Interim Status Treatment, Storage, and Disposal Facility (TSDF) Permit for the Open Burn area.

The DEQ annually inspects the WFF hazardous waste handling and management operations. The regulations which govern hazardous waste management are referenced in 40 CFR 260-270 and 9 VAC 20-60. The Environmental Office manages hazardous wastes generated at WFF including management of both the Main Base and Wallops Island/Mainland Less-Than-90-Day Hazardous Wase Storage Facilities, Satellite Accumulation Area (SAA) inspections, on-site transportation, and off-site shipment of all hazardous waste. The Environmental Office is responsible for tracking manifests and certificates of disposal for hazardous wastes, which leave the facility. Last fiscal year, 2003, the Environmental Office arranged shipping for 12,408 kilograms (29,529 pounds) of hazardous waste to off-site TSDFs.

The Environmental Office also provides a suite of annual training to all Civil Service and Contractor employees who handle hazardous waste as part of their job, including: ICP training, Resource Conservation and Recovery Act (RCRA) training, and Hazardous Waste Operations and Emergency Response (HAZWOPER) 8-hour refresher training. The WFF Safety Office is reponsible for ensuring that all employess have been instructed in Hazards Communication (HAZCOM) regarding the chemicals they may work with.

The generators at each operation or activity are responsible for:

- Properly containerizing waste.
- Properly completing and transferring disposal inventory sheet to the Environmental Office.
- Properly labeling waste containers with information pertaining to the contents and with the words: “Hazardous Waste,” if applicable.

The Hazardous Waste Technicians at each operation or activity are responsible for:

- Inspecting the material.
- Transporting the waste to an accumulation area.

Moreover, each area that hosts a hazardous waste SAA is equipped with a communication/alarm system that is capable of providing immediate emergency instructions to facility personnel in the event of an accident and summons emergency assistance. Fire extinguishers and fire control equipment are available onsite. All employees who handle hazardous waste as part of their job are annually trained on WFF’s ICP to be familiar with procedures if a release of hazardous waste occurs (Reference 10).

3.2.6.3 Environmental Restoration Program Sites

Several sites on WFF have been identified as either Formerly Used Defense Sites (FUDS) or remediation sites. These sites are currently being managed by the WFF Environmental Restoration Program (ERP), through partnerships with either the DEQ

Petroleum Storage Tank Management Division, the ACOE, and an Administrative Agreement on Consent, per RCRA 7003, between NASA, EPA, and DEQ. The proposed project area lies in close proximity to two of these identified ERP sites: Site 2 and Site 7.

Site 2 is located approximately 180 meters (600 feet) northeast of the proposed project area, at the former location of Building E-52, the maintenance facility and motor pool. Aboveground storage tanks and soil staining evident in aerial photographs led to a Preliminary Assessment/Site Investigation in 1986. This process indicated possible xylene and tetrachloroethene (TCE) contaminants in the soil. The Environmental Restoration Project Team is currently investigating this site and anticipates a Record of Decision and site closure in 2007.

Site 7 was designated as a potential site under CERCLA due identification of a former transformer locations where potential spillage of PCB containing dielectric fluid may have occurred. Site 7 consists of 27 indoor and outdoor areas where regulated and non-regulated transformers were located prior to 1993. Building E-108, The Range Engineering Building, is included as one of these 27 sites.

The regulated transformer located at Building E-108 was removed and disposed off-site on January 14, 1989. Subsequent environmental samples collected at this location indicated PCB levels below the TSCA cleanup threshold for low contact, restricted access indoor areas. The Environmental Restoration Project Team has arrived at the consensus that this site (Building E-108) requires No Further Action.

3.3 BIOLOGICAL ENVIRONMENT

3.3.1 Vegetation

The vegetative environment at the proposed site for construction of the Engineering Building consists of mowed lawns with landscaped trees and shrubs.

3.3.2 Terrestrial Wildlife and Migratory Birds

The WFF's grasslands and wooded areas provide a haven for amphibian, reptilian, avian, and mammalian species. Fowler's toad, green tree frog, black rat snake, hognose snake, box turtle, and the northern fence lizard are among the amphibians and reptiles existing in these areas. Birds common to WFF include various species of sparrows, red-winged blackbirds, boat-tailed grackles, fish crows, song sparrows, gray catbirds, and mourning doves. Mammalian species such as raccoon, red fox, white-footed mouse, meadow vole, opossum, raccoons, gray squirrels, and the cottontail rabbit also thrive in this region.

White-tailed deer are abundant on both Wallops Island and the Mainland. However, the Federal Aviation Administration (FAA) maintains a "Zero Tolerance" policy for deer on or around an active runway. Therefore, WFF hosts a representative of the Wildlife Services (WS) Department of the USDA Animal and Plant Health Inspection Service (APHIS), to assist in managing wildlife risks to aviation (Reference 11).

The Migratory Bird Treaty Act (MBTA) was enacted to ensure the protection of shared migratory bird resources. The MBTA prohibits the take and possesion of any migratory bird, their eggs, or nests, except as authorized by a valid permit. A migratory bird is any species that lives, reproduces, or

migrates within or across international borders at some point during its annual life cycle. The Atlantic Flyway route from the northwest is of great importance to migratory waterfowl and other birds. The coastal route of the Atlantic Flyway, which in general follows the shore line, is a regular avenue of travel for migrating land and water birds, that winter on the waters and marshes south of Delaware Bay. Ducks, geese, shorebirds, and songbirds pass through the Atlantic Flyway, using WFF as a stopover and an overwintering area.

3.3.3 Threatened and Endangered Species

Section 7(a)(2) of the Endangered Species Act (ESA) requires Federal agencies to ensure that their actions do not jeopardize the continued existence of any listed endangered or threatened species. A species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range and "threatened" if it is likely to become endangered in the foreseeable future.

The 1999 ERD (Reference 2) and the 1997 Vegetative Management Plan (Reference 12) contain listings of threatened or endangered species in the WFF vicinity as of 1999 and 1995, respectively. The WFF is obligated to protect any State or Federally listed species discovered on the facility.

The following Federal and State agencies oversee the classification and regulation of the endangered and threatened floral and faunal species at WFF:

- United States Department of the Interior, Fish and Wildlife Service
- Commonwealth of Virginia Department of Agriculture and Consumer Services
- Commonwealth of Virginia Department of Game and Inland Fisheries
- Commonwealth of Virginia Department of Conservation and Recreation, Division of Natural Heritage
- United Stated Department of Commerce, NOAA, National Marine Fisheries Services.

Federal or State threatened and endangered birds may be found at various locations on WFF. During their migratory season, upland sandpipers (State Threatened) may occur in large grassy areas such as those adjacent to the runway on the Main Base. Gull-billed terns (State Threatened), Wilson's plovers (State Endangered), and Piping plovers (Federal Endangered) may nest on beach or mud flats on Wallops Island. A resident pair of Peregrine falcons (State Endangered) nests on a hacking tower on the northwest side of Wallops Island. Migrating Peregrine falcons occur along the Wallops Island beach during fall migration. An inactive Bald eagle (Federal Threatened) nest exists on the northern border of the Main Base. Refer to Section 4.0 of WFF's ERD for more information on Threatened and Endangered Species around WFF (Reference 2).

As part of WFF's management practices, both the northern and southern ends of Wallops Island beach areas (Figure 3.5) are closed during the piping plover nesting season (March 15 through September 15). Biologists from the USDA APHIS assist with predator control. Biologist from the Chincoteague National Wildlife Refuge and from the Virginia Department of Game and Inland Fisheries monitor nesting activities.

