



Final

Environmental Assessment

Implementation of an Instrument
Development Facility
Area Development Plan at
NASA Goddard Space Flight Center,
Maryland



June
2015

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NOTICE: GSFC-15-01

NATIONAL ENVIRONMENTAL POLICY ACT: Instrument Development Facility Area Development Plan at NASA Goddard Space Flight Center (GSFC), Maryland

AGENCY: National Aeronautics and Space Administration (NASA)

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321, *et seq.*), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and NASA policy and procedures (14 CFR Part 1216, Subpart 1216.3), NASA has made a FONSI with respect to the proposed implementation of an Instrument Development Facility (IDF) Area Development Plan (ADP) at the NASA GSFC, Greenbelt, Maryland. NASA is proposing to redevelop an approximately 10-acre area within the GSFC Greenbelt campus. The redevelopment would occur in phases and would involve both the deconstruction of existing buildings and the construction of new facilities, the first of which would be the IDF.

ADDRESSES: The Final EA may be viewed at the following locations:

- a) Prince George's County Memorial Library, Greenbelt Branch, 11 Crescent Road, Greenbelt, MD 20770 301-345-5800
- b) Prince George's County Memorial Library, Laurel Branch, 8101 Sandy Spring Road, Laurel, MD 20707 301-776-6790
- c) Prince George's County Memorial Library, Bowie Branch, 15210 Annapolis Road, Bowie, MD 20716 301-262-7000
- d) Goddard Space Flight Center Visitor Center, 8800 Greenbelt Road, Greenbelt, MD 20771 301-286-8981
- e) <http://code250.gsfc.nasa.gov/docs/idf-adp-finalEA.pdf>

A limited number of hard copies of the Final EA are available by contacting Ms. Lizabeth Montgomery at the address or telephone number indicated below.

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SUPPLEMENTAL INFORMATION: NASA has reviewed the EA for the IDF ADP and has determined that it represents an accurate and adequate analysis of the scope and level of associated environmental impacts. The Final EA is hereby incorporated by reference in this FONSI.

NASA solicited public and agency review and comment on the environmental impacts of the Proposed Action through a 30-day comment period on the Draft EA. Notices were published on January 29, 2015, in the *Greenbelt Gazette*, *Bowie Blade*, and *Laurel Leader* newspapers. Printed copies of the Draft EA were mailed to local libraries in Prince George's County, and an electronic version was emailed to interested parties and posted online. Comments received were considered in the preparation of the Final EA.

The EA addressed the potential environmental impacts of implementing an ADP for redevelopment of an approximately 10-acre site within GSFC's campus, as well as the No Action Alternative. Under the Proposed Action, NASA would construct and operate up to four distinct, but connected, facilities as part of the Engineering Renewal initiative aimed at improving aging engineering capabilities, the first of which would be the IDF. The construction and operation of this new complex is aimed at promoting synergistic collaborations between the Applied Engineering and Technology Directorate and the Sciences and Exploration Directorate.

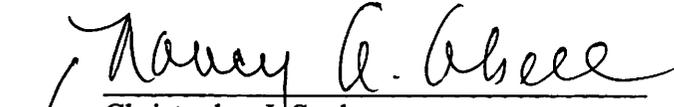
The Proposed Action entails the phased construction of the four buildings, parking, and utility infrastructure within the site. Phase I of this action includes the deconstruction of existing buildings (Buildings 16, 16A, 16B, 17, 84, and 86; and the buildings in Area 400) and the construction of the IDF, consisting of approximately 4,645 square meters (m²) (50,000 square feet [ft²]) of laboratory and office space to accommodate approximately 100 staff and associated parking spaces. Phases II through IV would include the deconstruction of Building 27 and the construction of three facilities with additional office and laboratory space. Personnel staffing the IDF would be relocated from existing facilities; thus, there would be no increase in personnel at GSFC. In total, site improvement activities include the construction of four connected facilities totaling up to 18,580 m² (200,000 ft²), with up to 2,787 m² (30,000 ft²) of expansion potential, to accommodate approximately 400 to 550 staff and associated parking spaces

Four alternatives for the Proposed Action and the No Action Alternative were analyzed in detail in the EA. The location of the Proposed Action would remain the same for each of the alternatives; however, the layout of the IDF and its phases would vary. Under the No Action Alternative, the IDF and other facilities would not be constructed and no structures would be demolished.

Analysis in the EA showed that adverse and beneficial impacts on environmental resources would result from implementation of the Proposed Action. These impacts would range from short to long-term and minor to moderate. Variations in impacts between the Proposed Action alternatives are minimal. Construction and deconstruction activities would result in short-term, minor, adverse impacts on soil and water quality as a result of erosion, sedimentation, and storm water runoff. There would also be short-term, minor, adverse impacts on local traffic from construction vehicles. Short-term, minor to moderate, adverse impacts from generation of solid waste would result from construction and deconstruction activities. Long-term, moderate, adverse impacts on historic and cultural resources would occur from deconstruction of contributing resources to the National Register of Historic Places-eligible GSFC Historic District. A Memorandum of Agreement is being developed between NASA GSFC and the Maryland Historical Trust to resolve the adverse effect of the project on historic properties. The new buildings would incorporate energy-efficient designs which would result in long-term, moderate, beneficial impacts on electrical and heating and cooling systems. This would also have long-term, minor, beneficial impacts on air quality from reduced generation of greenhouse

gas emissions. Long-term, minor, beneficial impacts on water resources would occur due to facility designs that would reduce impervious surfaces and improve storm water management. Under the No Action Alternative there would continue to be minor adverse impacts on air quality and water resources due to less efficient building utility and storm water systems.

On the basis of the Final EA, NASA has determined that the environmental impacts associated with the Proposed Action (any of the alternative layouts, including the preferred alternative) would not individually or cumulatively have a significant impact on the quality of the human environment. Therefore, an Environmental Impact Statement is not required.



Christopher J. Scolese
Director
Goddard Space Flight Center

7/9/2015

Date

Final
**ENVIRONMENTAL ASSESSMENT
FOR IMPLEMENTATION
OF AN
INSTRUMENT DEVELOPMENT FACILITY AREA DEVELOPMENT PLAN AT
NASA GODDARD SPACE FLIGHT CENTER, MARYLAND**

JUNE 2015

Lead Agency: Facilities Management Division, Management Operations Directorate, Goddard Space Flight Center (GSFC), National Aeronautics and Space Administration (NASA).

Proposed Action: Implementation of an Instrument Development Facility Area Development Plan (ADP) at GSFC, Maryland.

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Date: June 2015

Abstract: NASA proposes to implement an ADP for the approximately 4-hectare (10-acre) Water Tower Redevelopment Site (also referred to as the “Site”) within the GSFC campus. The ADP supplements the current GSFC Master Plan by providing a detailed, phased site planning approach for the development of the Site. Per the ADP, NASA would construct and operate up to four distinct but connected facilities as part of the Engineering Renewal initiative aimed at improving aging engineering capabilities, the first of which would be the Instrument Development Facility (IDF). The construction and operation of this new complex is aimed at promoting synergistic collaborations between the Applied Engineering and Technology Directorate and the Sciences and Exploration Directorate. The purpose of the Proposed Action is to consolidate the functions of the Science and Engineering neighborhoods and replace aging infrastructure to meet the mission of GSFC. The Proposed Action is needed to maintain cutting-edge facilities and allow NASA to conduct research and develop advanced technologies at GSFC. NASA envisions the phased construction of the four buildings, parking, and utility infrastructure within the Site. Phase I of this action includes the deconstruction of existing buildings (Buildings 16, 16A, 16B, 17, 84, and 86; and the buildings in Area 400) and the construction of the IDF on the Site, consisting of approximately 4,645 square meters (m²) (50,000 square feet [ft²]) of laboratory and office space to accommodate approximately 100 staff and associated parking spaces. Phases II through IV would include the deconstruction of Building 27 and the construction of three facilities with an additional 4,645 m² (50,000 ft²) of office and laboratory space each with the potential expansion of 930 m² (10,000 ft²). Personnel staffing the IDF would be relocated from existing facilities; thus, there would be no increase in personnel at GSFC. In total, Site improvement activities include the construction of four connected facilities totaling up to 21,368 m² (230,000 ft²) to accommodate approximately 400 to 550 staff and associated parking spaces. Construction of the IDF would begin in 2016 with a projected completion of the other three buildings by 2028 contingent upon availability of funds.

This EA evaluates the potential environmental consequences of the Proposed Action alternatives and the No Action Alternative. Under the No Action Alternative, the IDF and other facilities would not be constructed and no structures would be deconstructed. This alternative does not meet the purpose of and need for the Proposed Action; however, it serves as a baseline against which the impacts of the Proposed Action can be evaluated.

The intent of the National Environmental Policy Act (NEPA) is to help decisionmakers make well-informed decisions based on an understanding of the potential environmental consequences of an action. This EA will evaluate the potential environmental consequences of the Proposed Action and alternatives, including the No Action Alternative, on the following general impact topics: land use, cultural resources, air quality, noise, coastal zone management, geological resources, biological resources, water resources, socioeconomics (including environmental justice and protection of children from environmental health risks and safety risks), utilities and infrastructure (including transportation), hazardous materials and wastes, and human health and safety.

Executive Summary

Introduction

This Environmental Assessment (EA) addresses potential environmental impacts of the proposal to implement an Area Development Plan (ADP). The ADP was developed to be consistent with the Goddard Space Flight Center's (GSFC's) current Master Plan and its goals. The ADP supplements and refines the GSFC's current Master Plan by providing a detailed, phased site planning approach for the approximately 4-hectare (10-acre) Water Tower Redevelopment Site (also referred to as the "Site") at National Aeronautics and Space Administration (NASA) GSFC in Greenbelt, Maryland. The implementation of the ADP includes the construction and operation of up to four buildings, parking facilities, and associated infrastructure in four distinct phases at the Site. This EA was prepared as a tiered document to the 2002 Master Plan EA to address specific development of the Site in four distinct phases, as proposed in the ADP.

This EA has been prepared to comply with the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] Sections 4321–4347); the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508); NASA NEPA Regulations (14 CFR Part 1206.3); and the NASA Procedural Requirements (NPR) 8580.1A, *National Environmental Policy Act Management Requirements*.

Purpose of and Need for the Proposed Action

GSFC is divided into three primary neighborhoods: Engineering, Science, and Program/Project Management. Work at GSFC includes development of flight instruments and sensors in a number of different facilities across the campus. The Master Plan noted that the aging infrastructure and existing separation of facilities, work spaces, technologies, and workforce limits the GSFC's ability to provide efficient research and development mission support to NASA. The purpose of the Proposed Action is to provide a phased approach that, when implemented, would unify these work elements into a consolidated space within the campus and replace aging infrastructure to meet the mission of GSFC. The Proposed Action is needed to enable close collaboration and greater efficiency of GSFC's science and engineering technical workforce, to maintain cutting-edge facilities, and to allow NASA to conduct research and develop advanced technologies at the GSFC. The Proposed Action has been designed to unify the neighborhoods (the green area shown in **Figure 1-3**) for greater professional interaction and technological efficiency to meet these needs.

Scope of the EA

The scope of the analysis in this EA consists of evaluation of the range of alternatives and impacts to be considered in accordance with NEPA. The purpose of the EA is to inform decisionmakers and the public of the likely environmental consequences of the Proposed Action and alternatives. In accordance with CEQ regulations, the No Action Alternative is analyzed to provide a baseline against which the environmental impacts of implementing the range of alternatives addressed can be compared. The EA will identify appropriate mitigation measures that are not already included in the Proposed Action or alternatives to avoid, minimize, reduce, or compensate for any adverse environmental impacts.

Interagency and Public Involvement

Agency and public participation in the NEPA process promotes open communication between the proponent and regulatory agencies, the public, and potential stakeholders. All persons and organizations having a potential interest in the Proposed Action or alternatives are encouraged to participate in the public involvement process.

NASA initiated agency coordination with the Maryland Department of Natural Resources (DNR), U.S. Fish and Wildlife Service (USFWS), and Maryland Historical Trust (MHT) through letters explaining NASA's Proposed Action and solicited comments regarding the project in each agency's area of expertise.

The Draft EA will be made available for public review. The public review period will be initiated through the publication of a Notice of Availability in local newspapers. Comments provided by stakeholders and the public during the EA process will be incorporated into the analysis of potential environmental impacts in the Final EA, where appropriate and applicable.

Description of the Proposed Action

The Proposed Action includes the redevelopment of the Water Tower Redevelopment Site in four distinct phases. The Site is bounded by Tiros Road to the north, Hubble Road and Building 34 to the east, Building 36 to the west, and a ravine and Explorer Road to the south. The existing water tower on the Site would be left undisturbed under the Proposed Action.

Phase I includes the deconstruction of existing buildings and construction of the Instrument Development Facility (IDF). Phases II, III, and IV include the construction of three additional facilities and deconstruction of other facilities yet to be determined. During this same timeframe, the Building 27 complex would be deconstructed and relocated to new facilities in locations yet to be determined. Developed, the four facilities would total up to 21,368 square meters (m²) (230,000 square feet [ft²]) to accommodate approximately 400 to 550 staff. All IDF staff would be employees relocated from existing facilities, and there would be no increase in personnel at GSFC under the Proposed Action. Parking would be constructed with each phase of construction to provide an approximated total ranging between 268 and 440 parking spaces. Based on this range of proposed parking spaces, deconstruction of the approximately 316 existing parking spaces on the Water Tower Redevelopment Site would result in a range from a net decrease of 48 parking spaces to a net increase of 124 spaces. Additionally, a 10-meter (33-foot) anti-terrorism/force protection (AT/FP) setback would be required to comply with the Interagency Security Committee Physical Security Criteria for Federal Buildings and NPR 1620.3, *Physical Security Requirements for NASA Facilities and Property*. Other improvements include the development of pedestrian walkways and creation of green space.

Utility services would be provided by new and existing service lines and corridors. Steam and chilled water would be provided by new and existing infrastructure. Existing power and telecommunications utilities would be sufficient for all phases of construction. New utility lines would be installed and connected to existing lines for fire suppression water and sanitary sewer.

The IDF would be designed to comply with Executive Order 13693, *Planning for Federal Sustainability in the Next Decade* (March 2015). If feasible, the IDF would be designed and constructed as a Net Zero Energy Building (NZEB). The IDF would be designed to reduce site energy use through energy efficiency and demand-side renewable energy building technologies (e.g., photovoltaic array). In addition, recapitalization efforts are underway to maximize use of installation space. Therefore, for every development action, GSFC must demonstrate a deconstruction activity.

Phase I Redevelopment

Phase I Deconstruction Activities. Proposed deconstruction of aging and inadequate infrastructure under Phase I would include Buildings 16, 16A, 16B, and 86, which total approximately 21,650 m² (233,000 ft²) and associated parking lots currently on the Water Tower Redevelopment Site. As a part of the recapitalization effort, Phase I would also include the deconstruction of Building 17, Building 84, and 11 buildings in Area 400.

Phase I Construction Activities. The proposed IDF would be constructed in the northwest corner of the Water Tower Redevelopment Site under Phase I. Associated features to be constructed with the 4,645-m² (50,000-ft²) facility include a surface parking lot containing approximately 67 to 80 spaces, access drives, walkways, utilities, outdoor lighting, and storm water management infrastructure. The proposed IDF would contain offices, laboratory spaces, and conference rooms.

Total ground disturbance from construction activities under Phase I would be up to 1.6 hectares (3.9 acres). The Site would use low-impact development design techniques. Storm water would be managed in accordance with Goddard Procedural Requirement (GPR) 8500.5C, *Water Management*; the 2007 Energy Independence and Security Act (EISA); and Federal, state, and local requirements. Storm water management infrastructure would include the construction of a storm water management facility in the vicinity of the parking lot and storm drains and grassy swales for the facility, which would substantially improve storm water management. Site preparation, construction, equipment commissioning, and move-in would take approximately 31 months and occur between December 2016 and July 2019 (GSFC 2014a).

Phases II–IV Redevelopment

Phases II–IV Deconstruction Activities. Deconstruction of the Building 27 complex, which includes eight associated structures totaling approximately 5,860 m² (63,047 ft²), would occur during Phases II through IV. It is anticipated that the deconstruction of Building 27 and other facilities to be determined as appropriate would occur during Phase III construction, once planning is complete and the budget for deconstruction is approved and programmed. GSFC operates a less-than-90-day Hazardous Waste Accumulation Facility in accordance with GPR 8500.3, *Waste Management* in Building 27A. The Hazardous Waste Accumulation Facility and other activities in Building 27 and associated structures would be transitioned to other facilities or locations on the GSFC campus as appropriate.

Phases II–IV Construction Activities. Facilities proposed to be constructed during Phases II, III, and IV would be aligned along the western edge of the Site. Phases II, III, and IV each would have approximately 4,645 m² (50,000 ft²) of development with an expansion potential of up to 930 m² (10,000 ft²). The total footprint of all four facilities under all four phases would be approximately 18,580 m² (200,000 ft²) with an expansion potential of up to 2,787 m² (30,000 ft²). During Phases II, III, and IV, approximately 201 to 360 parking spaces would be constructed. Additional parking would be available in the parking lot by Building 34 (located southeast of the Site).

There would be two primary entrances for each facility, one along the pedestrian walkway to the west of the facility, and a second to allow access from the parking lot to the east. Appropriate utilities, pavements, access drives, sidewalks, curbs, gutters, storm water drainage and storm water management facilities, lighting, and landscaping would be included, resulting in 35 to 40 percent open space in the overall footprint of the Site.

Alternatives Analysis for Building Layouts

Under NEPA, reasonable alternatives to implement a proposed action must be considered in an EA. To warrant detailed evaluation, an alternative must be considered reasonable with respect to the purpose of and need for the action and applicable screening criteria. NASA's IDF design team developed screening criteria for the placement and design of the four facilities to be consistent with the overall goals of the GSFC Master Plan applicable for the sector development.

NASA's IDF Design Team considered five alternatives for redevelopment, and determined that three were suitable and have been carried forth for detailed analysis in the EA. A fourth alternative, the Science and Engineering Corridor Alternative, which is the Preferred Alternative, was subsequently developed by merging the most favorable attributes of the three alternatives carried forward for analysis. Sites that were outside of the science and engineering functional neighborhoods were eliminated from further analysis because they would not meet the purpose of and need for unifying the neighborhoods.

Science and Engineering Corridor Alternative (Preferred Alternative)

The Science and Engineering Corridor Alternative meets or marginally supports all 12 criteria developed by NASA's IDF Design Team. The simple building geometry allows for maximum planning flexibility for each phase, has an optional interconnection between phases, and allows shared facilities between phases. The Science and Engineering Corridor Alternative also creates a uniform design that resembles many other buildings on campus, consolidates parking on the eastern side of the buildings, and provides ample open space for storm water control.

Goddard "L" Layout (Alternative 1)

The Goddard "L" layout would provide up to 21,972 m² (236,500 ft²) of building space and 300 parking spaces (GSFC 2014d). It meets or marginally supports 11 of the 12 criteria developed by NASA's IDF design team. The site utilization criteria would present challenges under this layout. The Goddard "L" layout allows for a shared service yard between phases, can be built to accommodate a fully connected complex, and consolidates building and parking areas. Challenges with this layout include the added costs for engineering the grading of the Site, limits to flexibility due to the building geometry, and limited expansion potential of the individual phases.

Checkerboard Layout (Alternative 2)

The Checkerboard layout option would provide up to 25,561 m² (275,000 ft²) of building space and 390 parking spaces, and accommodate up to approximately 550 NASA personnel based on final configuration. This layout design meets or marginally supports 11 of the 12 criteria outlined by NASA. The site utilization criteria would present challenges under the Checkerboard layout. Benefits of the Checkerboard layout design include maximum flexibility for planning a consolidated service yard, and it is well suited for the existing ground surface grade. Challenges with this layout include difficulty in expansion of individual phases and difficulty addressing the facility AT/FP setback requirements of 10 meters (32.8 feet) from the edge of the Site.

Radial Layout (Alternative 3)

The Radial layout would support up to 24,167 m² (260,000 ft²) of building space and 370 parking spaces, and accommodate up to approximately 530 NASA personnel based on final configuration. This layout design meets or marginally supports 11 of the 12 criteria outlined by NASA's IDF Design Team. The site utilization criteria would present challenges under the Radial layout. This design allows for a shared service yard between phases, a fully interconnected complex, and consolidated building and parking

areas. Challenges with the Radial layout design include additional site grading costs, limited planning flexibility imposed by building geometry, and a limited expansion of individual phases.

No Action Alternative

Under the No Alternative Action, the existing features of the Water Tower Redevelopment Site would remain unchanged. There would be no deconstruction of existing buildings and no construction of the IDF or the subsequent phases. GSFC would continue to develop instruments in separate locations on the campus and would not allow the science and engineering divisions to obtain more efficient collaboration. The No Action Alternative does not meet the purpose of and need for the Proposed Action. Under the No Action Alternative, GSFC would not consolidate functions or maintain cutting-edge facilities to support the GSFC mission of developing advanced technologies for space and earth science.

Summary of Environmental Consequences

The differences in impacts among the action alternatives would be expected to be negligible. In general, environmental impacts would generally be more adverse for Alternatives 1 and 3 than for the Preferred Alternative and Alternative 2 due to the increase in grading required for these layouts. In addition, the Preferred Alternative would require a slightly larger amount of vegetation removal than Alternatives 1, 2, or 3. The No Action Alternative would not result in any adverse impacts.

Generally, construction and deconstruction activities would be expected to result in ground disturbance. Short-term, minor, adverse impacts on local traffic from construction vehicles and on soil and water resources as a result of sedimentation, erosion, and storm water runoff would occur. Construction and deconstruction activities also generate solid waste. Long-term, moderate, adverse impacts on historic and cultural resources would occur from the deconstruction of contributing resources to the National Register of Historic Places-eligible GSFC Historic District. A Memorandum of Agreement (MOA) is being developed between NASA GSFC and the Maryland Historical Trust (MHT) to resolve the adverse effect of the project on historic properties. The MOA specifies mitigation measures for implementation of the ADP and the demolition of historic properties. Impacts from operational activities include a slight increase in traffic in the immediate project area, but overall traffic levels would not change as the population of GSFC would not increase due to the Proposed Action. The new buildings would incorporate energy-efficient designs which would result in long-term, moderate, beneficial impacts on electrical and heating and cooling systems. This would also have long-term, minor, beneficial impacts on air quality from reduced generation of greenhouse gas (GHG) emissions. Long-term, minor, beneficial impacts on water resources would occur due to facility designs that would reduce impervious surfaces and improve storm water management. These kinds of impacts would be expected regardless of the alternative chosen.

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**FINAL ENVIRONMENTAL ASSESSMENT FOR IMPLEMENTATION OF AN
INSTRUMENT DEVELOPMENT FACILITY AREA DEVELOPMENT PLAN
AT NASA GODDARD SPACE FLIGHT CENTER, MARYLAND**

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1. Purpose of and Need for the Proposed Action

1.1 Introduction

This Environmental Assessment (EA) has been prepared to address potential environmental impacts of the proposal to implement an Area Development Plan (ADP) to construct and operate up to four facilities, parking facilities, and associated infrastructure in four distinct phases at an approximately 4-hectare (10-acre) Water Tower Redevelopment Site (also referred to as the “Site”) at National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. This EA has been prepared to comply with the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] Sections 4321–4347); the Council on Environmental Quality’s (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508); the NASA NEPA Regulations (14 CFR Part 1206.3); and the NASA Procedural Requirements (NPR) 8580.1A, *National Environmental Policy Act Management Requirements*.

1.2 Background

GSFC was established in 1959, and today remains at the forefront of the NASA science, research, and exploration program. GSFC is located 14.5 kilometers (km) (9 miles) northeast of Washington, D.C., in Prince George’s County, Maryland, as shown in **Figure 1-1**. Occupying approximately 5 square km (2 square miles), it is just east of the City of Greenbelt, and adjoins the unincorporated communities of Seabrook, Lanham, and Glenn Dale. GSFC’s western property limit is shared with the City of Greenbelt, which is listed in the National Register of Historic Places (NRHP), and the Baltimore-Washington Parkway. The southern boundary follows Greenbelt Road, a state highway and a community artery. The eastern boundary follows Good Luck Road/Soil Conservation Road. The U.S. Department of Agriculture’s Beltsville Agricultural Research Center borders GSFC to the north.

GSFC is a multi-purpose central campus with isolated areas for specific research activities to accommodate the diverse functions it is intended to perform. The campus is composed of five distinct land areas. The NASA Greenbelt Main Campus is approximately 3.4 square km (1.3 square miles). Smaller areas comprise the remainder of the Greenbelt campus, including the Antenna Test Range (Area 100), the Goddard Geophysical and Astronomical Observatory (Area 200), the Spacecraft Magnetic Test Facility (Area 300), and the Propulsion Research Facility (Area 400). Areas 100, 200, 300, and 400 are located north and northeast of the GSFC Main Campus (see **Figure 1-2**). The campus accommodates thousands of civil servants, contractors, and partners.

The mission of GSFC is to remain a leader in the studies of earth and space science by conducting world-class research, and developing advanced technologies. To meet its mission, NASA and GSFC must maintain cutting-edge facilities and equipment such as the Instrument Development Facility (IDF), the first facility proposed to be constructed per the ADP for the Water Tower Redevelopment Site.

The 2008 and 2010 Master Plan updates (GSFC 2008, GSFC 2010) included revisions to the 2002 Master Plan that address:

- Both GSFC sites (Greenbelt/Wallops Flight Facility) in a combined manner on one plan
- Changes to programmatic needs
- New recapitalization strategy and funding guidance associated with it
- New Federal regulations for energy reduction
- New guidance to incorporate sustainable practices.

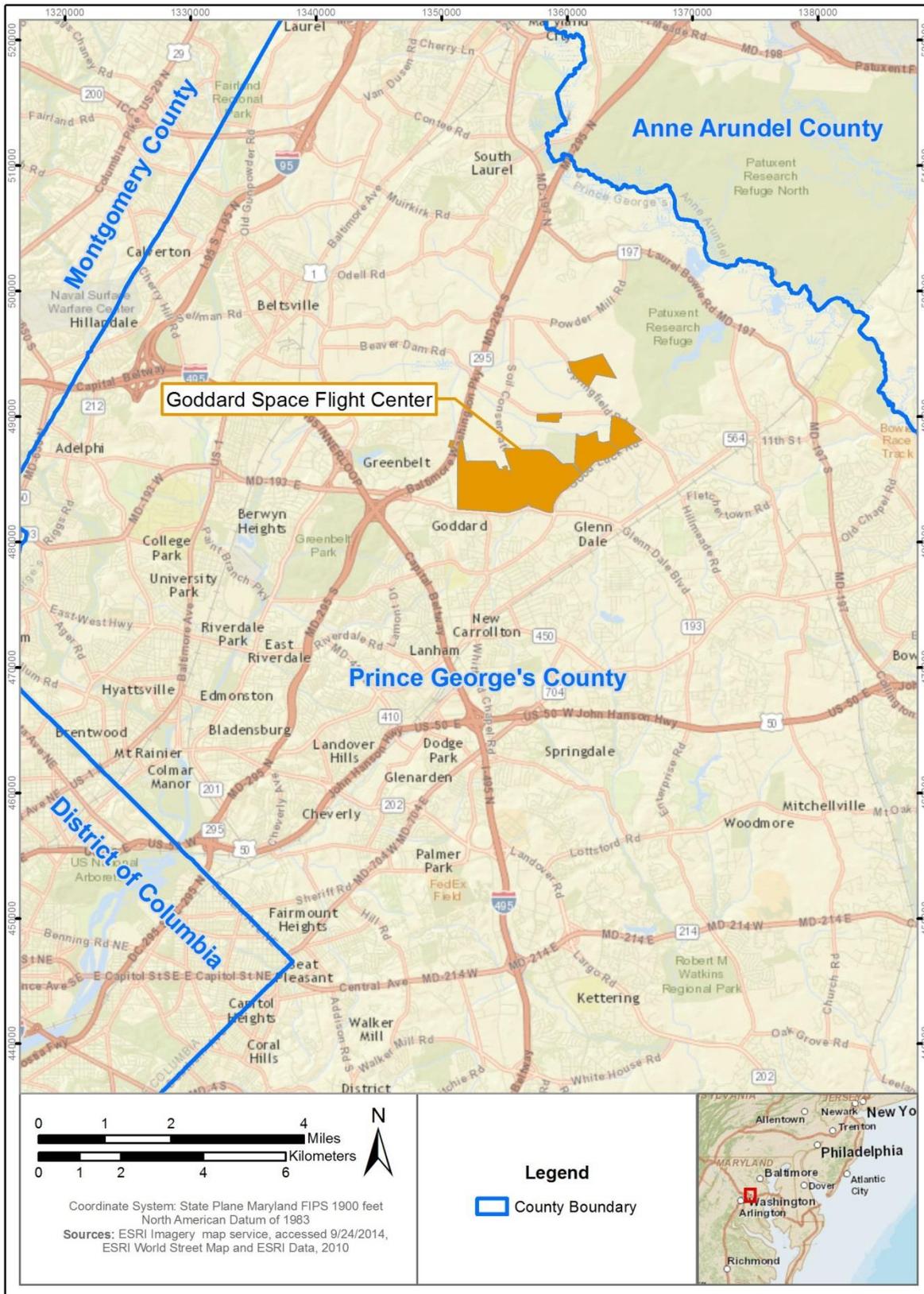


Figure 1-1. Location Map of NASA Goddard Space Flight Center, Maryland

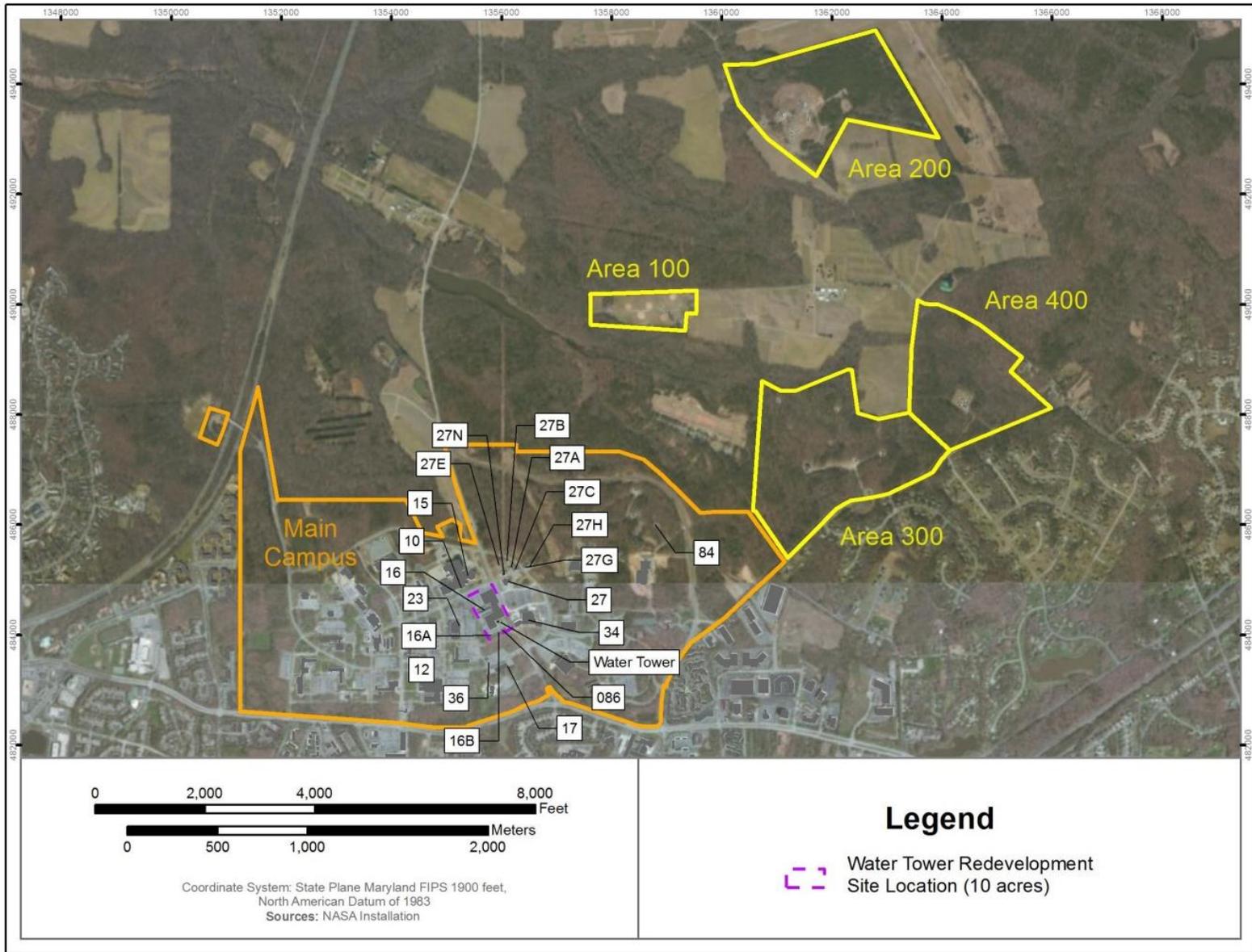


Figure 1-2. GSFC Campus and Additional Areas

The ADP was developed to be consistent with GSFC’s current Master Plan and its goals. The ADP addresses specific development of one sector within the Master Plan, the 4-hectare (10-acre) Water Tower Redevelopment Site. The ADP supplements and refines that sector of GSFC’s current Master Plan by providing a detailed, phased planning approach for the Site. The Site holds a key central position (shown in green on **Figure 1-3**) on campus where the Engineering and Technology, Sciences and Exploration, and Program and Project Management “neighborhoods” overlap.

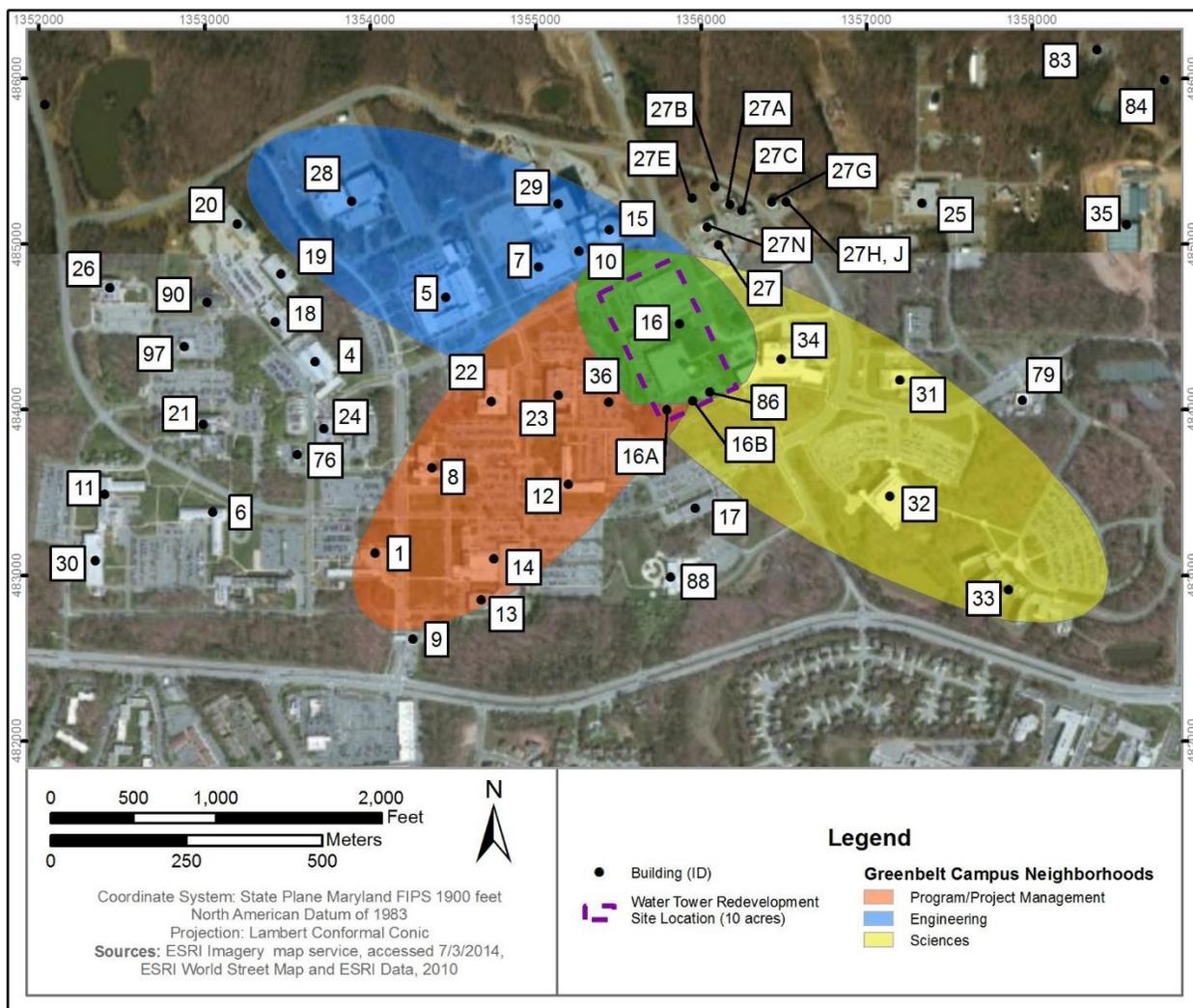


Figure 1-3. GSFC Campus Neighborhoods and Water Tower Redevelopment Site

GSFC completed an EA for the 2002 Master Plan in December 2002. The Master Plan EA is broad in scope and allows for more site-specific documents to evaluate project-specific environmental impacts. This EA was prepared as a tiered document to the 2002 Master Plan EA to address the specific development of the Site in four distinct phases, as proposed in the ADP.

1.3 Purpose of and Need for the Proposed Action

GSFC is dedicated to making significant, global contributions in Earth Science, Heliophysics, Planetary Science, Astrophysics, Exploration Systems, Communications and Space Operations, and Suborbital platforms contributing to NASA missions. GSFC is the home to advanced laboratories, fabrication

facilities, integration and testing facilities, and operations capabilities for the full life cycle development of spacecraft and instrumentation. This work is divided into three primary neighborhoods on the GSFC campus: Engineering, Science, and Program/Project Management, as shown in **Figure 1-3**, which are all supported by the Institutional neighborhood on the west side of the campus. Work at GSFC includes development of flight instruments and sensors that use a variety of technologies, such as optics, lasers, cryogenic systems, mass spectrometry, and nanotechnology, to facilitate these studies and explorations. Presently, instrument development occurs between engineers and scientists in a number of different facilities across the GSFC campus. The packaging and transport of components and instruments is expensive and risky as the instruments are highly sensitive to dust, static electricity, and other hazards. The Master Plan noted that the aging infrastructure and existing separation of facilities, work spaces, technologies, and workforce limits GSFC's ability to provide efficient research and development mission support to NASA. The purpose of the Proposed Action is to provide a phased approach that, when implemented, would unify these work elements into a consolidated space within the campus and replace aging infrastructure to meet the mission of GSFC. The Proposed Action is needed to enable close collaboration and greater efficiency of GSFC's science and engineering technical workforce, to maintain cutting-edge facilities, and allow NASA to conduct research and develop advanced technologies at GSFC. The Proposed Action has been designed to unify the neighborhoods (the green area shown in **Figure 1-3**) for greater professional interaction and technological efficiency to meet these needs.

1.4 Scope of the EA

The Proposed Action and the range of alternatives being considered in this EA are presented in detail in **Section 2**. In accordance with CEQ regulations, the No Action Alternative is analyzed to provide a baseline against which the environmental impacts of implementing the range of alternatives addressed can be compared. The EA will identify appropriate mitigation measures not already included in the Proposed Action or alternatives to avoid, minimize, reduce, or compensate for any adverse environmental impacts. This EA is organized into seven sections and an appendix. **Section 1** states the purpose, need, scope, and public involvement efforts associated with the Proposed Action. **Section 2** contains a detailed description of the Proposed Action and the alternatives considered. **Section 3** describes the existing conditions of the potentially affected environment and identifies the environmental impacts of implementing the reasonable alternatives. **Section 4** identifies cumulative impacts associated with past, present, and reasonably foreseeable future actions when combined with the Proposed Action and alternatives. **Section 5** provides the names of those persons who prepared the EA. **Section 6** provides a list of agencies and persons consulted during the NEPA process. **Section 7** lists the references used to support the analysis. **Appendix A** contains documentation of interagency coordination and public involvement activities. **Appendix B** contains public comments received on the Draft EA.