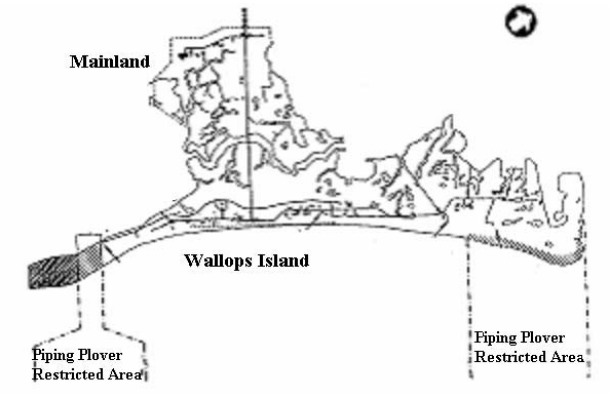


Figure 3.4 Piping Plover Management Areas

3.4 SOCIAL AND ECONOMIC ENVIRONMENT

3.4.1 Population

The study area for WFF includes Accomack and Northampton Counties in Virginia, and Somerset, Worcester, and Wicomico Counties in Maryland. WFF is located in Accomack County, Virginia, which is the northernmost of the two Virginia counties on the south end of the Delmarva Peninsula.

WFF is located in a rural area, and year-round densities of neighboring areas are low. Table 3.4 shows the population and density of Accomack and neighboring counties.

Table 3.4 Population And Density

COUNTY	RESIDENTS	LAND AREA (Sq. Mi.)	DENSITY (People/ Sq. Mi.)
Accomack, VA	38,305	455	84.1
Northampton, VA	13,093	207	63.1
Somerset, MD	24,747	327	75.6
Wicomico, MD	84,644	377	224.4
Worcester, MD	46,543	473	98.4

Source: U.S. Census Bureau, 2004

Chincoteague Island, Virginia, is approximately 8 kilometers (5 miles) east of the Main Base. It is the largest densely populated area near WFF, with a resident population of 4,317 people. Area populations fluctuate seasonally. During the summer months, the population increases due to tourism and vacationers who visit the nature reserve and beaches of Assateague Island. Daily populations often reach up to 15,000 in the summer months. Special events, like the carnival and the pony roundup/auction, sponsored by the Chincoteague Volunteer Fire Department in July, draw crowds of approximately 40,000.

3.4.2 Employment and Income

Employing approximately 5 percent of the total work force in Accomack and Northampton Counties, WFF is the third largest employer in Accomack County. In fiscal year 2004, NASA employed 260 civil service and 914 support contractors. The Navy currently employs 515 military, civilian, and contractor personnel. NOAA employs 98 people in fiscal year 2004. Employment records from 1999 through 2004, indicate an increase of 22 percent and 33 percent employment for NASA and the Navy, respectively. During that same time, employment at NOAA decreased by 0.01 percent.

Employment in Accomack and Northampton Counties fluctuates seasonally, throughout the agricultural and seafood industries. During the months of June to October, the greatest number of residents are employed in the civilian labor force. These months also result in the lowest rates of unemployment, usually between 4.5 and 6.5 percent, respectively (Reference 13). The unemployment rate as of for the first quarter of 2004 was 6.7 percent for Accomack and 6.2 percent for Northampton Counties, with a combined unemployment rate of 12.9 percent. The civilian labor force in

these counties totaled 23,697 (Reference 13).

3.4.3 Health and Safety

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

A mutual aid agreement has been established between WFF and the local volunteer fire companies for any additional assistance. Additional response would be handled by the closest volunteer companies, Atlantic and Chincoteague.

A 24-hour security force serves both the Main Base and Wallops Island. The security force is responsible for internal security of the base, employee and visitor identification, after-hours security checks, and police services. State, county, and town officers provide police protection for the surrounding areas.

Three local emergency health services are located in the vicinity of WFF. Wallops Flight Facility has its own health unit with a full-time nursing staff and physician to provide first aid and immediate assistance to patients in emergency situations. The Health Unit operates from 8:00 a.m. - 4:30 p.m.

After-hours emergency medical care is provided by Emergency Medical Services staff of the Wallops Flight Facility Fire Department. The Chincoteague Medical Center on Chincoteague Island and the Atlantic Medical Center in Oak Hall, Virginia, also provide emergency assistance, and are both located 8 kilometers (5 miles) of the WFF area. Four hospitals are also located in the region, all approximately 64 kilometers (40 miles) from WFF, including:

- Atlantic General Hospital in Berlin, Maryland
- McCready Memorial Hospital in Crisfield, Maryland
- Peninsula Regional Medical Center in Salisbury, Maryland
- Shore Memorial Hospital in Nassawadox, Virginia

The Peninsula Regional Medical Center serves as the regional trauma center for the Delmarva Peninsula. If additional trauma care is needed, Sentara Norfolk General Hospital is 19 minutes away (by helicopter) from Shore Memorial Hospital in Nassawadox. Accomack and Northampton County Health Departments offer clinical services. Worcester, Somerset, and Wicomico Counties also have health departments. Five nursing homes on Virginia's Eastern Shore and eight nursing homes on Maryland's Lower Eastern Shore are available to the community.

3.4.4 Cultural Resources

The WFF is currently working with the Virginia Department of Historic Resources (VDHR) to comply with the requirements of Section 106 and Section 110 of the National Historic Preservation Act, as amended. The ultimate compliance objective of this 3 year plan is to develop an Integrated Cultural Resources Management Plan (ICRMP) for the entire facility. In November 2003, the VDHR approved WFF's first submittal, the Cultural Resource Assessment NASA Wallops Flight Facility Accomack County, Virginia prepared by URS Corporation (Reference 14). This document developed the predictive archaeological model for the facility and detailed WFF's plans and schedule to prepare the ICRMP.

The goal for 2004 is to develop the historic context and to survey the facility. The

Historic Resources Survey and Eligibility Report for NASA/Wallops Flight Facility, (Reference 15) is under development by URS Corporation at the time of this printing and will serve as the baseline for understanding the cultural resources at WFF and their treatment. That document will identify structures eligible for individual listing in the National Register of Historic Places (NRHP) and those that are contributing elements to any eligible National Register historic districts that may exist on the facility. It is expected that no buildings built between 1955 and 2005 will have achieved exceptional importance which would make them eligible for individual listing in the NRHP.

3.4.5 Environmental Justice

The basic goal of environmental justice 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. Executive Order (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) require that Federal agencies 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.". This EA examines the various impacts of the construction and operations of the Engineering Building to determine if any impact from the activities would be experienced disproportionately and adversely by minority or low-income communities within geographic areas in which the activities occur. Each environmental attribute addressed in this EA has been scrutinized from an environmental justice perspective. Thus, for example, if significant levels of air pollution resulted from operations in the Engineering Building, the question, from the environmental justice perspective, would be whether this pollution would disproportionately and adversely impact areas in which minority and/or low-income populations reside in proportions greater than in the general population.

Wallops Flight Facility has prepared an Environmental Justice Implementation Plan (EJIP) to comply with EO 12898. A review of Accomack County census data provided the baseline for the facility's EJIP. This review found no low-income or minority communities occurring along the borders of WFF.

Chincoteague Island is the closest populated area to the seaward side of Wallops Island. No minority or low-income communities exist on the portion of Chincoteague Island that lies within a 4 kilometer (2.5 mile) radius of Wallops Island.

3.5 UTILITIES

3.5.1 Water Supply

Groundwater is the sole source of potable water for WFF and the general vicinity. No major streams or other fresh surface water supplies are available as alternative sources of water for human consumption. A groundwater management planning program has been established by DEQ, for the entire Eastern Shore of Virginia, to ensure that an optimal balance exists between groundwater withdrawal 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.