This EA examines the environmental impacts of the Proposed Action and reasonable alternatives on the following resource areas: land use, cultural resources, air quality, noise, coastal zone management, geological resources, biological resources, water resources, socioeconomics (including environmental justice and protection of children from environmental health risks and safety risks), utilities and infrastructure (including transportation), hazardous materials and wastes, and human health and safety.

1.4.1 Environmental Laws, Regulations, and Executive Orders

To comply with NEPA, the planning and decisionmaking process involves a study of other relevant environmental laws, regulations, and executive orders (EOs). The NEPA process does not replace the procedural or substantive requirements of other environmental laws; it addresses them collectively in an analysis, which enables decisionmakers to have a comprehensive view of major environmental issues and requirements associated with the Proposed Action. According to the CEQ regulations, the requirements of NEPA must be integrated "with other planning and environmental review procedures required by law

or by agency practice so that all such procedures run concurrently rather than consecutively” (40 CFR Part 1500.2(c)).

Summaries of the environmental laws, regulations, and EOs that might apply to this project are described in more detail in the appropriate resource areas in **Section 3** of this EA. The EA contains a list of Federal permits, licenses, and other entitlements that might be required in implementing the Proposed Action or alternatives (see **Table 1-1**).

Table 1-1. List of Federal Permits and Coordination Potentially Associated with the Proposed Action

Agency	Permit/Approval/Coordination
U.S. Fish and Wildlife Service (USFWS)	<ul style="list-style-type: none"> • Migratory Bird Treaty Act (MBTA) coordination • Endangered Species Act coordination
Maryland Department of the Environment (MDE), Water Management Administration	<ul style="list-style-type: none"> • Clean Water Act (CWA) Section 401 State Water Quality Certification • CWA National Pollutant Discharge Elimination System (NPDES) permit • Erosion and Sediment Control Plan • Stormwater Management Plan/permit
Maryland Historical Trust (MHT)	<ul style="list-style-type: none"> • National Historic Preservation Act (NHPA) Section 106 consultation

1.5 Interagency and Public Involvement

Agency and public participation in the NEPA process promotes open communication between the proponent and regulatory agencies, the public, and potential stakeholders. All persons and organizations having a potential interest in the Proposed Action or alternatives are encouraged to participate in the public involvement process. Public participation opportunities with respect to the Proposed Action and this EA are guided by CEQ regulations, Goddard Policy Directive (GPD) 8500.1, *Environmental Policy and Program Management*, and the NASA NEPA Desk Guide. The Intergovernmental Coordination Act and EO 12372, *Intergovernmental Review of Federal Programs*, require Federal agencies to cooperate with and consider state and local views in implementing a Federal proposal.

During the scoping process, NASA initiated agency coordination with the Maryland Department of Natural Resources (DNR), USFWS, and MHT. Letters were sent to the Maryland DNR and USFWS on April 23, 2014, and to MHT on May 22, 2014, explaining NASA’s Proposed Action and solicited comments regarding the project in the agency’s area of expertise. Copies of the letters and their responses are included in **Appendix A**.

Appendix A also contains the list of potentially interested parties. The Draft EA was made available for public review. The public review period was initiated through the publication of a Notice of Availability in local newspapers and distribution of the Draft EA to the potentially interested parties. Comments provided by stakeholders and the public during the EA process have been incorporated into the analysis of potential environmental impacts in the Final EA, where appropriate and applicable, and included in **Appendix B**.

2. Description of the Proposed Action and Alternatives

This section describes the Proposed Action and its three alternatives, and the No Action Alternative. The NEPA process evaluates potential environmental consequences associated with a proposed action and alternative courses of action. Reasonable alternatives must satisfy the purpose of and need for the Proposed Action, as defined in **Section 1.3**. In addition, CEQ regulations also specify the inclusion of a No Action Alternative against which potential impacts can be compared. While the No Action Alternative would not satisfy the purpose of or need for the Proposed Action, it is analyzed in accordance with CEQ regulations.

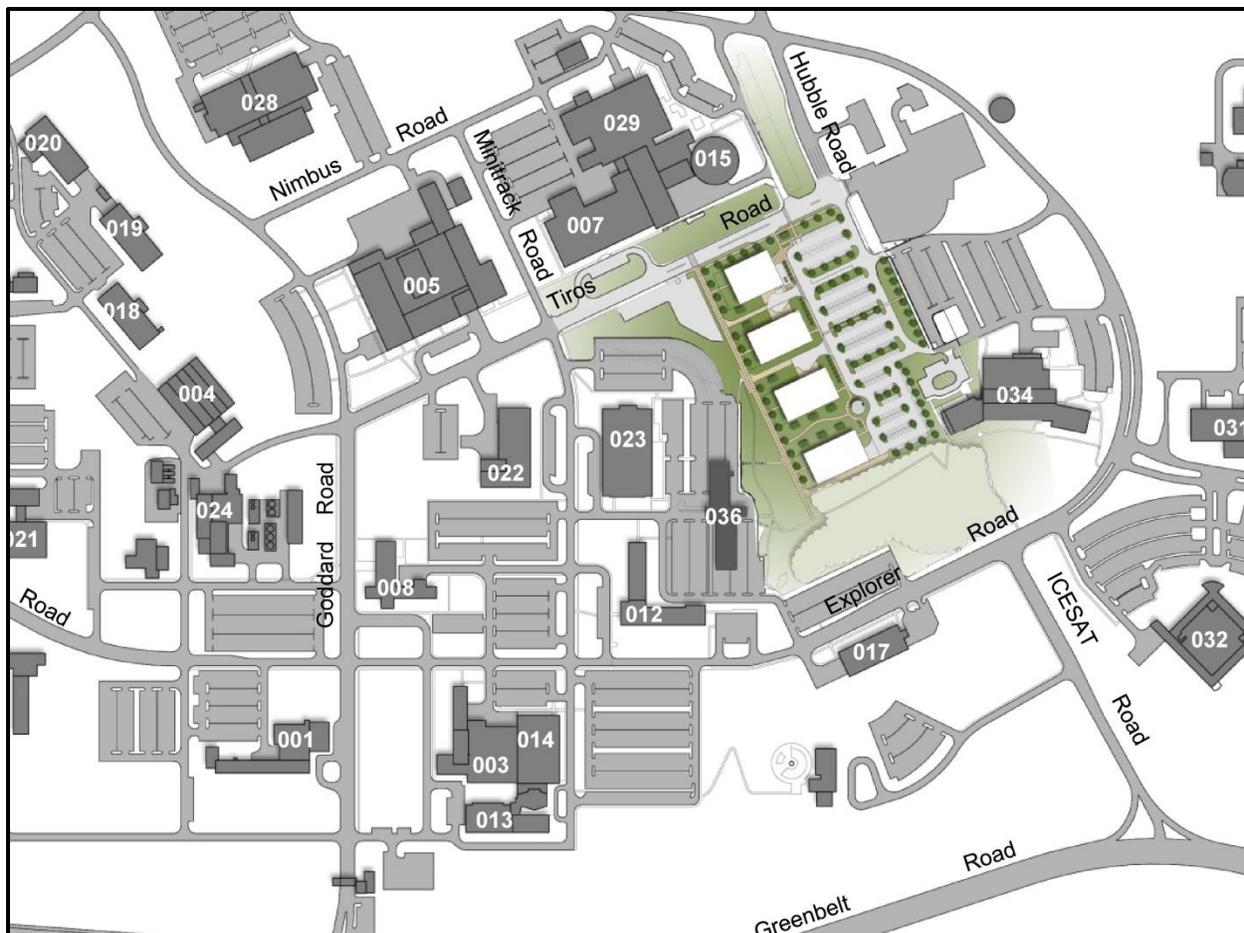
2.1 Proposed Action

The Proposed Action is designed to meet the goals and requirements of the GSFC Master Plan and align with NASA's mission of being a leader in the studies of earth and space science by conducting research and developing advanced technologies. NASA's IDF design team used GSFC Master Plan goals and requirements as follows as a guide to potential options for the new construction at the Water Tower Redevelopment Site:

- Renew facilities to meet future mission requirements
- Consolidate activities into strategic “neighborhoods”
- Link GSFC activities and reorganize circulation
- Create a safe, accessible, and sustainable environment at GSFC.

The Proposed Action includes the redevelopment of the Water Tower Redevelopment Site in four distinct phases. Phase I includes the deconstruction of existing buildings and construction of the IDF. Phases II, III, and IV include the construction of three additional facilities and deconstruction of other facilities yet to be determined. During this same timeframe, the Building 27 complex would be deconstructed and its functions relocated to new facilities in locations to be determined. The four facilities would total up to 18,580 square meters (m²) (200,000 square feet [ft²]) to accommodate approximately 400 to 550 staff. All staff that would occupy the IDF would be employees relocated from existing facilities, and there would be no increase in personnel at GSFC under the Proposed Action. Parking would be constructed with each phase of construction to provide an approximated total ranging between 268 and 440 parking spaces. Based on this range of proposed parking spaces, deconstruction of the approximately 316 existing parking spaces on the Water Tower Redevelopment Site would result in a range from a net decrease of 48 parking spaces to a net increase of 124 spaces. In addition, a 10-meter (33-foot) anti-terrorism/force protection (AT/FP) setback would be required to comply with the Interagency Security Committee Physical Security Criteria for Federal Buildings and NPR 1620.3, *Physical Security Requirements for NASA Facilities and Property*. Other improvements include the development of pedestrian walkways and creation of green space. **Figure 2-1** shows the conceptual Water Tower Redevelopment Site in the context of the Greenbelt Main Campus. The water tower itself would remain undisturbed under the Proposed Action. The Site is bounded by Tiros Road to the north, Hubble Road and Building 34 to the east, Building 36 to the west, and a ravine and Explorer Road to the south.

Table 2-1 presents the square footages, number of personnel and parking spaces, and timeframes involved with each phase. The following subsections provide detailed descriptions of the deconstruction and construction activities for the Proposed Action under Phase I and Phases II through IV of development for the Water Tower Redevelopment Site, followed by an analysis of other building layout alternatives considered for the Site.



Source: GSFC 2014c

Figure 2-1. Concept of the Water Tower Redevelopment Site in the Context of the Greenbelt Main Campus

Table 2-1. Water Tower Redevelopment Site Phase Development

Phase	Floor Space	Number of Personnel	Number of Parking Spaces	Timeframe for Completion
I	4,645 m ² (50,000 ft ²)	100	67–80	2019
II	4,645 m ² (50,000 ft ²) with 930 m ² (10,000 ft ²) of expansion potential	300–450	201–360	2022
III	4,645 m ² (50,000 ft ²) with 930 m ² (10,000 ft ²) of expansion potential			2025
IV	4,645 m ² (50,000 ft ²) with 930 m ² (10,000 ft ²) of expansion potential			2028
Total	18,580 m² (200,000 ft²) with 2,787 m ² (30,000 ft ²) of expansion potential	400–550	268–440	

Source: GSFC 2014d, GSFC 2014c

Note: All numbers are approximate.

Utility services would be provided by new and existing service lines and corridors. Steam and chilled water would be provided from the existing GSFC central utility plant to the Water Tower Redevelopment Site. Existing power and telecommunications utilities would be sufficient for all phases of construction. New utility lines would be installed and connected to existing lines for fire suppression water and sanitary sewer (GSFC 2014a).

The IDF would be designed to comply with EO 13693, *Planning for Federal Sustainability in the Next Decade* (March 25, 2015). EO 13693 directs Federal agencies to improve water use efficiency and management; implement high performance sustainable Federal building design, construction, operation and management; and evaluate and pursue opportunities to increase use of renewable energy. If feasible, the IDF would be designed and constructed as a Net Zero Energy Building (NZEB). An NZEB is a building or development that generates as much energy on site, as it consumes. The IDF would be designed to reduce site energy use through energy efficiency and demand-side renewable energy building technologies (e.g., photovoltaic arrays).

Recapitalization efforts are underway to maximize use of installation space. Therefore, for every development action, GSFC must demonstrate a deconstruction activity. GSFC has determined that Buildings 17, 27, and 84 and the buildings in Area 400 would be deconstructed, in addition to the buildings currently on the Water Tower Redevelopment Site, to help offset the additional square footage proposed for full buildout of the Site.

2.1.1 Phase I Redevelopment

2.1.1.1 Phase I Deconstruction Activities

Proposed deconstruction of aging and inadequate infrastructure under Phase I would include Buildings 16, 16A, 16B, and 86, which total approximately 21,650 m² (233,000 ft²) and associated parking lots currently on the Water Tower Redevelopment Site (see **Figure 2-2**). These buildings, originally constructed in the 1960s, are not suited to serve the current engineering and scientific communities and the advanced laboratory work that is required for GSFC programs and projects (GSFC 2014c). Code 200 staff and operations would be relocated from Building 16 to Building 35. Codes 100 and 400 staff and operations would be relocated from Buildings 16 and 86 to Building 36.

As a part of the recapitalization effort, Phase I would also include the deconstruction of Building 17, Building 84, and 11 buildings in Area 400. Building 17 is south of the Site and is approximately 3,639 m² (39,166 ft²) of office support space. Building 17 was constructed in 1963 and currently does not meet required NASA quality standards (GSFC 2008). Approximately 119 personnel from Building 17 would relocate to Building 22, 33 personnel would relocate to Building 18, and 6 personnel would relocate to Building 28.

Building 84 is northeast of the Site, is used for laser communication testing, and is approximately 194 m² (2,088 ft²) of space. Building 84 was constructed in 1979 and currently does not meet required NASA quality standards.

Area 400 (see **Figure 2-2**) contains 11 buildings and associated infrastructure that total approximately 744 m² (8,000 ft²) of space. Eight of the buildings (Buildings 401, 402, 403, 407, 408, 409, 413, and 414) were constructed in the 1960s, and the remaining buildings (405, 415, and 416) were constructed in 1974 or later (Goodwin and Parsons 2012).

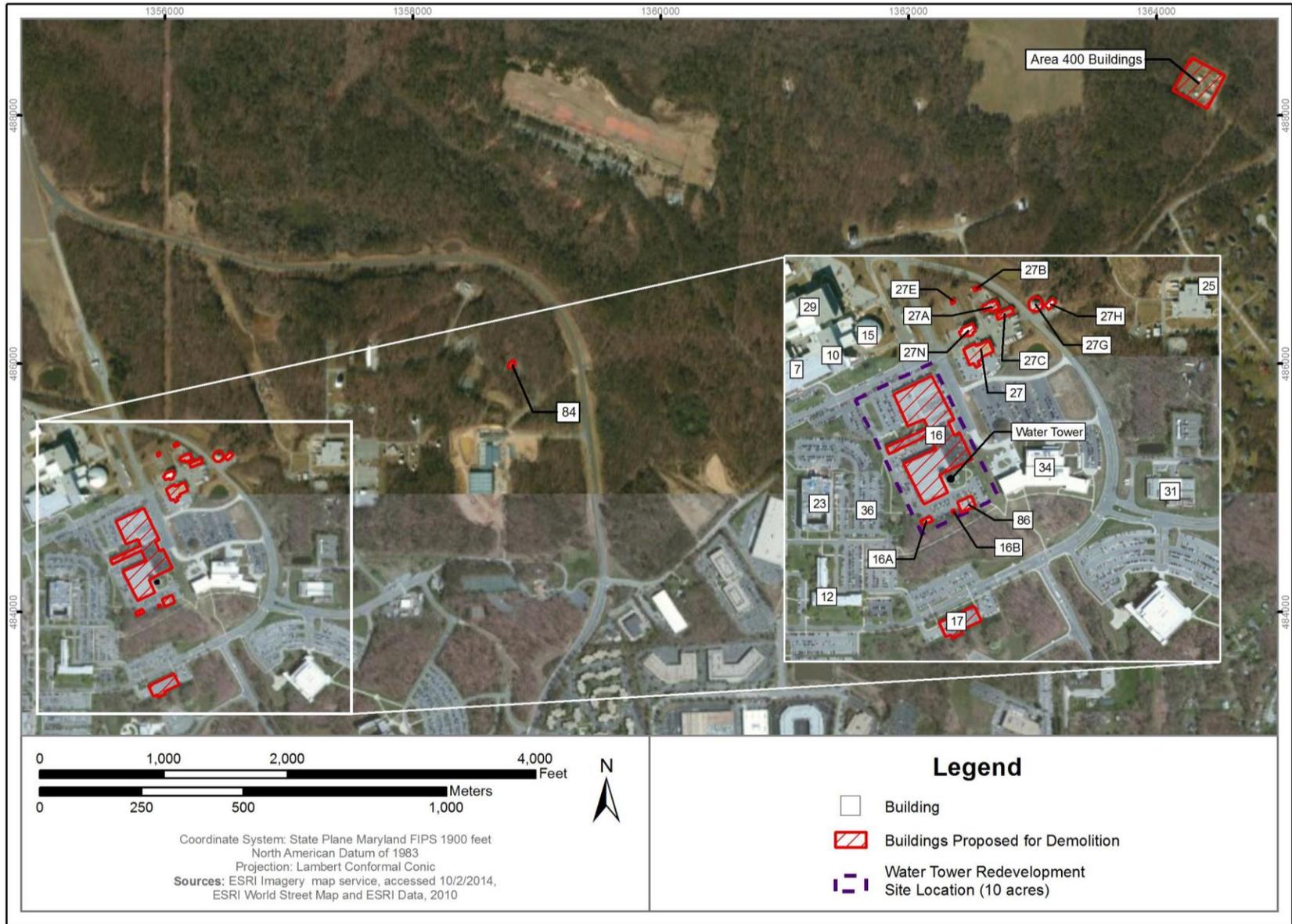
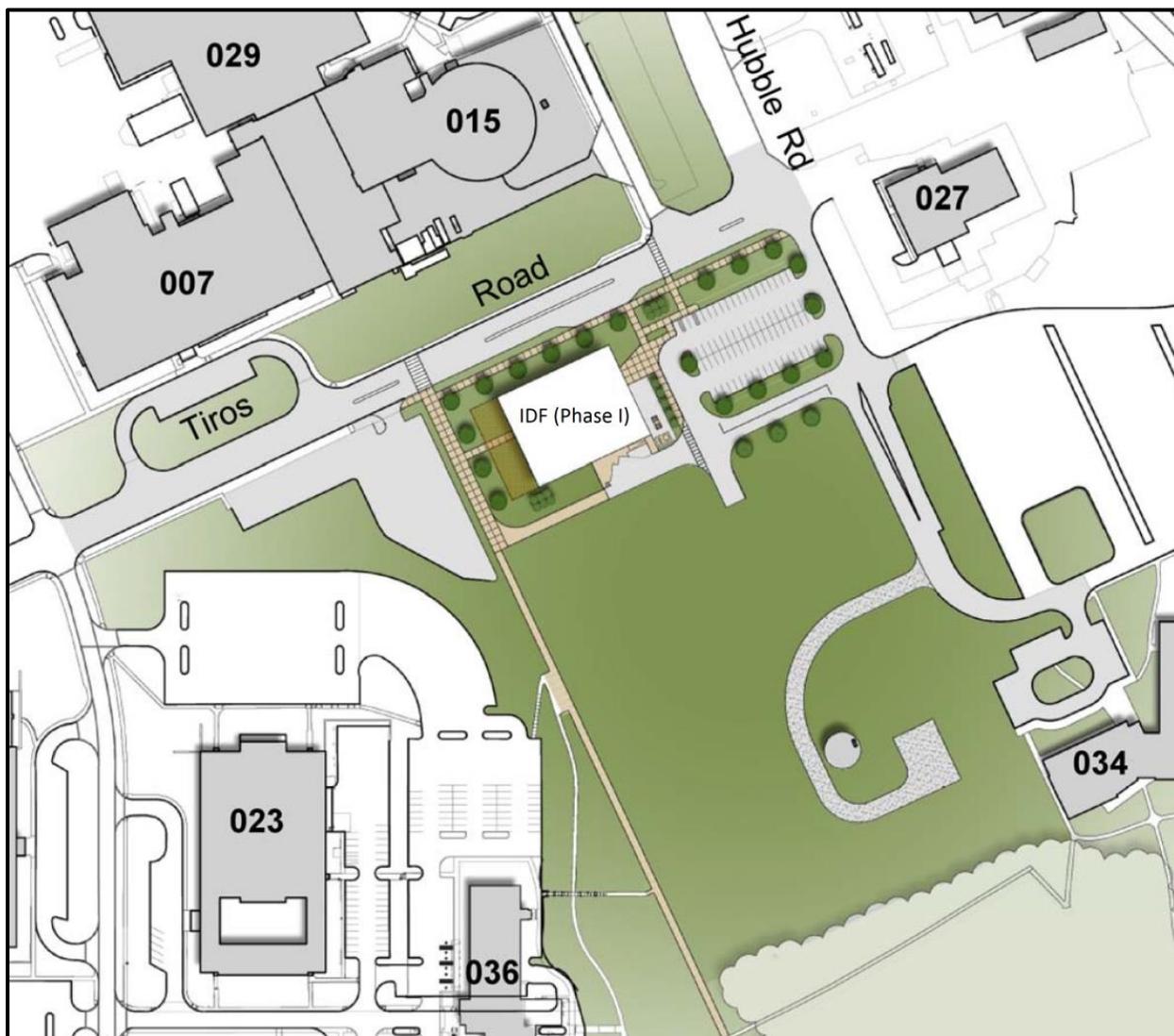


Figure 2-2. Proposed Deconstruction Activities under the Proposed Action

2.1.1.2 Phase I Construction Activities

The proposed IDF would be constructed in the northwest corner of the Water Tower Redevelopment Site under Phase I (see **Figure 2-3**). Associated features to be constructed with the 4,645 m² (50,000 ft²) facility include a surface parking lot containing approximately 67 to 80 spaces, access drives, walkways, utilities, outdoor lighting, and storm water management infrastructure. The proposed IDF would contain offices, laboratory spaces, and conference rooms to house a population of approximately 100 personnel relocating from Buildings 22, 33, and 34. Vacated space would re-populated as appropriate with other existing GSFC personnel and functions relocating to align better with their neighborhood.



Source: GSFC 2014c

Figure 2-3. Proposed Construction of IDF under Phase I

Total ground disturbance from construction activities under Phase I would be up to 1.6 hectares (3.9 acres). The Site would use low-impact development design techniques. Storm water would be managed in accordance with Goddard Procedural Requirement (GPR) 8500.5C, *Water Management*; the 2007 Energy Independence and Security Act (EISA); Maryland's 2007 Stormwater Management Act (Environment Article 4 §201.1 and §203); and Federal, state, and local requirements. Storm water management infrastructure for the Proposed Action would include the construction of a storm water management facility in the vicinity of the parking lot, bioretention facilities, grassy swales for the complex, which would substantially improve storm water management over current conditions. Detailed discussion on the low-impact development and environmental site design (ESD) techniques considered for the Proposed Action is provided in **Sections 3.8.3.1.1** and **3.10**. Further contributing to sustainable site planning, the Proposed Action would use a combination of mowed lawn and horticultural plantings and plantings of native species (GSFC 2014a). Site preparation, construction, equipment commissioning, and move-in would take approximately 31 months and occur between December 2016 and July 2019 (GSFC 2014a).

2.1.2 Phases II–IV Redevelopment

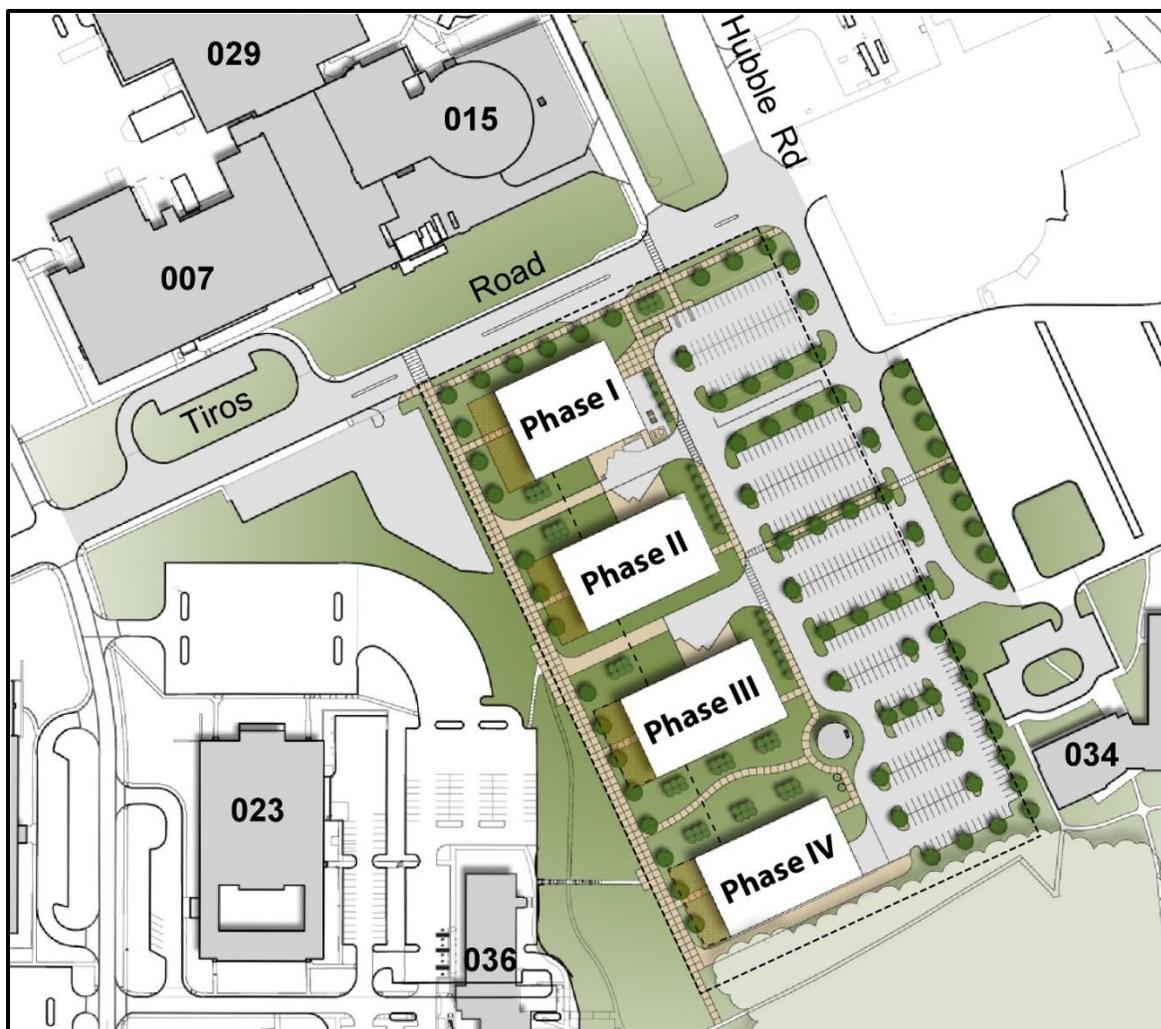
2.1.2.1 Phases II–IV Deconstruction Activities

Deconstruction of the Building 27 complex, which is to the east of and adjacent to the Water Tower Redevelopment Site, and includes eight associated structures (Buildings 27, 27A, 27B, 27C, 27E, 27G, 27H, and 27N) totaling approximately 5,860 m² (63,047 ft²) (see **Figure 2-2**) and other facilities to be determined as appropriate would occur during Phase IV, once planning is complete and the budget for deconstruction is approved and programmed. GSFC operates a less-than-90-day Hazardous Waste Accumulation Facility in accordance with GPR 8500.3, *Waste Management* in Building 27A (GSFC 2013e). The Hazardous Waste Accumulation Facility and other activities in Building 27 and associated structures would be transitioned to other facilities or locations on the GSFC campus as appropriate (see **Section 3.11.3.1.2**).

2.1.2.2 Phases II–IV Construction Activities

Facilities proposed to be constructed on the Water Tower Redevelopment Site during Phases II, III, and IV would be aligned along the western edge of the Site (see **Figure 2-4**). Phases II, III, and IV each would have approximately 4,645 m² (50,000 ft²) of development with an expansion potential of up to 930 m² (10,000 ft²). The total footprint of all four facilities under all four phases would be approximately 18,580 m² (200,000 ft²) with an expansion potential of up to 2,787 m² (30,000 ft²). There would be two primary entrances for each facility, one along the pedestrian walkway to the west of the facility, and a second to allow access from the parking lot to the east. During Phases II, III, and IV, approximately 201 to 360 parking spaces would be constructed. Additional parking would be available in the parking lot by Building 34 (located southeast of the Site).

The facilities would be interconnected via pedestrian walkways located on the western edge of the Site. The pedestrian walkways would also connect the Site with the central green space along the western edge of the Site. Appropriate utilities, pavements, access drives, sidewalks, curbs, gutters, storm water drainage and storm water management facilities, lighting, and landscaping would be included, resulting in 35 to 40 percent open space in the overall footprint of the Site.



Source: GSFC 2014c

Figure 2-4. Phases of the Proposed Action

2.2 Alternatives Analysis for Building Layouts

Under NEPA, reasonable alternatives to implement a proposed action must be considered in an EA. Considering alternatives helps to avoid unnecessary impacts and allows an analysis of reasonable ways to achieve the stated purpose. To warrant detailed evaluation, an alternative must be considered reasonable with respect to the purpose of and need for the action and applicable screening criteria. Based on NASA's Master Plan requirements, GSFC's IDF design team developed screening criteria for the placement and design of the four facilities to be consistent with the overall goals of the GSFC Master Plan. The 12 Site layout criteria developed in the planning and design phase includes the following (GSFC 2014a):

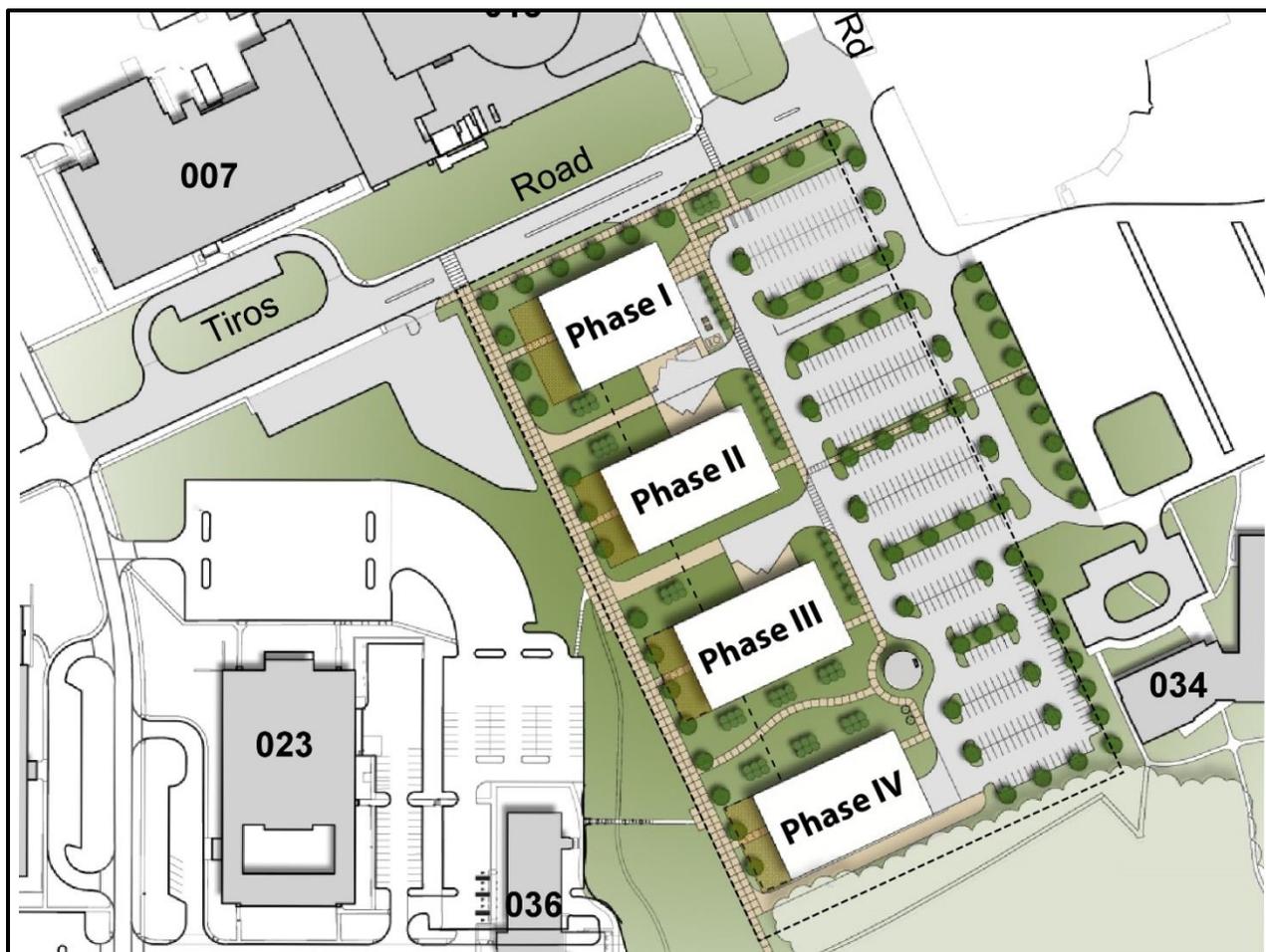
- **Mission.** Potential to address programmatic and technical research program requirements.
- **Flexibility.** Capability for building and site design to respond to fluctuating mission requirements.
- **Sustainable Design.** Potential to address fundamental sustainable design principles.

- **Open Space/Neighborhoods.** Provisions for green space and science/engineering linkages.
- **Campus Context.** Physical relationships to existing and proposed campus environment.
- **Civil/Site Engineering.** Responsiveness to site topography and storm water management requirements.
- **Utility Distribution.** Effective distribution and phasing of underground utilities.
- **Cost of Implementation.** Relative concept complexity related to site/building development costs.
- **Architectural.** Complexity and limitations related to individual phase building design.
- **Mechanical.** Complexity and limitations related to individual phase mechanical systems design.
- **Electrical.** Complexity and limitations related to individual phase electrical systems design.
- **Site Utilization.** Provisions for maximizing total building area, site population, and onsite parking.

NASA's IDF Design Team considered five alternatives for the proposed facility layouts at the Water Tower Redevelopment Site, and determined that three were suitable. These three alternatives have been carried forth for detailed analysis in the EA. A fourth alternative, the Science and Engineering Corridor Alternative, which is the Preferred Alternative, was subsequently developed by merging the most favorable attributes of the three alternatives carried forward for analysis. Other sites elsewhere on GSFC were eliminated from further analysis because none met the purpose and need, including being within the overlap of functional neighborhoods, described in **Section 1.3**. Each alternative is discussed in further detail in the following sections.

2.2.1 Science and Engineering Corridor Alternative (Preferred Alternative)

The Science and Engineering Corridor Alternative merged the most favorable attributes of each of the three alternatives carried forward for analysis (see **Figure 2-5**). The Science and Engineering Corridor Alternative fully meets every criteria developed by NASA's IDF design team with the exception of the Campus Context criterion, marginally supported (see **Table 2-2** at the end of **Section 2.2**). The simple building geometry allows for maximum planning flexibility for each phase, has an optional interconnection between phases, and allows shared facilities between phases. The Science and Engineering Corridor Alternative also creates a uniform design that resembles many other buildings on campus, consolidates parking on the eastern side of the buildings, and provides open space for storm water control. The Science and Engineering Corridor Alternative enhances the notion of neighborhoods by positioning the buildings primarily along the western edge of the site and maintains use of the campus pedestrian path and provides ample green space (GSFC 2014d). NASA believes the Science and Engineering Corridor layout meets the criteria set forth for the placement and design of the Water Tower Redevelopment Site, and, therefore, is the Preferred Alternative. Implementation of this alternative is discussed in detail in **Section 2.1**.

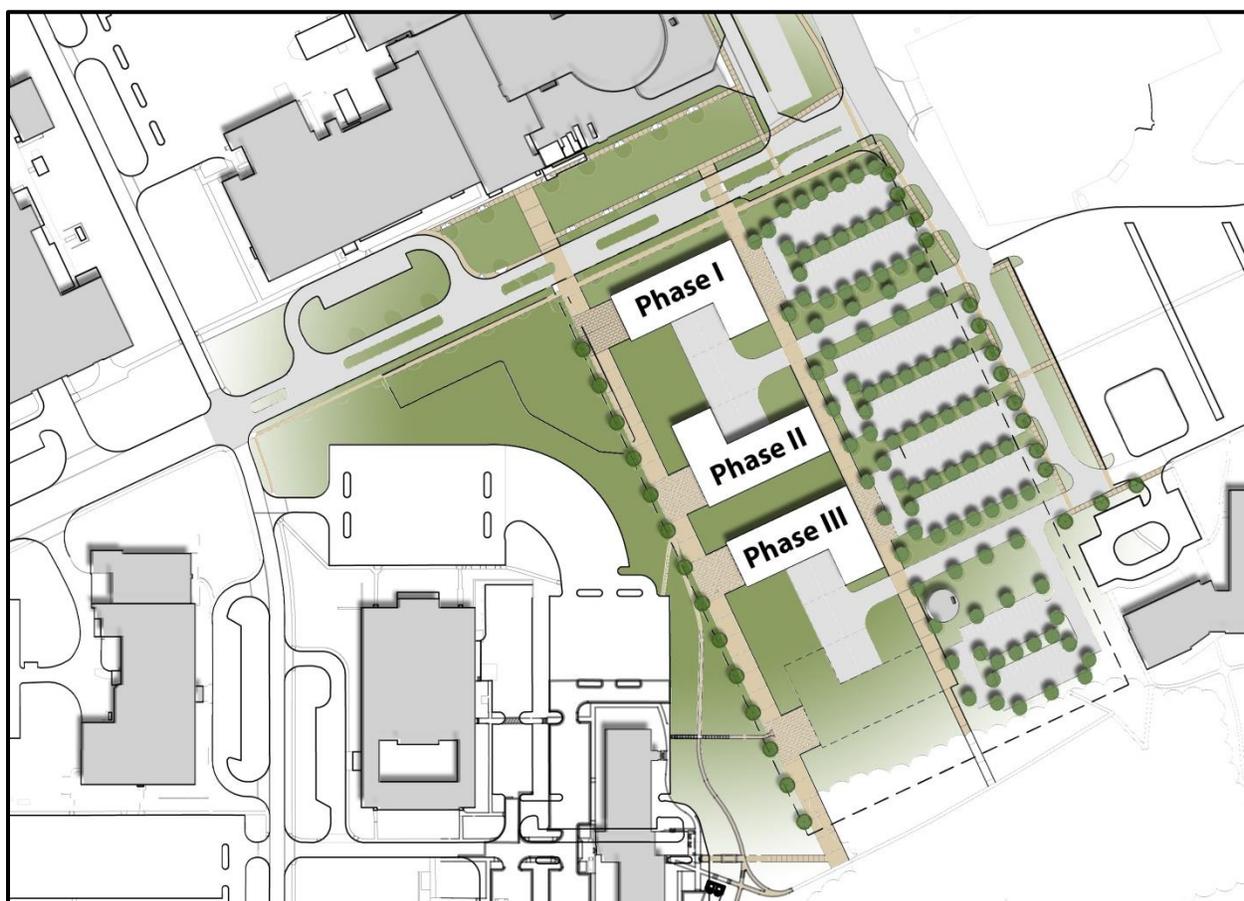


Source: GSFC 2014c

Figure 2-5. Science and Engineering Corridor Alternative (Preferred Alternative)

2.2.2 Goddard “L” Layout (Alternative 1)

The Goddard “L” layout would provide up to approximately 21,972 m² (236,500 ft²) of building space and 300 parking spaces (GSFC 2014d). The Goddard “L” layout, shown in **Figure 2-6**, meets or marginally supports 11 of the 12 criteria developed by NASA’s IDF Design Team. The site utilization criteria would present challenges under this layout. The Goddard “L” layout allows for a shared service yard between phases, can be built to accommodate a fully connected complex, and consolidates building and parking areas. Challenges with this layout include the added costs for engineering the grading of the Site, limits to flexibility due to the building geometry, and limited expansion potential of the individual phases. NASA believes the Goddard “L” layout meets or marginally supports nearly all of the criteria set forth for the placement and design of the Water Tower Redevelopment Site (GSFC 2014a), and has been carried forward for detailed analysis in the EA as Alternative 1.

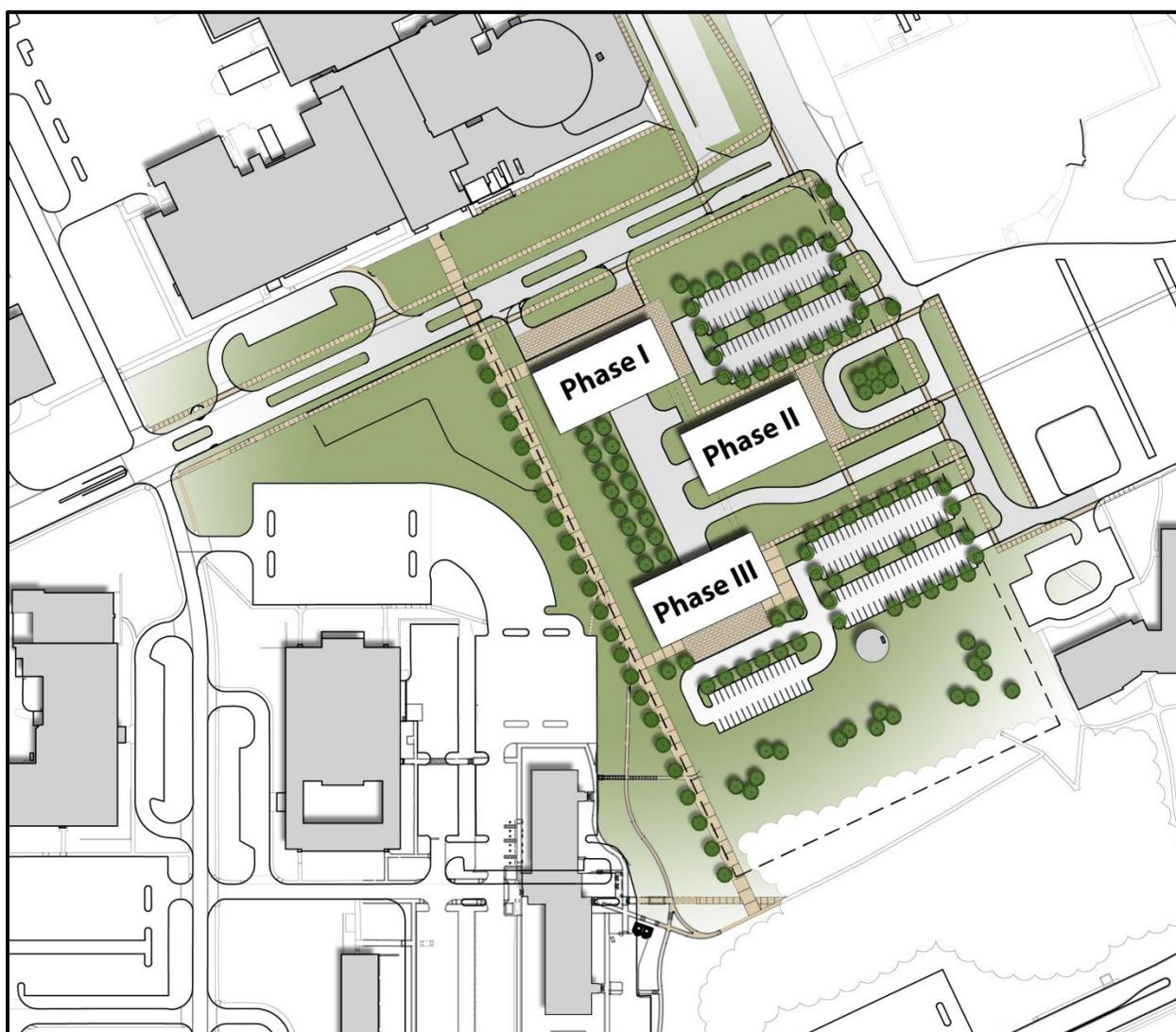


Source: GSFC 2014d

Figure 2-6. Goddard “L” Layout (Alternative 1)

2.2.3 Checkerboard Layout (Alternative 2)

The Checkerboard layout option would provide up to approximately 25,561 m² (275,000 ft²) of building space and 390 parking spaces, and accommodate up to approximately 550 NASA personnel based on final configuration. This layout design meets or marginally supports 11 of the 12 criteria developed by NASA's IDF Design Team. The site utilization criteria would present challenges under the Checkerboard layout. Benefits of the Checkerboard layout design include maximum flexibility for planning and a consolidated service yard, and it is well suited for the existing ground surface grade. Challenges with this layout include difficulty in expansion of individual phases and difficulty addressing the facility AT/FP setback requirements of 10 meters (32.8 feet) from the edge of the Site. The Checkerboard layout scored lower overall than the Preferred Alternative. However, this alternative is an acceptable alternative to the Proposed Action, and has been carried forward for detailed analysis in the EA as Alternative 2. The facility layout concept drawing of this layout is shown in **Figure 2-7** (GSFC 2014a).

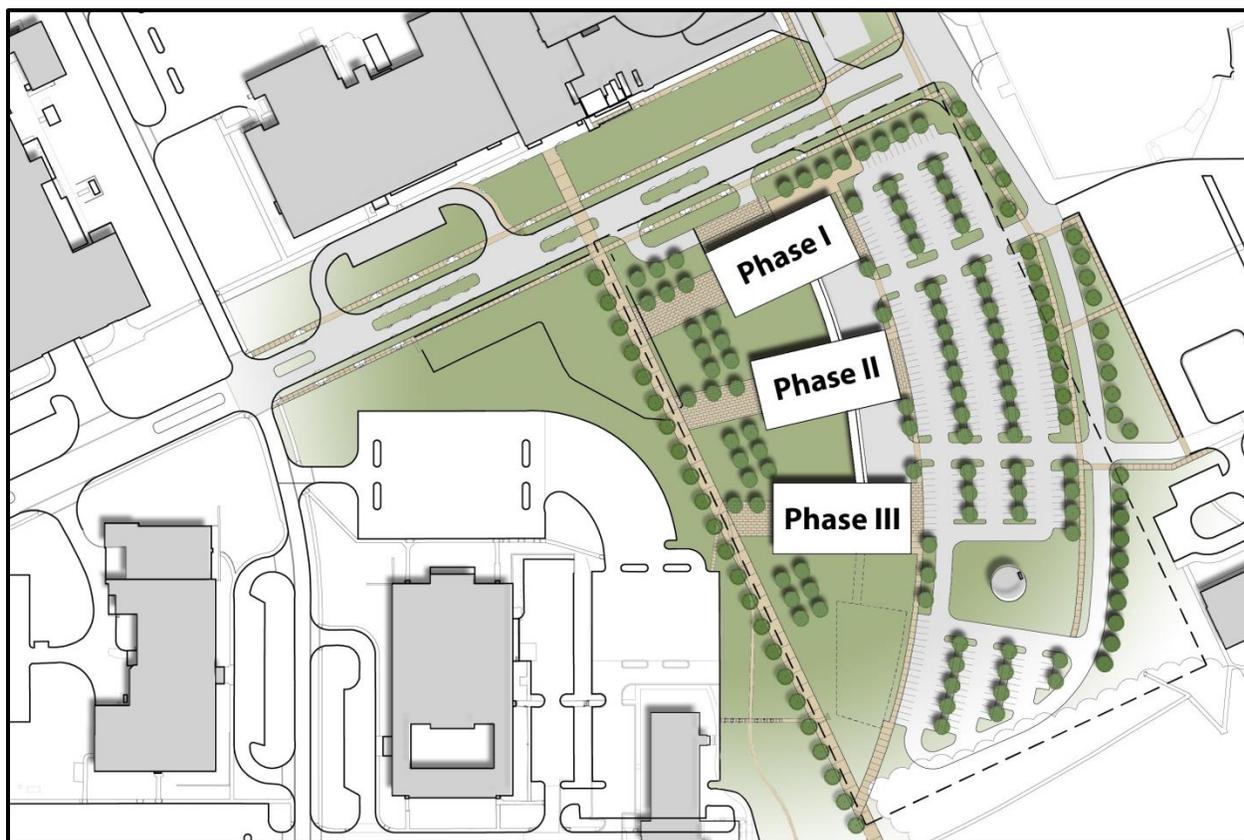


Source: GSFC 2014a

Figure 2-7. Checkerboard Layout (Alternative 2)

2.2.4 Radial Layout (Alternative 3)

The Radial layout would support a total of up to approximately 24,167 m² (260,000 ft²) of building space and 370 parking spaces, and accommodate up to approximately 530 NASA personnel based on final configuration. This layout design meets or marginally supports 11 of the 12 criteria developed by NASA's IDF Design Team. The site utilization criteria would present challenges under the Radial layout. As shown in **Figure 2-8**, this design allows for a shared service yard between phases, a fully interconnected complex, and consolidated building and parking areas. Challenges with the Radial layout design include additional site grading costs, limited planning flexibility imposed by building geometry, and a limited expansion of individual phases. The Radial layout scored lower overall than the Preferred Alternative. However, this is an acceptable alternative to the Proposed Action, and has been carried forward for detailed analysis in the EA as Alternative 3 (GSFC 2014a).

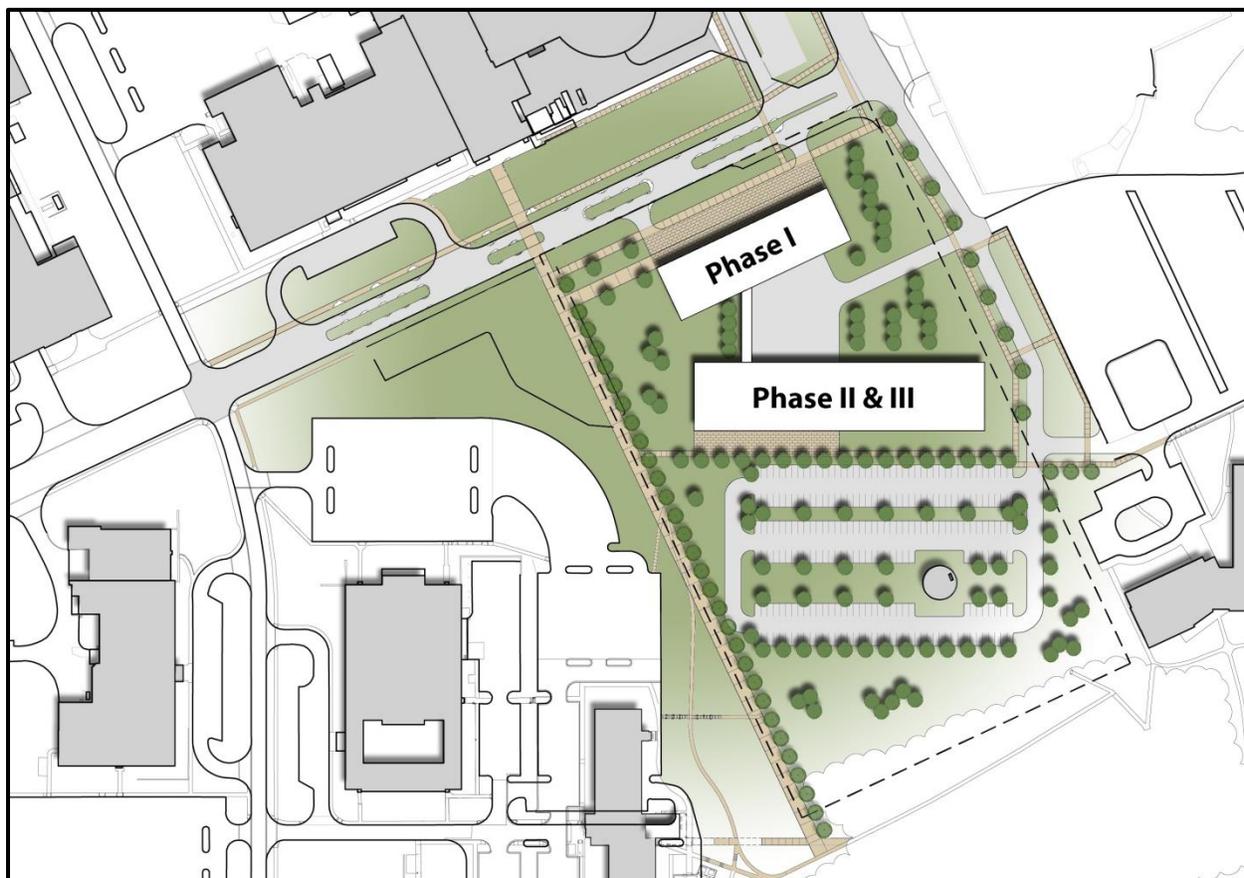


Source: GSFC 2014d

Figure 2-8. Radial Layout (Alternative 3)

2.2.5 Combined Phases Layout

The combined phases layout (shown in **Figure 2-9**) represents a two-building massing concept that places two buildings around a central service courtyard and links each with connectors at multiple floor levels. This layout design meets or marginally supports 10 of the 12 criteria developed by NASA's IDF Design Team. It provides adequate open space for the Site but does not allow for great connectivity to the rest of the campus for circulation. Furthermore, the design increases the civil and site engineering costs (GSFC 2014d). This design has been eliminated from further consideration as a viable alternative to the Proposed Action, and has not been carried forward for detailed analysis in the EA.

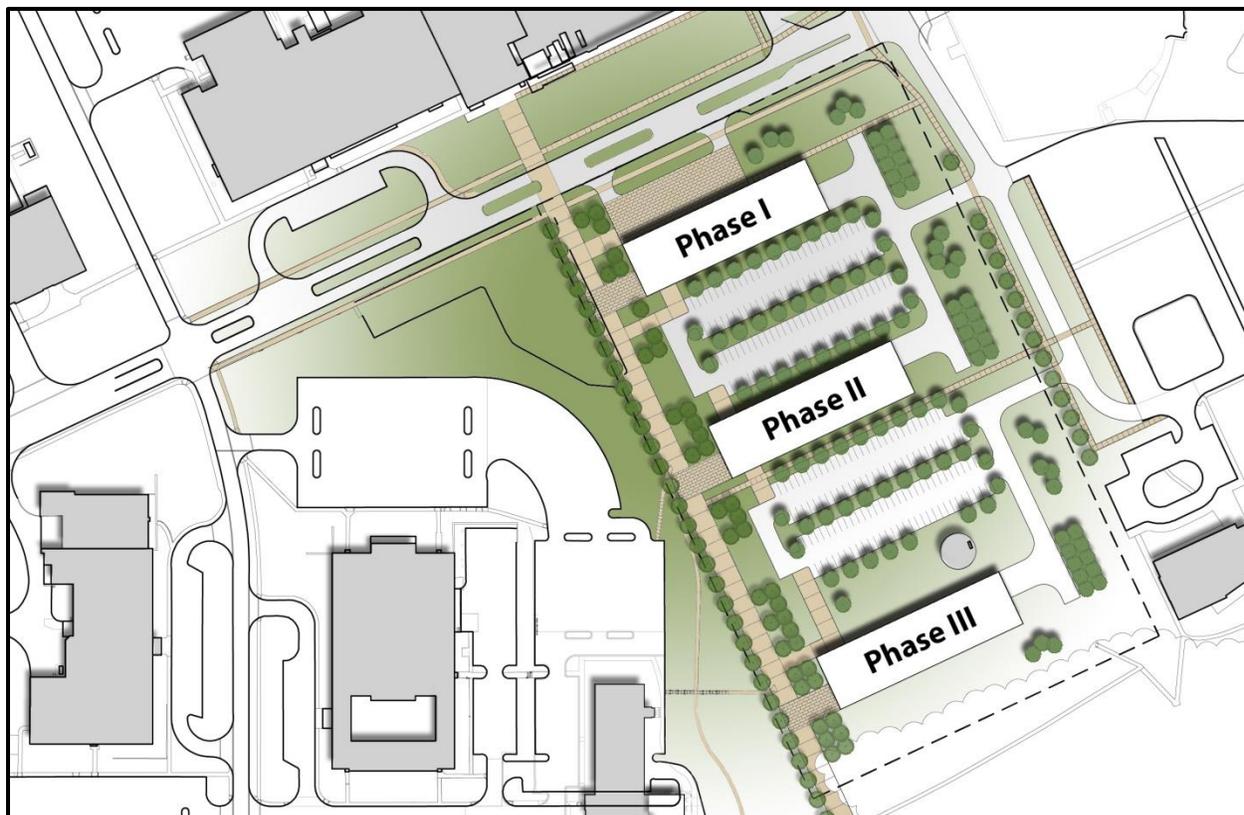


Source: GSFC 2014d

Figure 2-9. Combined Phases Layout

2.2.6 Stand-alone Layout

The Stand-alone layout promotes parking and greenspace between each building and is similar to many other buildings on campus (see **Figure 2-10**). This layout design meets or marginally supports 10 of the 12 criteria developed by NASA's IDF Design Team. This design would not meet the project criteria for increasing open space or the overall aesthetic value of the campus. Furthermore, this layout would not offer the flexibility of sharing functions, operations, and common areas between buildings (GSFC 2014d). This design has been eliminated from further consideration as a viable alternative to the Proposed Action, and has not been carried forward for detailed analysis in the EA.



Source: GSFC 2014d

Figure 2-10. Stand-alone Layout

2.2.7 Comparison of Alternatives

NASA identified the Science and Engineering Corridor layout as the Preferred Alternative for this Proposed Action. Overall, the Science and Engineering Corridor Alternative meets the requirements of all but one criterion, and it scored higher than each of the other alternatives. The basis for the development of this alternative as discussed in this EA is described in greater detail in the ADP. The Goddard “L” (Alternative 1), Checkerboard (Alternative 2), and Radial (Alternative 3) layout options meet nearly all of the criteria as well. These options will be carried forth as viable alternatives to the Proposed Action. The Combined Phases and Stand-alone layouts scored lower when compared to the other alternatives, are not considered viable alternatives to the Proposed Action, and have been eliminated from further consideration in this EA. **Figure 2-11** shows how the alternatives were developed and evaluated. **Table 2-2** depicts how each of the six facility layout concepts compared to the criteria developed by NASA.

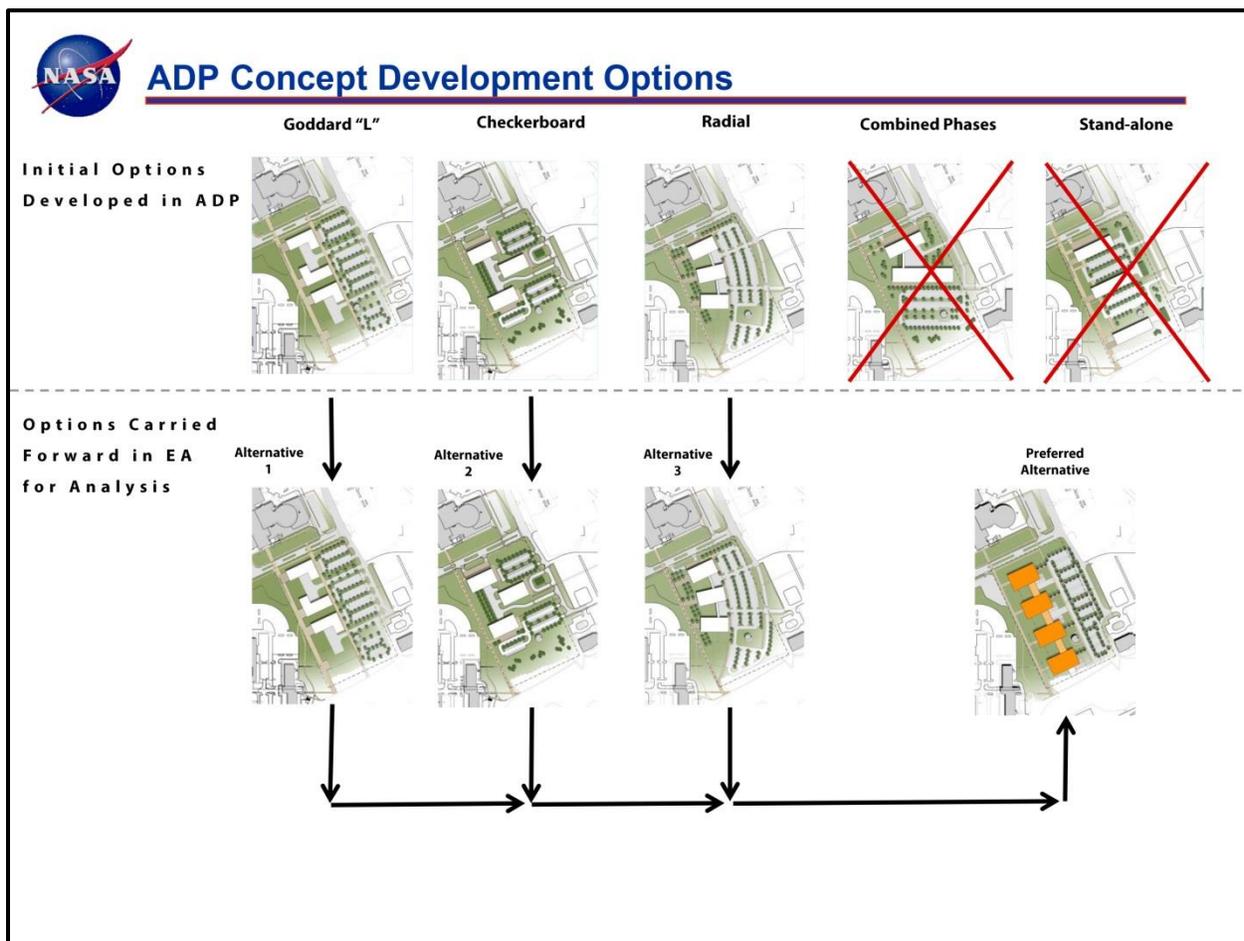
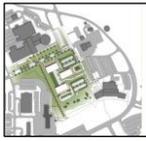
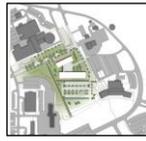
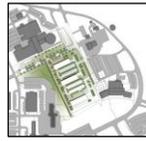


Figure 2-11. Alternatives Evaluation Process

Table 2-2. Comparison of Facility Layout Alternatives

						
CRITERIA	Science and Engineering Corridor Alternative (Preferred Alternative)	Goddard "L" (Alternative 1)	Checkerboard (Alternative 2)	Radial (Alternative 3)	Combined Phases	Stand alone
Mission						
Flexibility						
Sustainable Design						
Open Space/ Neighborhoods						
Civil/Site Engineering						
Utilities Distribution						
Campus Context						
Cost of Implementation						
Architectural						
Mechanical						
Electrical						
Site Utilization						

Source: GSFC 2014d, GSFC 2014c

Key:

-  Meets Requirements
-  Marginally Supports Requirements
-  Presents Challenges

2.3 No Action Alternative

Under the No Alternative Action, the existing features of the Water Tower Redevelopment Site would remain unchanged. There would be no deconstruction of existing buildings and no construction of the IDF or the subsequent phases. GSFC would continue to develop instruments in separate locations on the campus, which would continue to limit the collaboration between the science and engineering divisions at GSFC. The No Action Alternative does not meet the purpose of and need for the Proposed Action. Under the No Action Alternative, GSFC would not consolidate functions or maintain cutting-edge facilities to support the GSFC mission of developing advanced technologies for space and earth science.

2.4 Summary of Environmental Consequences

Table 2-3 summarizes the potential environmental consequences of the Proposed Action, Alternatives, and the No Action Alternative, based on the impact analyses presented in **Section 3**.

Table 2-3. Summary of Environmental Consequences

Resource	Science and Engineering Corridor Alternative (Preferred Alternative)	Goddard “L” Layout (Alternative 1)	Checkerboard Layout (Alternative 2)	Radial Layout (Alternative 3)	No Action Alternative
Land Use	No significant adverse impacts on land use would be expected from changes to land use.	Impacts would be the same as the Preferred Alternative.	Impacts would be the same as the Preferred Alternative.	Impacts would be the same as the Preferred Alternative.	No impacts on land use would be expected.
Cultural Resources	Long-term, moderate, adverse impacts on historic and cultural resources resulting from the deconstruction of contributing resources to the NRHP-eligible GSFC Historic District. The design of the IDF and the site development could result in possible indirect, adverse visual impacts on the GSFC Historic District.	Impacts would be the same as the Preferred Alternative.	Impacts would be the same as the Preferred Alternative.	Impacts would be the same as the Preferred Alternative.	No impacts on cultural resources would be expected.
Air Quality	Long-term, beneficial impacts on air quality would be expected from the aggressive energy efficiency standards in place and deconstruction of older, less efficient buildings, which would reduce greenhouse gas (GHG) emissions. Short-term, minor, adverse effects on air quality would be expected from construction and deconstruction. Emissions associated with operation would be similar to, and consistent with, existing conditions at GSFC. Renewable energy technologies would produce significantly lower emissions; however, some technologies, such as biomass heat, would result in a minor increase in emissions for GSFC and a modification to GSFC’s existing Title V air quality permit.	Impacts on air quality from activities proposed in Alternative 1 would be similar to those described for the Preferred Alternative.	Impacts on air quality from activities proposed in Alternative 2 would be similar to those described for the Preferred Alternative.	Impacts on air quality from activities proposed in Alternative 3 would be similar to those described for the Preferred Alternative.	Existing conditions would remain the same. Minor, adverse impacts on air quality due to ongoing use of less energy-efficient utility systems would continue. No new effects on regional or local air quality would occur.

Resource	Science and Engineering Corridor Alternative (Preferred Alternative)	Goddard “L” Layout (Alternative 1)	Checkerboard Layout (Alternative 2)	Radial Layout (Alternative 3)	No Action Alternative
Noise	Minor, short-term increases in ambient noise levels from deconstruction and construction of the proposed IDF facilities would cause adverse effects on personnel in surrounding facilities. Once construction and deconstruction activities are completed, operational noise levels would return to existing noise levels.	Noise levels associated with deconstruction and construction activities would be similar to those described in the Preferred Alternative. Operational activities would be similar to existing.	Noise levels associated with deconstruction and construction activities would be similar to those described in the Preferred Alternative. Operational activities would be similar to existing.	Noise levels associated with deconstruction and construction activities would be similar to those described in the Preferred Alternative. Operational activities would be similar to existing.	Proposed construction and deconstruction activities would not occur and the existing conditions would be unchanged. No adverse impacts on the ambient noise level would occur.
Coastal Zone Management	Long-term, minor, beneficial impacts would result from the expected net decrease of impervious surfaces. No impacts on coastal uses or resources of Maryland would be expected.	Impacts would be similar to, but slightly less than, those described under the Preferred Alternative.	Impacts would be similar to, but slightly more than, those described under the Preferred Alternative.	Impacts would be similar to, but slightly more than, those described under the Preferred Alternative.	No impacts on coastal resources would be expected.
Geological Resources	Short-term, minor, adverse impacts would result from soil disturbance and compaction related to construction and deconstruction.	Impacts would be similar to those of the Preferred Alternative, except more soil disturbance from grading activities.	Impacts would be the same as those mentioned under the Preferred Alternative.	Impacts would be similar to those of the Preferred Alternative, except more soil disturbance from grading activities.	No impacts on geological resources would be expected.

Resource	Science and Engineering Corridor Alternative (Preferred Alternative)	Goddard “L” Layout (Alternative 1)	Checkerboard Layout (Alternative 2)	Radial Layout (Alternative 3)	No Action Alternative
Biological Resources	Short- and long-term, negligible to minor, adverse impacts on vegetation and wildlife would be expected from construction and deconstruction activities. No adverse effects on federally and state-listed or other sensitive and protected species would be expected.	Impacts would be similar to, but slightly less intense than, those described under the Preferred Alternative.	Impacts would be similar to, but slightly less intense than, those described under the Preferred Alternative.	Impacts would be the same as those described under the Preferred Alternative.	No impacts on biological resources would be expected.
Water Resources	Long-term, beneficial impacts on water resources would be expected from increased management of storm water, established water use efficiency standards, and the deconstruction of inadequate facilities without storm water management facilities. Short-term, minor, adverse impacts on water resources would occur from temporary disturbances during construction and deconstruction activities. Appropriate NPDES permits, Storm Water Pollution Prevention Plan (SWPPP) implementation, and use of appropriate best management practices (BMPs) to minimize impacts would occur.	Impacts on water resources would be similar to, but slightly less than, those described under the Preferred Alternative.	Impacts on water resources would be similar to, but slightly more than, those described under the Preferred Alternative.	Impacts on water resources would be similar to, but slightly more than, those described under the Preferred Alternative.	Long-term, minor, adverse impacts on water resources would continue as result of runoff from existing impervious surfaces. No new impacts on water resources would be expected.

Resource	Science and Engineering Corridor Alternative (Preferred Alternative)	Goddard “L” Layout (Alternative 1)	Checkerboard Layout (Alternative 2)	Radial Layout (Alternative 3)	No Action Alternative
Socioeconomic Resources	Short-term, beneficial impacts on socioeconomics would be expected. The number of construction workers hired would most likely come from the existing supply and relocation of workers to meet the demand would not be expected. An increase in payroll tax revenues, purchase of materials, and purchase of goods and services in the area during construction activities would also be expected. Short-term, negligible, adverse impacts on environmental justice would be expected. Potential adverse impacts from construction activities could include increased traffic and noise levels, but these would be short-term, intermittent, and minimal. No off-installation minority populations would be disproportionately impacted by the Proposed Action.	Impacts on socioeconomics and environmental justice would be the same as those described under the Preferred Alternative.	Impacts on socioeconomics and environmental justice would be the same as those described under the Preferred Alternative.	Impacts on socioeconomics and environmental justice would be the same as those described under the Preferred Alternative.	No impacts on socioeconomics or environmental justice would be expected.
Utilities, Infrastructure, and Transportation	Short-term, minor to moderate, adverse impacts on solid waste and transportation during deconstruction and construction. Long-term, beneficial effects on utilities and infrastructure from construction and operation. No significant service disruptions are anticipated to personnel in nearby buildings. Impacts from operational activities would include an increase in traffic in the immediate project area, but overall traffic levels would not change as the population of GSFC would not increase.	Impacts would be the same as those described under the Preferred Alternative.	Impacts would be the same as those described under the Preferred Alternative.	Impacts would be the same as those described under the Preferred Alternative.	No impacts on utilities, infrastructure, and transportation would be expected.

Resource	Science and Engineering Corridor Alternative (Preferred Alternative)	Goddard “L” Layout (Alternative 1)	Checkerboard Layout (Alternative 2)	Radial Layout (Alternative 3)	No Action Alternative
Hazardous Materials and Wastes	GSFC management controls and processes would ensure that hazardous materials and wastes would be properly managed and any accidental release would result in minimal, if any, impacts.	Impacts would be the same as those described under the Preferred Alternative.	Impacts would be the same as those described under the Preferred Alternative.	Impacts would be the same as those described under the Preferred Alternative.	No impacts on hazardous materials and wastes would be expected.
Human Health and Safety	No impacts would be expected. GSFC has developed plans and processes to address worker safety and the potential release of known contaminants, or accidental release of materials used, during the construction and operation of the IDF complex.	Impacts would be the same as those described under the Preferred Alternative.	Impacts would be the same as those described under the Preferred Alternative.	Impacts would be the same as those described under the Preferred Alternative.	No impacts on human health and safety would be expected.

3. Affected Environment and Environmental Consequences

For each resource topic, this chapter describes the existing environmental conditions at GSFC, immediately followed by the analysis of potential environmental impacts associated with implementation of the Proposed Action and alternatives described in **Section 2**. The environmental impacts from the No Action Alternative are also described. The information and data presented in this chapter are commensurate with the level of potential impacts to provide the proper context for evaluating impacts.

The following parameters are used to evaluate the duration and extent of potential environmental and socioeconomic impacts associated with the Proposed Action and alternatives.

Short term or long term. These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. Generally, short-term effects occur only with respect to a particular activity or for a finite period, such as the time required for construction or installation. Long-term effects are more likely to be persistent and chronic.

Direct or indirect. A direct effect is caused by and occurs contemporaneously at or near the location of the action. An indirect effect is caused by a proposed action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action. For example, a direct effect of erosion on a stream might include sediment-laden waters in the vicinity of the action, whereas an indirect impact of the same erosion might lead to lack of spawning and result in lowered reproduction rates of indigenous fish downstream.

Negligible, minor, moderate, or major. These relative terms are used to characterize the magnitude or intensity of an impact. Negligible effects are generally those that might be perceptible but are at the lower level of detection. A minor effect is slight, but detectable. A moderate effect is readily apparent. A major effect is one that is severely adverse or exceptionally beneficial.

Adverse or beneficial. An adverse effect is one having unfavorable or undesirable outcomes on the man-made or natural environment. A beneficial effect is one having positive outcomes on the man-made or natural environment. A single act might result in adverse effects on one environmental resource and beneficial effects on another resource or could result in both adverse and beneficial impacts on a single resource.

Significance. Determination of significant effects requires the consideration of both context and intensity as set forth in CEQ regulations (40 CFR Part 1508.27).

Context. The context of an effect can be localized or more widespread (e.g., regional).

Intensity. The intensity of an effect is determined through consideration of several factors, including whether an alternative might have an adverse impact on the unique characteristics of an area (e.g., historical resources, ecologically critical areas), public health or safety, or endangered or threatened species or designated critical habitat. Effects are also considered in terms of their potential for violation of Federal, state, or local environmental law; their controversial nature; the degree of uncertainty or unknown effects, or unique or unknown risks; if there are precedent-setting effects; and their cumulative effects (see **Section 4**).

This EA examines the environmental impacts of the Proposed Action and reasonable alternatives on the following resource areas: land use, cultural resources, air quality, noise, coastal zone management, geological resources, biological resources, water resources, socioeconomics (including environmental

justice and protection of children from environmental health risks and safety risks), utilities and infrastructure (including transportation), hazardous materials and wastes, and human health and safety.

3.1 Land Use and Visual Resources

3.1.1 Definition of the Resource

The term land use refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel. In many cases, land use descriptions are codified in installation master planning and local zoning laws. Two main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent property parcels or areas. However, there is no nationally recognized convention or uniform terminology for describing land use categories. As a result, the meanings of various land use descriptions, labels, and definitions vary among jurisdictions. Natural conditions of property can be described or categorized as unimproved, undeveloped, conservation or preservation area, and natural or scenic area. There is a wide variety of land use categories resulting from human activity. Descriptive terms often used include residential, commercial, industrial, agricultural, institutional, and recreational.

In appropriate cases, the location and extent of a proposed action needs to be evaluated for its potential effects on a project site and adjacent land uses. The foremost factor affecting a proposed action in terms of land use is its compliance with any applicable land use or zoning regulations. Other relevant factors include matters such as existing land use at the project site, the types of land uses on adjacent properties and their proximity to a proposed action, the duration of a proposed activity, and its permanence.

Visual resources are related to land use and are defined as the natural and man-made features that give a particular setting or area its aesthetic qualities. These features define the landscape character of an area and form the overall impression that an observer receives of that area. Evaluating the aesthetic qualities of an area is a subjective process because the value that an observer places on a specific feature varies depending on his or her perspective.

3.1.2 Existing Conditions

The NASA GSFC is located in Prince George's County, Maryland, which is divided into 35 separate planning areas, each with their own County-approved Master Plan. GSFC lies primarily within Planning Area 64, also known as the Agriculture Research Center Planning Area of Prince George's County. Portions of GSFC are also situated within Planning Areas 67 (Greenbelt) and 70 (Glenn Dale-Seabrook-Lanham). GSFC, however, is a Federal entity with its own Master Plan and Environmental Resource Document (ERD) and is not required to abide by Prince George's County land use regulations (GSFC 2012b). An ERD provides a baseline description of all environmental aspects of a NASA facility. The ERD is a tool used to assist in ongoing management and planning decisions for GSFC projects and activities.

Land use around GSFC is typical of a suburban environment with a mix of land uses including residential, commercial, and institutional. To the north of GSFC is the Beltsville Agricultural Research Center, a lightly developed area managed by the U.S. Department of Agriculture (USDA) (NASA 2007). To the west of GSFC is the City of Greenbelt, which contains a mix of commercial and residential development consisting of shopping malls, office parks, and low-rise apartments and condominiums. Areas to the south and east of GSFC include the residential areas of Seabrook, Lanham, and Glenn Dale.

The GSFC campus itself is divided into five distinct areas, also known as "neighborhoods": Institutional Support, Engineering and Technology, Science and Exploration, Program and Project Management, and other areas reserved for future flexibility and development. The Institutional Support area is located

toward the west part of the campus and is predominately used to house personnel and facilities that provide GSFC with capacity to support research and technical functions on the campus. As shown as the blue area on **Figure 1-3**, the Engineering and Technology neighborhood composes the northern portion of the campus and it predominately houses the Engineering and Technology Directorate personnel, though many members of this staff are found throughout the campus. The Science and Exploration neighborhood (shown as the yellow area on **Figure 1-3**) located toward the east of the campus provides facilities for the Space Science Directorate, research facilities that deal with multiple NASA core scientific and technical organizations, and NASA employee support functions. The Program and Project Management neighborhood (shown as the orange area on **Figure 1-3**) is located at the center of GSFC campus and houses the Office of the Director and the Flight Programs and Projects Directorate who are responsible for administration and management. The southern portion of GSFC is reserved for future flexibility and development, which is designated for potential new program development that could take place on short notice (GSFC 2008).

Existing land use at GSFC is spread across the campus in various buildings, resulting in costly, time-consuming, and dangerous packaging and transport of components and instruments to the Integration and Test complex (Buildings 7, 10, 15, and 29). The Area 400 buildings are former propulsion laboratories currently used as support and storage facilities. Building 84 is also currently used for support functions on the campus. Neither the Area 400 buildings nor Building 84 occur within the designated GSFC neighborhoods. The Water Tower Redevelopment Site and Building 27, as part of the Proposed Action, are currently located within the Program and Project Management neighborhood.

The visual resources at GSFC are typical of an administrative and light industrial campus. The Water Tower Redevelopment Site is currently characterized by warehouse facilities associated with various research and administrative buildings. There is a small stand of trees along a ravine south of the site that breaks up the monotony of buildings and parking lots in the area. The Area 400 buildings and Buildings 17 and 84 are also characteristic of buildings at the Water Tower Redevelopment Site since they were generally built around the same time.

3.1.3 Environmental Consequences

The evaluation of impacts on land use is based on the degree of land use sensitivity in areas affected by a proposed action and compatibility of proposed actions with existing conditions. Land use can remain compatible or become compatible. Project compatibility issues were measured qualitatively. Effects on land use were assessed by evaluating the following criteria:

- Consistency and compliance with existing land use plans, zoning, or policies
- Alternation of the viability of existing land use
- The degree to which the Proposed Action or alternatives preclude continued use or occupation of an area
- The degree to which the Proposed Action or alternatives conflict with planning criteria established to ensure the safety and protection of human life and property.

The significance of potential impacts on visual resources is based on the level of visual sensitivity in the area. Visual sensitivity is defined as the degree of public interest in a visual resource and concern over adverse changes in the quality of that resource. In general, an impact on a visual resource is considered adverse if implementation of a proposal were to result in substantial changes to an existing sensitive visual setting.