Industrial and public water users withdrawing at least 1.14 megaliters per month (300,000 gallons per month (gpm)) are required to obtain a DEQ groundwater withdrawal permit. Wallops Flight Facility is presently limited to approximately 31 megaliters (8,200,000 gallons) per month. Actual WFF withdrawals are approximately 11.3 megaliters (3,000,000 gallons) per month (Reference 2). October 2002, water Chincoteague Public Works, indicates an usage data supplied by the Town of average withdrawal of approximately 60 megaliters (16,000,000 gallons), monthly, from their wells located on WFF property.

3.5.2 Storm Water and Wastewater

The Main Base has an extensive storm drain network that discharges into the Little Mosquito Creek to the north and west, and ultimately to Simoneaston Bay to the south and east (Figure 3.6). The DEQ, under EPA guidelines and Federal approval, regulates industrial point source discharges. Discharges are regulated by an approved VPDES permit and managed with WFF's Storm Water Pollution Prevention Plan (Reference 5). The WFF currently holds VPDES Permit No. VA0024457, which establishes effluent limits at two discharge locations, Outfalls 001 and 003, both of which discharge into unnamed tributaries of Little Mosquito Creek (Reference 16). An additional 11 stormwater outfalls drain the remainder of the Main Base, which is classified as a regulated industrial activity (Table 3.5). Therefore, these outfalls are included in the permit, but no testing is required. However, as a requirement of the permit, all stormwater outfalls are visually inspected on a quarterly basis. Surface water from the proposed site drains overland to storm water system drop inlets and discharges through Outfall 010 to Jenneys Gut. Refer to Chapter 4.0 of the WFF ERD for a more detailed discussion of stormwater management.

Table 3.5 Main Base Stormwater Outfalls

Outfall	Drainage Area	Receiving Water
001	Federally Owned Treatment Plant	unnamed tributary to Little Mosquito Creek
003	airfield, SAAs, less-than-90-day accumulation area, ASTs, offices, roadways, parking areas, and grassy areas	unnamed tributary to Little Mosquito Creek
004	airfield, SAA, salt storage facility, automobile fueling facility and a maintenance garage, ASTs, roadways, parking areas, offices, and grassy areas	unnamed tributary to Little Mosquito Creek
005 – 008	airfield and grassy areas	unnamed tributary to Little Mosquito Creek
009	airfield and grassy areas	unnamed tributary to Jenney's Gut
010	airfield, SAAs, less-than-90-day accumulation area, restoration site, ASTs, offices, roadways, parking areas, and grassy areas	unnamed tributary to Jenney's Gut
012, 013	airfield and grassy areas	unnamed tributary to Little Mosquito Creek
014	airfield, SAAs, ASTs, roadways, parking areas, office and storage, grassy areas.	unnamed tributary to Simoneaston Bay
302*	D-37 Fuel Farm	Outfall 003

*Intermediate Outfall

The Main Base is serviced by a gravity sewage collection system, lift stations, and force mains that convey the facility wastewater to a Federally Owned Treatment Works (FOTW) located in the northwest corner of the Main Base. The treatment

system provides primary, secondary, and tertiary treatment, ultraviolet disinfection, and sludge stabilization. Primary treatment includes grit removal bar screens and comminutors. Secondary treatment is accomplished by biological treatment and secondary clarifiers. Tertiary treatment is accomplished by sand filters. Prior to discharge, an ultraviolet system provides disinfection. Sludge stabilization is accomplished by aerobic digestion and dewatering in drying beds prior to land fill disposal. The discharge from the Main Base FOTW is designated under WFF's VPDES permit as Outfall 001. The receiving stream is an unnamed tributary of Little Mosquito Creek.

With a design capacity of 1,000,000 liters per day (lpd) (300,000 gallons per day (gpd)), the FOTW treats the wastewater from all the non-septic system buildings on the Main Base and Wallops Island. The average daily flow through the facility is 265,000 to 300,000 liters (70,000 to 80,000 gallons). Although the permit limits the volume of discharge, no flow rate limitation is established under the VPDES permit. However monthly pH, Carbonaceous Biochemical Oxygen Demand ($CBOD_5$), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN), and Dissolved Oxygen (DO); quarterly Total Recoverable Copper; and annual *Escherichia coli* effluent limitations are based on a maximum flow of 1,000,000 lpd (300,000 gpd). The facility generated 12,150 kilograms (26,800 pounds) of dried biosolids in calendar year 2003. The WFF Sludge Management Plan specifies disposal of sludge at the Accomack County Landfill, Oak Hall, Virginia (Reference 17). Prior to disposal, the sludge is analyzed for RCRA regulated heavy metals. Only non-hazardous sludge may be disposed of at a municipal landfill. To date, analysis of the sludge has not indicated contaminants above regulatory limits (Reference 2).

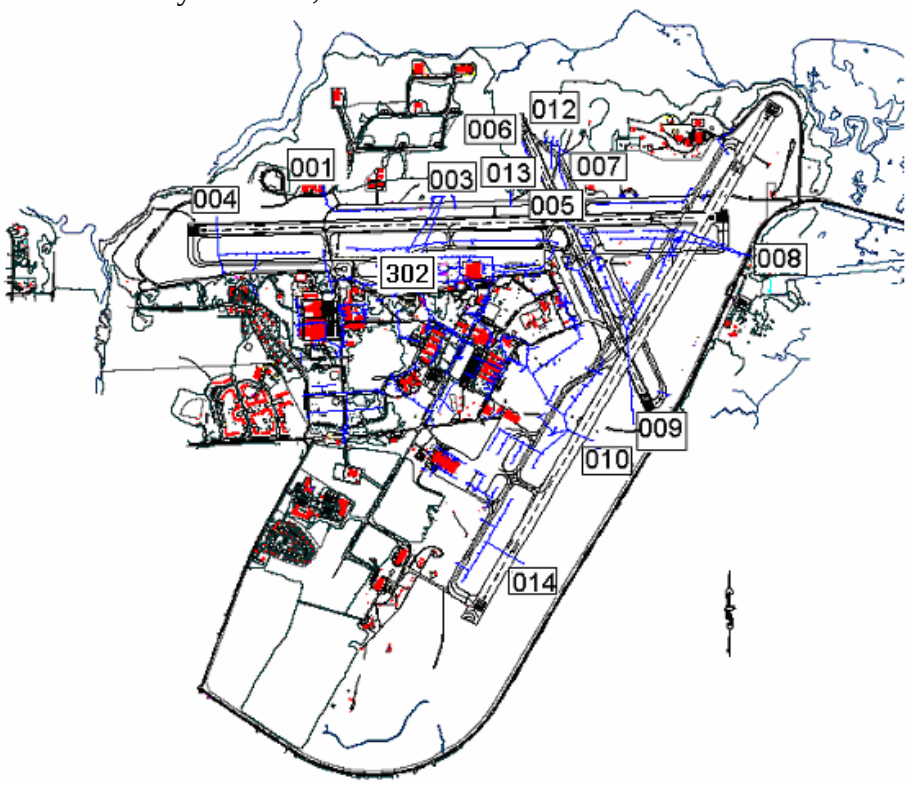


Figure 3.5 Main Base Storm Water System

3.5.3 Energy

Energy use data for WFF is maintained by the FMB. Consumption of electrical power and fuel oils is inventoried and recorded.