3.1.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

3.1.3.1.1 Phase I Activities

Short-term, negligible impacts on land use would occur from the presence of deconstruction and construction activities and equipment on the Water Tower Redevelopment Site under Phase I. Long-term beneficial impacts on land use would also be expected from creating a synergistic overlap of the existing Science and Exploration and Engineering and Technology neighborhoods. The overlap of neighborhoods would combine mixed land use that would serve to meet the GSFC Master Plan requirements. This would be an overall beneficial impact by centralizing activities on the GSFC campus.

Short-term, negligible impacts on visual resources would occur from the presence of deconstruction and construction activities and equipment on the Water Tower Redevelopment Site under Phase I. Long-term, beneficial impacts would also be expected on visual resources from the construction of modern buildings at the site. The buildings in Area 400 and Buildings 17 and 84 would be deconstructed and the area around them would be allowed to return to its natural state, which would represent a long-term, beneficial impact on the visual resources of the area. Removal of these structures would also support GSFC's recapitalization efforts to maintain sustainable infrastructure efficiently, which would have an overall beneficial impact.

3.1.3.1.2 Phases II–IV Activities

Impacts on land use and visual resources from Phases II through IV activities would be similar to those discussed under Phase I. The deconstruction of Building 27 (and associated buildings) would support GSFC recapitalization efforts and could also have long-term, beneficial impacts if the area was allowed to return to its natural state. Long-term, beneficial impacts on land use would also be expected on the Water Tower Redevelopment Site because the new construction would facilitate a more efficient work environment at GSFC.

3.1.3.2 Goddard “L” Layout (Alternative 1)

Impacts from Alternative 1 would be the same as those mentioned under the Preferred Alternative.

3.1.3.3 Checkerboard Layout (Alternative 2)

Impacts from Alternative 2 would be the same as those mentioned under the Preferred Alternative.

3.1.3.4 Radial Layout (Alternative 3)

Impacts from Alternative 3 would be the same as those mentioned under the Preferred Alternative.

3.1.3.5 No Action Alternative

Under the No Action Alternative, the Science and Engineering neighborhoods on GSFC would not be extended to overlap at the Water Tower Redevelopment Site. Existing features at the Water Tower Redevelopment Site would also remain the same. There would be no deconstruction or construction under the No Action Alternative because GSFC would continue to develop instruments in separate locations on the campus and inefficient collaboration would occur between the science and engineering divisions. Therefore, no impacts on land use or visual resources would be expected from implementation of the No Action Alternative.

3.2 Cultural Resources

3.2.1 Definition of the Resource

“Cultural resources” is an umbrella term for many heritage-related resources defined in several Federal laws and EOs. These include the NHPA, the Archeological and Historic Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (NAGPRA) (1990).

The NHPA focuses on cultural resources such as prehistoric and historic sites, buildings and structures, districts, or other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other reason. Such resources might provide insight into the cultural practices of previous civilizations or they might retain cultural and religious significance to modern groups. Resources found significant under criteria established in the NHPA are considered eligible for listing in the NRHP. These are termed “historic properties” and are protected under the NHPA. NAGPRA requires consultation with culturally affiliated Native American tribes for the disposition of Native American human remains, burial goods, and cultural items recovered from federally owned or controlled lands.

Typically, cultural resources are subdivided into archaeological sites (prehistoric or historic sites containing physical evidence of human activity but no structures remain standing); architectural sites (buildings or other structures or groups of structures, or designed landscapes that are of historic or aesthetic significance); and sites of traditional, cultural, or religious significance.

Archaeological resources comprise areas where human activity has measurably altered the earth or deposits of physical remains are found (e.g., projectile points and bottles). Architectural resources include standing buildings, bridges, dams, and other structures of historic or aesthetic significance. Generally, architectural resources must be more than 50 years old to warrant consideration for the NRHP. More recent structures might warrant protection if they are of exceptional importance or if they have the potential to gain significance in the future. Resources of traditional, religious, or cultural significance can include archaeological resources, sacred sites, structures, neighborhoods, prominent topographic features, habitat, plants, animals, and minerals considered essential for the preservation of traditional culture.

The EA process requires assessment of the potential impact of a Federal action on cultural resources. In addition, under Section 106 of the NHPA, Federal agencies must take into account the effect of their undertakings on historic properties, consult with the State Historic Preservation Officer (SHPO) and other consulting parties, and allow the Advisory Council on Historic Preservation a reasonable opportunity to comment. Under this process, the Federal agency evaluates the NRHP eligibility of resources within the proposed undertaking’s Area of Potential Effect (APE) and assesses the possible effects of the proposed undertaking on historic properties in consultation with the SHPO and other parties. The APE is defined as the geographic area(s) “within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.”

3.2.2 Existing Conditions

GSFC was established in 1959 as NASA’s first space research facility. Located in Greenbelt, Maryland, it was named after Dr. Robert Hutchings Goddard, who is widely considered the father of modern rocketry. GSFC was dedicated on March 16, 1961, on the 35th anniversary of Dr. Goddard’s first liquid-propelled rocket launch. GSFC was responsible for unmanned spacecraft and sounding rocket experiments in basic and applied research. The worldwide Space Tracking and Data Acquisition Network, later renamed the Spaceflight Tracking and Data Network, was operated from GSFC. The

development and launch of the Thor-Delta launch vehicle and the development of the Landsat program and the Hubble Space Telescope were also completed at GSFC (Garber 2005, Goodwin and Parsons 2013). GSFC's scientists and engineers have participated in nearly every aspect of space exploration, including human space flight projects, aeronautics research, remote-sensing Earth satellites, the development of communications satellites, and the Space Shuttle program (Goodwin and Parsons 2012). A more detailed history of GSFC is provided in the 2012 *Integrated Cultural Resources Management Plan* (Goodwin and Parsons 2013).

The GSFC campus was generally developed in three phases: 1959 to 1965, 1966 to 1969, and 1970 to the present. The first phase of construction occurred on the Main Campus and included the completion of Buildings 1 through 20 and Building 24. Despite the number of facilities constructed, there was still insufficient space to accommodate all of the programs and activities at GSFC. As soon as construction on the initial buildings was complete, several additions were constructed on the newly erected buildings. The second phase of construction completed buildings that began in the first phase, those identified in the installation's Master Plan, and additions to existing buildings to support the Apollo program. The third phase of construction includes the 12 buildings constructed since 1970; and updating, renovating, and adapting existing buildings and facilities in response to changing missions and programs (Goodwin and Parsons 2013).

GSFC covers more than 486 hectares (1,200 acres) across five geographic areas (Goodwin and Parsons 2013). These include the Main Campus, Area 100, Area 200, Area 300, and Area 400. The Main Campus, the largest of the five areas, covers more than 332 hectares (820 acres) and contains the largest concentration of buildings. The remainder of the campus is largely undeveloped and is forested. The Proposed Action is limited to the Main Campus and Area 400. Area 400 is known as the Bi-Propellant Test Facility. It was developed in 1965 to support bi-propellant research, which included cryogenics and testing facilities that examined how to cool and propel spacecraft. In the late 1960s, the mission of the area was expanded to include an Altitude Test Facility.

More than 10 cultural resources investigations have been completed at GSFC over the past three decades. An installation-wide architectural survey was completed in 2012 (Goodwin and Parsons 2012). As a result, of the survey and evaluation, the Main Campus and Area 300 were determined eligible for the NRHP as a discontinuous historic district. GSFC also has one National Historic Landmark (NHL), the Spacecraft Magnetic Test Facility, Building 305 listed in 1985 (Goodwin and Parsons 2013), which is 1.6 km (1 mile) from the Water Tower Redevelopment Site.

3.2.2.1 Archaeological Resources

Six archaeological investigations have been completed at GSFC since 1991. A campus-wide survey conducted in 1996 indicated that the majority of the GSFC has moderate or low sensitivity for prehistoric archaeological sites. However, some areas of the facility were found to have high sensitivity for archaeological resources, including the eastern end of the Main Campus, the southwest edge of Area 100, the northwest corner of Area 200, and the northwest corner of Area 300. GSFC has one archaeological site determined NRHP-eligible in 2004: Site 18PR548. The site consists of a small prehistoric camp utilized during the Late Archaic period (Goodwin and Parsons 2013). This site is more than 1.6 km (1 mile) northeast of the Water Tower Redevelopment Site and is west of Building 84.

3.2.2.2 Architectural Resources

GSFC contains several historic properties, including one NHL (Building 305) and one NRHP-eligible historic district (GSFC Historic District). The GSFC Historic District contains 67 resources, of which 43 are contributing resources and 24 are non-contributing elements. The district has a period of significance from 1960 to 1969. The discontinuous district, shown as the orange outlined areas in **Figure 3-1**, includes most of the Main Campus, generally defined by Aerobee Road to the south, IUE and Explorer Roads to the west, Cobe Road to the north, Hubble/ICESAT Road to the east, and most of Area 300. The historic district consists of a concentration of administrative, laboratory, communications, testing and evaluation, and support facilities that exhibit similar architectural designs. The buildings are typically brick construction with flat roofs and are one to four stories in height. Typical of mid-century buildings, ornamentation is minimal and generally limited to spandrels or decorative paneling between window bays. The Water Tower Redevelopment Site is on the east side of the Main Campus portion of the historic district.

3.2.2.3 Resources of Traditional, Religious, or Cultural Significance

No resources of traditional, religious, or cultural significance are known to exist at GSFC.

3.2.2.4 Paleontological Resources

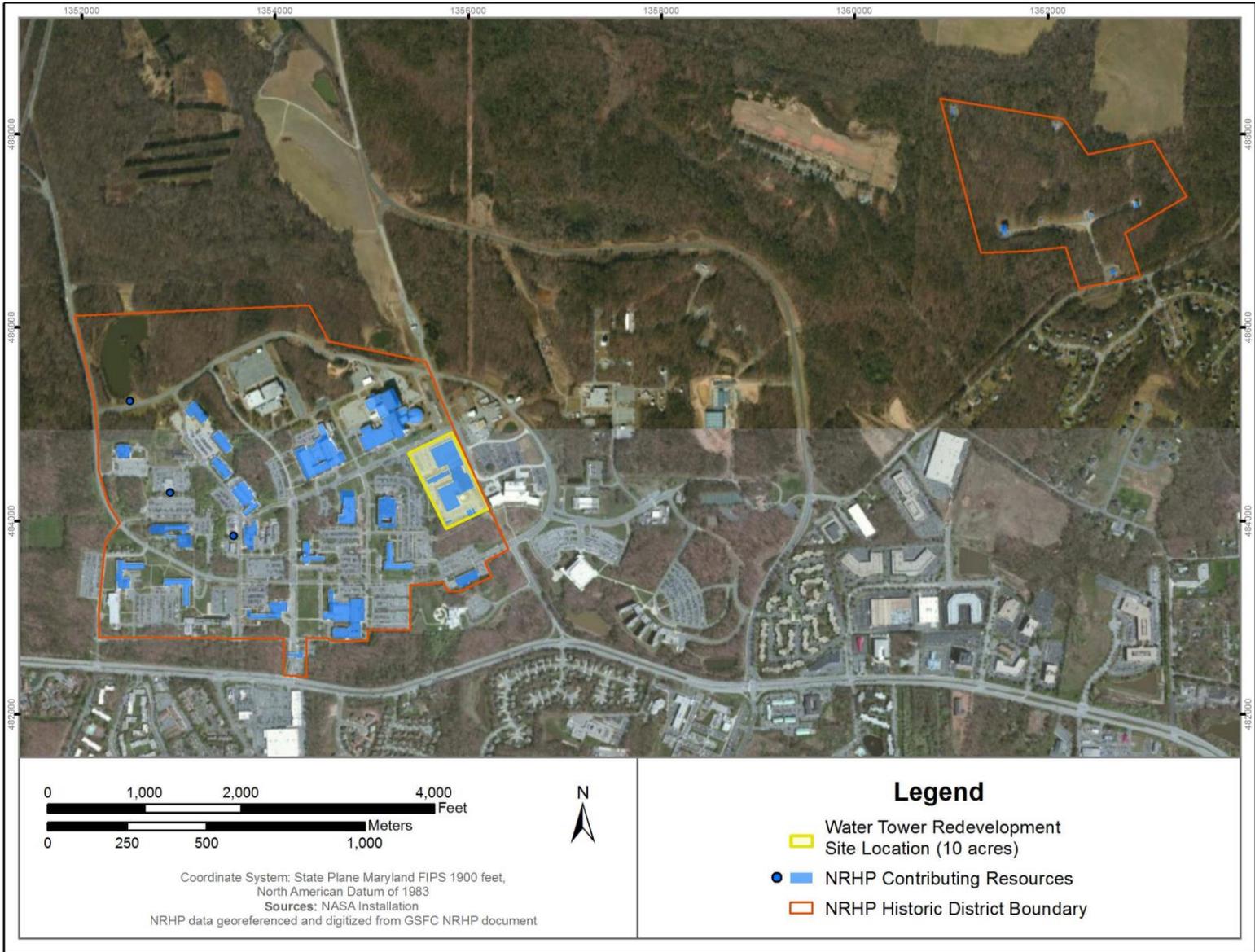
Paleontological resources were recently discovered at GSFC outside of the proposed project area. Paleontological resources are any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth. Localities, locations, and sites could be as small as a single point on the ground or as large as the area of an outcrop of a formation in which paleontological resources are found. Although paleontological resources are not considered cultural resources under the NHPA, these resources are protected by the Paleontological Resources Protection Act of 2009. Ground-disturbing activities at GSFC could have the potential to uncover paleontological resources (Goodwin and Parsons 2013).

A dinosaur footprint was discovered on the GSFC campus in August 2012 in close proximity to the Water Tower Redevelopment Site. The 12-inch wide footprint was identified as a nodosaur (armored dinosaur), a large herbivore. The footprint was authenticated by an expert in fossilized footprints and extracted by a Certified Professional Paleontologist via current standards and practices (Goodwin and Parsons 2013).

3.2.3 Environmental Consequences

Adverse impacts on cultural resources can include the following:

- Physically altering, damaging, or destroying all or part of a resource
- Altering characteristics of the surrounding environment that contribute to the resource's significance
- Introducing visual or audible elements that are out of character with the property or that alter its setting
- Neglecting the resource to the extent that it deteriorates or is destroyed
- Sale, transfer, or lease of the property out of agency ownership (or control) without adequate legally enforceable restrictions or conditions to ensure preservation of the property's historic significance.



Source: Goodwin and Parsons 2012

Figure 3-1. GSFC Historic District

3.2.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

3.2.3.1.1 Phase I Activities

The Preferred Alternative would result in the deconstruction of 25 buildings over four phases at GSFC (see **Figure 2-2**). Of these, five (Buildings 16, 16A, 16B, 17, and 86) are contributing resources to the GSFC Historic District and would be deconstructed in Phase I of the redevelopment of the Water Tower Redevelopment Site (see **Figure 3-2** and **Table 3-1**). Buildings 16, 16A, 16B, 17, and 86 were constructed in the 1960s as administration, laboratory, storage, and support facilities (see **Table 3-1**). The deconstruction of these five buildings would have an adverse effect on historic properties under NHPA. Potential measures to reduce these long-term moderate adverse impacts could include interior and exterior photo documentation of the buildings proposed for deconstruction and public interpretation of the history of GSFC and the deconstructed buildings in the GSFC visitor's center.

Short- and long-term, minor, adverse visual impacts on the GSFC Historic District would be expected under the Preferred Alternative. Visual impacts from deconstruction and construction activities would last only the duration of the activity, and therefore would be temporary in nature. Materials selected for the IDF and subsequent phases of construction would be consistent with existing buildings within the historic district (GSFC 2014a). The detailed design phase of the project is still underway and project impacts might not be fully understood until the design phase is complete. As the design process of the IDF continues, NASA will continue to consult with the MHT and other Section 106 consulting parties on the potential impact of the design on the historic district. A letter was sent to MHT on May 22, 2014, initiating the Section 106 process. The MHT responded on June 9, 2014, and concurred with NASA's determination that an adverse effect would occur from the Proposed Action (see **Appendix A**). A Memorandum of Agreement (MOA) is being developed between NASA GSFC and the MHT to resolve the adverse effect of the project on historic properties per 36 CFR Part 800.6. The MOA specifies mitigation measures for implementation of the ADP and the demolition of historic properties, including conceptual design review, documentation of Buildings 16, 16A, 16B, 17, and 86 prior to their demolition, and the development of interpretive exhibit material on the history and development of the GSFC campus that will be incorporated into a larger exhibit, and installed in the GSFC Visitor's Center. The MOA also specifies procedures for inadvertent discovery of historic properties, monitoring and reporting, and dispute resolution. NASA will continue to consult with MHT and the other consulting parties during the Section 106 process. Project information was sent to the consulting parties starting in October 2014 and public notification was provided in local newspapers on October 27, 2014.

In addition, there is one NRHP-eligible archaeological site (18PR548) west of Building 84, one of the facilities proposed for deconstruction. The building is located in the northeast corner of the Main Campus (see **Figure 2-2**). It is isolated from other facilities and surrounded by a heavily wooded area (see **Figure 3-3**). No redevelopment of the site is proposed as part of this project. If any cultural resources are unearthed during deconstruction or construction, all work in the immediate vicinity of the discovery would be halted until the materials are identified, documented, and appropriate treatment is developed in consultation with the SHPO and other consulting parties.

No paleontological resources have been identified in the project area, and no impacts are expected. Because paleontological resources have been discovered on the campus, GSFC will develop a Paleontological Resources Mitigation and Management Plan (PRMP) in accordance with U.S. Department of the Interior Bureau of Land Management Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources for site excavation activities. This plan will guide site excavation activities and the treatment of fossil resources, if encountered. If any paleontological resources are unearthed during deconstruction or construction, all work in the immediate vicinity of the discovery would be halted until the resources are identified, documented, and appropriate treatment is developed in accordance with GSFC and the PRMP.



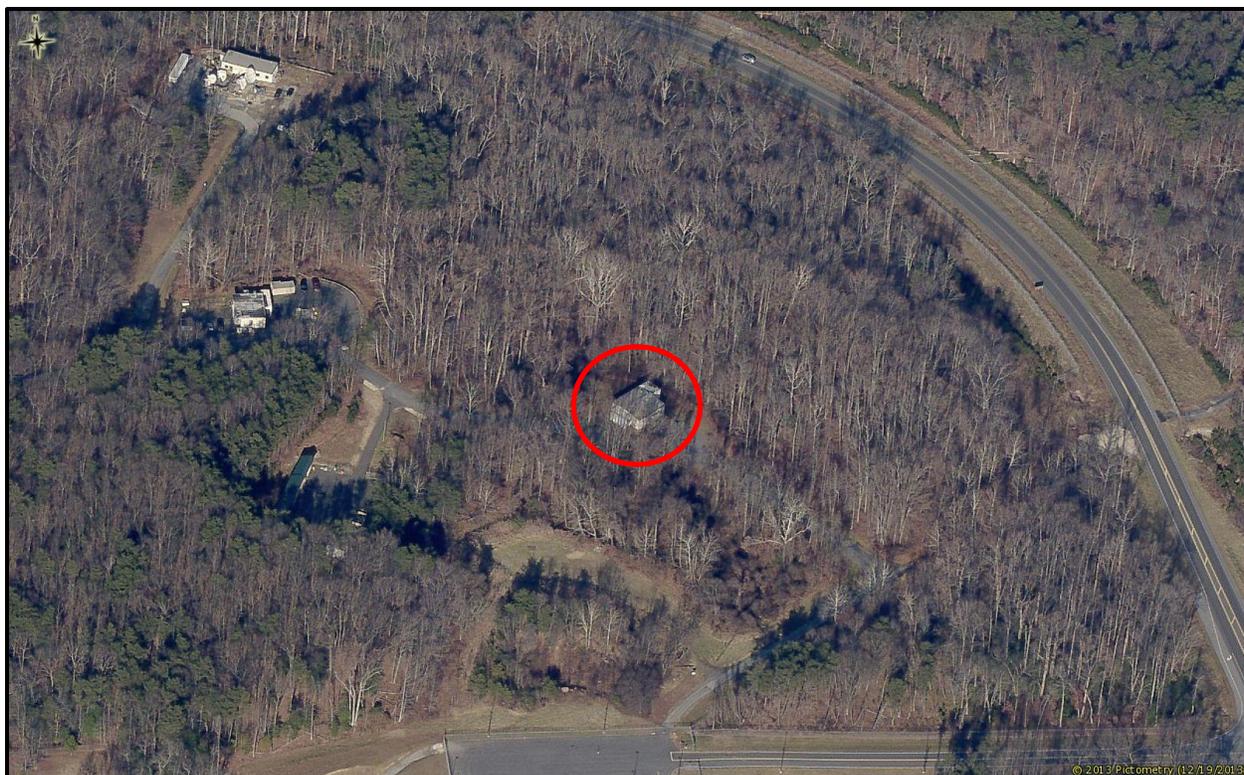
Source: Pictometry 2013

Figure 3-2. Oblique Aerial Photograph of the Water Tower Redevelopment Site

Table 3-1. GSFC Historic Properties Proposed for Deconstruction

Bldg. Number	Phase of Construction	Resource Name	Property Type	Date of Construction	NRHP Status
16	I	Logistics & Supply Facility	Administrative and Administrative/ Laboratory	1964	Contributing
16A	I	Gas Cylinder Storage Facility	Support (Storage)	1964	Contributing
16B	I	Ordnance Building	Support (Storage)	1969	Contributing
17	I	Administrative Support Building	Administrative and Administrative/ Laboratory	1963	Contributing
86	I	Project Support Facility	Support	1963	Contributing

Source: Goodwin and Parsons 2013



Source: Pictometry 2013

Figure 3-3. Building 84 (looking north)

3.2.3.1.2 Phases II–IV Activities

During the timeframe of Phases II through IV, deconstruction of Building 27 and several ancillary structures would occur. Building 27 is not a historic resource and is not listed or eligible for listing in the NRHP. The deconstruction of these buildings would have no impact on historic properties at GSFC. Construction impacts resulting from Phases II through IV would be the same as those described for Phase I.

3.2.3.2 Goddard “L” Layout (Alternative 1)

Impacts from Alternative 1 would be the same as those described for the Preferred Alternative.

3.2.3.3 Checkerboard Layout (Alternative 2)

Impacts from Alternative 2 would be the same as those described for the Preferred Alternative.

3.2.3.4 Radial Layout (Alternative 3)

Impacts from Alternative 3 would be the same as those described for the Preferred Alternative.

3.2.3.5 No Action Alternative

Under the No Action Alternative, there would be no deconstruction or construction and baseline conditions for cultural resources as described in **Section 3.2.2** would remain unchanged. Therefore, no impacts on cultural resources would occur as a result of the implementation of the No Action Alternative.

3.3 Air Quality

3.3.1 Definition of the Resource

In accordance with Federal Clean Air Act (CAA) requirements, the air quality in a given region or area is measured by the concentration of criteria pollutants in the atmosphere.

Ambient Air Quality Standards. Under the CAA, the U.S. Environmental Protection Agency (USEPA) developed numerical concentration-based standards, or National Ambient Air Quality Standards (NAAQS), for pollutants that have been determined to affect human health and the environment. The NAAQS represent the maximum allowable concentrations for six criteria pollutants: ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), respirable particulate matter (including particulate matter equal to or less than 10 microns in diameter [PM₁₀] and particulate matter equal to or less than 2.5 microns in diameter [PM_{2.5}]), and lead (Pb) (40 CFR Part 50). The CAA also gives the authority to states to establish air quality rules and regulations. The State of Maryland has adopted the NAAQS. **Table 3-2** presents the NAAQS and State Ambient Air Quality Standards (SAAQS).

Attainment versus Nonattainment. The USEPA classifies the air quality in an air quality control region (AQCR), or in subareas of an AQCR, according to whether the concentrations of criteria pollutants in ambient air exceed the NAAQS. Areas within each AQCR are therefore designated as either “attainment,” “nonattainment,” “maintenance,” or “unclassified” for each of the six criteria pollutants. Attainment means that the air quality within an AQCR is better than the NAAQS; nonattainment indicates that criteria pollutant levels exceed NAAQS; maintenance indicates that an area was previously designated nonattainment but is now attainment; and an unclassified air quality designation by the USEPA means that there is not enough information to appropriately classify an AQCR, so the area is considered attainment. The USEPA has delegated the authority for ensuring compliance with the NAAQS in Maryland. The MDE Air Quality Compliance Program regulates air quality for the State of Maryland. In accordance with the CAA, each state must develop a State Implementation Plan (SIP), which is a compilation of regulations, strategies, schedules, and enforcement actions designed to move the state into compliance with all NAAQS (see **Table 3-2**). A Federal Implementation Plan is promulgated by the USEPA if a state has failed to make a required SIP submittal, the submittal is incomplete, or it is disapproved.

Air Quality Construction Permitting Programs. Air quality construction permitting programs were developed under an overarching program called New Source Review (NSR). NSR air quality construction permitting for major stationary sources or major modifications to such sources is divided into Nonattainment New Source Review (NA NSR) for nonattainment pollutants and Prevention of Significant Deterioration (PSD) for attainment pollutants. These major source and major modification permitting programs are federally regulated. Each permitting program is discussed below.

Nonattainment New Source Review Permitting. Federal NA NSR permitting regulations apply in nonattainment areas to construction of a major stationary source (i.e., source with potential to emit 10 to 100 tons per year [tpy]), depending on the severity of the nonattainment classification of the regional area and the nonattainment pollutant (40 CFR Part 51.165). In addition, NA NSR regulations apply to existing sources making major modifications (i.e., change that adds 10 to 40 tpy to the facility’s potential to emit depending on the nonattainment pollutant). Triggering NA NSR requires a permit and implementing the Lowest Achievable Emission Rate through technology and emissions controls, offsetting reductions in emissions at prescribed ratios, alternative sites analysis, and other items.

Table 3-2. National and State Ambient Air Quality Standards, Effective October 2011

Pollutant	Averaging Time	Primary Standard		Secondary Standard
		Federal	Maryland	
CO	8-hour ⁽¹⁾	9 ppm (10 mg/m ³)	Same as Federal	None
	1-hour ⁽¹⁾	35 ppm (40 mg/m ³)	Same as Federal	None
Pb	Rolling 3-Month Average ⁽²⁾	0.15 µg/m ³ ⁽³⁾	Same as Federal	Same as Primary
	Quarterly Average	1.5 µg/m ³ ⁽³⁾	Same as Federal	Same as Primary
NO ₂	Annual ⁽⁴⁾	53 ppb ⁽⁵⁾	Same as Federal	Same as Primary
	1-hour ⁽⁶⁾	100 ppb	Same as Federal	None
PM ₁₀	24-hour ⁽⁷⁾	150 µg/m ³	Same as Federal	Same as Primary
PM _{2.5}	Annual ⁽⁸⁾	12 µg/m ³	Same as Federal	15 µg/m ³
	24-hour ⁽⁶⁾	35 µg/m ³	Same as Federal	Same as Primary
O ₃	8-hour ⁽⁹⁾	0.075 ppm ⁽¹⁰⁾	Same as Federal	Same as Primary
	1-hour	0.12 ppm	Same as Federal	Same as Primary
SO ₂	1-hour ⁽¹¹⁾	75 ppb ⁽¹²⁾	Same as Federal	None
	Annual (Arithmetic Average)	0.03 ppm (80 µg/m ³)	Same as Federal	None
	24-hour	0.14 ppm (365 µg/m ³)	Same as Federal	None
	3-hour ⁽¹⁾	None	None	0.5 ppm (1300 µg/m ³)

Sources: USEPA 2014, Code of Maryland Regulations (COMAR) 26.11.04

Notes: Parenthetical values are approximate equivalent concentrations.

- Not to be exceeded more than once per year.
- Not to be exceeded.
- Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m³ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved. The USEPA designated areas for the new 2008 standard on November 8, 2011.
- Annual Mean.
- The official level of the annual NO₂ standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of cleaner comparison to the 1-hour standard.
- 98th percentile, averaged over 3 years.
- Not to be exceeded more than once per year on average over 3 years.
- Annual mean, averaged over 3 years.
- Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.
- Final rule signed March 12, 2008. The 1997 O₃ standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, the EPA revoked the 1-hour O₃ standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard (“anti-backsliding”). The 1-hour O₃ standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.
- 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.
- Final rule signed June 2, 2010. The 1971 annual (0.3 ppm) and 24-hour (0.14 ppm) SO₂ standards were revoked in that same rulemaking. However, these standards remain in effect until 1 year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved. The USEPA designated certain areas for the new 2010 standard on July 25, 2013, with the remaining designations to occur in the future.

Key: ppm = parts per million; ppb = parts per billion; mg/m³ = milligrams per cubic meter; µg/m³ = micrograms per cubic meter

Prevention of Significant Deterioration Permitting. Federal PSD permitting regulations apply in attainment areas to construction of a major stationary source (i.e., source with the potential to emit 100 tpy of any attainment criteria pollutant) and a significant modification to a major stationary source, (i.e., change that adds 15 to 100 tpy to the facility's potential to emit depending on the attainment pollutant). The 100 tpy PSD major source threshold is applied instead of 250 tpy because GSFC has greater than 250 million British thermal units per hour in combined heat input capacity for all boilers. Additional PSD major source and significant modification thresholds apply for GHGs, as discussed in the Greenhouse Gas Emissions subsection. PSD permitting can also apply to a proposed project if all three of the following conditions exist: (1) the proposed project is a modification with a net emissions increase to an existing PSD major source, (2) the proposed project is within 10 km (6 miles) of national parks or wilderness areas (i.e., Class I Areas), and (3) regulated stationary source pollutant emissions would cause an increase in the 24-hour average concentration of any regulated pollutant in the Class I area of 1 milligram per cubic meter (mg/m^3) or more (40 CFR 52.21[b][23][iii]). A Class I area includes national parks larger than 6,000 acres, national wilderness areas and national memorial parks larger than 5,000 acres, and international parks. PSD regulations implement emission control requirements based on technological and economic considerations. PSD regulations also define ambient air increments, limiting the allowable increases to any area's baseline air contaminant concentrations, based on the area's Class designation (40 CFR 52.21[c]).

State and Local Construction Permitting. State-level and/or local-level construction permits are required for the addition of minor sources, minor modifications of a minor source, or minor modifications of a major source. The permit can impose emission limits, work practice controls, emissions monitoring, and recordkeeping and reporting requirements.

General Conformity. The General Conformity Rule states that no department, agency or instrumentality of the Federal government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable State or Federal Implementation Plan. More specifically, General Conformity is ensured when a Federal action does not cause a new violation of the NAAQS; does not contribute to an increase in the frequency or severity of violations of NAAQS; or does not delay the timely attainment of any NAAQS, interim progress milestones, or other milestones toward achieving compliance with the NAAQS. This rule only applies to Federal actions that occur in nonattainment or maintenance areas.

A General Conformity Determination is required if the total direct and indirect emissions from the proposed Federal action exceed *de minimis* threshold levels established in 40 CFR Part 93.153(b) for individual nonattainment or maintenance pollutants and their precursors. Depending on the severity of the nonattainment area classification, the *de minimis* thresholds vary as shown in **Table 3-3**. Emissions from proposed action activities or equipment covered under any NSR air quality construction permit (i.e., NA NSR, PSD, or minor new or modified source) are not required to be included in the total emissions for general conformity determination purposes (40 CFR Part 93.151[d][1]). No further analysis is required, and the action is presumed to conform to the SIP if the total direct and indirect emissions are less than the *de minimis* levels. If a General Conformity Determination is required, more detailed emissions analysis, including but not limited to ambient air dispersion modeling, would be conducted and mitigation measures may be needed to demonstrate the action would conform to the SIP.

If a facility has a site-specific general conformity budget listed in the SIP, a proposed action that results in exceeding that budget would require either mitigation by reducing emissions from existing activities, revising the proposed action to stay below the budget, or going through the process of incorporating the proposed action emissions into the SIP. The latter option could be the most difficult and time consuming.

Table 3-3. General Conformity *de minimis* Emissions Thresholds

Pollutant	Status	Classification	<i>de minimis</i> Limit (tpy)
O ₃ (measured as NO _x or volatile organic compounds [VOCs])	Nonattainment	Extreme Severe Serious Moderate/marginal (inside ozone transport region) All others	10 25 50 50 (VOCs)/100 (NO _x) 100
	Maintenance	Inside ozone transport region Outside ozone transport region	50 (VOCs)/100 (NO _x) 100
CO	Nonattainment/ maintenance	All	100
PM ₁₀	Nonattainment	Serious Moderate No Special Classification	70 100 100
	Maintenance	All	100
PM _{2.5} (measured directly, or as SO ₂ , or as NO _x or VOC if significant precursors)	Nonattainment/ maintenance	All	100
Pb	Nonattainment/ maintenance	All	25

Source: 40 CFR Part 93.153(b), as of December 3, 2014

Title V Operating Permit Requirements. Title V of the CAA Amendments of 1990 requires states and local agencies to permit the operation of major stationary sources. A Title V major stationary source has the potential to emit criteria air pollutants and/or hazardous air pollutants at levels equal to or greater than Major Source Thresholds. Major Source Thresholds vary depending on the attainment status of an AQCR. The purpose of the Title V operating permit rule is to consolidate all air pollution control requirements into a single, comprehensive operating permit that covers all aspects of a source's year to year air pollution activities. The design of the program is to make it easier for larger sources to comply with emission control requirements but also make them federally enforceable.

Greenhouse Gas Emissions and Climate Change. GHGs are primarily produced by the burning of fossil fuels and through industrial and biological processes. On September 22, 2009, the USEPA issued a final rule for mandatory GHG reporting from large GHG stationary emissions sources in the United States. The purpose of the rule is to collect comprehensive and accurate data on carbon dioxide (CO₂) and other GHG emissions that can be used to inform future policy decisions. In general, the threshold for reporting is 25,000 metric tons, i.e., 27,558 tons equivalent, or more of CO₂ equivalent emissions per year, excluding mobile source emissions. GHG emissions also became regulated under PSD and Title V permitting programs under a USEPA rulemaking issued on June 3, 2010, known as the GHG Tailoring Rule (75 Federal Register [FR] 31514). However, on June 23, 2014, the U.S. Supreme Court ruled that the USEPA may not treat GHGs as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. On July 24, 2014, the USEPA released a memorandum indicating if a new source triggers PSD for pollutants other than GHGs, then the USEPA

would apply the PSD Best Available Control Technology requirements to GHG emissions if their CO₂ equivalent potential to emit is 75,000 tpy or greater. The 75,000-tpy CO₂ equivalent threshold would also apply to a PSD modification if a PSD major modification is first triggered by a non-GHG pollutant. These GHG thresholds may change based on the court ruling that the USEPA needs to justify these values and the outcome of future court decisions. The 100,000-tpy CO₂ equivalent Title V permit threshold for GHGs no longer applies.

EO 13693 requires Federal agencies to set goals for reducing GHG emissions. On June 28, 2013, NASA submitted its Strategic Sustainability Performance Plan. The plan includes specific actions NASA will take to achieve its GHG reduction targets, reduce long-term costs, and meet the full range of goals of the EO. This plan segregates GHG emissions into three categories: Scope 1, Scope 2, and Scope 3 emissions. Scope 1 GHG emissions are those directly occurring from sources that are owned or controlled by the agency. Scope 2 emissions are indirect emissions generated in the production of electricity, heat, or steam purchased by the agency. Scope 3 emissions are other indirect GHG emissions that result from agency activities but from sources that are not owned or directly controlled by the agency. The GHG goals in the NASA plan include reducing Scope 1 and Scope 2 GHG emissions by 18.3 percent by 2020, relative to Fiscal Year 2008 emissions, and reducing Scope 3 GHG emissions by 12.6 percent by 2020, relative to Fiscal Year 2008 emissions (NASA 2011).

3.3.2 Existing Conditions

GSFC is located in Prince George's County, Maryland, within the National Capital Intrastate AQCR. Prince George's County has been designated by the USEPA as nonattainment for 1-hour O₃, 8-hour O₃ (2008 and 1997 standards), and PM_{2.5}. All other criteria pollutants are unclassified/attainment (USEPA 2013a). According to 40 CFR Part 81, no Class I air quality protection areas are located within 10 km (6.2 miles) of the GSFC.

GSFC maintains a Title V permit (Permit # 24-033-00675). Air emissions from the installation are primarily produced from fuel-burning equipment (e.g., boilers, generators), electro-chemical plating, surface coating, and gasoline filling stations (GSFC 2010). Actual emissions for GSFC in 2012 are listed in **Table 3-4**. Also listed in the table are the most recent emissions inventories for Prince George's County and the National Capital Intrastate AQCR (2011). There are no permitted existing emissions sources on the Water Tower Redevelopment Site. GSFC's Title V permit includes GHG emissions from boilers and generators, which amounted to 2012 actual emissions of CO₂, methane, and nitrous oxide, of 27,923 tpy, 97 tpy, and 1 tpy, respectively. This totals 30,270 tpy of CO₂ equivalent emissions using global warming potentials of 21 and 310 for methane and nitrous oxide, respectively.

Table 3-4. GSFC and Local and Regional Air Emissions Inventories

	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
GSFC (2012)*	22	3	32	2	1	1
Prince George's County	98,466	21,631	5,943	2,856	6,423	22,845
National Capital Intrastate AQCR	504,587	116,832	38,716	15,553	14,004	119,343

Source: GSFC 2010, USEPA 2013b

Notes: * Emissions are rounded to the nearest whole number

GSFC is part of the Baltimore-Washington metropolitan area and experiences various climate conditions, including snow and ice, tornadoes, thunderstorms, and extreme heat. The average annual precipitation for the area is approximately 44.6 inches and annual snowfall is 13.4 inches. January is typically the coldest month of the year and July is the hottest. The annual prevailing wind direction is from the west.

3.3.3 Environmental Consequences

The environmental consequences on local and regional air quality conditions from a proposed Federal action are determined based upon the changes in regulated air pollutant emissions, and upon existing conditions and ambient air quality. Other evaluation criteria include whether NA NSR air quality construction permitting or Title V operation permitting is triggered. To evaluate whether air quality impacts are significant with respect to NA NSR permitting requirements, it is determined if the net increase in stationary source emissions qualifies the facility as a NA NSR source.

For this Proposed Action, the majority of emissions increases are temporary construction and deconstruction activity emissions due to mobile sources; therefore, air permitting impacts are not a substantive concern.

3.3.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

3.3.3.1.1 Phase I Activities

Short-term, minor, adverse impacts on air quality would be expected from construction and deconstruction activities under the Preferred Alternative. The proposed deconstruction and construction activities would generate air pollutant emissions from site-disturbing activities and operation of construction equipment. Construction activities would also generate particulate emissions as fugitive dust from ground-disturbing activities. The quantity of uncontrolled fugitive dust emissions from a construction or deconstruction site is proportional to the area of land being worked and the level of activity. Emissions would be produced only for the duration of construction and deconstruction activities, which, for the purposes of this air quality analysis, is conservatively assumed to be 240 work days or 12 months for deconstruction and 620 workdays or 31 calendar months for construction.

Construction and deconstruction activities would incorporate BMPs to minimize fugitive particulate matter emissions. Additionally, the work vehicles are assumed to be well-maintained. Construction and workers commuting daily to and from the job site in their personal vehicles would also temporarily create regulated pollutant air emissions.

Air emissions from construction and deconstruction activities under Phase I of the Preferred Alternative are summarized in **Table 3-5**. The levels of emissions are not considered significant. A specific construction schedule is not currently available. It was assumed that deconstruction activities would last 12 months and construction activities would require an additional 31 months to complete: 5 months in 2016, 12 months in 2017, 12 months in 2018, and 2 months in 2019.

Under Phase I, the deconstruction and construction activities would result in a net decrease in facility space. In addition, the proposed IDF would be designed and built as an NZEB-capable facility, a building or development that generates as much renewable energy on site as it consumes in total energy on an annual basis. The proposed IDF would be designed to reduce site energy use through energy efficient and demand-side renewable energy building technologies.