Electrical service is supplied by Conectiv Power Delivery. Wallops Flight Facility is supplied with electric power on separate lines for the Main Base, Mainland, and Wallops Island. During low-voltage periods, WFF supplements electricity with generators as part of a peak-load reduction program. The FMB operates backup power generators when interruptions to Conectiv's services occur. The FMB also sets up short-term power services throughout the facility when needed for special projects. WFF consumed approximately 48 megawatts of electricity in calendar year 2003. Heat is provided to buildings at WFF by a combination of heat pumps, electric heat, or steam heat generated by boilers using Number 2 or Number 6 fuel oils. Conservation measures currently employed at WFF include installation of high-efficiency heating units and automatic shutdown of some units on nights and weekends.

Oil usage in calendar year 2003 for the Main Base totaled 554,434 liters (146,466 gallons) of Number 2 fuel oil and 2,006,416 liters (530,039 gallons) of Number 6 fuel oil. The majority of heating oil is stored in WFFs 50 aboveground storage tanks (AST) and the remainder in underground storage tanks (UST). The maximum storage capacity of AST's is 1,280,264 liters (338,210 gallons) of fuel. The maximum storage capacity of UST's is approximately 742,680 liters (196,195 gallons) of fuel. UST's primarily store motor vehicle fuel, aircraft fuel, and heating fuel for buildings (Reference 10).

The WFF Logistics Team is responsible for the transportation fuel inventory. During calendar year 2003, approximately 25 percent of the ground transportation fuel consisted of diesel (112,805 liter (29,800 gallons)), with the remainder being gasoline (338,400 liters (89,400 gallons)). The 1,245,904 liters (329,133 gallons) of Jet Propellant (JP-5) used for air transportation fuel in 2003 represented greater than 99 percent of the total air fuel consumed at WFF. Jet Propellant Thermally Stable (JPTS) fuel is only used when the ER-2 aircraft is at Wallops Flight Facility. The ER-2 aircraft uses approximately 38,000 liters (10,000 gallons) of JPTS fuel per year.

3.5.4 Solid Waste

Wallops Flight Facility has active pollution prevention and recycling programs. In fiscal year 2003, WFF recycled the following waste streams listed in Table 3.6.

Table 3.6 Recycled Materials

Waste	Pounds	Kilograms
Batteries	2,905	1,315
Cardboard	106,560	48,335
Drums, metal	6,900	3,100
Fluorescent	1,200	950
Grease	1,600	725
Metals	240,000	109,000
Plastic	48	22
Silver	180	80
Solvents	3,552	1,611
Tires	6,850	3,110
Toner	300	140
Used Oil	25,400	11,500
White Paper	48,120	21,830

Non-hazardous solid waste generated by WFF operations is deposited into dumpsters located throughout the facility. A private disposal service, under contract to the FMB, collects and disposes of all solid waste contained in these dumpsters. Wallops Flight Facility generated and disposed of an

estimated 132 tonnes (145 tons) of municipal solid waste to the Accomack County landfill, in fiscal year 2003.

3.5.5 Transportation

Access is gained to WFF from State Route 175 to either Atlantic Avenue or Mill Dam Road. The Eastern Shore of Virginia is connected to the rest of the state by the double span of the 28.3 kilometer (17.6 mile) long 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 of U. S. Route 13. Access to Wallops Flight Facility is provided by State Route 175 to State Route 178, a two-lane secondary road (Figure 3-7). Traffic in the region of WFF varies with the seasons. During the winter and early spring, traffic is minimal, while during the summer and early fall, traffic increases due to tourism (Reference 2).

Commercial air service is provided through the Norfolk International Airport (about 145 kilometers (90 miles) to the south) and by Salisbury Regional Airport (about 64 kilometers (40 miles) to the north) of WFF. Air service is also available through the Accomack County Airport in Melfa about 64 kilometers (40 miles) to the south, which usually provides flights only during daylight hours. Surface transportation from the airports to the facility is provided by private rentals, government vehicles, and commercial bus or taxi.

Chartered and private aircraft, both piston and jet type, may land, with the proper clearance, at WFF Airport for business purposes. Air-freight services are available from the Salisbury-Ocean City Wicomico Regional Airport and are provided by U.S. Airways Express and Bayland Aviation, Inc.

Rail freight service is provided to the peninsula by the Eastern Shore Railroad. No rail passenger service is available to WFF. Eleven motor freight carriers that serve the eastern United States are authorized to provide service to the Accomack-Northampton District.

Ocean cargo shipments are off-loaded at the Port of Baltimore (Maryland) or Cape Charles (Virginia) and then transferred to commercial trucks or rail for transportation to WFF. There are numerous small harbors located throughout Accomack and Northampton Counties, which are used primarily for commercial or recreational fishing and boating (Reference 2).

Figure 3.6 Road Atlas of the Delmarva Peninsula
(Copyright Mapquest™, 2002)

4.0 ENVIRONMENTAL CONSEQUENCES

This section describes the potential environmental impacts associated with the construction and operation of the Engineering Building at the proposed site. Direct, indirect, and cumulative impacts are evaluated as appropriate. The analysis of siting alternatives is discussed in Chapter 2.0, Alternatives Including the Proposed Action.

4.1 PHYSICAL ENVIRONMENT

4.1.1 Land Resources

Construction activities, including demolition of the parking area would cause land disturbances, such as clearing, earth moving, and excavation. All soils removed during grading and excavation would be stockpiled in accordance with WFF's Storm Water Pollution Prevention Plan and reutilized at WFF. These activities have the potential to negatively impact soils at the project site through disturbance and removal of soils and vegetation, which can result in soil erosion. It is unlikely that the Proposed Action would affect the geology at WFF because impacts would only occur on the surface, with no deep excavations anticipated.

Approximately 0.8 hectares (2 acres) of soil would be disturbed during the construction activities. Although soil in the project area is not highly erodible, sediment and erosion control techniques detailed in Section 4.1.2.1 below would be taken to avoid excessive soil loss.

The operations portion of the Proposed Action is not likely to affect topography or drainage patterns. Therefore, no impacts to land resources are anticipated.

4.1.1.1 Land Use

As the proposed site is classified as "Industrial" by Accomack County and given the extensive aerospace research operations history of WFF, dating back to 1945, the Proposed Action remains consistent with prior land use and activities.

4.1.2 Water Resources

4.1.2.1 Surface Water

Temporary impacts to surface water resources could occur due to the operation of heavy equipment and disturbance of soil during proposed construction activities at WFF. Impacts associated with the construction of the Engineering Building would be minor since the proposed construction would occur in previously developed areas of the facility and would not occur in close proximity to any surface waters.

Most land disturbing activities in Virginia must comply with the Virginia Erosion and Sediment Control Program, which is implemented by the Virginia Department of Conservation and Recreation (DCR). The WFF would coordinate with DCR to comply with the Virginia Erosion and Sediment Control Program. The following techniques would be utilized to control possible sedimentation and erosion impacts to the WFF stormwater system:

- sediment fences surrounding the area of disturbance to control site runoff from precipitation,
- sediment filters or fences around stormwater drop inlets to prevent sediment from entering storm piping,

- daily inspection, including sweeping if necessary, of the paved construction entrance to prevent sediments from being transported off-site,
- addition of a stone contruction entrance if daily inspection and sweeping is not adequate to prevent off-site transportation of sediments,
- revegetating bare soils as soon as possible, and
- water sprays to prevent wind erosion during dry conditions.