Table 3-5. Estimated Air Emissions Resulting from Phase I Construction and Deconstruction Activities under Preferred Alternative (2015 through 2019)

Activity	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	CO ₂ (tpy)
2015 (Deconstruction)							
Combustion Equipment	5.24	0.31	2.07	0.43	0.317	0.307	609.78
Fugitive Dust	-	-	-	-	7.39	0.74	-
Haul Truck On-Road	0.17	0.02	0.01	0.00	0.01	0.01	85.97
Worker Commuter	0.07	0.08	0.71	0.00	0.01	0.01	119.08
Total Emissions in 2015	5.48	0.41	2.91	0.43	7.72	1.06	814.83
2016 (Construction)							
Combustion Equipment	2.00	0.20	0.88	0.16	0.14	0.14	226.35
Fugitive Dust	-	-	-	-	2.65	0.27	-
Haul Truck On-Road	0.02	0.00	0.01	0.00	0.00	0.00	12.65
Worker Commuter	0.05	0.06	0.51	0.00	0.01	0.01	98.61
Total Emissions (2016)	2.07	0.26	1.40	0.16	2.80	0.41	337.62
2017 (Construction)							
Combustion Equipment	4.86	0.49	2.14	0.39	0.35	0.34	551.73
Fugitive Dust	-	-	-	-	6.46	0.65	-
Haul Truck On-Road	0.05	0.01	0.01	0.00	0.00	0.00	30.83
Worker Commuter	0.11	0.13	1.17	0.00	0.02	0.01	240.95
Total Emissions (2017)	5.02	0.63	3.33	0.39	6.83	1.00	823.50
2018 (Construction)							
Combustion Equipment	4.86	0.49	2.14	0.39	0.35	0.34	551.73
Fugitive Dust	-	-	-	-	6.46	0.65	-
Haul Truck On-Road	0.05	0.01	0.01	0.00	0.00	0.00	30.83
Worker Commuter	0.10	0.12	1.10	0.00	0.02	0.01	240.81
Total Emissions (2018)	5.01	0.62	3.25	0.39	6.83	1.00	823.36
2019 (Construction)							
Combustion Equipment	0.75	0.08	0.33	0.06	0.05	0.05	84.88
Fugitive Dust	-	-	-	-	8.28	0.83	-
Haul Truck On-Road	0.01	0.00	0.00	0.00	0.00	0.00	4.74
Worker Commuter	0.01	0.02	0.16	0.00	0.00	0.00	36.80
Total Emissions (2019)	0.77	0.09	0.49	0.06	8.34	0.88	126.42
Significance Criteria							
General Conformity Applicability Thresholds	100	50	NA	100	NA	100	NA

Source: HDR 2014

Notes: All activities generate emissions from mobile sources unless indicated as stationary sources. Lead (Pb) emissions are not included above because they are negligible. NA = Not Applicable

While the proposed IDF would utilize energy-efficient and demand-side renewable energy building technologies, the exact technology to use has not been decided. One type of this technology is a photovoltaic array, benefits of this include the negligible amount of materials required to produce energy and the negligible amount of pollutants discharged. Fuel cells associated with photovoltaic arrays produce minimal emissions because they do not rely on fuel combustion. Renewable energy technologies would produce significantly lower emissions; however, some technologies, such as biomass heat, would result in a minor increase in emissions for GSFC, which may require a permit from MDE and a modification to GSFC's Title V permit.

The proposed IDF would include operation of laboratories. These laboratory functions are anticipated to be transferred from existing facilities at GSFC and would produce emissions similar to existing levels. Because existing laboratory operations are moving within the same property, there would be no net changes in overall operational laboratory emissions for GSFC. Current emissions (2013) associated with laboratory operations are approximately 0.33 tons per year of volatile organic compounds (VOCs) (GSFC 2014g).

While the proposed IDF would be constructed as a NZEB-capable facility, the facility would be connected to GSFC's central utility plant that would provide steam and chilled water to the IDF for heating and cooling. The demand on the central utility plant is expected to remain at current levels; thus, there would be no increase in emissions from the plant. The proposed buildings would also be primarily populated with existing personnel from existing facilities; therefore, no significant increases from operational or commuter emissions are anticipated.

No new stationary sources are proposed for this project. In addition, operational emissions are expected to remain comparable to current levels; therefore, a stationary source air quality construction permit is not required, including NA NSR, PSD, or a minor source permit.

General Conformity. The Preferred Alternative is located in a nonattainment area for PM_{2.5} and O₃. Therefore, General Conformity applicability was evaluated based on the increase in PM_{2.5} emissions, SO₂ emissions (as a precursor to PM_{2.5}), and the pollutants that generate O₃ (i.e., VOCs and NO_x). The thresholds are 100 tpy for each of these pollutants, except for VOCs which is 50 tons, because Maryland is located in an O₃ transport region. As shown in **Table 3-5**, the General Conformity thresholds are not expected to be exceeded for Phase I deconstruction or construction activities. The IDF would contain existing laboratory functions transferred from other facilities at GSFC; therefore, it is anticipated that GSFC operational emissions would not increase from operation of these laboratories. Additionally, the central utility plant demand is expected to remain at current levels; thus, there would be no emissions increase from operating this plant.

This General Conformity analysis indicates emissions associated with this action do not exceed the *de minimis* thresholds; therefore, a General Conformity Determination is not required, and the action is presumed to conform to the SIP.

Greenhouse Gas Emissions. Implementation of the Preferred Alternative would contribute directly to emissions of GHGs from the combustion of fossil fuels. Because CO₂ emissions account for approximately 85 to 90 percent of all combustion-related GHG emissions in the United States, they are used for analyses of GHG emissions in this assessment. The U.S. Department of Energy, Energy Information Administration estimates that in 2011, gross CO₂ emissions in Maryland and the United States were 63.8 million metric tons and 5,384 million metric tons, respectively (DOE/EIA 2014). **Table 3-6** summarizes the anticipated amount of CO₂ emissions from the proposed construction and deconstruction activities. There would be no net change in operational emissions from operation of the IDF because its laboratory functions would be transferred from existing facilities and functions elsewhere

Table 3-6. Estimated CO₂ Emissions from the Preferred Alternative

	CO₂ Emissions (tons)	CO₂ Emissions (metric tons)	Percent of Maryland's CO₂ Emissions	Percent of U.S. CO₂ Emissions
Preferred Alternative 2015 (Phase I)	814.83	739.05	0.0012%	0.000014%
Preferred Alternative 2016 (Phase I)	337.62	306.22	0.00048%	0.000006%
Preferred Alternative 2017 (Phase I)	823.50	746.91	0.00018%	0.000002%
Preferred Alternative 2018 (Phase I)	823.36	746.79	0.0012%	0.000014%
Preferred Alternative 2019 (Phases I through IV) ⁽¹⁾	126.42 + <u>216.50</u> = 342.90	311.03	0.00049%	0.000006%
Preferred Alternative Each Year 2021 thru 2024 (Phases II through IV) ⁽²⁾	790.92	717.36	0.0011%	0.000013%

Source: DOE/EIA 2014

Notes: CO₂ emissions in this table represent approximately 85 percent to 90 percent of the total CO₂ equivalent emissions. (1) = Includes 216.50 tons of CO₂ emissions from deconstruction during Phases II through IV in 2020; see **Table 3-7**. (2) = 790.92 tons obtained from **Table 3-7**.

on GSFC. These emissions would represent a negligible contribution towards the statewide GHG inventory and an extremely negligible contribution toward the national GHG inventory. Apart from minimal emissions increases due to potential additional landscaping activities (e.g., lawn mowing and leaf blowing) from an increase in open space, there would be no appreciable net change in operational emissions. In addition, **Table 3-6** shows the CO₂ emissions are less than 1,000 metric tpy and are approximately 85 to 90 percent of the total CO₂ equivalent emissions. Therefore, CO₂ equivalent emissions are well below the 25,000 CO₂ equivalent metric tpy reference point for quantitative analysis of GHG emissions under the CEQ's NEPA guidance (CEQ 2014). Based on the short-term nature and negligible levels of increased GHG emissions, their impacts would not be significant.

3.3.3.1.2 Phases II–IV Activities

Air emissions from construction and deconstruction activities under Phases II through IV of the Preferred Alternative are summarized in **Table 3-7**. The levels of emissions are not considered significant. A specific construction/deconstruction schedule is not currently available. It was assumed that deconstruction activities would last 6 months and would occur entirely in 2019. It was also assumed that construction activities would require an additional 60 months, or 5 years to complete. Phases II through IV would result in impacts similar to those described for Phase I. There would be no net change in operational emissions from operation of facilities under Phases II through IV as their laboratory functions would be transferred from existing facilities and functions elsewhere on GSFC. The demand on the central utility plant is expected to remain at current levels; thus, there would be no increase in emissions from the plant. The proposed buildings would also be primarily populated with existing personnel from existing facilities; therefore, no significant increases from commuter emissions are anticipated.

No new stationary sources are proposed for this project, and operational emissions are expected to remain comparable to current levels; therefore, a stationary source air quality construction permit is not required, including NA NSR, PSD, or a minor source permit.

Table 3-7. Estimated Air Emissions Resulting from Phases II–IV Construction and Deconstruction Activities under the Preferred Alternative (2019 through 2024)

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
2019 (Deconstruction)							
Combustion Equipment	1.18	0.07	0.47	0.01	0.07	0.07	137.63
Fugitive Dust	-	-	-	-	0.82	0.09	-
Haul Truck On-Road	0.03	0.00	0.01	0.00	0.00	0.00	19.20
Worker Commuter	0.02	0.03	0.26	0.00	0.01	0.00	59.67
Total Emissions in 2019	1.23	0.10	0.73	0.01	0.90	0.16	216.50
Each year - 2020 thru 2024 (Construction)							
Combustion Equipment	4.78	0.45	2.11	0.38	0.34	0.33	541.81
Fugitive Dust	-	-	-	-	8.02	0.80	-
Haul Truck On-Road	0.02	0.00	0.00	0.00	0.00	0.00	10.52
Worker Commuter	0.09	0.11	0.96	0.00	0.02	0.01	238.59
Total Emissions (Each year 2020 thru 2024)	4.88	0.57	3.07	0.38	8.38	1.15	790.92
Significance Criteria							
General Conformity Applicability Thresholds	100	50	NA	100	NA	100	NA

Source: HDR 2014

Notes: All activities generate emissions from mobile sources unless indicated as stationary sources. Lead (Pb) emissions are not included above because they are negligible.

NA = Not Applicable

General Conformity. Impacts on General Conformity thresholds would be similar but slightly greater than those described under Phase I due to an increase in the quantity of square feet of construction during Phases II through IV. However, as shown in **Table 3-7**, the General Conformity thresholds are not expected to be exceeded for Phases II through IV deconstruction or construction activities. Additionally, the GSFC operational emissions would remain at the same level because any laboratory functions are only moving from one location to another on site, and the central utility plant demand and associated emissions are expected to remain the same; therefore, Phase II through IV emission increases during construction, deconstruction, and GSFC operations would be below the General Conformity *de minimis* thresholds. This demonstrates a General Conformity Determination is not required, and the action is presumed to conform to the SIP.

Greenhouse Gas Emissions. Impacts from GHG emissions would be similar to those described under Phase I. **Table 3-6** also summarized the anticipated amount of CO₂ emissions from the deconstruction and construction activities associated with Phases II through IV (years 2020–2024). These emissions would represent a negligible contribution towards the statewide GHG inventory and an extremely negligible contribution toward the national GHG inventory. In addition, **Table 3-6** shows the CO₂ emissions are less than 1,000 metric tpy and are approximately 85 to 90 percent of the total CO₂ equivalent emissions; therefore, CO₂ equivalent emissions are well below the 25,000 CO₂ equivalent metric tpy reference point under the CEQ's NEPA guidance (CEQ 2014).

3.3.3.2 Goddard “L” Layout (Alternative 1)

Short-term, minor, adverse effects on air quality would be expected from construction and deconstruction activities under Alternative 1. Air emissions from site preparation and construction under Alternative 1 are expected to be similar to those described in **Section 3.3.3.1** for the Preferred Alternative.

3.3.3.3 Checkerboard Layout (Alternative 2)

Short-term, minor adverse effects on air quality would be expected from construction and deconstruction activities under Alternative 2. Air emissions from site preparation and construction under Alternative 2 are expected to be similar to those described in **Section 3.3.3.1** for the Preferred Alternative.

3.3.3.4 Radial Layout (Alternative 3)

Short-term, minor adverse effects on air quality would be expected from construction and deconstruction activities under Alternative 3. Air emissions from site preparation and construction under Alternative 3 are expected to be similar to those described in **Section 3.3.3.1** for the Preferred Alternative.

3.3.3.5 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Existing conditions would remain the same as described in **Section 3.3.2**. The No Action Alternative would continue to have minor, adverse impacts on air quality due to ongoing use of less energy-efficient utility systems.

3.4 Noise

3.4.1 Definition of the Resource

Sound is defined as an auditory effect produced by a given source. Noise and sound share the same physical aspects, but noise is considered a disturbance while sound is defined as an auditory effect. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Noise can be intermittent or continuous, steady or impulsive, and can include any number of sources and frequencies. It can be readily identifiable or generally nondescript. Human response to increased sound levels varies according to the source type, characteristics of the sound source type, characteristics of the sound source, distance between source and receptor, receptor type, receptor sensitivity, and time of day. How an individual responds to the sound source will determine if the sound is viewed as music to one’s ears or as annoying noise. Affected receptors are specific (e.g., schools, churches, or hospitals) or broad (e.g., nature preserves or designated districts) areas.

Although human response to noise varies, measurements can be calculated with instruments that record instantaneous sound levels in decibels. A-weighted decibel (dBA) is used to characterize sound levels that can be sensed by the human ears. “A-weighted” denotes the adjustment of the frequency range to what the average human ears can sense when experiencing an audible event. The threshold of audibility is generally within the range of 10 to 25 dBA for normal hearing. The threshold of pain occurs at the upper boundary of audibility, which is normally in the region of 135 dBA (USEPA 1981). **Table 3-8** compares common sounds and show they rank in terms of the effects of hearing. As shown, a whisper is normally 30 dBA and considered to be very quiet while an air conditioning unit 6 meters (20 feet) away is considered an intrusive noise at 60 dBA. Noise levels can become annoying at 80 dBA and very annoying at 90 dBA. To the human ear, each 10 dBA increase seems twice as loud (USEPA 1981).

Table 3-8. Sound Levels and Human Response

Noise Level (dBA)	Common Sounds	Effect
10	Just audible	Negligible
30	Soft whisper (4.6 meters [15 feet])	Very quiet
50	Light auto traffic (30.5 meters [100 feet])	Quiet
60	Air conditioning unit (6.1 meters [20 feet])	Intrusive
70	Noisy restaurant or freeway traffic	Telephone use difficult
80	Alarm clock (0.6 meters [2 feet])	Annoying
90	Heavy truck (15.2 meters [50 feet]) or city traffic	Very annoying, Hearing damage (8 hours)
100	Garbage truck	Very annoying
110	Pile drivers	Strained vocal effort
120	Jet takeoff (61 meters [200 feet]) or auto horn (0.9 meters [3 feet])	Maximum vocal effort
140	Carrier deck jet operation	Painfully loud

Source: USEPA 1981

3.4.2 Existing Conditions

The State of Maryland has transferred noise regulation authority to local jurisdictions; however, the state continues to be responsible for setting standards and general exemptions (COMAR 26.02.03.03). **Table 3-9** lists maximum allowable noise levels for land use categories. Noise limits for construction and deconstruction activities include not exceeding 90 dBA during daytime hours at the property line. Nighttime construction and deconstruction noise limits are also listed in **Table 3-9**. Prince George's County Code (Subtitle 19 Sections 19–124) restricts noise in residential areas to audible more than 15 meters (50 feet) from its source; however, noise limits do not apply to "... any sound resulting from the operations of an instrumentality of the Federal, State, or County government, or of a municipality." Noise sources on the Water Tower Redevelopment Site are primarily limited to commercial and light industrial operations associated with the existing warehouse.

Table 3-9. State of Maryland Maximum Allowable Noise Level (dBA)

	Daytime	Nighttime
Residential Districts	65 dBA	55 dBA
Commercial and Mixed Use Districts	67 dBA	62 dBA
Industrial and Marine Districts	75 dBA	75 dBA

Source: COMAR 26.02.03.03

3.4.3 Environmental Consequences

Noise impact analyses typically evaluate potential changes to the existing noise environment that would result from implementation of a proposed action. Proposed noise impacts were evaluated qualitatively for the alternatives considered. Potential changes in the acoustical environment could be:

- Beneficial (i.e., if they reduce the number of sensitive receptors exposed to unacceptable noise levels or reduce the ambient sound level),
- Negligible (i.e., if the total number of sensitive receptors to unacceptable noise levels is essentially unchanged), or
- Adverse (i.e., if they result in increased sound exposure to unacceptable noise levels or ultimately increase the ambient sound level).

3.4.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

3.4.3.1.1 Phase I Activities

Noise construction activities under Phase I vary depending on the type of construction equipment being used, the area that the action would occur in, and the distance from the noise source. Phase I construction activities can cause a temporary increase in sound that is well above the ambient level. A variety of sounds are emitted from loaders, trucks, and other work equipment. **Table 3-10** lists noise levels associated with common types of construction equipment. Construction equipment usually exceeds ambient sound levels by 20 to 25 dBA in an urban environment and up to 30 to 35 dBA in a quiet suburban area.

Table 3-10. Predicted Levels for Construction Equipment

Construction Category and Equipment	Predicted Noise Level (dBA) at 15 meters (50 feet)
Clearing and Grading	
Bulldozer	80
Grader	80–93
Truck	83–94
Roller	73–75
Excavation	
Backhoe	72–93
Jackhammer	81–98
Building Construction	
Concrete mixer	74–88
Welding generator	71–82
Pile driver	91–105
Crane	75–87
Paver	86–88

Source: USEPA 1981

Individual equipment used for Phase I construction activities would be expected to result in noise levels comparable to those shown in **Table 3-10**. Noise from construction activities varies depending on the type of equipment being used, the area the action would occur in, and the distance from the noise source. To predict how these activities would impact adjacent populations, noise from the proposed equipment was estimated. For example, construction usually involves several pieces of equipment (e.g., bulldozers and trucks) that could be used simultaneously. Under Phase I, the cumulative noise from the equipment during the busiest day was estimated to determine the total impact of noise from construction activities at a given distance. Examples of expected additive construction noise during daytime hours at specific distances from the Water Tower Redevelopment Site are shown in **Table 3-11**. These sound levels were estimated by adding the noise from several pieces of equipment and then calculating the decrease in noise levels at various distances from the source.

Table 3-11. Estimated Noise Levels from Construction Activities

Distance from Noise Source	Estimated Noise Level
15 meters (50 feet)	90–94 dBA
30 meters (100 feet)	84–88 dBA
45 meters (150 feet)	81–85 dBA
60 meters (200 feet)	78–82 dBA
120 meters (400 feet)	72–76 dBA
240 meters (800 feet)	66–70 dBA
370 meters (1,200 feet)	< 64 dBA

It is anticipated that the temporary increase in ambient noise levels from deconstruction and construction of the proposed IDF facilities would cause short-term, minor, adverse impacts on the surrounding populations. The noise from construction equipment would be localized, short-term, and intermittent during machinery operations. Heavy construction equipment would be used periodically during Phase I construction; therefore, noise levels from the equipment would fluctuate throughout the day. Construction of the IDF would be located entirely within GSFC; however, personnel in adjacent GSFC facilities could be exposed to deconstruction and construction noise. These facilities could be as close as 60 meters (200 feet) away from the Water Tower Redevelopment Site and could experience noise levels of 78 to 82 dBA. Noise generation would last only for the duration of deconstruction and construction activities and would be minimized through measures such as restricting use of heavy construction equipment and other activities that generate high noise levels to normal working hours (i.e., between 7:00 a.m. and 5:00 p.m.), and the use of equipment exhaust mufflers. Construction vehicles would be expected to access GSFC via primary roads, which would minimize potential impacts on nearby residents. The proposed construction activities under Phase I would be expected to result in noise levels comparable to those indicated in **Table 3-11**.

Once construction and deconstruction activities are completed, operational noise levels would return to existing noise levels. Therefore, there would be no long-term impacts on the noise environment from operational activities.

3.4.3.1.2 Phases II–IV Activities

The impacts on the noise environment from deconstruction and construction activities under Phases II through IV would be similar to those described for the Phase I.

3.4.3.2 Goddard “L” Layout (Alternative 1)

Noise levels associated with the proposed deconstruction and construction activities under Alternative 1 would be similar to those described in **Section 3.4.3.1** for the Preferred Alternative.

3.4.3.3 Checkerboard Layout (Alternative 2)

Noise levels associated with the proposed deconstruction and construction activities under Alternative 2 would be similar to those described in **Section 3.4.3.1** for the Preferred Alternative.

3.4.3.4 Radial Layout (Alternative 3)

Noise levels associated with the proposed deconstruction and construction activities under Alternative 3 would be similar to those described in **Section 3.4.3.1** for the Preferred Alternative.

3.4.3.5 No Action Alternative

Under the No Action Alternative, proposed construction and deconstruction activities would not occur and the existing conditions would be unchanged. No impacts on the ambient noise level would occur.

3.5 Coastal Zone Management

3.5.1 Definition of the Resource

The Coastal Zone Management Act (CZMA) of 16 U.S.C. Section 1451 et seq., as amended, 15 CFR Parts 921–930 provides assistance to states, in cooperation with Federal and local agencies, for developing land and water use programs in coastal zones. When a state coastal management plan is federally approved, Federal agencies proposing actions with the potential to affect the state’s coastal uses or resources are subject to review under the CZMA Section 307 Federal consistency determination requirement. Section 307 mandates that “Federal actions within a state’s coastal zone (or outside the coastal zone, if the action affects land or water uses or natural resources within the coastal zone) be consistent to the maximum extent practicable with the enforceable policies of the state coastal management plan” (16 U.S.C. Section 1456[c][1][A]).

An enforceable policy is a state policy that is legally binding under state law (e.g., through constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decisions), and by which a state exerts control over private and public coastal uses and resources, and which are incorporated in a state’s federally approved Coastal Management Program (CZMA Section 304[6a] and 15 CFR Part 930.11[h]). Enforceable policies are given legal effect by state law and do not apply to Federal lands, Federal waters, Federal agencies, or other areas or entities outside a state’s jurisdiction, unless authorized by Federal law (the CZMA does not confer such authorization).

At the heart of Federal consistency is the “effects test.” A Federal action is subject to CZMA Federal consistency requirements if the action will affect a coastal use or resource, in accordance with National Oceanic and Atmospheric Administration regulations.

According to 15 CFR Part 930.11(g), the term “effect on any coastal use or resource” means any reasonably foreseeable effect on any coastal use or resource resulting from a Federal agency activity or Federal license or permit activity (including all types of activities subject to the Federal consistency requirement under subparts C, D, E, F, and I of this part). Effects are not just environmental effects, but include effects on coastal uses. Effects include both direct effects which result from the activity and occur at the same time and place as the activity, and indirect (cumulative and secondary) effects which

result from the activity and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects are effects resulting from the incremental impact of the Federal action when added to other past, present, and reasonably foreseeable actions, regardless of what person(s) undertake(s) such actions.

3.5.2 Existing Conditions

Maryland has a federally approved Coastal Zone Management Program (CZMP). Maryland's coastal zone is composed of the land, water, and subaqueous land between the territorial limits of Maryland in the Chesapeake Bay, Atlantic Coastal Bays, and the Atlantic Ocean. The Maryland coastal zone extends from 3 miles (4.8 km) out in the Atlantic Ocean to the inland boundaries of the 16 counties and Baltimore City that border the Atlantic Ocean, Chesapeake Bay, and the Potomac River up to the District of Columbia (MDNR 2014). GSFC is located approximately 30 km (20 miles) from the Chesapeake Bay in Prince George's County, which lies within Maryland's coastal zone. The ERD noted, additionally, that GSFC is not located in close proximity to any beaches, estuaries, barrier islands, or coral reefs (GSFC 2012b). The CZMA excludes all Federal lands like GSFC from the legal definition of coastal zone (16 U.S.C. Section 1453(1)). However, in accordance with the CZMA, Federal actions undertaken at GSFC that have reasonably foreseeable effects on the coastal zone must be consistent with Maryland's 19 enforceable policies.

3.5.3 Environmental Consequences

Impacts on coastal zone resources are based on the potential of a proposed action to have a direct, indirect, or secondary change on any coastal zone resource under Maryland's CZMP. Impacts would be considered significant if elements of a proposed action are not consistent with the enforceable policies of the CZMP.

3.5.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

3.5.3.1.1 Phase I Activities

Deconstruction and construction activities at GSFC have the potential to affect waters of the state through storm water runoff, ground disturbance, and erosion/sedimentation. The relevant enforceable policies of the Maryland CZMP, including Core Policies, Water Quality, and Development, were reviewed to assess if there would be any impacts on coastal resources from the Proposed Action. GSFC is not located within a 100-year floodplain, as defined by the Federal Emergency Management Agency (FEMA); therefore, Maryland's CZMP Flood Hazard Policy was not included in the review.

Under GSFC's recapitalization efforts to maximize installation space, GSFC must demonstrate a deconstruction activity for every development activity. Therefore, the project requires the deconstruction of aging and inadequate infrastructure equivalent to the Proposed Action. The deconstruction of these buildings would allow for the offset of the additional square footage for the construction of the IDF (approximately 4,645 m² [50,000 ft²]) and associated features (e.g., parking lot, storm water management infrastructure, outdoor lighting, and walkways). Total ground disturbance from construction activities under Phase I would be approximately 1.6 hectares (3.9 acres), and, based on the amount of deconstruction activities and open space post-construction, there would be an overall net decrease of impervious surfaces due to a slight increase in open space following deconstruction of the existing structures and construction of the IDF on the Water Tower Development Site and deconstruction of other facilities elsewhere on GSFC. Low-impact development design techniques outlined in Federal and state guidance (i.e., Section 438 of the EISA and the 2009 Maryland Stormwater Design Manual); BMPs outlined in the GSFC SWPPP; storm water management procedures in accordance with Goddard Procedural Requirement 8500.5C, *Water Management*; the 2007 EISA; and Federal, state, and local

requirements would be implemented. In addition, the construction of a storm water management facility in the vicinity of the parking lot and storm drains and nearby storm water management ponds would contain sufficient capacity to minimize runoff from the development site and allow for the management of storm water during future construction activities. GHG emissions and climate change impacts from the Proposed Action, discussed in **Section 3.3.3**, were determined to be negligible. GSFC has determined that the Proposed Action for Phase I would not affect the coastal uses or resources of Maryland.

3.5.3.1.2 Phases II–IV Activities

Phases II through IV would require the construction of approximately 15,983 m² (172,000 ft²) of infrastructure. Similar to Phase I, no impacts on coastal resources would be expected. Based on the amount of deconstruction activities and open space post-construction, there would be an overall net decrease (an approximately 8 percent reduction) of impervious surfaces due to a slight increase in open space following deconstruction of the existing structures and new construction on the Water Tower Development Site and deconstruction of other facilities elsewhere on GSFC (GSFC 2014a). Storm water management facilities developed for this project and nearby existing storm water management ponds would contain sufficient capacity to manage runoff from the Water Tower Redevelopment Site. Surrounding woodlands would generally be preserved and existing developed space would be utilized in accordance with GSFC recapitalization efforts. Because a storm water management facility would be put in place and BMPs would be implemented, discharge and disturbance from GSFC activities would be minimal. GSFC has determined that Phases II through IV of the Proposed Action would not affect the coastal uses or resources of Maryland.

3.5.3.2 Goddard “L” Layout (Alternative 1)

Alternative 1 would have the same footprint size as the Preferred Alternative with respect to deconstruction of existing buildings, construction of new infrastructure, and storm water management, but differs in the layout of infrastructure and would result in slightly less impervious surfaces. The storm water management facility would be appropriately sized for the amount of impervious surfaces under this alternative, resulting in slightly less discharge and disturbance than those described for the Preferred Alternative. Therefore, GSFC has determined that Alternative 1 impacts would be minimal and would not affect the coastal uses or resources of Maryland.

3.5.3.3 Checkerboard Layout (Alternative 2)

Alternative 2 is the same as the Preferred Alternative with respect to deconstruction of existing buildings, construction of new infrastructure, and storm water management, but involves a different structural layout with a slightly larger amount of impervious surfaces. The storm water management facility would be appropriately sized for the amount of impervious surfaces under this alternative, resulting in slightly more discharge and disturbance than those described for the Preferred Alternative. Therefore, GSFC has determined that the impacts from Alternative 2 would be minimal and would not affect the coastal uses or resources of Maryland.

3.5.3.4 Radial Layout (Alternative 3)

Alternative 3 is the same as the Preferred Alternative with respect to deconstruction of existing buildings, construction of new infrastructure, and storm water management, but involves a structural layout with a slightly larger amount of impervious surfaces. The storm water management facility would be appropriately sized for the amount of impervious surfaces, resulting in slightly more discharge and disturbance than those described for the Preferred Alternative. Therefore, GSFC has determined that Alternative 3 impacts would be minimal and would not affect the coastal uses or resources of Maryland.

3.5.3.5 No Action Alternative

Under the No Action Alternative, the existing features of the Water Tower Redevelopment Site would remain unchanged. There would be no deconstruction of existing buildings and no construction of the IDF or subsequent phases. Therefore, there would be no effects on the coastal uses or resources of Maryland.

3.6 Geological Resources

3.6.1 Definition of the Resource

Geological resources consist of the Earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of geology, topography and physiography, soils, and, where applicable, geologic hazards.

Geology. Geology is the study of the Earth's composition and provides information on the structure and configuration of surface and subsurface features. Such information derives from field analysis based on observations of the surface and borings to identify subsurface composition.

Topography. Topography and physiography pertain to the general shape and arrangement of a land surface, including its height and the position of its natural features and human-made alterations of landforms.

Soils. Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land use.

Farmland. Farmland is protected under the Farmland Protection Policy Act (FPPA) of 1981, which is intended to minimize the extent that Federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. The USDA, Natural Resources Conservation Service (NRCS) identifies farmland soils, has developed rules and regulations for implementation of the FPPA, and oversees compliance with the FPPA. The implementing procedures of the FPPA (i.e., 7 CFR Part 658) require Federal agencies to evaluate the adverse effects of their activities on farmland, which includes prime and unique farmland and farmland of statewide and local importance, and to consider alternative actions that could avoid adverse effects.

Geologic Hazards. Geologic hazards are defined as natural geologic events that can endanger human lives and threaten property. Examples of geologic hazards include earthquakes, landslides, rock falls, ground subsidence, and mass wasting.

3.6.2 Existing Conditions

Geology. The Water Tower Redevelopment Site and nearby buildings proposed for deconstruction under the Proposed Action lie within the Coastal Plain physiographic province of Maryland (GSFC 2012b). This area is underlain by a seaward thickening wedge of unconsolidated and semi-consolidated sedimentary deposits from the Cretaceous Period to the Holocene Epoch. The Coastal Plain is bordered by the Atlantic Ocean to the east and the Piedmont Physiographic Province to the west (GeoConcepts 2014).

The Water Tower Redevelopment Site is mapped within the Potomac Group Formation of the Cretaceous Period. Soils in this area are highly over-consolidated as a result of the weight of a substantial thickness of overlying soils that have eroded away. As a result, Potomac Group soils are generally capable of supporting substantial loads (GeoConcepts 2014).

Topography. The topography for the Water Tower Redevelopment Site and areas that are proposed for deconstruction, including Area 400, are relatively flat because much of that area has been developed.

Soils. The USDA NRCS has mapped the soils within the Water Tower Redevelopment Site:

- *Urban land-Beltsville complex, 0 to 5 percent slopes.* Urban land-Beltsville complex is composed of approximately 80 percent urban land with about 20 percent of Beltsville soil and other minor components. This soil type is moderately well-drained, does not have any increased potential for erosion, and makes up roughly 20 percent of the Water Tower Redevelopment Site.
- *Urban land-Russett-Christiana complex, 0 to 5 percent slopes.* Urban land-Russett-Christiana complex is made up of 80 percent urban, 10 percent Russett soils, and 10 percent Christiana soils. This soil type is similar to the Urban land-Beltsville complex and is also moderately well-drained and has no increased potential for erosion. This soil type makes up roughly 70 percent of the Water Tower Redevelopment Site.
- *Christiana-Downer complex, 10 to 15 percent slopes.* This soil makes up the least amount of the site location (approximately 10 percent) and is moderately well-drained and has no increased potential for erosion. This soil unit type is composed of 50 percent Christiana soils, 35 percent Downer soils, and 15 percent of other minor soil components (NRCS 2014).

Soil types for deconstruction activities that occur outside of the Water Tower Redevelopment Site are provided in **Table 3-12**.

Table 3-12. Buildings Proposed for Deconstruction and Their Associated Soil Unit Types

Building Number	Soil Unit Name
17	Urban land-Russett-Christiana complex, 0 to 5 percent slopes
27, 27A, 27B, 27C, 27E, 27G, 27H, 27N	Sassafras and Croom soils, 10 to 15 percent slopes; Urban land-Beltsville complex, 0 to 5 percent slopes; and Urban land-Sassafras complex, 0 to 5 percent slopes
84	Christiana-Downer complex, 15 to 25 percent slopes
Area 400 Buildings	Russett-Christiana complex, 2 to 5 percent slopes; Ingleside sandy loam, 0 to 2 percent slopes

Source: NRCS 2014

Farmland. No farmland soils have been mapped within the Water Tower Redevelopment Site (NRCS 2014).

Geologic Hazards. Earthquakes occur in Maryland; however, they are not common. According to the U.S. Geological Survey, the hazard rating for Prince George's County, Maryland, is very low at approximately 0.08 percent gravity. There are no major fault lines that occur within Maryland (Reger 2003).

3.6.3 Environmental Consequences

Protection of geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating the potential impacts of a proposed action on geological resources. Generally, adverse impacts can be avoided or minimized if proper construction techniques and erosion-control measures are incorporated into project development. Impacts on geology and soils would be considered significant if they would substantially alter the geology that controls groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or substantially change the soil composition, structure, or function within the environment.

3.6.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

3.6.3.1.1 Phase I Activities

Short-term, negligible to minor, adverse impacts on geological resources would be expected under Phase I of the Preferred Alternative from disturbance and compaction of soils, clearing of vegetation, excavation, trenching, grading, and paving related to deconstruction and construction activities. These impacts would be limited to the Water Tower Redevelopment Site and the footprints for Buildings 17 and 84, and the nine buildings in Area 400, totaling approximately 21,650 m² (233,000 ft²) of disturbance from deconstruction under Phase I. Much of the area proposed for redevelopment is previously disturbed. Deconstruction activities outside of the Water Tower Redevelopment Site could cause localized changes in drainage patterns; however, the removal of these structures would be an overall long-term, beneficial impact as those sites revert to pervious or natural conditions. Deconstruction and construction activities associated with Phase I would increase soil erosion and sedimentation; however, these short-term impacts would be mitigated through use of BMPs and other engineering controls. No long-term impacts on geological resources would be expected from Phase I of the Preferred Alternative.

3.6.3.1.2 Phases II–IV Activities

Short-term, negligible to minor, adverse impacts on geological resources from Phases II through IV activities would be similar to the impacts under Phase I activities. There would be less total ground disturbance from deconstruction activities associated with Phases II through IV (approximately 5,860 m² [63,047 ft²] of disturbance) than Phase I activities. Impacts on soils from construction activities would be greater during Phases II through IV; however, due to the propensity for the soil (as described in **Section 3.6.2**) to hold substantial loads, these impacts would be negligible.

3.6.3.2 Goddard “L” Layout (Alternative 1)

Impacts as a result of Alternative 1 would be similar, but slightly greater than impacts detailed under the Preferred Alternative. Alternative 1 would have the same amount of deconstruction and construction associated with the Preferred Alternative; however, additional grading would be required to meet the needs of the IDF facility under this alternative, which would result in more soil disturbance. Impacts from additional grading under Alternative 1 would be short-term, minor, and adverse.

3.6.3.3 Checkerboard Layout (Alternative 2)

Impacts as a result of Alternative 2 would be similar to the impacts detailed under the Preferred Alternative. No additional grading would be required under Alternative 2.

3.6.3.4 Radial Layout (Alternative 3)

Impacts as a result of Alternative 3 would be similar, but slightly greater than the impacts detailed under the Preferred Alternative. Alternative 3, like Alternative 1, would have the same amount of deconstruction and construction associated with the Preferred Alternative; however, additional grading would be required to meet the needs of the IDF facility under this alternative, which would result in more soil disturbance. Impacts from additional grading under Alternative 3 would be short-term, minor, and adverse.

3.6.3.5 No Action Alternative

Under the No Action Alternative, the existing features of the Water Tower Redevelopment Site and other buildings associated with the Proposed Action would remain unchanged. There would be no deconstruction of facilities, and no construction of the IDF. There would be no impacts on geological resources under the No Action Alternative.

3.7 Biological Resources

3.7.1 Definition of the Resource

Biological resources include native or naturalized plants and animals and the habitats (e.g., grasslands, forests, and wetlands) in which they exist. Protected and sensitive biological resources include Endangered Species Act (ESA)-listed species (threatened or endangered) and those proposed for ESA listing as designated by the USFWS; state-listed threatened, endangered, or special concern species; migratory birds; and bald and golden eagles. Sensitive habitats include those areas designated by the USFWS as critical habitat protected by the ESA and as sensitive ecological areas designated by state or other Federal rulings. Sensitive habitats also include wetlands, plant communities that are unusual or limited in distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer and winter habitats).

The ESA (16 U.S.C. Section 1531 et seq.) establishes a Federal program to protect and recover imperiled species and the ecosystems upon which they depend. The ESA requires Federal agencies, in consultation with the USFWS, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. Under the ESA, “jeopardy” occurs when an action is reasonably expected, directly or indirectly, to diminish numbers, reproduction, or distribution of a species so that the likelihood of survival and recovery in the wild is appreciably reduced. An “endangered species” is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range. A “threatened species” is defined by the ESA as any species likely to become an endangered species in the foreseeable future. Candidate species are plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as threatened or endangered under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. The ESA also prohibits any action that causes a “take” of any listed species. “Take” is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct.”

The MBTA (16 U.S.C. Section 703–712), as amended, and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, require Federal agencies to minimize or avoid impacts on migratory birds. Unless otherwise permitted by regulations, it makes it unlawful to (or attempt to) pursue, hunt, take, capture, or kill any migratory bird, nest, or egg. If design and implementation of a Federal action cannot avoid measurable negative impacts on migratory birds, EO 13186 directs the responsible agency to

develop and implement, within 2 years, a Memorandum of Understanding with the USFWS that shall promote the conservation of migratory bird populations. Additionally, to help Federal land management agencies and their partners abide by the conservation principles embodied in the MBTA and EO 13186, the USFWS identified bird conservation regions throughout the United States and, within each, determined bird species of conservation concern (BCCs). These BCCs represent the MBTA species of greatest conservation priority whose populations are in such decline that they are also vulnerable to Federal listing under the ESA.

3.7.2 Existing Conditions

Vegetation. The GSFC Main Campus acts as a transition zone between suburban development and open space, with more than half of the campus undeveloped and providing a variety of successional habitat. The campus has approximately 34.6 hectares (85.5 acres) of forest, separated into eight stands. The 1.6-hectare (4-acre) Forest Stand C (see **Figure 3-4**) overlaps the southern portion of the Water Tower Redevelopment Site. Forest stands are primarily dominated by red oak (*Quercus rubra*), white oak (*Quercus alba*), red maple (*Acer rubrum*), scrub pine (*Pinus virginiana*), and sweet gum (*Liquidambar styraciflua*) (GSFC 2002a; GSFC 2012b). The understory in Forest Stand C includes black gum (*Nyssa sylvatica*), sweet gum, mountain laurel (*Kalmia latifolia*), blueberry/huckleberry (*Vaccinium/Gaylussacia* sp.), and red maple, but is sparse due to the overabundance of white-tailed deer (*Odocoileus virginianus*) grazing (NASA 2007). Approximately 0.03 hectares (0.08 acres) of forest occur within the project area, which is primarily developed and impervious and surrounded in part by landscaped lawns that are mowed regularly (GSFC 2008). Area 400 is dominated by mature forests except the perimeter of the roads and the areas immediately around the buildings proposed for deconstruction, which have been cleared. The forest stands in Area 400 are similar to those described for the Main Campus (GSFC 2002b).