Approximately 0.8 hectares (2 acres) of land would be disturbed during the construction activities for the Engineering Building. Activities in Virginia that disturb greater than 0.4 hectares (1 acre) of land require a VPDES Construction General Stormwater Permit. The WFF Environmental Office and the FMB would prepare the application for this permit and anticipate issuance from the DEQ prior to the initiation of any land disturbing activities.

4.1.2.2 Ground Water

The construction and operation of the facility would have a neglibible impact on ground water resources and ground water quality. Construction impacts would be limited to surficial ground disturbing activities associated with site clearing, grading, excavation, and building construction. Excavations for the footers would terminate at approximately 0.9 meters (3 feet) below the surface. Excavations for the elevator pit footings would terminate at approximately 2.4 meters (8 feet) below the surface. Since this excavation is very shallow, it is unlikely that the excavation could disrupt the underlying hydrostratigraphic system.

4.1.2.3 Wetlands

No impacts to wetlands would occur, since the site does not contain any delineated wetlands. The site is not located near any wetlands that could be impacted by runoff during construction.

4.1.2.4 Floodplains

Since the site does not lie within or adjacent to any mapped 100-year floodplains, the proposed project would not fill or modify any floodplains.

4.1.2.5 Coastal Zone

NASA, through the NEPA process, has determined that the construction and operations of the Engineering Building would be fully consistent with the applicable policies of the VCP. The following information is herein submitted to DEQ for consistency review and concurrence.

a. Fisheries Management – The proposed location of the Engineering Building is not near any surface water. Therefore, WFF does not anticipate an impact on commercial or recreational fishing.

   The State Tributylin (TBT) Regulatory Program regulates the possession, sale, or use of marine antifoulant paints containing TBT. Since, TBT containing paints would not be used on any part of the Engineering Building, no negative impacts to marine animal species are anticipated under the TBT Program.

b. Subaqueous Lands Management – No activities would occur in waters of the Commonwealth. Therefore, no negative impacts are anticipated to marine or fisheries resources, tidal wetlands, adjacent or nearby properties, anticipated public and private benefits, or water quality.

c. Wetlands Management – No impacts to wetlands would occur since the Engineering Building construction and operations would not occur near any wetlands that could be impacted.

d. Dunes Management - No impacts to dunes would occur, since the Engineering Building construction and operations would not take place near any dunes that could be impacted.

e. Non-point Source Pollution Control – Since greater than 0.4 hectares (1 acre) of land would be disturbed during the proposed action, WFF would prepare the application for VPDES Construction General Stormwater Pemit. Concurrently, a Sediment and Erosion Control Plan would be prepared for the proposed action as discussed in Section 4.1.2.1 above.

f. Point Source Pollution Control –There are no point sources of discharge associated with this operation.

g. Shoreline Sanitation – This project would be connected to the WFF FOTW which discharges to an unnamed tribubutary of Little Mosquito Creek per the requirements of VPDES Municipal Minor Discharge Permit VA0024457. Therefore, no negative impact to either streams, rivers, or other waters of the Commonwealth of Virginia are anticipated.

h. Air Pollution Control – The emissions produced by demolition and construction activities would be minor and temporary and would have no significant regional impact. Therefore, no negative impacts to the air quality of WFF are anticipated.

i. Coastal Lands Management - The Coastal Lands Management is a state-local cooperative program administered by the Chesapeake Bay Local Assistance Program. Since WFF lies east of the centerline of U. S. Route 13, it is outside the involvement of the Chesapeake Bay Local Assistance Program.

4.1.3 Air Quality

4.1.3.1 Construction Related Emissions

Construction activities have the potential to cause air quality impacts due to dust (fugitive) emissions created during demolition of the parking area and sidewalks, land clearing and grading, ground excavation, and the construction of the Engineering Building itself. All construction debris would be properly disposed; no open burning would occur. Approximately 0.8 hectares (2 acres) of mown lawns and parking areas would be disturbed during demolition, site preparation, and construction. The EPA has developed "Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: *Stationary Point and Area Sources"* to aid in the development of emission models. Section 13.2.3.3 "Emission Factors for Heavy Construction Operations" gives a simple equation for calculating a conservatively high estimate of emissions from construction activities. Specifically:

E=1.2 tons/acre/month of activity

The demolition and construction phases are estimated to take approximately 18 months to complete. Therefore, emissions (E) from approximately 0.8 hectares (2 acres) would be calculated as:

E = (1.2 tons)*(2 acres)/(18 months)
E ≈ 0.13 tons of particulate matter (PM-10)

Given the highly conservative nature of this model, an insignificant impact is expected to the air quality from construction related emissions.

4.1.3.2 Operation Related Emissions

The GSFC staffs Industrial Hygiene Technicians who review complaints on air quality and perform air quality surveys. Ventilation systems are also reviewed to ensure compliance with the American Conference of Governmental Industrial Hygienists (ACGIH) and the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) standards.

Operations of the Engineering Building would include the addition of a fume hood to capture vapors from small containers of adhesives. The WFF Environmental Office would evaluate the current Stationary Source Permit to Modify and Operate Designated Equipment Subject to New Source Review for the Main Base and revise the permit if necessary. Since this emission source would be relocating from another building on the facility and the WFF currently operates below permit limits, no impact to air quality from operations of the Engineering Building are anticipated.

4.1.4 Noise

Noise concerns include both construction noise levels and noise during operation of the proposed Engineering Building.

Construction activities would result in an ambient noise level increase at and near the proposed construction site. Noise would result from the use of bulldozers, graders, saw-cutters, scrapers, pavers, cranes, concrete mixers, and other heavy equipment employed during demolition and construction. The noise levels at the construction site, associated with the activities would range from 76 decibels (dB) to 89 dB over approximately 18 months.

Noise impacts to the employees at the construction site would be controlled based on the existing Occupational Safety and Health Administration (OSHA) guidelines. Vehicle noise would be controlled by the installation of noise abatement systems on construction equipment, as necessary. To mitigate the impact of construction noise and vibration to employees, especially those in Building E-108, activities that create noise levels above 80 dB would be performed during off-hours (i.e., after 4:30 p.m. or on weekends).

Noise levels inside the facility are expected to be typical for an industrial facility that operates cranes, compressors, pumps, etc. and would be similar to other industrial activities performed at WFF. No additional permanent employees would be assigned to this facility. Personnel would relocated to the Engineering Building from various buildings around the facility. Consequently, vehicular traffic to the building, once operational, would be minimal.

The combination of operational and mission-related noise and increased vehicular traffic would result in no impact of concern on the environment.

4.1.5 Electromagnetic Radiation

4.1.5.1 Ionizing Radiation

Other than minor calibration sources, WFF does not anticipate the requirements for engineering research and technology development to utilize radioactive material.

4.1.5.2 Non-Ionizing Radiation

4.1.5.2.1 Radio Frequency

The typical anticipated mission would require a variety of radio frequencies in the region of

10 kHz, for command systems, and up to 100 GHz, for telemetry and/or command systems. These frequencies are used routinely at WFF in conduct of normal operations and could potentially cause interference with WFF radar, telemetry, and/or airborne systems which are in the same frequency range.

Power outputs for these systems are anticipated to be 10 watts, maximum, with an anticipated average peak power output of approximately 10 milliwatts. WFF has a well established frequency monitor and control program in place to preclude personnel from being exposed to potentially hazardous non-ionizing radiation and to preclude radio frequency interference with other operational systems. For each RF emitter that is brought onto WFF, a Frequency Utilization Form is completed which defines operational restrictions necessary to operate the system at this facility.

These types of RF emitters are typical to spacecraft and vehicles already flown at WFF. There are no environmental impacts anticipated from radio frequency emissions or from power output levels.

4.1.5.2.2 Lasers

The AETD does not anticipate using lasers in the proposed Engineering Building. If a future project requires the use of lasers, WFF has a well established procedure for classifying hazard areas with regards to lasers (refer to Section 3.1.5.2.2 Lasers). All of NASA's laser operators must be trained in the proper use of their respective class of lasers. There are no anticipated environmental impacts from lasers operations.

4.1.6 Hazardous Materials and Hazardous Wastes

4.1.6.1 Hazardous Materials

Standard industrial bottles of compressed, gaseous nitrogen and standard industrial dewers of liquid nitrogen may be used in the laboratories or fabrication areas. These bottles and dewers would be kept chained in a rack to prevent falling so that the valves would not be sheared off. Additionally, these bottles and dewers would remain capped, unless in use. Oxygen level sensors will ensure that there is no toxic build-up of nitrogen gas in an enclosed room. A Harzardous Materials storage area would be located in the Engineering Building to house hazardous and flammable chemicals. This storage area would be maintained in acordance with WFF's ICP (Reference 10), therefore no impacts from hazardous materials are anticipated.

4.1.6.2 Hazardous Waste Management

The construction of the proposed facility would utilize small quantities of hazardous materials which in turn could result in the generation of some hazardous wastes. These materials include the following:

Table 4.1 Construction Generated Hazardous Wastes at the Proposed Engineering Building

Hazardous Material	Waste
Paint, adhesives	Paint and empty containers
Organic solvent/ thinners	Spent material and cleaners
Petroleum greases and lubricants	Spilled material and absorbent

All of the above referenced materials and resulting wastes would be managed as hazardous substances and properly disposed of by the construction contractor.

Contractors ordering, transporting, using, and disposing of hazardous materials would be required to comply with all WFF, State, and Federal requirements including the WFF Integrated Contingency Plan (Reference 10) and the WFF Hazardous Waste Management Plan (Reference 18).

The potential sources for hazardous waste being generated or spills occurring as a consequence of operation of the proposed Engineering Building can occur from activities involving the transportation, storage, or handling of hazardous materials. The Table 4-2 summarizes the types of hazardous wastes which could be generated by the operation of the proposed Engineering Building.

Table 4.2 Operations Generated Hazardous Wastes at Proposed Engineering Building

Hazardous Waste	Generation Activity
Used oil	Used oil from backup emerency generators, sorbents used on spills
Hydraulic oil	Used hydraulic oils from periodic replacement of fluids in hydraulic equipment
Spent lead-acid batteries	Periodic replacement of emergency and mobile equipment batteries
Solvents	Out-of specification, out-of –shelf-life cleaning solvents
Adhesives	Out-of specification, out-of –shelf-life, or unused adhesives

The implementation of the proposed project would cause minor adverse impacts with respect to the disposal of hazardous wastes. The amounts of hazardous waste generated are anticipated to be small and would be managed in accordance with all applicable WFF, State, and Federal requirements including the WFF Integrated Contingency Plan (Reference 10) and the WFF Hazardous Waste Management Plan (Reference 18).

4.1.6.3 Environmenal Restoration Program Sites

The proposed project area is adjacent to ERP Site 7, a former PCB impacted transformer pad and 180 meters (600 feet) southwest of Site 2, an area of potential xylene and TCE contaminated soils. Currently, the ERP has determined that Site 7 (Building E-108) requires No Further Action and is further investigating conditions at Site 2. Due to the No Further Action status of Site 7 and the distance to Site 2 from the proposed project area, no potential impacts from soil contamination are anticipated. However, if during site preparation, clearing, or demolition of the pavement and sidewalk, any soil is suspected of contamination, site work would immediately be halted and the Environmental Restoration Project Team would be consulted. All suspected soils would be analyzed and contaminated soils would be disposed of in accordance with all applicable Federal, State, and local regulations.

4.2 BIOLOGICAL ENVIRONMENT

4.2.1 Vegetation

Site preparation and construction under the Proposed Action would result in the loss of approximately 0.8 hectares (2 acres) of pavement, mown lawn, and a small number of landscaping trees and shrubs. Tree clearing activities at WFF have previously been assessed in both the Vegetative Management Plan for WFF (Reference 12)

and the Environmental Assessment for Tree Clearing Activities at WFF (Reference 19). Based upon the EA, NASA determined a Finding of No Significant Impact with regard to tree clearing activities at WFF.

Sediment and erosion control methods would protect undisturbed vegetation from damage caused by surface runoff and sedimentation. Therefore, no impact to vegetation is anticipated.

4.2.2 Wildlife

Abundant wildlife populations in the Aircraft Operating Area (AOA) (i.e., the Main Base) at WFF have resulted in several wildlife aircraft strikes and numerous wave-offs or aborted takeoffs and landings. The risk to aviation safety increases as the wildlife population within the AOA grows. The Federal Aviation Administrations maintains a "Zero Tolerance" policy for deer and birds on or around an active runway (References 11, 20, 21, 22, 23, 24). Therefore, WFF hosts a wildlife biologist from the USDA WS to assist in managing wildlife risks to aviation (References 11, 20, 21, 22, 23, 24).

The WFF has implemented wildlife management practices in the AOA. Management practices have included the following (Reference 11):

- habitat modification, including controlled burning of patches of *Phragmites australis* (phragmites) within the stormwater outfalls drainage area where deer hide;
- fencing of the Main Base and the culverts under Route 175 to prevent wildlife from passing from U. S. Fish and Wildlife Service land onto WFF;
- harassment of wildlife with propane cannons, sirens, lights, and pyrotechnics;
- alteration of habitat by removal of food bearing trees and brush near runways;
- trapping and removal of foxes, feral cats, and birds; and
- sharpshooting of deer by certified WS sharpshooters.

Therefore, since wildlife populations are actively discouraged in the AOA, no impacts to wildlife are anticipated.

4.2.3 Threatened and Endangered Species

No Federal or State listed threatened, endangered, or rare plant or animal species are known to occur at the proposed site. Therefore, no impacts to these species are anticipated.

4.3 SOCIAL AND ECONOMIC ENVIRONMENT

4.3.1 Population

Impacts to population were considered to be of concern if development of the proposed project would cause overcrowding of schools or result in an increase of population that would stress existing housing stock. Currently, there is not anticipated to be an increase in personnel. However, the building designs allows for a growth of approximately 20 people (a 16 percent increase over the current number of personnel in the AETD) Therefore, there would be may be a slight increase in population for housing or schools.

4.3.2 Employment and Income

An additional 20 permanent employees could be assigned to this facility, therefore a slight increase in the employee base from the operation of the proposed Engineering Building is anticipated.

The economic benefits related to the construction of the Engineering Building are derived from a few key assumptions, together with the regional data and the Implan model. Although construction costs are typically based on the 2003 International Building Code construction cost estimates, the laboratories in the proposed building would increase cost per unit area. The cost estimate for this type of building is approximately $14 per square meter ($150.00 per square foot). Based on the approximate size of 4,900 square meters (52,000 square feet) for the Engineering Building, the construction cost estimates are $8,000,000[1]. This information is used on the Implan model to determine the expected number of employees that will be needed for the construction of each project and the expected economic impacts to the local community.

Table 4.3 details the direct, indirect, and induced impacts on employment in the region resulting from the construction phase of the project. The impacts are reported on an annual basis. The direct jobs are simply the number of jobs that are created for the construction of the project. The indirect jobs are new jobs created as a result of business operations necessary to support the construction. And the induced jobs are new jobs created as a result of the increased economic activity in the area. The total number of annual jobs created in Accomack County, Virginia, as a result of the construction is estimated to be 161.9. These jobs would disappear after completion of the construction phase.