The ERD reported that invasive plant species, including microstegium grass (*Microstegium vimineum*), Japanese honeysuckle (*Lonicera japonica*), Asiatic bittersweet (*Celastrus orbiculatus*), multiflora rose (*Rosa multiflora*), and kudzu (*Pueraria montana* var. *lobata*) have been found on the installation; however, none are readily abundant (GSFC 2012b). Microstegium grass has been noted in several areas and requires monitoring (GSFC 2002a).

Wildlife. More than 40 species of mammals, 65 species of birds, and 50 species of reptiles and amphibians have been identified on the GSFC Main Campus. A wildlife management plan has been developed by NASA to address white-tailed deer and Canada goose (*Branta canadensis*), which are overly abundant nuisance species (GSFC 2008; GSFC 2012b). The white-footed mouse (*Peromyscus leucopus*) and deer mouse (*Peromyscus maniculatus*) are readily abundant on the installation. Other small mammals found on GSFC primarily include mammals typically adaptable to suburban-urban environments such as short-tailed shrew (*Blarina brevicauda*), eastern chipmunk (*Tamias striatus*), eastern gray squirrel (*Sciurus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), red fox (*Vulpes vulpes*), and gray fox (*Urocyon cinereoargenteus*). Striped skunk (*Mephitis mephitis*) and long-tailed weasel (*Mustela frenata*) are typically more sensitive to urbanization but have also been observed on the installation (GSFC 2004; GSFC 2012b). Northern long-eared bats (*Myotis septentrionalis*) are found in Maryland. Suitable habitat for this species could include a broad range of tree species having cracks, crevices, or shag bark, and trunks measuring 7.6 centimeters (3 inches) in diameter. However, this species prefers old-growth forests and relies on interior forest habitat with lower amounts of edge habitat for foraging, roosting, and pup rearing (NatureServe 2014). No old growth or interior forest habitat occurs on the installation. The tree stands that do exist would be considered second-growth forest and highly fragmented forest edge habitat.

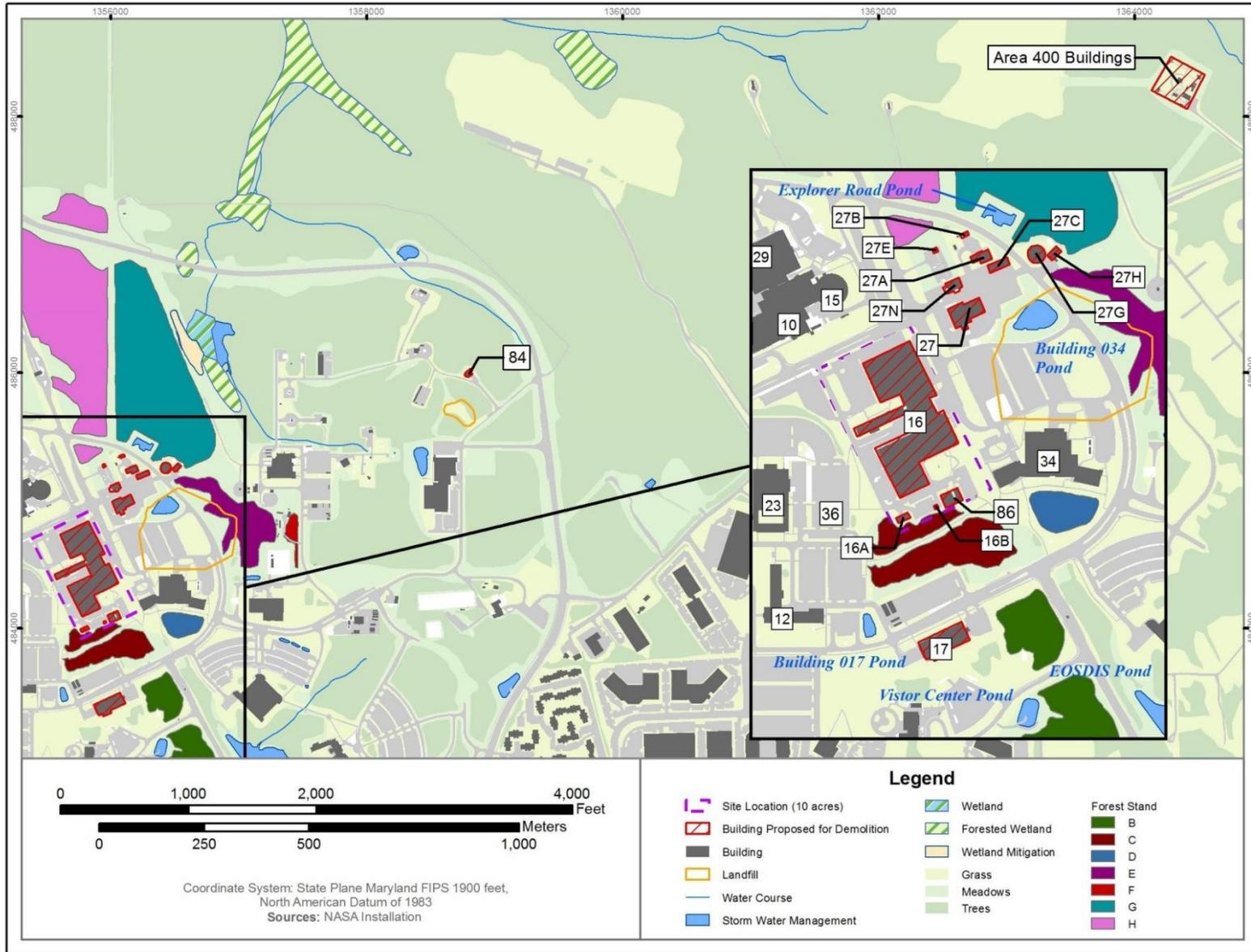


Figure 3-4. Forest Stands at GSFC

Common bird species observed on the installation include tufted titmouse (*Baeolophus bicolor*), Carolina chickadee (*Poecile carolinensis*), Carolina wren (*Thryothorus ludovicianus*), blue jay (*Cyanocitta cristata*), American robin (*Turdus migratorius*), gray catbird (*Dumetella carolinensis*), northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), northern cardinal (*Cardinalis cardinalis*), and house sparrow (*Passer domesticus*) (GSFC 2012b). Additionally, there is potential for 24 migratory BCCs to be present on the installation (USFWS 2015a); these are listed in **Table 3-13**.

Table 3-13. Bird Species of Conservation Concern Potentially Occurring at the Site

Common Name	Scientific Name	Seasonal Occurrence in Project Area
American Oystercatcher	<i>Haematopus palliatus</i>	Year-round
American Bittern	<i>Botaurus lentiginosus</i>	Wintering
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Year-round
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	Breeding
Blue-winged Warbler	<i>Vermivora pinus</i>	Breeding
Cerulean Warbler	<i>Dendroica cerulean</i>	Breeding
Fox Sparrow	<i>Passerella iliaca</i>	Wintering
Gull-billed Tern	<i>Gelochelidon nilotica</i>	Breeding
Kentucky Warbler	<i>Oporornis formosus</i>	Breeding
Least Bittern	<i>Ixobrychus exilis</i>	Breeding
Nelson's Sparrow	<i>Ammodramus nelson</i>	Wintering
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Breeding
Prairie Warbler	<i>Dendroica discolor</i>	Breeding
Prothonotary Warbler	<i>Protonotaria citrea</i>	Breeding
Purple Sandpiper	<i>Calidris maritima</i>	Wintering
Red Knot	<i>Calidris canutus rufa</i>	Wintering
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Year-round
Rusty Blackbird	<i>Euphagus carolinus</i>	Wintering
Saltmarsh Sparrow	<i>Ammodramus caudacutus</i>	Year-round
Short-billed Dowitcher	<i>Limnodromus griseus</i>	Wintering
Short-eared Owl	<i>Asio flammeus</i>	Breeding
Snowy Egret	<i>Egretta thula</i>	Breeding
Wood Thrush	<i>Hylocichla mustelina</i>	Breeding
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	Breeding

Source: USFWS 2015a

The most common amphibians include southern leopard frog (*Lithobates sphenoccephala*), American toad (*Anaxyrus americanus*), gray tree frog (*Hyla vesicolor*), northern spring peeper (*Pseudacris crucifer*), and green frog (*Lithobates clamitans*). Other species, such as the red-backed salamander (*Plethodon cinereus*) are likely to occur but have not been officially observed (GSFC 2004).

Rare, Threatened, and Endangered Species. No Federal- or state-listed species are known to occur on GSFC (USFWS 2015a). Federally listed species in Prince George’s County include the threatened sensitive joint-vetch (*Aeschynomene virginica*) and northern long-eared bat (*Myotis septentrionalis*), and the endangered Hay’s Spring amphipod (*Stygobromus hayi*). Sensitive joint-vetch prefers brackish water in the intertidal zone and Hay’s Spring amphipods are only found on a 3-mile stretch in the Rock Creek floodplain on the western edge of Prince George’s County (USFWS 2014a). There is no available habitat on the installation for sensitive joint-vetch or Hay’s Spring amphipod.

Northern long-eared bats (*Myotis septentrionalis*), listed as threatened under the ESA on April 2, 2015, are found in Maryland; however, county-level data for this species does not exist for the state (USFWS 2014b). This species prefers old-growth forests and relies on interior forest habitat with minimal edge habitat for foraging, roosting, and pup rearing (NatureServe 2014). Caves and mines are preferred as overwintering hibernacula. None of these preferred habitats occur on the installation. Suitable roosting habitat for this species could include a broad range of tree species that have cracks, crevices, or shag bark that bats could crawl into, and trunks measuring 7.6 centimeters (3 inches) or greater in diameter (80 FR 17994). Suitable stands of trees do exist on the installation; however, these are considered second-growth or highly fragmented forest edge habitat.

There is a wide variety of state-listed species within Prince George’s County primarily associated with bodies of water. None have been identified within the project area and are not likely to occur within the project area, given the high amount of disturbance to the site (MDNR 2010, GSFC 2004).

3.7.3 Environmental Consequences

Ground disturbance and noise associated with construction activities have the potential to cause direct or indirect adverse effects on biological resources. Effects can include disturbance, injury, or mortality of individual plants or animals; and habitat removal, damage, or degradation. The context and intensity of the effects were evaluated based on the nature and location activities relative to important biological resources, the magnitude of the effects, the number of species or individuals involved, amount of habitat affected relative to the total available habitat within the region, and the type of stressors involved.

3.7.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

3.7.3.1.1 Phase I Activities

Vegetation. Short- and long-term, negligible to minor, adverse effects on vegetation would be expected from temporary disturbances during construction and deconstruction activities (e.g., trampling and removal). Decline or mortality of trees that would remain in the area could occur as a result of root disturbance, limb damage, changes in soil moisture, and soil compaction from grading the site. The majority of construction and deconstruction activities would occur within improved and already disturbed areas at GSFC. The majority of vegetation near the selected projects is modified, landscaped, and mowed regularly. Any landscaping and grassy areas associated with Phase I that would be removed during deconstruction and disturbed areas would be revegetated. Native plant species would be used in the landscape design.

A variety of invasive vegetation occurs throughout GSFC. Disturbances to the canopy or ground surface in the forested habitat could also allow opportunities for nonnative and invasive species to establish or spread within this forested habitat, resulting in long-term, negligible to minor, adverse effects on vegetation. BMPs, such as inspecting and cleaning equipment to remove soil, plants, and seeds or revegetating disturbed sites with native plant species would help prevent the establishment or spread of invasive species.

Wildlife. Phase I of the Preferred Alternative would result in short- and long-term, negligible to minor, adverse effects on wildlife due to disturbances from noise, deconstruction and construction activities (i.e., increased human presence), and heavy equipment use. Loud noise events could cause wildlife to engage in escape or avoidance behaviors; however, these effects would be temporary. While mobile species (e.g., birds) would be expected to recover faster than more sedentary species (e.g., amphibians), wildlife species in the proposed project vicinity would be expected to recover quickly once the disturbances from noise, deconstruction and construction, and heavy equipment use have ceased. Furthermore, the project area is highly developed; therefore, wildlife currently inhabiting the project sites would be habituated to noise disturbances.

Rare, Threatened, and Endangered Species. No adverse effects on federally and state-listed species or other sensitive and protected species (e.g., migratory birds) would be expected from Phase I of the Proposed Action. No state or federally listed species have been identified on the installation. Although very unlikely, if a population of federally listed species were discovered within the project area, the USFWS would be consulted. Construction and deconstruction would occur in a primarily disturbed environment. Habitat removal would be negligible and would not preclude the use of habitat by any rare, threatened, or endangered species.

3.7.3.1.2 Phases II–IV Activities

Impacts on biological resources during Phases II through IV would be similar to, but greater than, those described for Phase I because the vegetation removal in the southern end of the Water Tower Redevelopment Site would occur during these phases over a larger area. Short- and long-term, minor, adverse effects on vegetation would be expected from disturbances during construction and deconstruction activities. Any landscaping and grassland associated with Phases II through IV that would be removed during deconstruction and disturbed areas would be revegetated. Native plant species would be used in the landscape design. Short-term, minor, adverse impacts on Forest Stand C could be expected from potential tree-removal activities required to accommodate construction of the parking lot at the southern edge of the Water Tower Redevelopment Site; however, these activities would only affect up to 0.03 hectare (0.08 acre) of forest edge habitat. As a result, Forest Stand C would not be further fragmented by the Proposed Action.

No impacts on rare, threatened, or endangered species, with the exception of the northern long-eared bat, would be expected because none have been identified in the project area. Phases II through IV would not have any measureable adverse impacts on migratory birds. Impacts would be similar to those previously discussed for wildlife under Phase I.

Phase IV would require tree removal over an area of 0.03 hectare (0.08 acre). Since the area that would be affected is so small, impacts on wildlife from this would be minor and would not preclude the use of remaining habitat by any rare, threatened, or endangered species or other protected species. NASA initiated informal consultation with the USFWS in May 2015 to determine the potential for impacts from the proposed IDF complex on federally listed species. Because the project area is not located within the buffer of a known northern long-eared bat hibernacula or maternity roost and the clearing affects less than 0.4 hectare (1 acre), the USFWS determined that the project is not likely to have an adverse effect on the species (USFWS 2015b; see **Appendix A**). Additionally, except for occasional transient individuals, no other federally proposed or listed endangered or threatened species under USFWS jurisdiction are known to exist within the project area. No impacts on such occasional transient individuals would be expected.

3.7.3.2 Goddard “L” Layout (Alternative 1)

Under Alternative 1, impacts on biological resources would be similar to, but slightly less than, those described under the Preferred Alternative. Short- and long-term, negligible to minor, adverse effects on vegetation would be expected from temporary disturbances during construction and deconstruction activities. Vegetation removal would occur in grassy areas and portions of Forest Stand C in later phases of construction; however, a larger portion of open space would buffer construction activities from Forest Stand C, potentially reducing impacts. Landscaping temporarily disturbed during construction activities would be revegetated. Short-term, negligible to minor, adverse effects on wildlife would be expected due to disturbances from noise, deconstruction and construction activities, and heavy equipment use. Impacts on rare, threatened, or endangered species would be negligible for Phases I through III. Potential impacts on federally-listed species from Phase IV construction activities would be the same as those described for the Preferred Alternative.

3.7.3.3 Checkerboard Layout (Alternative 2)

Impacts on biological resources under Alternative 2 would be similar to, but slightly less than, those described under the Preferred Alternative. Short- and long-term, negligible to minor, adverse effects on vegetation would be expected from temporary disturbances during construction and deconstruction activities. Vegetation removal would occur in grassy areas; however, impacts on Forest Stand C would be avoided because no tree removal would be required. Additionally, Alternative 2 has the largest buffer zone of open space between construction activities and the forest stand. Landscaping temporarily disturbed during construction activities would be revegetated. Short-term, negligible to minor, adverse effects on wildlife would be expected due to disturbances from noise, deconstruction and construction activities, and heavy equipment use. Impacts on rare, threatened, or endangered species would be negligible for Phases I through III. Potential impacts on federally-listed species from Phase IV construction activities would be the same as those described for the Preferred Alternative.

3.7.3.4 Radial Layout (Alternative 3)

Impacts on biological resources under Alternative 3 would be similar to, but slightly less than, those described under the Preferred Alternative. Short- and long-term, negligible to minor, adverse effects on vegetation would be expected from temporary disturbances during construction and deconstruction activities. Vegetation removal would occur in grassy areas and portions of Forest Stand C. Alternative 3 would not have a large buffer zone of open space between construction activities and the forest stand. Impacts from tree-removal required to accommodate the parking facilities would be the same as those described for the Preferred Alternative. Landscaping temporarily disturbed during construction activities would be revegetated. Short-term, negligible to minor, adverse effects on wildlife would be expected due to disturbances from noise, deconstruction and construction activities, and heavy equipment use. Impacts on rare, threatened, or endangered species would be negligible for Phases I through III. Potential impacts on federally-listed species from Phase IV construction activities would be the same as those described for the Preferred Alternative.

3.7.3.5 No Action Alternative

The No Action Alternative would not result in changes in biological resources if the Proposed Action were not implemented. The proposed site would remain largely developed, with no change in habitat. No construction or deconstruction activities associated with the proposed project would occur. Therefore, no impacts on biological resources would be expected and biological resources would remain as described in **Section 3.7.2**.

3.8 Water Resources

3.8.1 Definition of the Resource

Water resources are natural and man-made sources of water available for use by and for the benefit of humans and the environment. Hydrology concerns the distribution of water resources through the processes of evapotranspiration, atmospheric transport, precipitation, surface runoff and flow, and subsurface flow. Hydrology is affected by climatic factors such as temperature, wind direction and speed, topography, and soil and geologic properties.

Surface Water. Surface water resources generally consist of wetlands, lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. Waters of the United States are defined under Section 404 of the CWA, as amended, as (1) traditional navigable waters, (2) wetlands adjacent to navigable waters, (3) nonnavigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow perennially or have continuous flow at least seasonally (e.g., typically 3 months), and (4) wetlands that directly abut such tributaries. Waters of the United States are regulated by the USEPA and the U.S. Army Corps of Engineers (USACE).

The CWA (33 U.S.C. Section 1251 et seq., as amended) establishes Federal limits, through the NPDES, on the amounts of specific pollutants that can be discharged into surface waters to restore and maintain the chemical, physical, and biological integrity of the water. The NPDES program regulates the discharge of point (i.e., end of pipe) and nonpoint sources (i.e., storm water) of water pollution. The Maryland NPDES storm water program requires construction site operators engaged in clearing, grading, and excavating activities that disturb 1 acre or more to obtain coverage under an NPDES permit for their storm water discharges. Construction or deconstruction that necessitates a permit also requires preparation of a Notice of Intent to discharge storm water and an SWPPP implemented during construction.

In 2010, the USEPA issued a Final Rule for the CWA concerning technology-based Effluent Limitations Guidelines and New Source Performance Standards for the Construction and Development point source category. All NPDES storm water permits issued by the USEPA or states must incorporate requirements established in the Final Rule. As of February 1, 2010, all new construction (or deconstruction) sites that disturb 1 or more acres of land are required to meet the non-numeric effluent limitations and effective erosion and sedimentation controls must be designed, installed, and maintained.

To prevent adverse impacts from storm water runoff, the State of Maryland has developed performance standards that must be met at development sites, which apply to any construction activity disturbing 465 m² (5,000 ft²) or more of earth, including those on Federal properties. An approved erosion-and-sediment-control plan and storm water management plan, per MDE erosion- and sediment-control regulations (COMAR 26.17.01, Erosion and Sediment Control) and storm water management regulations (COMAR 26.17.02, Stormwater Management), would be required. Maryland's Stormwater Management Act of 2007, COMAR 26.17.01 and 26.17.02, and the *Maryland Stormwater Management and Erosion and Sediment Control Guidelines for State and Federal Projects* requires establishing a comprehensive process for storm water management approval and implementing ESD to the maximum extent practicable (MDE 2009; MDE 2015a). Title 4, Subtitle 201.1(B) of the Act defines ESD as the use of small-scale storm water management practices, non-structural techniques, and better site planning to mimic natural hydrological runoff characteristics and minimize the impact of land development on water resources. ESD includes optimizing conservation of natural features (e.g., drainage patterns, soil, and vegetation); minimizing impervious surfaces (e.g., pavement, concrete channels, roofs); slowing down runoff to maintain discharge timing and increase infiltration and

evapotranspiration; and using other nonstructural practices or innovative technologies approved by MDE (MDE 2009). ESD and low-impact storm water management techniques include bioretention with vegetated swales. This method entails development of a landscape depression that slows the flow of storm water directed into some combination of sand beds, ponding areas, organic or mulch layers, planting medium, and plants to remove storm water contaminants on-site. The runoff is then allowed to infiltrate native soils or directed to nearby storm water drains or receiving waters. Use of low-impact development, ESD techniques, and BMPs for storm water management would also ensure adherence to the MDE's anti-degradation of water quality policies and would protect waters of high quality (i.e., Tier II). Additionally, Section 438 of the EISA (42 U.S.C. Section 17094) establishes storm water design requirements for Federal development and redevelopment projects. Under these requirements, Federal facility projects larger than 465 m² (5,000 ft²) must "maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow."

Wetlands and Floodplains. The USACE defines wetlands as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (USACE 1987). Wetlands are currently regulated by the USACE under Section 404 of the CWA as a subset of all "waters of the United States." The term "waters of the United States" has a broad meaning under the CWA and incorporates deepwater aquatic habitats and special aquatic habitats, including wetlands. Jurisdictional waters of the United States regulated under the CWA include coastal and inland waters, lakes, rivers, ponds, streams, intermittent streams, and "other" waters, that if degraded or destroyed, could affect interstate commerce.

Floodplains are protected under EO 11988, *Floodplain Management*. If action is taken that encroaches within the floodplain and alters the flood hazards designated on a National Flood Insurance Rate Map (e.g., changes to the floodplain boundary), an analysis reflecting any changes must be submitted to FEMA. Flood potential is evaluated by FEMA, which defines the 100-year floodplain as the area that has a one percent chance of inundation by a flood event in a given year. Certain facilities inherently pose too great a risk to be in either the 100- or 500-year floodplain, such as hospitals, schools, or storage buildings for irreplaceable records. Federal, state, and local regulations often limit floodplain development to passive uses, such as recreational and preservation activities, to reduce the risks to human health and safety.

Groundwater. Groundwater is water that flows or seeps downward and saturates soil or rock, supplying springs and wells. Groundwater quality and quantity are regulated under several statutes and regulations, including the Safe Drinking Water Act.

3.8.2 Existing Conditions

Surface Water. The ERD reported that GSFC is located on the Anacostia-Patuxent River Divide, at the apex of five separate tributary stream basins (GSFC 2012b). Most of the surface water at GSFC is storm water runoff from impervious surfaces. Storm water runoff on the northern portion of the project area drains into the Anacostia River watershed, and the southern portion drains into the Patuxent River watershed. Runoff flows into a storm water drainage system via closed storm drains and open channels and swales. Eight main storm water management ponds lie on the periphery of GSFC and receive runoff from the storm water drainage system (NASA 2007, GSFC 2013d). Additionally, GSFC is located within the Beaverdam Creek-2 (Hydrologic Unit Code [HUC] 02070010) and Bald Hill Branch-1 (HUC 02060006) Tier II Catchments (i.e., watersheds) (MDE 2015b). Within the Beaverdam Creek-2 catchment, surface water features of the Water Tower Redevelopment Site drain to two stream systems. Beck Branch lies to the northeast of the Water Tower Redevelopment Site and Soil Conservation Road and drains into the Anacostia River watershed.

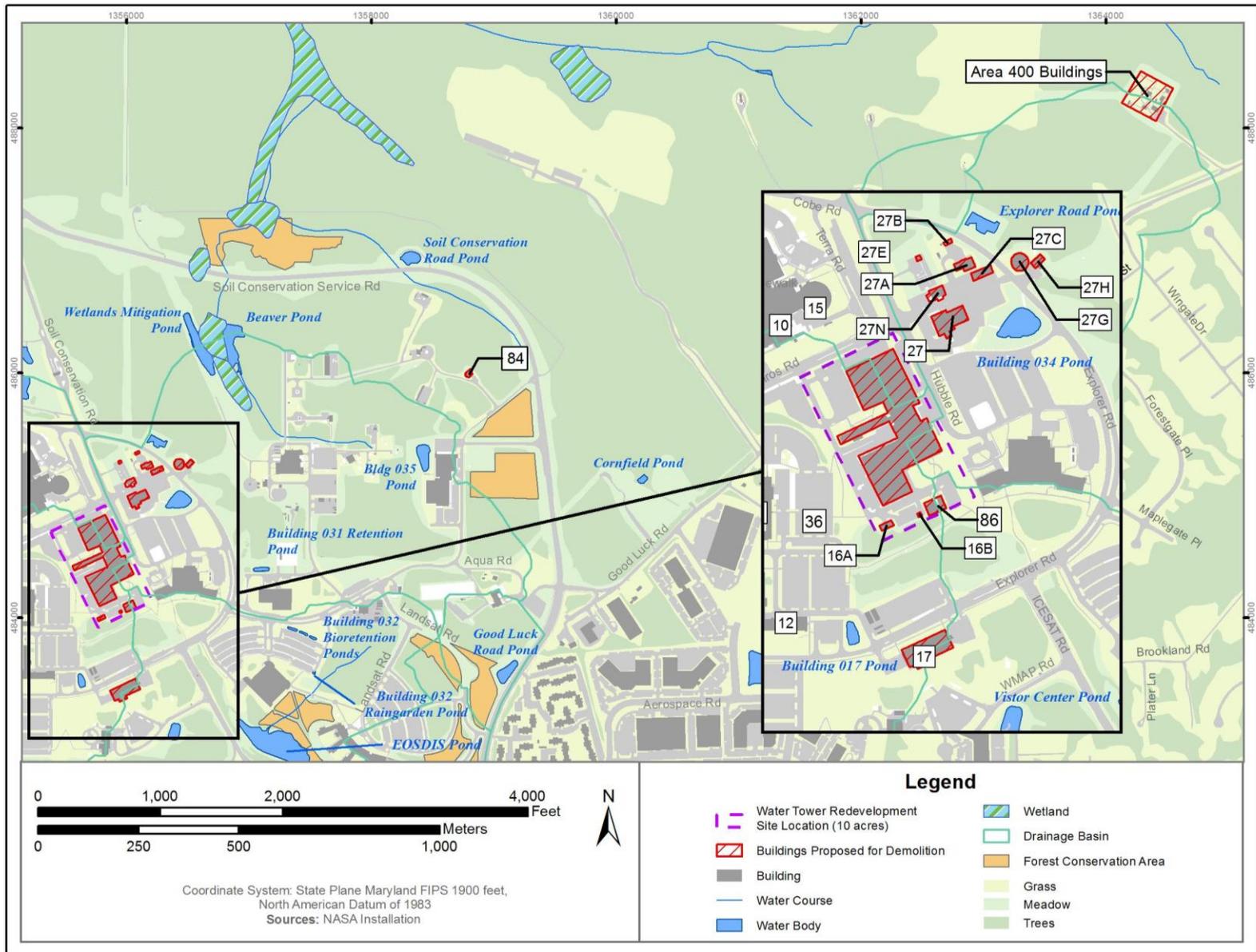


Figure 3-5. Surface Water and Wetlands on and within the vicinity of GSFC

Beaverdam Creek is located northwest of Explorer Road and GSFC, and also drains portions of GSFC into the Anacostia River watershed (GSFC 2008). Bald Hill Branch is located south of Explorer Road near the intersection of ICESAT Road and MD 193 (MDE 2015b). **Figure 3-5** shows storm water management ponds and nearby streams.

Storm water management is important to maintain healthy aquatic resources and water quality. There are eight storm water management ponds within the project area associated with the storm sewer system. GSFC's SWPPP includes BMPs to reduce and prevent pollutants in storm water runoff from entering water bodies associated with the installation (GSFC 2013d).

Wetlands and Floodplains. Wetlands at GSFC are associated with Beck Branch and Beaverdam Creek, located to the northeast and northwest of the Water Tower Redevelopment Site, respectively. A seasonally flooded, palustrine forested/emergent wetland lies to the northeast of the Water Tower Redevelopment Site, just south of Soil Conservation Road, and is approximately 305 meters (1,000 feet) from the Site. Additional palustrine, forested/emergent wetlands lie outside of GSFC along Beck Branch. A man-made, palustrine, unconsolidated bottom wetland is associated with the main pond, to the northwest of the Water Tower Redevelopment Site and just east of Explorer Road (USFWS 2014c) (see **Figure 3-5**). Additionally, no wetlands occur near Building 84 or in Area 400 (GSFC 2012b).

GSFC does not have any 100-year floodplains as defined by FEMA. The closest 100-year floodplain is associated with Beck Branch and is located northeast of the existing GSFC Main Campus (NASA 2007, NASA 2004, GSFC 2008). Historically, no issues have occurred with floodplains; site flooding is generally limited to the immediate banks of local streams (GSFC 2008).

Groundwater. GSFC uses water provided by the Washington Suburban Sanitary Commission (WSSC) and groundwater wells on the property to meet facility needs. Potable water is supplied by WSSC to all buildings at GSFC and Areas 200, 300, and 400. Potable water is supplied by Beltsville Agricultural Research Center through groundwater wells to Area 100 (GSFC 2012b; GSFC 2012c). GSFC is located above the Patuxent aquifer, which is a regional confined (artesian) aquifer primarily fed from surface water sources (NASA 2007, NASA 2004). Two onsite production wells, located on the eastern and western sides of GSFC, are used for drawing water only for cooling towers and boilers (GSFC 2012c, NASA 2004). Withdrawals from groundwater wells are made under MDE Water Appropriations and Use Permit PG1998G023(03), which is effective until 2018. The permit allows GSFC to withdraw an average of 972,851 liters (257,000 gallons) per day on a yearly basis, and an average of 1,419,530 liters (375,000 gallons) per day for the month of maximum use (GSFC 2006). Groundwater extracted from the Patuxent aquifer generally has very good to excellent water quality. Previous chemical analysis from wells supplying water from the Patuxent aquifer reveal that the groundwater has very low mineral content and is soft (GSFC 2002b).

3.8.3 Environmental Consequences

Evaluation of impacts on water resources is based on water availability, quality, and use; existence of groundwater recharge, surface waters, wetlands and floodplains in the project area; and associated regulations. A proposed action would be considered significantly adverse if it were to affect water quality substantially; reduce water availability or supply to existing users substantially; threaten or damage hydrologic characteristics; or violate established Federal, state, or local laws and regulations.

3.8.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

The Preferred Alternative would result in short-term, minor, adverse and beneficial impacts on water resources under the Preferred Alternative. Overall, there would be a net decrease of impervious surfaces due to a slight increase in open space following deconstruction of the existing structures and construction

of the IDF on the Water Tower Development Site and deconstruction of other facilities elsewhere on GSFC. The decrease in impervious surfaces would have minor beneficial effects on water resources due to increased percolation to groundwater. All proposed projects under the Preferred Alternative would obtain appropriate NPDES permits and implement the SWPPP; appropriate BMPs would be used to minimize impacts on water resources at GSFC.

3.8.3.1.1 Phase I Activities

Surface Water. Short-term, minor, adverse impacts would occur on storm water management ponds in the vicinity of the Water Tower Redevelopment Site for Phase I under the Preferred Alternative. Long-term, minor, beneficial impacts on water resources would occur due to facility designs that would reduce impervious surfaces and improve storm water management. Explorer Road Pond, Building 34 Pond, and Building 17 Pond are approximately 230 meters (754 feet), 150 meters (492 feet), and 370 meters (1,214 feet), respectively from the Site. Storm water from the Water Tower Redevelopment Site would carry sediments into these ponds. However, these ponds and the storm water management facilities constructed under Phase I would retain the sediments, generally avoiding sedimentation impacts on natural surface waters downstream in the watershed. Phase I would result in 1.6 hectares (3.9 acres) of total ground disturbance from construction activities. An approved SWPPP, erosion-and-sediment-control plan, additional NPDES coverage, and appropriate BMPs would be implemented to minimize storm water runoff and erosion/sediment control. During construction and deconstruction activities, applicable low-impact development storm water BMPs and practices established according to the MDE regulation for storm water management and erosion and sediment control would be installed to help reduce the volume and velocity of storm water runoff and prevent sedimentation and the introduction of pollutants into nearby streams and watersheds. ESD and low-impact storm water management techniques to be used include bioretention and grassy swales.

In accordance with Section 438 of the EISA (42 U.S.C. Section 17094), the proposed storm water management devices to be used in parking areas would be micro-bioretention areas with underdrains that would provide approximately 15,000 cubic feet (425 cubic meters) of water storage. These systems treat a maximum of 20,000 ft² (1,858 m²) of drainage area. To maximize the efficiency of these systems and limit the amount of pervious surface runoff that is collected, they would be placed within the parking islands. The drive aisle and parking spaces would drain into the islands where storm water would be filtered through a designed planting medium and plant material. To meet the GSFC goal of an overall 20 percent reduction in impervious surfaces, this design option would require the use of alternate paving surfaces such as pervious concrete, pavers, or asphalt (GSFC 2014c).

A spill or leak of fuel or other construction-related products would impact surface water quality. Appropriate BMPs outlined in GSFC's Integrated Contingency Plan (ICP) would be implemented to minimize potential contamination of surface waters.

Wetlands and Floodplains. No short- or long-term adverse impacts on wetlands and floodplains would be expected because no structures would be built in or adjacent to wetlands. In addition, the Water Tower Redevelopment Site is not within a 100-year floodplain and is approximately 457 meters (1,500 feet) from the nearest wetland. Implementation and proper maintenance of an erosion-and-sediment-control plan and storm water management practices along with strict adherence to Federal and state permit requirements would further minimize the potential for any indirect impacts to occur.

Groundwater. No short- or long-term adverse impacts on groundwater would occur during Phase I under the Preferred Alternative. Phase I requires the deconstruction of approximately 21,650 m² (233,000 ft²) of aging and inadequate infrastructure. The deconstruction of these buildings would allow for the offset of the additional square footage for the construction of an IDF and associated features (parking lot, storm

water management infrastructure, outdoor lighting, and walkways) [approximately 4,645 m² (50,000 ft²)]. The reduction in impervious surface would have long-term, minor, beneficial impacts on groundwater.

If left unmanaged, storm water could have adverse effects on groundwater by transporting dissolved nutrients, pesticides, and pollutants through the soil. Phase I includes the construction of a storm water management facility in the vicinity of the parking lot and storm drains and grassy swales for the facility. Additionally, a project-specific erosion-and-sediment-control plan would be required for construction activities since it is greater than 464 m² (5,000 ft²). The total ground disturbance from construction activities under Phase I would be up to 1.6 hectares (3.9 acres). Disturbances greater than 1 acre would require additional written request for coverage under the Maryland NPDES permit (GSFC 2013d). BMPs established in the GSFC SWPPP would be implemented during and after deconstruction and construction activities to reduce storm water runoff and erosion/sediment control. In addition, the Site would use low-impact development design techniques. Storm water would be managed in accordance with GPR 8500.5C, *Water Management*; the 2007 EISA; and Federal, state, and local requirements.

A spill or leak of fuel or other construction-related products could impact groundwater quality. All construction and deconstruction equipment would be maintained according to the manufacturer's specifications and all fuels and other potentially hazardous materials would be contained and stored appropriately. Construction and deconstruction personnel would follow appropriate BMPs outlined in the GSFC ICP to protect against potential petroleum or hazardous material spills. If a spill or leak were to occur, BMPs outlined in the ICP would be implemented to contain the spill and minimize the potential for, and extent of, associated contamination (GSFC 2013d).

3.8.3.1.2 Phases II–IV Activities

Surface Water. Short-term, minor, adverse impacts would occur to surrounding storm water management ponds for Phases II through IV under the Preferred Alternative. As described under Phase I, storm water from the project area would carry sediments into these ponds. However, these ponds and the storm water management facility constructed under Phase I would retain the sediments, avoiding sedimentation impacts on natural surface waters downstream in the watershed. Impacts on surface water during Phases II through IV would be similar to the impacts discussed under Phase I. Phases II through IV (when combined with Phase I) would continue to result in a net decrease of impervious surfaces, resulting in long-term, minor, beneficial impacts on natural surface waters. An approved SWPPP, erosion-and-sediment-control plan, additional NPDES coverage, and appropriate BMPs would be implemented in Phases II through IV. Additional BMPs outlined in the ICP would be implemented to prevent any contamination from spills and leaks from construction equipment.

Wetlands and Floodplains. No adverse impacts on wetlands and floodplains would occur because no structures would be built in or adjacent to wetlands or floodplains. The Water Tower Redevelopment Site is not within the 100-year floodplain and is approximately 305 meters (1,000 feet) from the nearest wetland. Implementation and proper maintenance of an erosion-and-sediment-control plan and storm water management practices along with strict adherence to Federal and state permit requirements would further minimize the potential for any indirect impacts to occur. No significant impacts on wetlands and floodplains would be expected.

Groundwater. Impacts on groundwater resources during Phases II through IV would be similar to the impacts discussed under Phase I. Phases II through IV would result in the construction of 15,983 m² (172,000 ft²) of facilities and the deconstruction of 5,860 m² (63,470 ft²) of facilities. Overall, the Preferred Alternative (Phases I through IV) would result in a net decrease of impervious surfaces. The reduction in impervious surface would have minor beneficial effects on groundwater. Additionally, storm water management facilities constructed in the vicinity of the parking lot and storm drains and grassy swales for the facility would reduce the amount of pollutants that could reach the soils and groundwater. An approved SWPPP, erosion-and-sediment-control plan, additional NPDES coverage, and appropriate

BMPs mentioned under Phase I would continue to be implemented under Phases II through IV. Additional BMPs outlined in the ICP would be implemented to prevent any contamination from spills and leaks from construction equipment.

3.8.3.2 Goddard “L” Layout (Alternative 1)

Under Alternative 1, impacts on water resources would be similar to, but slightly less than those described under the Preferred Alternative. Alternative 1 would result in the development of 21,972 m² (236,500 ft²) of facilities. Appropriate BMPs outlined in the SWPPP would prevent disturbed soil from polluting such water bodies. In addition, guidelines outlined in the erosion-and-sediment-control plan would prevent soil erosion by storm water runoff and prevent sedimentation of storm sewers and receiving streams. All Federal and state regulations and BMPs described under the Preferred Alternative would be implemented under Alternative 1, as necessary.

3.8.3.3 Checkerboard Layout (Alternative 2)

Under Alternative 2, impacts on water resources would be similar to, but slightly greater than, those described under the Preferred Alternative due to a smaller decrease in impervious surfaces from existing conditions. Alternative 2 would result in the development of 25,561 m² (275,000 ft²) of facilities. Appropriate BMPs outlined in the SWPPP would prevent disturbed soil from polluting such water bodies. In addition, guidelines outlined in the erosion-and-sediment-control plan would prevent soil erosion by storm water runoff and prevent sedimentation of storm sewers and receiving streams. All Federal and state regulations and BMPs described under the Preferred Alternative would be implemented under Alternative 2, as necessary.

3.8.3.4 Radial Layout (Alternative 3)

Under Alternative 3, impacts on water resources would be similar to, but slightly greater than, those described under the Preferred Alternative due to a smaller decrease in impervious surfaces. Alternative 3 would result in the development of 24,167 m² (260,000 ft²) of facilities. Appropriate BMPs outlined in the SWPPP would prevent disturbed soil from polluting such water bodies. In addition, guidelines outlined in the erosion-and-sediment-control plan would prevent soil erosion by storm water runoff and prevent sedimentation of storm sewers and receiving streams. All Federal and state regulations and BMPs described under the Preferred Alternative would be implemented under Alternative 3, as necessary.

3.8.3.5 No Action Alternative

Under the No Action Alternative, the existing water resources features and conditions of the Water Tower Redevelopment Site would remain unchanged. There would be no deconstruction of existing buildings and no construction of the IDF or subsequent phases. Long-term, minor, adverse impacts on water resources would continue as result of runoff from existing impervious surfaces.

3.9 Socioeconomics and Environmental Justice

3.9.1 Definition of the Resource

Socioeconomics. Socioeconomics is the relationship between economics and social elements such as population levels and economic activity. Factors that describe the socioeconomic environment represent a composite of several interrelated and nonrelated attributes. Indicators of economic conditions for a geographic area include median household income, unemployment rates, percentage of families living below the poverty level, employment, and housing data. Data on employment identify gross numbers of

employees, employment by industry or trade, and unemployment trends. Data on industrial, commercial, and other sectors of the economy provide baseline information about the economic health of a region.

Environmental Justice. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, pertains to environmental justice issues and relates to various socioeconomic groups and the disproportionate impacts that could be imposed on them. This EO requires that Federal agencies' actions substantially affecting human health or the environment do not exclude persons, deny persons benefits, or subject persons to discrimination because of their race, color, or national origin. The EO ensures the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Consideration of environmental justice concerns includes race, ethnicity, and the poverty status of populations in the vicinity of a proposed action.

3.9.2 Existing Conditions

GSFC is located in Prince George's County, Maryland, along the Baltimore-Washington Corridor just northeast of Washington, D.C. Prince George's County, Maryland, is part of the Washington-Arlington-Alexandria, DC-VA-MD-WV metropolitan statistical area (MSA) delineated by the U.S. Office of Management and Budget. This means that Prince George's County shares a high degree of economic and social integration with other areas within the statistical area. The census tracts containing and surrounding GSFC serve as the region of influence (ROI) and represent the geographic area where most effects of the Proposed Action would occur (see **Figure 3-6**). Data for the State of Maryland provides a baseline comparison.

Demographics. The State of Maryland's population totaled 5,773,552 in 2010. Based on 2000 and 2010 U.S. Census data, the population of the State of Maryland grew 9 percent from 2000 to 2010 and the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA experienced a 16.4 percent increase. During this same time period, the ROI experienced an increase of 8 percent. See **Table 3-14** for 2000 and 2010 population data (USCB 2000, USCB 2010a, USCB 2011).

Table 3-14. 2000 and 2010 Population

Location	2000	2010	Percentage Change
ROI	38,237	41,364	7.9%
Washington-Arlington-Alexandria, DC-VA-MD-WV MSA	4,796,183	5,582,170	16.4%
Maryland	5,296,486	5,773,552	9.0%

Source: USCB 2000, USCB 2010a, USCB 2011

Employment Characteristics. The labor force within the ROI totals 23,235 persons. The three largest industries in the ROI in terms of percentage of the workforce employed within the industry are educational services, health care and social assistance (27.7 percent); public administration (14.2 percent); and professional, scientific, and management, and administrative and waste management services (14.2 percent) (USCB 2010b). With a workforce of approximately 3,400 Federal employees, GSFC was the sixth largest employer in Prince George's County in 2013 (DBED 2014). Unemployment in the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA ranged from 3.1 to 8.1 percent annually from January 2004 to April 2014. In April 2014, the unemployment rate dropped to 5.4 percent after trending higher (BLS 2014).

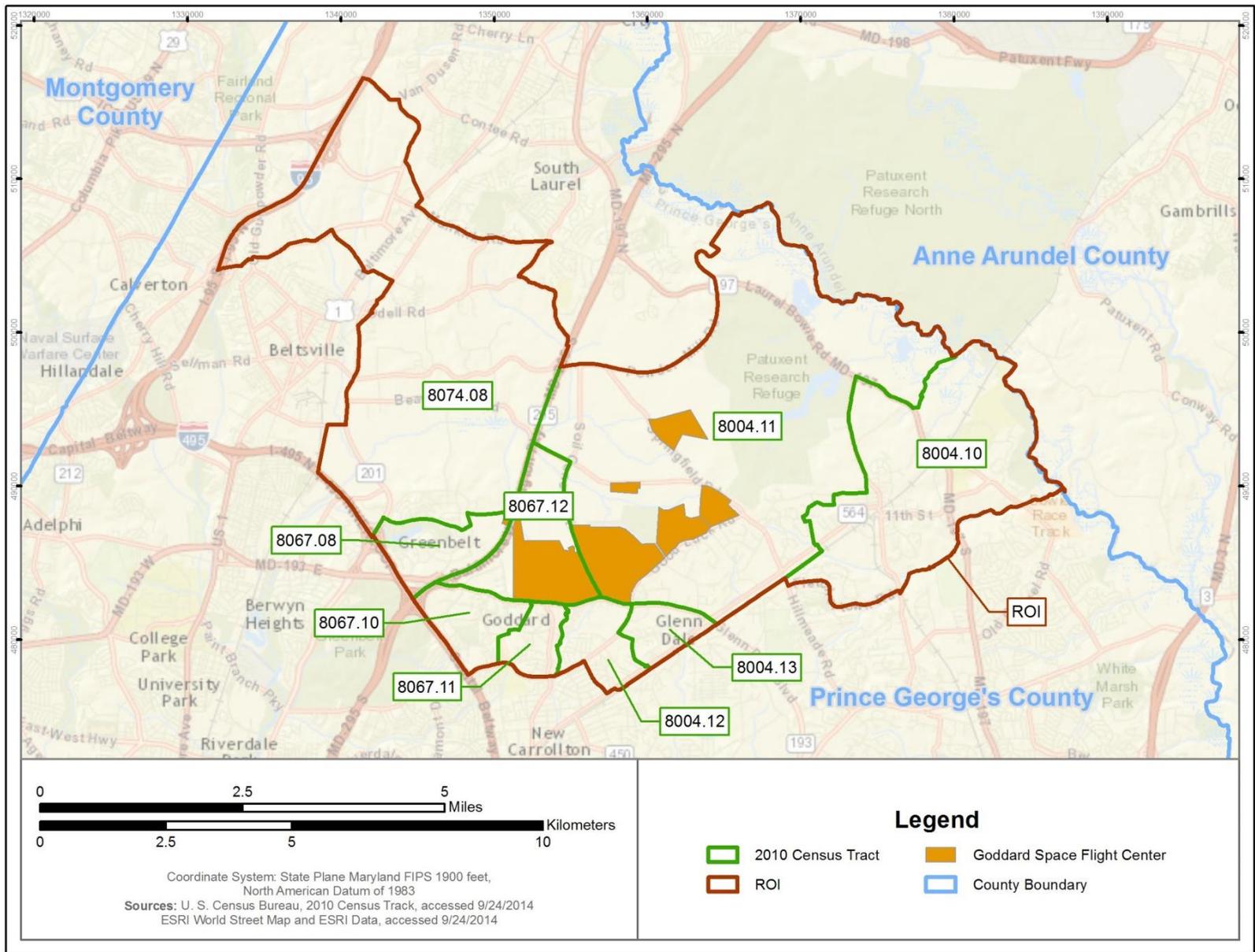


Figure 3-6. Census Tracts Composing the ROI

Environmental Justice. To provide a baseline measurement for environmental justice, an area around the installation was established to examine the impacts on minority and low-income populations. For the purposes of this analysis, the eight census tracts within Prince George’s County surrounding GSFC were evaluated to identify minority and low-income populations. These census tracts include numerous cities, towns, villages, and census-designated places. The population within these census tracts ranges from 3,053 (Census Tract 8067.12) to 6,634 (Census Tract 8004.10) (USCB 2010a).

Based on the 2010 Census data, minority individuals compose greater than 50 percent of all individuals living in six of the eight census tracts within the ROI. Census Tracts 8067.08 and 8074.08, both located west of GSFC on the west side of the Baltimore-Washington Parkway, have a greater percentage of white populations than minority populations. The percentage of families living below the poverty level varies throughout the ROI (see **Table 3-15**). Census Tract 8067.08 has the highest poverty rate at 7.7 percent, while Census Tracts 8004.10, 8067.12, and 8074.08 have no families living below the poverty level (USCB 2010a).

Table 3-15. Minority and Low-Income Characteristics (2010)

Race and Origin	Prince George’s County Census Tract								
	8004.10	8004.11	8004.12	8004.13	8067.08	8067.10	8067.11	8067.12	8074.08
Total Population	6,634	4,252	3,272	3,714	4,232	5,332	5,146	5,729	3,053
Percent White	28.2	23.7	17.2	8.5	55.3	17.8	12.9	16.8	51.2
Percent Black or African American	59.7	58.2	61.2	83.3	25.9	59.3	71.7	71.1	30.6
Percent American Indian or Alaska Native	0.3	0.6	0.3	0.3	0.2	0.2	0.1	0.1	0.3
Percent Asian	5.5	9.8	9.1	3.1	12.3	16.4	5.5	6.4	10.5
Percent Native Hawaiian and Other Pacific Islander	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.1	0.0
Percent Other Race	3.2	4.7	9.1	1.6	2.8	3.3	7.0	2.5	4.1
Percent Two or More Races	3.1	3.0	3.1	3.2	3.5	3.0	2.8	3.1	3.3
Percent Hispanic or Latino	7.0	7.6	13.5	5.4	7.2	7.3	10.2	5.7	8.6
Estimated Median Household Income	\$120,243	\$88,182	\$54,819	\$69,135	\$74,063	\$90,052	\$66,944	\$70,422	\$80,386
Estimated Percent of Families Living Below Poverty	0.0	3.2	6.0	4.5	7.7	1.1	5.8	0.0	0.0

Source: USCB 2010a, USCB 2010b

Note: Hispanic and Latino denote a place of origin.

3.9.3 Environmental Consequences

Socioeconomics. This section addresses the potential for direct and indirect impacts that the Proposed Action could have on local or regional socioeconomics. Impacts on local or regional socioeconomics are evaluated according to their potential to stimulate the economy through the purchase of goods or services

and increase in employment and population. Similarly, impacts are evaluated to determine if overstimulation of the economy (e.g., the construction industry's ability to meet the demands of a project sufficiently) could occur as a result of the Proposed Action.

Environmental Justice. Environmental justice concerns are evaluated to determine if the Proposed Action would result in disproportionate impacts on low-income and minority populations. The Proposed Action would have a significant impact if implementing the Proposed Action would result in a substantial change to the local business volume, employment, personal income, or population that exceeds the ROI's historical annual change.

3.9.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

3.9.3.1.1 Phase I Activities

Demographics. Short-term, negligible, beneficial impacts would be expected from implementation of Phase I of the Proposed Action. The number of workers hired to deconstruct Buildings 16, 16A, 16B, 17, 84, 86, and Area 400 and construct the proposed IDF would most likely come from the existing supply within the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA. Relocation of construction workers to meet the demand for Phase I would not be expected as the scope of construction activities should not necessitate out-of-town workers to relocate permanently.

Employment Characteristics. Short-term, negligible, beneficial impacts would be expected from implementation of Phase I of the Proposed Action. The existing construction industry within the ROI and Washington-Arlington-Alexandria, DC-VA-MD-WV MSA should adequately provide enough workers as required to deconstruct buildings and construct the proposed IDF. The number of construction workers required for Phase I is not large enough to outstrip the supply of the industry. Short-term, beneficial impacts on the socioeconomic resources of the ROI would result from the increase in payroll tax revenues, purchase of materials, and purchase of goods and services in the area during construction activities.

Environmental Justice. Short-term, negligible impacts would be expected from implementation of Phase I of the Proposed Action. Potential adverse impacts from construction activities could include increased traffic and noise levels, but these would be short-term, intermittent, and minimal. Proposed construction activities would generally occur entirely on GSFC as the Water Tower Redevelopment Site is near the center of the campus, approximately 0.8 km (0.5 miles) from the closest installation boundary. Therefore, no off-installation minority populations would be disproportionately impacted by Phase I of the Proposed Action.

3.9.3.1.2 Phases II–IV Activities

Demographics. Short-term, negligible, beneficial impacts would be expected from implementation of Phases II through IV of the Proposed Action. With the timeframe for completion of these structures being spread over a 7-year period, the number of workers hired to construct the proposed facilities and deconstruct the Building 27 complex would most likely come from the existing supply within the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA. Relocation of construction workers to meet the demand for Phases II through IV would not be expected as the scope of construction activities should not necessitate out-of-town workers to relocate permanently.

Employment Characteristics. Short-term, negligible, beneficial impacts would be expected from implementation of Phases II through IV of the Proposed Action. With the timeframe for completion of these structures being spread out over a 7-year period, the existing construction industry within the ROI and Washington-Arlington-Alexandria, DC-VA-MD-WV MSA should adequately provide enough

workers as required to construct the proposed facilities and deconstruct the Building 27 complex. The number of construction workers necessary for Phases II through IV is not large enough to outstrip the supply of the industry. Short-term, minor, beneficial impacts on the socioeconomic climate of the ROI would result from the increase in payroll tax revenues, purchase of materials, and purchase of goods and services in the area during construction activities.

Environmental Justice. Short-term, negligible impacts would be expected from implementation of Phases II through IV of the Proposed Action. Possible adverse impacts from construction activities could include increased traffic and noise levels, but these would be short-term, intermittent, and minimal. Proposed construction activities would occur entirely on GSFC; therefore, no off-installation minority populations would be disproportionately impacted by Phases II through IV.

3.9.3.2 Goddard “L” Layout (Alternative 1)

Impacts on socioeconomics and environmental justice for the Goddard “L” Layout would be the same as those described under the Preferred Alternative.

3.9.3.3 Checkerboard Layout (Alternative 2)

Impacts on socioeconomics and environmental justice for the Checkerboard Layout would be the same as those described under the Preferred Alternative.

3.9.3.4 Radial Layout (Alternative 3)

Impacts on socioeconomics and environmental justice for the Radial Layout would be the same as those described under the Preferred Alternative.

3.9.3.5 No Action Alternative

Under the No Action Alternative, no changes in socioeconomics or environmental justice would be expected. There would be no deconstruction or construction activities and no changes in GSFC operations would take place. Therefore, no impacts on socioeconomics or environmental justice would be expected.

3.10 Utilities, Infrastructure, and Transportation

3.10.1 Definition of the Resource

Utilities and Infrastructure. Utilities and infrastructure consists of the systems, physical structures, and utility systems that enable a population in a specified area to function. The availability of expansion for both infrastructure and utility systems are generally regarded as essential to the economic growth of an area. The infrastructure components discussed in this section include the electrical, natural gas, heating and cooling, potable water, wastewater, storm water, telecommunications, and solid waste management (i.e., nonhazardous waste) systems. In addition, use of the Leadership in Energy and Environmental Design (LEED) program is evaluated. The LEED program is used by the U.S. Green Building Council to evaluate building projects against sustainable energy and design goals.

Transportation. This section also documents existing transportation systems, conditions, and travel patterns within GSFC. The transportation systems consist of the road network and pedestrian pathways. Available capacity and performance of the transportation system indicate the conditions that commuters

and other travelers encounter during normal business hours in their working activities. The traffic network, vehicular traffic, travel patterns, circulation, and parking are described for the study area.

3.10.2 Existing Conditions

Electrical System. The existing electrical distribution system on the Water Tower Redevelopment Site consists of underground lines that serve the existing buildings from the western side of the Site. Service is provided by Potomac Electric Power. Based on the Master Plan, the service has a capacity of 55 megavolt-amperes (MVA), with a peak demand of 26 MVA (GSFC 2014a).

Natural Gas System. There is no natural gas infrastructure within the Site or immediate vicinity (NASA 2004).

Heating and Cooling Systems. Chilled water and steam used for heating, humidification, and process loads on the Site is provided by the central utility plant located in Building 24 through underground lines that travel to Tiros Road. There is an existing steam manhole on the Site that services the existing buildings (GSFC 2014a). GSFC operates under an NPDES Industrial Discharge Permit from the State of Maryland (Permit 08-DP-4156 [MD0067482]) to discharge cooler water and boiler blowdown from campus operations.

Potable Water System. The domestic water main service and fire protection is provided by the city main located along Tiros Road by the WSSC (GSFC 2014a, NASA 2004). Area 400 could contain a closed, underground water storage tank (GSFC 2014f).

Wastewater System. GSFC has been issued a WSSC Discharge Authorization Permit (Permit No. 00449) to discharge industrial waste into the wastewater system which is serviced by WSSC. There is an existing manhole on the southeast corner of the Site. This system services the recently constructed Building 34 (GSFC 2014a). There are existing septic systems associated with Building 84 and Area 400 (GSFC 2014e).

Storm Water System. The Site includes one of the highest points on the GSFC campus and is composed of four drainage areas defined by GSFC. There are two drainage areas in the northern portion of the Site that accommodate the majority of the parking surfaces and the existing buildings on the Site. The two drainage areas in the southern portions of the Site contain a wooded area with a small intermittent stream. These areas drain into larger storm water management devices downstream. There are no existing storm water management devices on the Site (GSFC 2014a).

Telecommunications System. The voice/data, security, and fire alarm systems network consists of communications duct banks and manholes along Tiros Road (GSFC 2014a).

Solid Waste Management. Non-hazardous solid waste at GSFC consists of office waste, plastics, glass, wood, and trash. Waste is collected by custodial staff and placed in dumpsters. A private contractor then hauls the waste to the Prince George's County sanitary landfill 16 km (10 miles) south of GSFC on Brown Station Road in Upper Marlboro, Maryland. GSFC recycles standard items such as white and mixed paper, cardboard, aluminum soda cans, ferrous and nonferrous metals, and glass and plastic containers. Several contractors collect materials for recycling (NASA 2007).

LEED Scorecard. The LEED v2009 program has been developed to standardize benchmarks in building design and management that improve environmental and economic performance of buildings using both established and advanced industry principles, practices, materials, and standards. A project garners points by meeting a checklist of benchmarks for requirements that lead to levels of rating certifications. Rating certifications include, in ascending order, Certified, Silver, Gold, and Platinum. Checklist categories

include Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, and Innovation and Design processes (GSFC 2014a).

Transportation System. As part of the GSFC Transportation Management Plan, current commuting and transportation patterns were determined at several locations in the vicinity of GSFC. An employee commuting survey was conducted in October 1999, which determined that during peak usage times, an estimated 90 percent of the GSFC staff commute with only one person in a vehicle. Approximately 8 percent of the employees use ridesharing, 2 percent commute by bus, and less than 1 percent ride a bike or walk to GSFC (GSFC 2002c). Employees access GSFC via Greenbelt Road from the south and the Baltimore-Washington Parkway and Hubble Road from the north. Delivery trucks enter GSFC from Soil Conservation Road, which is adjacent to the Site on the east. The majority of traffic on Soil Conservation Road flows to the south in the mornings and the north in the evenings. During rush hour peak periods, flow frequently becomes congested at each end of the road and significant delays can occur. Cyclists and pedestrians are able to use Soil Conservation Road, although the conditions for such use are inadequate (GSFC 2002c). The Site is currently accessed from Tiros Road to the north, which is fed primarily by Goddard and Minitrack Roads to the west and Hubble Road to the east. Modes of transport within GSFC include use of vehicles, bicycles, and walking.

3.10.3 Environmental Consequences

The availability of infrastructure and its capacity to support growth are generally regarded as essential to the economic growth of an area. The analysis to determine potential impacts on utilities, and infrastructure systems considers primarily whether a proposed action would exceed capacity or place unreasonable demand on a specific utility. Impacts might arise from energy needs created by either direct or indirect workforce and population changes related to installation activities. Pursuant to EO 13693, impacts from energy usage and alternative energy sources are also evaluated. Impacts would be considered major if implementation of the Proposed Action resulted in exceeded capacity of a utility, long-term interruption of the utility, violation of a permit condition, or violation of an approved plan for a utility. Construction contractors should be well-informed of utility locations prior to any ground-disturbing activities that could result in major unintended utility disruptions or human safety hazards, and all ground-disturbance required for utility line installation and facility construction would be accomplished in accordance with Federal and state safety guidelines. In addition, any permits required for excavation and trenching would be obtained prior to the commencement of construction activities.

The evaluation of impacts on the transportation system is based on the capacity of the transportation network in an area affected by a proposed action and compatibility of proposed actions with existing conditions. Thresholds for triggering significant or major impacts include evaluating the potential for the following:

- Increase in traffic volumes or delays to levels that impair a roadway's handling capacity or increase traffic safety hazards
- Substantial increase in vehicle queue length
- Substantial disruption of traffic operations.

3.10.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

Deconstruction activities under the Preferred Alternative would have no impacts on utilities, infrastructure, or transportation. Existing infrastructure in the areas proposed for deconstruction would be reused where possible, as is the case for the Water Tower Redevelopment Site, or removed. Utility corridors would be constructed along the western and eastern sides of the Site during construction of

Phase I. The utility corridors would include water, electric, natural gas, chilled water, steam, fire protection, and telecommunication utilities.

3.10.3.1.1 Phase I Activities

Electrical System. Long-term, minor, beneficial impacts on electrical systems would be expected. The existing capacity of the electrical lines on the Water Tower Redevelopment Site is suitable for the proposed new infrastructure on the site. The proposed utility connections for the IDF would come from Tiros Road where the majority of the connections are available. Sustainable upgrades to both the electrical system, and energy-saving fixtures would reduce the overall load to below current usage (GSFC 2014a).

Natural Gas. No impacts on natural gas systems would be expected. There is no existing natural gas service to the Site and no new natural gas lines would be installed under Phase I.

Heating and Cooling System. Long-term, negligible, beneficial impacts on the heating and cooling system would be expected from the installation of new, more efficient chilled water and steam lines. The existing main would be tapped from Tiros Road and routed through the utility corridor on the western edge of the Site and would not exceed the current capacity of the central utility plant.

Potable Water System. No long-term impacts on potable water service are expected. Usage and available capacity are not anticipated to change as there is no increase in personnel on site. New piping infrastructure to the buildings could reduce the overall load (GSFC 2014a).

Wastewater System. Long-term, negligible beneficial impacts on sanitary service would be expected. The sanitary sewer system services the recently constructed Building 34 adjacent to the site, and has generally been determined to meet the requirements of the Proposed Action. Current wastewater treatment capacities would not be adversely affected as the number of personnel would not increase on GSFC. A new gravity sanitary main would also be constructed along the eastern side of the Site (GSFC 2014a). Changes to the locations of laboratory and industrial discharges to sanitary sewer systems would be coordinated with WSSC in accordance with requirements of GSFC's WSSC Discharge Authorization Permit. The existing septic systems associated with Building 84 and Area 400 would be removed under Phase I. A study of the septic systems to verify that no chemical contamination has occurred as a result of laboratory operations that are serviced by the septic system would need to be conducted prior to removal (GSFC 2014e, GSFC 2014f).

Storm Water System. Long-term, minor, beneficial impacts on storm water management would be expected. Storm water modeling shows that the existing storm water system would not meet the requirements of development on the Site. The parking surfaces would be graded to crown at the center of the driving aisle and flow towards the medians, where runoff would be collected in micro bio-retention storm water management devices. The runoff would not flow over walkways or entrances. The landscaped areas on the Site would be graded to flow away from the buildings, and managed through the use of storm drains and grassed swales to create a storm water management network to move the water from the Site. Planted bioretention areas using storm water collection devices would be integrated into the IDF design to treat storm water from impervious surfaces. Additionally, the site design would include use of alternate paving surfaces, such as pervious concrete, pavers, or asphalt, to help reduce the amount of impervious surfaces. The proposed storm water management system would substantially improve storm water management on the Site. Overall, there would be a net decrease in impervious surfaces under Phase I, thus meeting the sustainability requirements identified in **Section 2.1.1.2** (GSFC 2014a).

Telecommunications System. No impacts are anticipated on telecommunications systems. Voice/data, security, and fire alarm systems for the each building would tie into the existing campus distribution system via the new utility corridor for the site located along the western side of the Site (GSFC 2014a).

Solid Waste Management. Short-term, minor, adverse impacts on solid waste management would be expected. No additional operations waste is anticipated from the operation of the building. Any solid waste from construction, deconstruction, and land-clearing activities would be recycled in accordance with EO 13693, if possible, or properly disposed of at GSFC's permitted solid waste acceptance facility located on Good Luck Road or at Prince George's County landfill in Upper Marlboro, both of which have sufficient capacity to meet project requirements, or another facility (PG County DoE 2013).

LEED Scorecard. Long-term, moderate, beneficial effects on the reduction of conventional energy use and the increase in usage of renewable energies would be expected. NASA has committed to designing and constructing the IDF complex to a LEED v2009 Gold certification standard (GSFC 2014a). The design features to be implemented for achieving this certification level include building orientation to maximize energy efficiency, building layout and sidewalk connectivity, reflective roof and "cool pavements" to reduce heat island effects, management of open space areas to promote wildlife habitat and native vegetation, use of energy-efficient vehicles, right-sizing spaces to maximize use of parking lots, and management strategies including bioretention facilities and revegetation using native plants, reduction of light pollution through use of motion sensors and low-glare technologies, use of on-site renewable energy sources, and implementation of NASA's Net Zero Energy Policy (GSFC 2014a). Deconstruction of inadequate facilities as a part of the recapitalization effort would also contribute to achieving the LEED v2009 Gold certification.

Transportation System. Short-term, minor, adverse impacts on local transportation are expected. As there would not be an increase in campus personnel population as a result of the Proposed Action, no additional traffic at GSFC would occur. The Site has been designed to include a pedestrian walkway along the western side linking campus neighborhoods, and walkways between the buildings as discussed in **Section 2.1.2**. Increased pedestrian access between buildings would potentially result in less vehicular traffic and emissions. Construction activities might result in short-term adverse impacts on traffic along Soil Conservation Road and Hubble Road from construction vehicles using these roads. However, it is anticipated that normal personnel commuter traffic would be managed with onsite measures to maintain current traffic levels during construction activities, or take other available routes through the complex if required during peak traffic hours, and construction deliveries would occur during off-peak hours.

The primary access to the IDF complex under Phase I would be from Tiros Road to the north and Hubble Road to the east. Hubble Road to the east would also be reconfigured slightly to the east to allow for maximum use of land available for the Site and provide access to employee parking and service access from the east. Any parking not accommodated on the Site would be provided by nearby available surface parking lots, including Building 34. By placing the majority of the vehicular traffic to the northern and eastern edges of the Site, the IDF complex would be afforded views of the central campus green to the west (GSFC 2014a). Impacts from operational activities include an increase in traffic in the immediate project area, but overall traffic levels would not change as the population of GSFC would not increase due to the Proposed Action.

3.10.3.1.2 Phases II–IV Activities

Electrical System. Under Phases II through IV, long-term, minor, beneficial impacts on the electrical system would be expected to be the same as those described for Phase I. The utility corridor would extend along the western corridor as necessary to accommodate each phase. Total load for the electrical system is estimated to be 3,550 kilovolt-amperes for all four phases and would be supplied from either the east or west substation on GSFC via existing feeders servicing nearby buildings (GSFC 2014a).

Natural Gas. Under Phases II through IV, no impacts on natural gas systems would be expected. There is no existing natural gas service to the Site and no new natural gas lines would be installed under Phases II through IV.

Heating and Cooling System. Under Phases II through IV, long-term, negligible, beneficial impacts on the heating and cooling system would be similar to those described for Phase I. A service connection would be provided for each building as the phases are constructed. Chilled water load calculations total an estimated 4,459 kilowatts for all four phases. Steam load calculations total an estimated 6,416 kilograms (14,115 pounds) per hour for all four phases. Designs for water service would result in a net zero rating for energy use, which would require a balance between the amounts of energy generated through renewable options and reducing the energy use of the buildings (GSFC 2014a).

Potable Water System. Under Phases II through IV, no long-term impacts on the potable water system would be expected, which is similar to those described for Phase I. Domestic hot and cold water loads are estimated to require 2,177 liters per minute (575 gallons per minute) for all four phases (GSFC 2014a).

Wastewater System. Under Phases II through IV, long-term, negligible, beneficial impacts on the wastewater system would be expected and similar to those described for Phase I. Service connections would extend along the eastern side of each building as the phases are constructed. Sanitary sewer supply estimates have been estimated at 570 liters per minute (150 gallons per minute) for all four phases (GSFC 2014a).

Storm Water System. Under Phases II through IV, long-term, minor, beneficial impacts on the storm water system would be expected and similar to those described for Phase I. Implementation of all four phases would reduce impervious surface area on the Site by approximately 8 percent (GSFC 2014a).

Telecommunications System. Under Phases II through IV, no impacts on the telecommunications system would be expected, which is similar to those described for Phase I. Extension service would be provided to each building during construction of each phase.

Solid Waste Management. Under Phases II through IV, short-term, moderate, adverse impacts on solid waste management from the increase in generation of construction and deconstruction waste would be expected and similar to but greater than those described for Phase I.

LEED Scorecard. Under Phases II through IV, slightly greater beneficial impacts from sustainable design would be expected and similar to those described for Phase I. NASA is committed to a net zero energy balance, and continually improved and sustainable design for future construction projects. It is anticipated that future phases would meet or exceed the design for the IDF.

Transportation System. Under Phases II through IV, short-term, minor, adverse impacts on the transportation system would be expected and the same as those described for Phase I.

3.10.3.2 Goddard “L” Layout (Alternative 1)

Impacts from the Goddard “L” Layout (Alternative 1) would be similar to those described for the Preferred Alternative.

3.10.3.3 Checkerboard Layout (Alternative 2)

Impacts from the Checkerboard Layout (Alternative 2) would be similar to those described for the Preferred Alternative.

3.10.3.4 Radial Layout (Alternative 3)

Impacts from the Radial Layout (Alternative 3) would be similar to those described for the Preferred Alternative.

3.10.3.5 No Action Alternative

Existing conditions would remain the same under the No Action Alternative. Therefore, no effects on utilities, infrastructure, and transportation would occur.

3.11 Hazardous Materials and Wastes

3.11.1 Definition of the Resource

Hazardous materials are defined by 49 CFR Part 171.8 as “hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions” in 49 CFR Part 173. Transportation of hazardous materials is regulated by the U.S. Department of Transportation regulations in 49 CFR Parts 105–180.

Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA) at 42 U.S.C. Section 6903(5), as amended by the Hazardous and Solid Waste Amendments, as: “a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.” Certain types of hazardous wastes are subject to special management provisions intended to ease the management burden and facilitate the recycling of such materials. These are called universal wastes and their associated regulatory requirements are specified in 40 CFR Part 273.

Special hazards include asbestos-containing material (ACM), polychlorinated biphenyls (PCBs), and lead-based paint (LBP). USEPA is given authority to regulate these special hazard substances by the Toxic Substances Control Act Title 15 U.S.C. Chapter 53. USEPA has established regulations regarding asbestos abatement and worker safety under 40 CFR Part 763 with additional regulation concerning emissions (40 CFR Part 61). Whether from lead abatement or other activities, depending on the quantity or concentration, the disposal of the LBP waste is regulated by RCRA at 40 CFR Part 260. The disposal of PCBs is addressed in 40 CFR Parts 750 and 761.

3.11.2 Existing Conditions

GSFC’s Medical and Environmental Management Division (MEMD) manages all environmental activities, including hazardous waste and pollution prevention for the campus through GPD 8500.1, *Environmental Policy and Program Management*; GPD 8500.3, *Waste Management*; and GPD 8500.5C *Water Management*. These policies outline responsibilities for GSFC personnel, facilities, and activities to develop and implement sound environmental practices and procedures for the facilities and operations on the campus (GSFC 2012a, GSFC 2012c, GSFC 2013e).

GSFC operates under USEPA Large Quantity Generator status (USEPA ID No. MD9800013865) and USEPA Small Quantity Generator status (USEPA ID Nos. MDR000001925 and MDR000001933) for various locations within the campus (GSFC 2002b, Levine 2013). Hazardous wastes are accumulated in

secure areas within the building of origin and then transported to the Building 27A, where it is stored for less than 90 days.

Building 27 serves as the center motor pool, where vehicle maintenance and repair activities and fueling services are conducted. This area previously housed underground storage tanks that have been formally closed and currently houses active aboveground storage tanks. GSFC operates an Oil Operations Permit from MDE (Permit No. 2014-OPT-3356) in accordance with COMAR 26.10 (*Oil Pollution and Tank Management*) and a Secondary Scrap Tire Collection Facility License (2010-RSC-08127) for activities related to operations in this building (Levine 2013). Building 27B historically housed Class C explosives, and is now used for storage for environmental field activities, including sampling (GSFC 2014b).

A historic trichloroethene (TCE) plume is present 21 to 24 meters (70 to 80 feet) below the ground surface at the Water Tower Redevelopment Site in the shallow unconfined Upper Patapsco Aquifer. It is unlikely that the near-surface soils at the Water Tower Redevelopment Site are contaminated as a result of the TCE groundwater plume (Meyer 2013). Remediation efforts have eliminated risks associated with both groundwater and soil pollution, and the Site is above the fringe of the plume. However, a very small potential for soil vapor intrusion might still remain (Meyer 2013).

GSFC generally possesses only a small fraction of the quantity of radioactive material allowed by the Nuclear Regulatory Commission General Research and Development License issued to GSFC (Nuclear Regulatory Commission license 19-05748-02) (GSFC 2002b, NASA 2007).

There is an existing debris fill area (DFA), known as Landfill B, to the east of the Site under Explorer Road that was used by the Washington Metropolitan Area Transit Authority as an unpermitted construction rubble and debris landfill during construction of the New Carrollton station. GSFC conducted a trench investigation that showed the site was mostly soil, not rubble or debris (NASA 2007).

3.11.3 Environmental Consequences

Impacts would be considered major if implementation of the Proposed Action resulted in a substantial release or contamination issue or a violation of a permit condition. Potential impacts of hazardous materials and wastes on human health are discussed in **Section 3.12**.

3.11.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

3.11.3.1.1 Phase I Activities

No impacts on the management of hazardous materials and wastes are expected because materials and wastes would be managed in accordance with applicable regulations and there would be no net change in the GSFC operations. The proposed construction and deconstruction activities would require the delivery and use of hazardous materials and petroleum products and would generate hazardous wastes. Contractors would be responsible for the management of hazardous materials, hazardous wastes, and petroleum products during construction and deconstruction activities. GSFC MEMD would be responsible for the disposal of all hazardous wastes generated during construction. Existing laboratory functions that involve use of radioactive materials and potentially toxic gases would be relocated to the IDF, but their use would not increase during operation. These products would be handled in accordance with Federal, state, and local regulations (GSFC 2015). Due to the age of buildings, ACM and LBP surveys are recommended prior to deconstruction (GSFC 2013a, GSFC 2013b, GSFC 2013c). Deconstruction activities would be conducted in consultation with the GSFC MEMD and Occupational Safety and Health Division to ensure compliance in accordance with GSFC procedures and Federal regulatory requirements (GSFC 2012a).

In order to control risks related to the TCE groundwater plume beneath the Site, construction contractors would perform work in accordance with the relevant land use control requirements currently being coordinated with MDE. Vapor intrusion monitoring should be considered during design and post-construction in the basement of the occupied building. In addition, construction planning and performance would ensure that the existing cover in place associated with the former DFA (e.g., soil, roadway/asphalt, and building footprints/concrete) would be maintained or replaced as a barrier to limit potential future worker exposure to underlying potentially contaminated soils. Construction contractors would develop and implement a site safety and health plan for any intrusive activities planned in the footprint of the former DFA or that might result in worker exposure to the contaminated shallow unconfined Upper Patapsco Aquifer to ensure that workers are adequately protected pursuant to Federal Occupational Safety and Health Administration (OSHA) regulation and safe worker practices.

3.11.3.1.2 Phases II–IV Activities

Impacts would be similar to those discussed under Phase I. GSFC's MEMD developed a deconstruction planning document to outline potential contamination issues associated with the Building 27 complex. Issues might have arisen from vehicle maintenance and storage activities, hazardous materials and waste storage, and past releases (GSFC 2014b). Procedures for the control and minimization of new hazardous waste releases are covered under the GSFC Storm Water Pollution Prevention Plan and ICP (GSFC 2013d). Relocation of Building 27A personnel and functions would be required prior to deconstruction. No impacts on the management of hazardous materials and hazardous wastes would be expected as there would be no net change in the operations of GSFC.

3.11.3.2 Goddard "L" Layout (Alternative 1)

Impacts from the Goddard "L" Layout (Alternative 1) would be similar to those described for the Preferred Alternative.

3.11.3.3 Checkerboard Layout (Alternative 2)

Impacts from the Checkerboard Layout (Alternative 2) would be similar to those described for the Preferred Alternative.

3.11.3.4 Radial Layout (Alternative 3)

Impacts from the Radial Layout (Alternative 3) would be similar to those described for the Preferred Alternative.

3.11.3.5 No Action Alternative

Existing conditions would remain the same under the No Action Alternative. Therefore, no effects on hazardous materials and waste management would occur.

3.12 Human Health and Safety

3.12.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. Human health and safety addresses workers' and the public's health and safety during construction activities and subsequent operation of the newly constructed facilities.

Construction site safety requires adherence to regulatory requirements imposed for the benefit of employees. It includes implementation of engineering and administrative practices that aim to reduce risks of illness, injury, death, and property damage. The health and safety of onsite workers and personnel are safeguarded by numerous regulations designed to comply with standards issued by OSHA, the USEPA, and state occupational safety and health agencies. These standards specify health and safety requirements, the amount and type of training required for workers, the use of personal protective equipment (PPE), administrative controls, engineering controls, and permissible exposure limits for workplace stressors. Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances.

Health and safety hazards can often be identified and reduced or eliminated. Necessary elements for an accident-prone situation or environment include the presence of the hazard itself, together with the exposed (and possibly susceptible) population. The degree of exposure depends primarily on the proximity of the hazard to the population. Hazards include transportation, maintenance and repair activities, and the creation of noisy environments or a potential fire hazard. The proper operation, maintenance, and repair of vehicles and equipment carry important safety implications. Any facility or human-use area with potential explosive or other rapid oxidation process creates unsafe environments due to noise or fire hazards for nearby populations. Noisy environments can also mask verbal or mechanical warning signals such as sirens, bells, or horns.

OSHA aims to ensure safe and healthy working conditions by setting and enforcing safe workplace standards. The National Institute for Occupational Safety and Health also has guidelines and recommendations to ensure safety and prevention of work-related illnesses and injuries.

3.12.2 Existing Conditions

All contractors performing deconstruction and construction activities at GSFC are responsible for following safety regulations and workers compensation programs and are required to conduct deconstruction and construction activities in a manner that poses minimal risk to workers or personnel. Industrial hygiene programs address exposure to hazardous materials, use of PPE, and availability of Safety Data Sheets. Industrial hygiene is the responsibility of contractors, as applicable. Contractor responsibilities are to review potentially hazardous workplace operations; to monitor exposure to workplace chemicals (e.g., asbestos, lead, hazardous materials), physical hazards (e.g., noise propagation, falls), and biological agents (e.g., infectious waste, wildlife, poisonous plants); to recommend and evaluate controls (e.g., prevention, administrative, engineering) to ensure personnel are properly protected or unexposed; and to ensure a medical surveillance program is in place to perform occupational health physicals for those workers subject to any accidental chemical exposures.

Areas of documented environmental contamination are within the area of the Proposed Action and are discussed in Detail in **Section 3.11.2**.

3.12.3 Environmental Consequences

If implementation of the Proposed Action were to increase risks associated with the safety of construction personnel, contractors, GSFC personnel, or the local community; or hinder the ability to respond to an emergency, it would represent an adverse impact. An impact would be significant if implementation of the Proposed Action were to substantially increase risks associated with the safety of construction personnel, contractors, GSFC personnel, or the local community; substantially hinder the ability to respond to an emergency; or introduce a new health or safety risk for which the installation is not prepared or does not have adequate management and response plans in place.

3.12.3.1 Science and Engineering Corridor Alternative (Preferred Alternative)

3.12.3.1.1 Phase I Activities

Contaminated Materials. Short-term, negligible, adverse impacts on human health and safety would be expected from potential construction worker contact with contaminated building materials from deconstruction activities under Phase I of the Preferred Alternative. Buildings proposed for deconstruction under the Phase I of the Preferred Alternative could contain ACM, LBP, or PCBs or RCRA-8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium or silver) because a number of the buildings were constructed prior to 1978. Any contamination present in these buildings would be handled in accordance with applicable policies and procedures, including inspection by a state-certified inspector prior to commencement of deconstruction activities. Deconstruction plans would be reviewed by installation civil engineering personnel to ensure appropriate measures were taken to properly manage or remove ACMs, 8-RCRA metals, LBP, and PCB-containing materials, and reduce potential exposure to, and release of, asbestos, lead, and PCBs. Contractors would be required to adhere to Federal and state regulations in addition to installation management plans. GSFC has established measures and programs for the management of ACMs, LBP, and PCBs to ensure they are handled and disposed of in compliance with Federal and state environmental laws and regulations. Beneficial impacts would be expected from the removal of buildings containing contaminated materials by reducing potential personnel exposure.