[1] These cost estimates are not to be interpreted as actual costs to perform the work, but simply approximations included for the purpose of this analysis.

Table 4.3 Expected Construction Employment

Direct Impacts	108.8
Indirect Impacts	26.6
Induced Impacts	26.5
Total Jobs	161.9

Table 4.4 provides the value added, in 2004 dollars, from the construction phase of the project. The direct impacts are simply the value of the project budgeted and contracted to the construction firm. The indirect costs reflect the additional value to the economy from purchases of goods and services necessary for the construction of the project. The induced impacts capture the net gain from the redistribution through the community of income generated by the project. The total economic output from the construction is estimated to be $9,680,503. The total value added from the construction is estimated to be $3,493,490.

Table 4.4 Construction Impacts (2004 $)

	Total Output	Value Added
Direct Impacts	7,947,534	1,996,599
Indirect Impacts	1,643,056	922,266
Induced Impacts	1,861,710	1,214,042
Total Output	11,452,300	4,132,811

4.3.3 Health and Safety

Proposed construction activities could present safety risks to construction personnel and WFF personnel, contractors, and/or official visitors in nearby facilities. To minimize risks to safety and human health, all construction activities would be performed by qualified personnel who are trained to safely operate the appropriate equipment. Additionally, all activities would be conducted in accordance with OSHA regulations and Virginia OSHA regulations. All contractors will submit approved Health and Safety Plans to the WFF Safety Office or Facilities Management Branch prior to

commencement of work activities. Appropriate signage and fencing would be placed to alert pedestrians and motorists of project activities, as well as any changes in traffic patterns.

4.3.4 Cultural Resources

The proposed location of the Engineering Building is in a previously disturbed area that has been identified in the *Cultural Resource Assessment NASA Wallops Flight Facility Accomack County, Virginia* (Reference 14) as having low prehistoric and historic archaeological sensitivity (Figures 4.1 and 4.2, respectively). Therefore, construction of the Engineering Building is not anticipated to impact archaeological resources. Since no structures would be demolished during the course of constuction, no historic resources would be impacted. If, during the course of construction, unanticipated archaeological resources are uncovered, NASA would consult with VDHR regarding appropriate mitigation measures.

4.3.5 Environmental Justice

No low-income or minority communities occur along the borders of WFF. Moreover, the proposed actions at WFF are best summarized as activities that could lead to the expansion of existing research and operations at the facility and would affect the same local population that current actions do. As found in the EJIP, these current actions do not disproportionately affect low-income or minority populations. Therefore, no impacts to Environmental Justice are anticipated.

4.4 UTILITIES

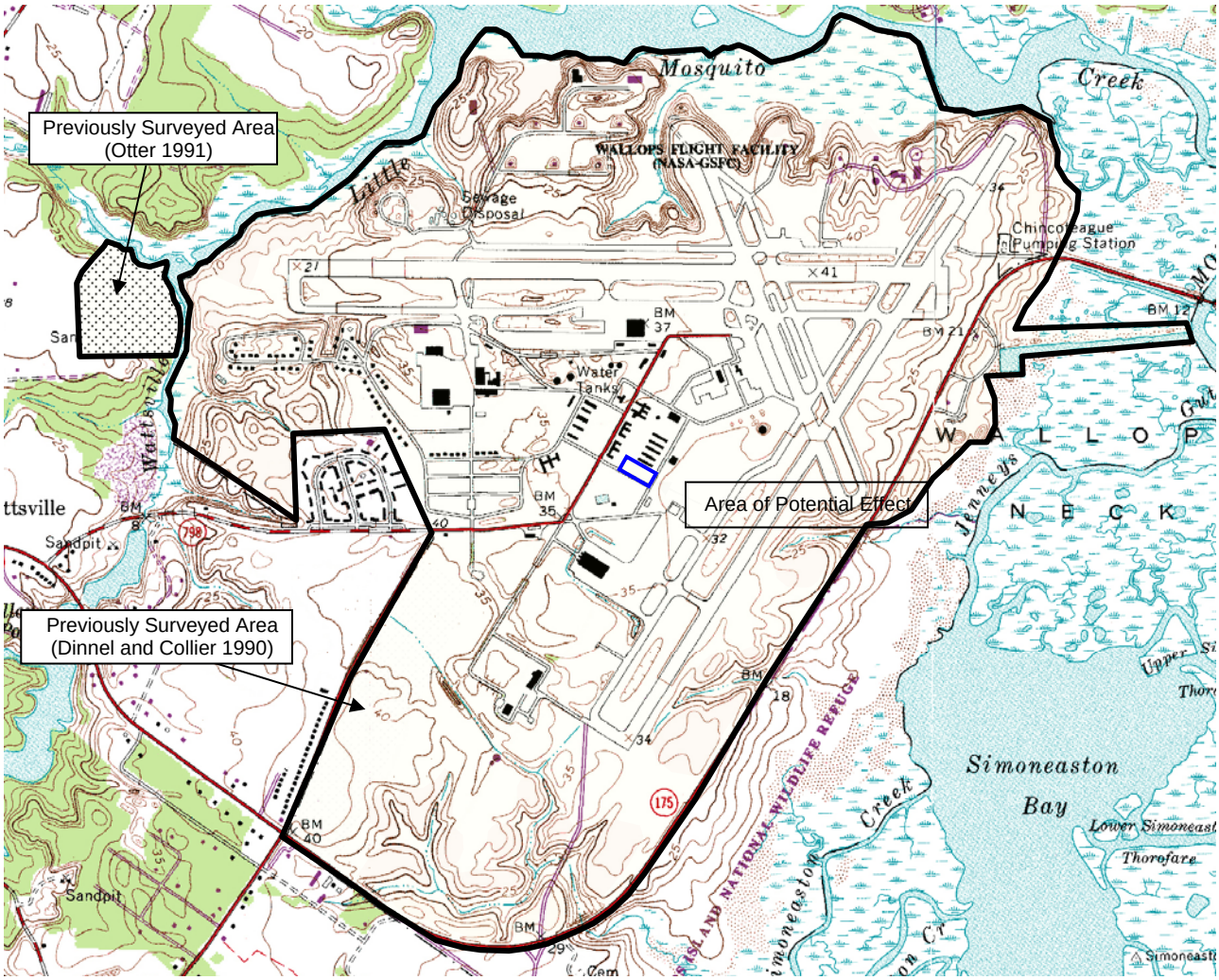
4.4.1 Water Supply and Wastewater

Operation of the proposed facility would require an estimated average of 75 liters (20 gallons) of potable water per person per day or a total of approximately 39,000 lpd (10,300 gpd). Nearly all of this water would be sent as wastewater to the FOTW and discharged to an unnamed tributary of Little Mosquito Creek under VPDES permit number VA0024457 (Reference 16). After construction, the Engineering Building would be connected to the facility wide sanitary sewer system A sanitary sewer system connection is currently located at the proposed site. This system is adequate to handle additional sanitary sewer requirements. Therefore, no impacts to the sanitary sewer system would be anticipated.

Normal construction related water usage is forseen including fugitive dust control. Water would be obtained from the WFF water distribution system which draws from the Yorktown-Eastover Multiaquifer System, an EPA designated Sole Source Aquifer. At present, this aquifer is not overdrafted and the operation of the facility would not increase potable water consumption or wastewater generation since the occupants of the building would be consolidated from existing buildings on WFF. Therefore, no impacts to either potable water resources would be anticipated.

4.4.2 Storm Water

An area greater than 1 acre (0.4 hectares) of land would be disturbed during the construction of the Engineering Building. Therefore, WFF would submit a “VPDES General Permit Registration Statement for Storm Water Discharges from Construction Activites” to DEQ. After construction, the



KEY

- Area of Moderate Sensitivity
- Area of High Sensitivity

N

Unshaded Areas Are Low Sensitivity

Figure 4.1 Main Base Sensitivity Map for Prehistoric Archaeological Sites

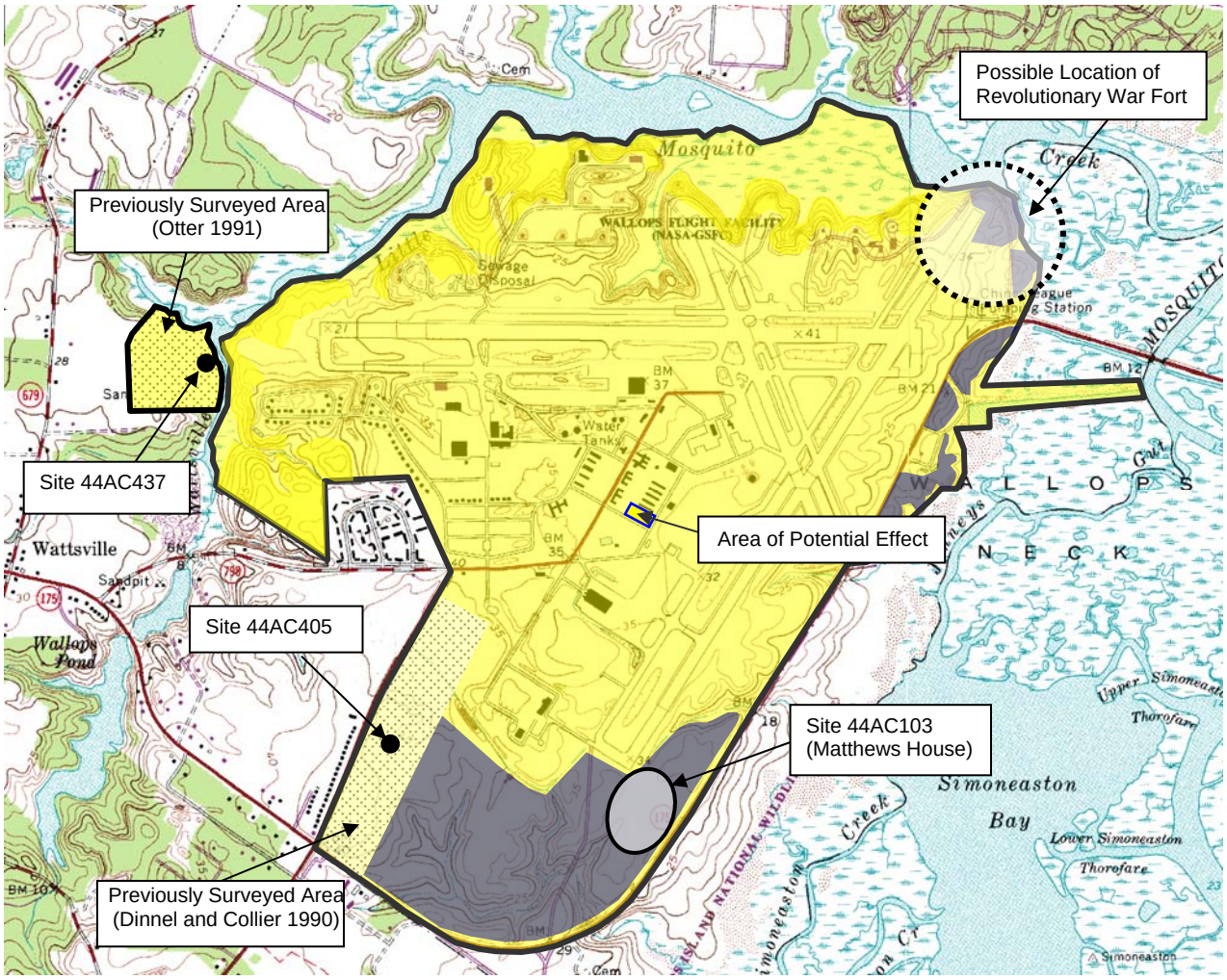


Figure 4.2 Main Base Sensitivity Map for Historic Archaeological Sites

Engineering Building would be connected to the facility wide storm water drainage system. However, roughly 88 meters (289 feet) of storm water lines would be rerouted including the relocation of 4 stormwater catchbasins and 1 endsection. The area would discharge through the storm drainage pipes east of the construction site to outfall 010.

Construction of the Engineering Building will create an increase of approximately 0.4 hectares (1 acre) of impervious surface. Construction and operation of the facility would comply with all applicable sections of the WFF Storm Water Pollution Prevention Plan (Reference 25). Therefore, no impacts are anticipated to the storm water systems.

4.4.3 Energy

The WFF Facilities Management Branch estimated the annual electric draw for the proposed Engineering Building. Calculations were determined for a maximum draw of 80 percent capacity during peak hours and 30 percent capacity during off-peak hours, assuming the facility is in operation year round. Based upon this model, the annual electric draw for the Engineering Building was estimated to be approximately 4,338,819 kilowatt-hours. The total electric draw for the WFF in calendar year 2003 was 48,213,512 kilowatts. Since the occupants of the building would be consolidated from existing buildings on WFF, no net increase in electric consumption is expected for the facility. Therefore, no impacts are anticipated to energy resources.

4.4.4 Solid Waste

Solid waste generated during the demolition of approximately 930 square meters (10,000 square feet) of parking area and 640 square meters (6,882 square feet) of sidewalk would be recycled where possible or disposed of in the Accomack County landfill. Construction wastes would be typical of a light industrial building (Class III Industrial Solid Waste) and would also be disposed of in the Accomack County landfill.

Solid waste generated during operation of the facility would consist of typical materials involved with operating an office and light industrial facility. These wastes may include paper products and scrap plastic. All applicable wastes would be recylced by one of WFF's current recycling programs.

The total volume of waste intended to be sent to the Accomack County landfill is negligible and is not anticipated to impact the landfill.

4.4.5 Transportation

A very slight increase in traffic is anticipated as a result of the Proposed Action. The majority of the increase would occur during the demolition, site preparation, and construction phases. WFF infrastructure is adequate to handle the additional flow. Therefore, no impacts to transportation are anticipated.

4.5 CUMULATIVE EFFECTS

Impacts from construction would be minor and temporary. Impacts from operation of the Engineering Building would be identical to current and ongoing operations at WFF. Potentionally, an additional 20 permanent personnel could be required to support AETD activities. The additional personnel would not cause a significant increase to the cumulative effect on the environment at WFF.

4.6 OTHER NEPA DISCLOSURES

4.6.1 Unavoidable Adverse Effects

Adverse environmental effects that cannot be avoided include the release of small amounts of pollutants into the atmosphere and minor noise impacts during construction. However, these adverse environmental effects would not be at significant levels.

4.6.2 Relationship of Short-Term Uses of the Human Environment and the Maintenance of Long-Term Productivity

All activities would occur at an active NASA facility. Therefore, the proposed action would not be expected to result in any impacts that would reduce environmental productivity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to health, safety, or the general welfare of the public.

4.6.3 Irreversible and Irretrievable Commitment of Resources

The amount of materials and energy required for the proposed action would be small and is similar to activities that have been carried out in previous years at the WFF.

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APPENDIX A

COMMUNICATIONS