Worker Health and Safety. Short-term, negligible, adverse impacts on human health and safety would be expected from potential construction worker contact with deconstruction or construction hazards under Phase I of the Preferred Alternative. Construction personnel by nature are exposed to increased hazards during the average workday. All construction contractors would be required to follow and implement OSHA and NASA safety standards to establish and maintain a safe working environment. Workers would be required to wear appropriate PPE including ear protection, steel-toed boots, hard hats, and gloves. Soil vapor from the TCE plume located below the Water Tower Redevelopment Site would be monitored. Workers would also be potentially exposed to contaminated materials (e.g., ACM, LBP, PCBs) during deconstruction activities. If any contaminated materials are discovered, then they would be characterized and removed by a certified removal specialist and disposed of in a USEPA-approved disposal site. Construction sites would be appropriately marked and fenced off to protect construction workers when working near the Site. Construction activities would be coordinated to avoid or minimize impacts on construction or GSFC personnel. The IDF and associated development would meet AT/FP requirements. Short-term, negligible, adverse impacts on worker health or safety would be expected as a result of deconstruction and construction related to Alternative 1.

Emergency Services and Safety. No impacts on emergency services would be expected under Phase I of the Preferred Alternative. The Proposed Action would not impact emergency response times because emergency response vehicles would either trigger traffic signals to green to allow vehicle pass-through or sirens would provide appropriate warning to pedestrians and traffic alike.

Pedestrian and Vehicle Safety. No impacts on pedestrian and vehicle safety would be expected from Phase I of the Preferred Alternative. Apart from potential use of a roadway to the east of the Water Tower Redevelopment Site, no road work is anticipated, and a pedestrian walkway would be constructed along the western side of the Site, creating a safer pedestrian environment. Buildings would be constructed to ensure compliance with a required 10-meter (33-foot) setback for all buildings as an AT/FP precaution, creating a safer environment for installation personnel.

3.12.3.1.2 Phases II–IV Activities

Impacts from Phases II through IV would be similar to those discussed for Phase I under the Preferred Alternative.

3.12.3.2 Goddard “L” Layout (Alternative 1)

Impacts from the Goddard “L” Layout (Alternative 1) would be similar to those described for the Preferred Alternative.

3.12.3.3 Checkerboard Layout (Alternative 2)

Impacts from the Checkerboard Layout (Alternative 2) would be similar to those described for the Preferred Alternative.

3.12.3.4 Radial Layout (Alternative 3)

Impacts from the Radial Layout (Alternative 3) would be similar to those described for the Preferred Alternative.

3.12.3.5 No Action Alternative

Existing conditions would remain the same under the No Action Alternative. Therefore, no effects on human health and safety would occur.

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4. Cumulative Impacts

Federal regulations implementing NEPA (40 CFR Parts 1500–1508) require that the cumulative effects of a proposed action be assessed. CEQ regulations implementing the procedural provisions of NEPA define cumulative effects as follows (40 CFR Part 1508.7):

“The impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.”

A cumulative effect could be additive (i.e., the net adverse cumulative effects are strengthened by the sum of individual effects), countervailing (i.e., the net adverse cumulative effect is less as a result of the interaction between beneficial and adverse individual effects), or synergistic (i.e., the net adverse cumulative effect is greater than the sum of the individual effects). Cumulative effects could result from individually minor, but collectively significant actions that take place over time. Accordingly, a cumulative effects analysis identifies and defines the scope of other actions and their interrelationship with the alternatives if there is an overlap in space and time. Cumulative effects are most likely to occur when there is an overlapping geographic location and a coincidental or sequential timing of events.

For the purposes of this analysis, it is assumed that Phase I deconstruction activities would begin in 2015 with construction activities following thereafter, and Phases II through IV would occur in the 2019–2028 timeframe. For most resources, the spatial area for consideration of cumulative effects is limited to the installation on which an activity would occur. Given that the Proposed Action would occur within the central portion of GSFC, nearly 0.8 km (0.5 mile) from the GSFC installation boundary, and that there would be no change in resources such as operational emissions or traffic levels on or off GSFC, no cumulative impacts off-campus would be expected from the Proposed Action; therefore, only other cumulative actions within GSFC were analyzed. In addition, the alternatives for the Proposed Action would not have any differences in terms of cumulative effects as the only differences between the alternatives are building alignments and negligible differences in total project square footage and other measurements.

Past actions are those actions, and their associated impacts, that occurred within the geographical extent of cumulative effects that have shaped the current environmental conditions of the project area. CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions (Connaughton 2005). The effects of past actions are now part of the existing environment and are included in the affected environment described in **Section 3**. However, recent past actions with continuing ongoing effects germane to cumulative impacts are discussed with present and reasonably foreseeable future actions.

4.1 Projects Considered for Potential Cumulative Effects

Earth Science Building, Building 34. The Earth Science Building is an 18,580-m² (200,000-ft²) facility with mixed office/laboratory building uses to support the Astrophysics Science Division, Solar System Exploration Division, and Sciences and Exploration Directorate. The Astrophysics division conducts a broad program of research in astronomy, astrophysics, and fundamental physics. The Solar System Exploration Division conducts theoretical and experimental research to explore the solar system and understand the formation and evolution of planetary systems. The Earth Science Building houses approximately 493 occupants and is sited to the immediate southeast of the Water Tower Redevelopment Site. The construction of this building was completed in 2009 (Montgomery and Ramsey 2014).

Shipping and Receiving Building, Building 35. The Shipping and Receiving Building is a 9,662-m² (104,000-ft²) facility that receives, stores, and processes goods for shipment throughout the GSFC Campus to occupants in various buildings. Building 35 is sited approximately 671 meters (2,200 feet) east of the Water Tower Redevelopment Site. The construction of this building was completed in 2012 (Montgomery and Ramsey 2014).

Relocation of Less-than-90-Day Facility, Building 27A. Building 27A serves as GSFC's less-than-90-day Hazardous Waste Accumulation Facility. Staff and operations at the Building 27 complex would be relocated to new or existing facilities elsewhere on GSFC prior to deconstruction of the facility. The new facilities would be consistent with the footprint and functionality of the existing Building 27A facilities. A new less-than-90-day facility would be constructed to meet stringent requirements defined in 40 CFR Parts 262 and 265. Location of the new facilities has not been determined; however, it is anticipated that it would be collocated with the shipping and receiving facility on GSFC (Building 35).

Flight Projects Building, Building 36. The Flight Projects Building is a four-story, 11,613-m² (125,000-ft²) office building. The Flight Projects Directorate would be the principal occupant. The new office building will accommodate approximately 330 people that would be relocated from other facilities on the GSFC Main Campus. Approximately 94 percent of the proposed office building would be allocated to Flight Projects and 6 percent is allocated to New Opportunities Office (Code 101). The Flight Projects Building is sited just west of the Water Tower Redevelopment Site and northeast of Building 12, within the Flight Projects neighborhood to facilitate synergy within the community. This facility is currently under construction and is scheduled to be completed in June 2015 (Montgomery and Ramsey 2014).

Main Gate Reconfiguration. A new Main Gate to provide access to GSFC via ICESAT Road would be constructed, east of the current Main Gate. ICESAT Road intersects with Greenbelt Road and proceeds north to Explorer Road. An addition to ICESAT Road north of Explorer Road would be constructed to connect directly to the Water Tower Redevelopment Site. The Main Gate at Goddard Road and Greenbelt Road would be closed following the opening of the new Main Gate (GSFC 2014d).

Combined Heating and Power (CHP) Installation. A Level 1 CHP feasibility analysis was completed for GSFC located in Greenbelt, Maryland (GSFC and USEPA 2013). Two combustion turbine alternatives were evaluated. The first option is based on two Solar Mercury 50 recuperated combustion turbines. The second option is based on a single Solar Mars 100 combustion turbine integrated with an extraction steam turbine. Both options would produce steam in a heat recovery steam generator to provide steam for heating the Greenbelt facilities. A Phase 2 study is currently underway to verify the proposed approaches and determine if there are any roadblocks which would prevent the project. Dependent on the study results, expansion of the Building 24 central utility plant would occur to install the equipment necessary to implement a CHP system. This is an energy reduction project, and a portion would be considered renewable with the continued use of landfill gas.

4.2 Cumulative Effects on Resource Areas

The following analysis examines the cumulative effects on the environment that would result from the incremental impacts of the Proposed Action, in addition to other past, present, and reasonably foreseeable future actions. This analysis assesses the potential for an overlap of impacts with respect to project schedules or affected areas. This section presents a qualitative analysis of the cumulative effects.

Under the No Action Alternative, there would be no change in the baseline conditions for any resource areas. Existing conditions would continue as described in **Section 3**. No new cumulative impacts would be expected; however, air quality would continue to be negatively impacted due to ongoing use of less

energy efficient utility systems, and higher impervious surfaces and less efficient storm water management systems would continue to negatively affect storm water runoff and water quality.

4.2.1 Land Use

The construction of the IDF and subsequent phases would not require a change in the land use category at the Water Tower Redevelopment Site. If changes in a land use category are necessary for one of the cumulative projects, it would be in accordance with the categorizations defined in the *GSFC Center Master Plan* (GSFC 2008). No significant, cumulative effects on land use at GSFC are expected. The Proposed Action and past, ongoing, and future cumulative projects would create a synergistic overlap of mixed land use that would serve to meet the GSFC Master Plan requirements, which would result in long-term, beneficial impacts on land use.

Long-term, minor, adverse impacts on visual resources would be expected from the removal of trees at the southern end of the Water Tower Redevelopment Site under the Proposed Action and additional past, ongoing, and future cumulative projects. However, the planting of landscaping and deconstruction of inadequate buildings and construction of modern buildings would result in long-term, beneficial impacts on visual resources at GSFC. In areas where existing buildings would be replaced with new structures, no adverse impacts on the visual environment would be expected. Cumulatively, the construction of new, modern buildings at GSFC would result in a long-term, beneficial impact on the visual environment.

4.2.2 Cultural Resources

The additional past, ongoing, and future cumulative projects could impact historic buildings or districts if the construction or deconstruction activities occur in or near NRHP-listed or -eligible resources. If new structures are constructed within the historic district, they would be considered non-contributing structures and would diminish the integrity of the district; however, currently there are numerous non-contributing structures on the installation. Consultation with the MHT should be initiated prior to the commencement of the additional projects to minimize potential indirect visual effects within the Historic District. If any paleontological resources are unearthed during deconstruction or construction, all work in the immediate vicinity of the discovery would be halted until the resources are identified, documented, and appropriate treatment is developed in accordance with GSFC and the PRMP.

4.2.3 Air Quality

The estimated yearly emissions under either Alternative 1 or 2 would be well below one percent of the yearly emission inventory of the National Capital Intrastate AQCR. Construction activities from additional past, ongoing, and future projects occurring at the same time and in the same vicinity as the Proposed Action could have cumulative effects. These activities could collectively increase emissions of criteria air pollutants in the area temporarily, but variations in the timing of cumulative projects, and the relatively short duration of project effects, would distribute impacts over space and time. Once construction and renovation activities are complete, operation of the IDF along with other past, ongoing, and future cumulative projects would not result in any long-term impacts on regional air emissions.

The anticipated amount of CO₂ emissions from the proposed construction and deconstruction activities of the Proposed Action and the additional past, ongoing, and future cumulative projects would represent a negligible contribution towards the statewide GHG inventory and an extremely negligible contribution toward the national GHG inventory. The additional past, ongoing, and future cumulative projects would vary in timing and location so the impacts would be distributed over space and time. In addition, long-term GHG emissions are being steadily reduced based on more stringent energy management and compliance requirements for future projects at GSFC. Long-term, beneficial impacts on air quality would

be expected from the energy efficiency standards that would be implemented (i.e., constructing the IDF as a LEED-certified facility), and deconstruction of older, less efficient buildings that would result in reduced GHG emissions.

4.2.4 Noise

No significant impacts on the noise environment would occur from construction and deconstruction activities under the Proposed Action and other cumulative projects. Construction-related activities from the additional projects at the installation could collectively increase noise levels in the area temporarily, but variations in the timing and locations of cumulative projects, and the relatively short duration of these effects would distribute impacts over space and time. Noise generation would last only for the duration of deconstruction and construction activities, would be intermittent, and could be minimized through measures such as the restriction of these activities to normal working hours (i.e., between 7:00 a.m. and 5:00 p.m.), and the use of equipment exhaust mufflers. Consequently, construction activities occurring at the same time and in the same vicinity could have cumulative effects; however they would not be significant.

4.2.5 Coastal Zone Management

Under the Proposed Action and the additional cumulative projects, BMPs outlined in the GSFC SWPPP; storm water management procedures in accordance with GPR 8500.5C, *Water Management*; the 2007 EISA; and Federal, state, and local requirements would be implemented to reduce the volume and velocity and improve the quality of storm water that would be discharged to surface waters. In the event of a spill, the installation's SWPPP would be implemented. There are no wetlands on the Water Tower Redevelopment Site or other project sites; however, there are wetlands in the vicinity of the Proposed Action and the additional cumulative project sites. Construction-related activities from the additional projects at the installation could collectively increase impervious surfaces. However, variations in the timing and locations of cumulative projects, and the relatively short duration and small footprint of these effects, would distribute impacts over space and time. As a result, no significant cumulative impacts on coastal zone resources would be expected at GSFC.

GSFC is not located within a 100-year floodplain, as defined by FEMA and, therefore, further review of Maryland's CZMP Flood Hazard Policy is not necessary. Therefore, the Proposed Action and additional cumulative projects on GSFC would not result in impacts on floodplains.

4.2.6 Geological Resources

Impacts would result from disturbance and compaction of soils, clearing of vegetation, excavation, trenching, grading, and paving in areas of the Proposed Action and additional ongoing and future cumulative projects. Soil erosion and sediment production would be minimized during construction by following BMPs and by complying with Section 438 of the EISA, which requires implementation of low-impact development. Many areas and soils at GSFC have been disturbed from past development activities. Construction activities occurring at the same time and in the same vicinity could have cumulative effects on soil resources from disturbance and a potential increase in erosion. However, these effects would be minimized by following appropriate BMPs. As a result, no significant cumulative effects on geological resources are expected.

4.2.7 Biological Resources

Construction activities from additional cumulative projects occurring at the same time and in the same vicinity as the Proposed Action could have cumulative effects on vegetation and wildlife resources from

habitat removal and noise disturbances. Any habitat removal could be offset with recapitalization of underutilized infrastructure into green space or native species plantings, or reforestation with native plant species elsewhere on GSFC.

There is minimal habitat available due to the developed and urban environment at the installation and most species present are adapted to the noisy environment. Short- and long-term, negligible to minor, adverse effects on wildlife due to disturbances from noise, deconstruction and construction activities (i.e., increased human presence), and heavy equipment use would be expected from the Proposed Action and additional cumulative projects. In addition, planned construction projects would occur at varying times and locations across the installation.

No Federal- or state-listed threatened or endangered animal or plant species have been documented on GSFC. Appropriate coordination with USFWS would be completed prior to implementation of actions that would remove suitable habitat or otherwise affect any listed species. Therefore, no impacts on state or federally listed species would be expected.

4.2.8 Water Resources

Implementation of the Proposed Action would result in a net decrease in impervious surfaces and storm water runoff. If additional buildings are deconstructed as part of the other cumulative impacts projects in coordination with GSFC's recapitalization effort, a net decrease in impervious surfaces could be realized. Use of BMPs and implementation of an erosion-and-sediment-control plan and SWPPP during construction activities would minimize cumulative effects on water resources. Storm water design requirements for Federal development and redevelopment projects larger than 495 m² (5,000 ft²) must "maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow." There are no wetlands on the Water Tower Redevelopment Site, however there are wetlands in vicinity of the Site. Under the Proposed Action, a storm water management facility would be constructed near the parking lot, and storm drains and grassy swales would also be constructed around the facility. This system, combined with other projects using similar systems on their sites, along with deconstruction of aging facilities to offset new construction through recapitalization and conversion of some of these sites to pervious surfaces would cumulatively benefit storm water management at GSFC.

4.2.9 Socioeconomics and Environmental Justice

Implementation of the Proposed Action and the cumulative projects would not result in new personnel relocating to the installation; therefore, no impacts on the demographics of the area are expected, and no increases in housing requirements or employment would occur.

Construction activities of the Proposed Action and the additional cumulative projects would stimulate the local economy through increases in payroll taxes, sales receipts, and the indirect purchase of goods and services. Construction workers likely would come from within the area and short-term increases in local business volume within the local economy would be expected due to the purchase of construction materials, supplies, and other related services.

Construction and deconstruction activities of the Proposed Action and the additional cumulative projects would occur entirely on GSFC. Noise from construction activities and operational vehicle use would likely be the only source of potential impact on populations. Noise would not generally extend to residential areas off the installation. Additionally, construction activities would be restricted to normal working hours. Therefore, the Proposed Action and the additional cumulative projects would not disproportionately impact any children, minority, or low-income populations.

4.2.10 Utilities, Infrastructure, and Transportation

Long-term, minor, beneficial impacts would be expected from the deconstruction of inadequate buildings not properly configured to support future growth under the Proposed Action and the additional cumulative projects. Cumulatively, construction-related activities could result in increased use of utilities or possibly brief periods when services are interrupted for utility interconnections; however, it is not expected to be significant because construction activities would occur at varying times. Under the Proposed Action and the additional past, ongoing, and future cumulative projects, there would be no foreseeable increase in the demand for utilities beyond current levels due to implementation of NZEB-capable facilities or facilities that use less energy through energy-saving technology and deconstruction of older, energy-consuming facilities to offset new construction through recapitalization. Therefore, long-term, negligible, beneficial impacts would be expected on utility systems. Under the Proposed Action, there would be a net decrease in impervious surfaces and the proposed storm water management devices would substantially improve storm water management on the Site. Implementation of the Main Gate reconfiguration would result in a cumulative, long-term, beneficial impact on local transportation.

4.2.11 Hazardous Materials and Wastes

Construction, deconstruction, and operational activities for cumulative projects would require the delivery and use of hazardous materials and petroleum products and would generate hazardous wastes. Although the construction of additional cumulative projects would have similar impacts, these projects would not occur at the same time. The phasing of individual projects over several years, as is currently anticipated, would further minimize cumulative construction-related impacts. The removal of ACMs, LBP, 8-RCRA metals, and PCBs during deconstruction activities would cumulatively reduce potential exposure to these materials.

4.2.12 Human Health and Safety

For any project that would occur at the installation, ACMs, 8-RCRA metals, LBP, and PCB-containing materials present in the buildings slated for deconstruction would be handled in accordance with applicable policies and procedures, including inspection by a state-certified inspector prior to commencement of deconstruction activities. Construction-related activities, including identification and removal of ACMs, LBP, and PCBs, would comply with Federal and state regulations and applicable installation management plans. The removal of ACMs, LBP, 8-RCRA metals, and PCBs would reduce the potential exposure to personnel accessing facilities that contain these materials. Therefore, negligible cumulative impacts on human health and safety at GSFC would be expected.

Short-term, negligible, adverse impacts on construction worker's health and safety under the Proposed Action and additional cumulative projects would also be expected. All deconstruction and construction contractors would be required to follow and implement OSHA and NASA safety standards to establish and maintain a safe working environment. Workers would be required to wear appropriate PPE including ear protection, steel-toed boots, hard hats, and gloves.

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This EA has been prepared under the direction of NASA GSFC. Personnel at HDR, Inc., that contributed to the preparation of this document are listed.

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6. List of Agencies and Persons Consulted

NASA initiated agency coordination in support of the NEPA process with the following agencies:

- Maryland DNR
- MHT
- USFWS.

Copies of the correspondence between NASA and these agencies can be found in **Appendix A**.

The following agencies were sent copies of the Draft EA (see **Appendix A**):

- Advisory Council on Historic Preservation
- U.S. Department of Agriculture Agricultural Research Center (USDA ARS), Beltsville
- Mayor and City of Greenbelt
- Maryland DNR
- MHT
- Maryland-National Capital Park and Planning Commission (MNCPPC)
- National Capital Planning Commission (NCPC)
- State of Maryland Clearinghouse
- USFWS.

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8. Acronyms and Abbreviations

$\mu\text{g}/\text{m}^3$	microgram per cubic meter	EISA	Energy Independence and Security Act
ACHP	Advisory Council on Historic Preservation	ERD	Environmental Resource Document
ACM	asbestos-containing material	EO	Executive Order
ADP	Area Development Plan	ESA	Endangered Species Act
APE	Area of Potential Effect	ESD	environmental site design
ARS	Agricultural Research Center	FEMA	Flood Emergency Management Agency
AQCR	air quality control region	FPPA	Farmland Protection Policy Act
AT/FP	anti-terrorism/force protection	FR	Federal Register
BCC	bird species of conservation concern	ft^2	square feet
BMP	best management practice	GHG	greenhouse gas
CAA	Clean Air Act	GPD	Goddard Policy Directive
CEQ	Council on Environmental Quality	GPR	Goddard Procedural Requirement
CFR	Code of Federal Regulations	GSFC	Goddard Space Flight Center
CHP	Combined Heating and Power	HUC	Hydrologic Unit Code
CO	carbon monoxide	ICP	Integrated Contingency Plan
CO_2	carbon dioxide	IDF	Instrument Development Facility
COMAR	Code of Maryland	km	kilometers
CWA	Clean Water Act	LBP	lead-based paint
CZMA	Coastal Zone Management Act	LEED	Leadership in Energy and Environmental Design
CZMP	Coastal Zone Management Program	m^2	square meter
dba	A-weighted decibel	MBTA	Migratory Bird Treaty Act
DFA	debris fill area	MDE	Maryland Department of the Environment
DNR	Department of Natural Resources	MEMD	Medical and Environmental Management Division
EA	Environmental Assessment		

mg/m ³	milligram per cubic meter	PM _{2.5}	particulate matter equal to or less than 2.5 microns in diameter
MHT	Maryland Historical Trust	ppb	parts per billion
MSA	metropolitan statistical area	PPE	personal protective equipment
MVA	megavolt-amperes	ppm	parts per million
NA NSR	Nonattainment New Source Review	PRMP	Paleontological Resources Mitigation and Management Plan
NAAQS	National Ambient Air Quality Standards	PSD	Prevention of Significant Deterioration
NAGPRA	Native American Graves Protection and Repatriation Act	RCRA	Resource Conservation and Recovery Act
NASA	National Aeronautics and Space Administration	ROI	region of influence
NEPA	National Environmental Policy Act	SAAQS	State Ambient Air Quality Standard
NHL	National Historic Landmark	SHPO	State Historic Preservation Officer
NHPA	National Historic Preservation Act	SIP	State Implementation Plan
NO ₂	nitrogen dioxide	SO ₂	sulfur dioxide
NPDES	National Pollutant Discharge Elimination System	SWPPP	Storm Water Pollution Prevention Plan
NPR	NASA Procedural Requirement	TCE	trichloroethene
NRCS	Natural Resources Conservation Service	tpy	tons per year
NRHP	National Register of Historic Places	U.S.C.	United States Code
NZEB	Net Zero Energy Building	USACE	U.S. Army Corps of Engineers
O ₃	ozone	USDA	U.S. Department of Agriculture
OSHA	Occupational Safety and Health Administration	USEPA	U.S. Environmental Protection Agency
Pb	lead	USFWS	U.S. Fish and Wildlife Service
PCB	polychlorinated biphenyl	VOC	volatile organic compound
PM ₁₀	particulate matter equal to or less than 10 microns in diameter	WSSC	Washington Suburban Sanitary Commission

APPENDIX A

INTERAGENCY COORDINATION AND PUBLIC INVOLVEMENT

Interagency Coordination and Public Involvement

During the scoping process, NASA initiated agency coordination with Maryland Department of Natural Resources (DNR), U.S. Fish and Wildlife Service (USFWS), and the Maryland Historical Trust (MHT). Letters were sent to Maryland DNR and USFWS on April 23, 2014, and MHT on May 22, 2014, explaining NASA's Proposed Action and solicited comments regarding the project and in the agency's area of expertise. Copies of the letters and their responses are included in this appendix.

The Maryland Department of Natural Resources responded to the initiation letter on May 2, 2014, and stated that there are no State or Federal records showing rare, threatened, or endangered species within the boundaries of the delineated project site.

The USFWS responded via email on April 24, 2014, and requested NASA use the USFWS Web site to determine if federally endangered or threatened species would be impacted by the Proposed Action.

The letter sent to the MHT on May 22, 2014, initiated the Section 106 process. The MHT responded on June 9, 2014, and concurred with NASA's recommendation that an adverse effect would occur from the Proposed Action. NASA will continue to consult with MHT and the other consulting parties during the Section 106 process. Project information was sent to the consulting parties starting in October 2014, and public notification was provided in local newspapers on October 27, 2014.

The Draft EA was made available for public review. The public review period was initiated through the publication of a Notice of Availability in local newspapers. The EA was distributed to the agencies listed below. Comments provided by stakeholders and the public during the EA process has been incorporated into the analysis of potential environmental impacts in the EA, where appropriate and applicable, and included in **Appendix B**.

The Honorable Emmett V. Jordan
Mayor of Greenbelt
Greenbelt City Council
25 Crescent Road
Greenbelt, MD 20770

Ms. Genevieve LaRouche
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Dr
Annapolis, MD 21401

Ms. Lori A. Byrne
Environmental Rev. Specialist
Maryland Department of Natural Resources
Tawes State Office Building E-1
580 Taylor Ave
Annapolis, MD 21401

Ms. Linda C. Janey, J.D.
Asst. Secretary, Clearinghouse
Maryland Department of Planning
Capital Planning and Review Division
301 West Preston St, Suite 1104
Baltimore, MD 21201-2305

Ms. Elizabeth J. Cole
SHPO
Maryland Historic Trust
100 Community Place
Crownsville, MD 21032-2023

Mr. Brian Lusher
Program Analyst
Advisory Council on Historic Preservation
401 F Street, NW, Suite 308
Washington, DC 20001

Mr. Shane Dettman
Office of Public Engagement
National Capital Planning Commission
401 9th Street, NW, North Lobby, Suite 500
Washington, DC 20004

Ms. Fern Piret
Director, M-NCPPC Prince George's County
Planning Dept., 4th Floor
14741 Governor Oden Bowie Drive
Upper Marlboro, MD 20772

Ms. Celia Craze
Director, Greenbelt Planning and Community
Development
15 Crescent Road
Greenbelt, MD 20770

Mr. Dana Jackson
Sr. Remedial Project Manager
USDA ARS, Beltsville
10300 Baltimore Ave
Beltsville, MD 20705-2350

National Aeronautics and
Space Administration
Goddard Space Flight Center
Greenbelt, MD



April 23, 2014

Reply to Attn of: 250

Ms. Lori Byrne
Maryland Department of Natural Resources
Tawes State Office Building E-1
580 Taylor Ave
Annapolis, MD 21401

Dear Ms. Byrne:

NASA is proposing to redevelop the area located near the water tower on Goddard Space Flight Center's (GSFC) Greenbelt campus. In accordance with National Environmental Policy Act (NEPA), as amended, (42 U.S.C. 4321 et seq.), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and NASA's NEPA regulations (14 CFR Part 1216, subpart 1216.3), NASA is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts of the proposed redevelopment project.

The redevelopment of the water tower site would occur in phases and involves both the demolition of several existing warehouse and support buildings and the relocation of existing personnel and laboratory functions into state-of-the-art facilities to be constructed on the site. The first phase of development for the project is the construction of an Instrument Development Facility (IDF). Future phases would include construction of additional facilities. The IDF would co-locate several branches of scientists and engineers in order to gain efficiencies and mutual influence in the development of new technologies, instruments, and instrument components. The IDF would consist of approximately 50,000 gross square feet and would include office and conference areas, laboratories, shop, and support space, as well as storage, administrative areas, and maintenance areas. This new energy efficient facility would also include parking, storm water management, emergency and life-safety generators, utilities, and support appurtenances. Full build-out for the redevelopment would be approximately 250,000 square feet. See below for a map showing the location of the redevelopment area.



Area proposed (Orange box) for redevelopment at GSFC Greenbelt campus

The intent of this correspondence is to solicit any comments within your area of expertise that you may presently have concerning the potential environmental impacts of the proposed project. We request that comments be submitted within 30 days of the date of this notice to the address or email listed below:

Lizabeth Montgomery
GSFC NEPA Program Manager
NASA Goddard Space Flight Center
Code 250, Building 28, Room N150F
8800 Greenbelt Road
Greenbelt, MD 20771
Phone: (301) 286-0469
gsfc-enviro@lists.nasa.gov

The Draft EA is expected to be released later this year for public review and comment. At that time your organization will have an opportunity to review and comment on the Draft EA. If you need further information on NASA's environmental review process or the proposed project please contact me on (301) 286-0469. We look forward to hearing from you.

Sincerely,


Lizabeth Montgomery
GSFC NEPA Program Manager



Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor
Joseph P. Gill, Secretary
Frank W. Dawson III, Deputy Secretary

May 2, 2014

Lizabeth Montgomery
NASA Goddard Space Flight Center
8800 Greenbelt Road
Greenbelt, MD 20771

RE: Environmental Review for redevelop area near water tower at Goddard Space Flight Center's Greenbelt Campus, demo and relocation of facilities and associated parking, swm mgmt and utilities, Prince George's County, MD.

Dear Ms. Montgomery:

The Wildlife and Heritage Service has determined that there are no State or Federal records for rare, threatened or endangered species within the boundaries of the project site as delineated. As a result, we have no specific comments or requirements pertaining to protection measures at this time. This statement should not be interpreted however as meaning that rare, threatened or endangered species are not in fact present. If appropriate habitat is available, certain species could be present without documentation because adequate surveys have not been conducted.

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2014.0606.pg

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National Aeronautics and
Space Administration
Goddard Space Flight Center
Greenbelt, MD



April 23, 2014

Reply to Attn of: 250

Ms. Genevieve LaRouche
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Dr
Annapolis, MD 21401

Dear Ms. LaRouche:

NASA is proposing to redevelop the area located near the water tower on Goddard Space Flight Center's (GSFC) Greenbelt campus. In accordance with National Environmental Policy Act (NEPA), as amended, (42 U.S.C. 4321 et seq.), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and NASA's NEPA regulations (14 CFR Part 1216, subpart 1216.3), NASA is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts of the proposed redevelopment project.

The redevelopment of the water tower site would occur in phases and involves both the demolition of several existing warehouse and support buildings and the relocation of existing personnel and laboratory functions into state-of-the-art facilities to be constructed on the site. The first phase of development for the project is the construction of an Instrument Development Facility (IDF). Future phases would include construction of additional facilities. The IDF would co-locate several branches of scientists and engineers in order to gain efficiencies and mutual influence in the development of new technologies, instruments, and instrument components. The IDF would consist of approximately 50,000 gross square feet and would include office and conference areas, laboratories, shop, and support space, as well as storage, administrative areas, and maintenance areas. This new energy efficient facility would also include parking, storm water management, emergency and life-safety generators, utilities, and support appurtenances. Full build-out for the redevelopment would be approximately 250,000 square feet. See below for a map showing the location of the redevelopment area.



Area proposed (Orange box) for redevelopment at GSFC Greenbelt campus

The intent of this correspondence is to solicit any comments within your area of expertise that you may presently have concerning the potential environmental impacts of the proposed project. We request that comments be submitted within 30 days of the date of this notice to the address or email listed below:

Lizabeth Montgomery
GSFC NEPA Program Manager
NASA Goddard Space Flight Center
Code 250, Building 28, Room N150F
8800 Greenbelt Road
Greenbelt, MD 20771
Phone: (301) 286-0469
gsfc-enviro@lists.nasa.gov

The Draft EA is expected to be released later this year for public review and comment. At that time your organization will have an opportunity to review and comment on the Draft EA. If you need further information on NASA's environmental review process or the proposed project please contact me on (301) 286-0469. We look forward to hearing from you.

Sincerely,

A handwritten signature in blue ink that reads "Lizabeth Montgomery". The signature is fluid and cursive, written over the printed name.

Lizabeth Montgomery
GSFC NEPA Program Manager

From: Clark, Trevor
Sent: Thursday, April 24, 2014 9:30 AM
To: Montgomery, Lizabeth R. {Beth} (GSFC-2500)
Cc: Genevieve LaRouche
Subject: Goddard Space Flight Center - Proposed Project

Hi Beth,

Please go to the following website to determine if federally endangered and/or threatened species within the Maryland, Delaware and Washington D.C. region have the potential to be impacted by your proposed project:

<<http://www.fws.gov/chesapeakebay/EndSppWeb/ProjectReview/Index.html>>

Please contact me if you have any questions. Thanks

--

Trevor Clark
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Chesapeake Bay Ecological Services Field Office
Endangered and Threatened Species Branch
177 Admiral Cochrane Drive
Annapolis, Maryland 21401

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National Aeronautics and
Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771



May 22, 2014

Reply to Attn of: 221

Mr. J. Rodney Little
Director
Maryland Historical Trust
100 Community Place/Third Floor
Crownsville, MD 21032
ATTN: Beth Cole
Michael Day
Jonathan Sager

Dear Mr. Little,

NASA is completing an Area Development Plan (ADP) and Environmental Assessment (EA) for the proposed redevelopment of the area around the water tower and the construction of a new Instrument Development Facility (IDF) at Goddard Space Flight Center's (GSFC) Greenbelt campus. The proposed project is located within the boundaries of the NASA GSFC Historic District, a National Register of Historic Places (NRHP)-eligible historic district.

This letter serves as our initiation of the Section 106 process with your office under the requirements of 36 CFR Part 800, the implementing regulations of the National Historic Preservation Act. With this letter, we formally request your engagement in the Section 106 process for this project.

The redevelopment of the water tower site involves the relocation of existing personnel and laboratory functions into state-of-the-art facilities and is planned to occur in phases. The first phase of the project is the construction of the 46,500-gross square foot (GSF) IDF, which includes preparation of the site and the demolition of Buildings 16, 16A, 16B, 17, and 86. All of these buildings are contributing resources to the GSFC Historic District. Future phases would include construction of additional facilities on the site. The site projected capacity for a total buildout is approximately 250,000 GSF.

The IDF would co-locate several branches of scientists and engineers in order to gain efficiencies and mutual influence in the development of new technologies, instruments, and instrument components. The proposed new construction for the IDF site would include office and conference areas, laboratories, shop, and support space, as well as storage, administrative areas, and maintenance areas. This new energy efficient facility would also include parking, storm water management, emergency and life-safety generators, utilities, and support appurtenances.

We are also inviting the following groups to participate as consulting parties for this project: the City of Greenbelt, Maryland-National Capital Park and Planning Commission (M-NCPPC), and the National Capital Planning Commission (NCPC). We will also be posting the pertinent information on our website and in local public libraries. The postings will be advertised in local newspapers. We would appreciate any suggestions you have for additional consulting parties.

NASA understands that the proposed demolition of contributing resources to the NRHP-eligible GSFC Historic District will result in an adverse effect to the historic district. NASA is committed to working with you and the consulting parties to minimize or mitigate the adverse effect of the project.

Thank you for your participation in this project. We look forward to consulting with you as the project continues to be refined and more detailed information is available. If you have any questions or concerns about the proposed project, please contact Alan Binstock, GSFC Cultural Resources Manager, at (301) 286-3889 . We look forward to hearing from you.

Sincerely,



Braulio R. Ramon
Historic Preservation Officer, Goddard Space Flight Center

Enclosures: Aerial view of campus and site, and Proposed Site Layout

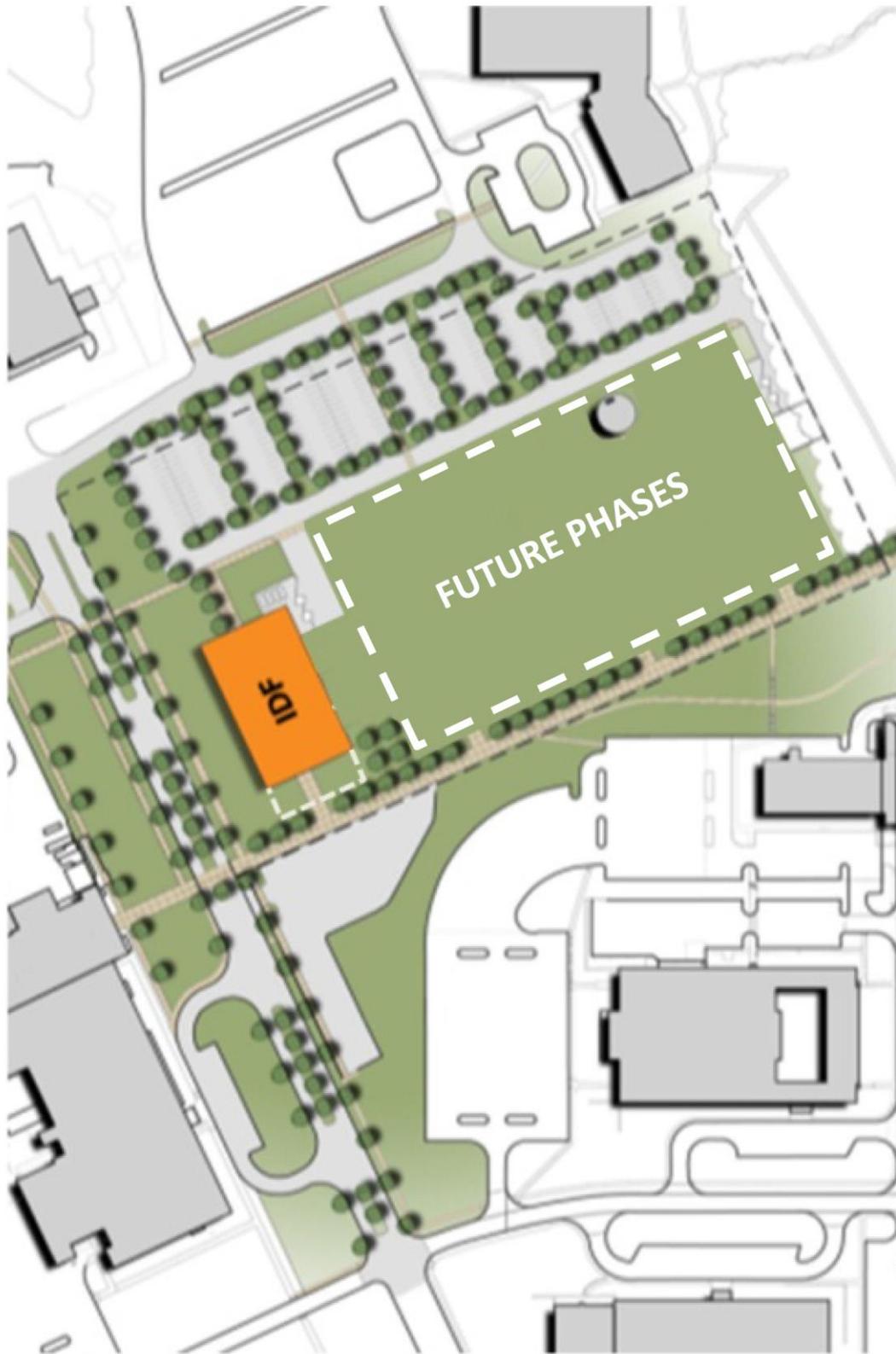
cc:

100/Mr. Scolesce
100/Ms. Abell
200/Mr. Rubillota
220/Mr. Jewitt
221/Mr. Binstock
250/Ms. Montgomery

Aerial view of GSFC campus and project site



Proposed Site Layout





June 9, 2014

Braulio R. Ramon
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771

Re: Instrument Development Facility (IDF)
Section 106 of the National Historic Preservation Act

Dear Mr. Ramon:

Thank you for your May 22, 2014 letter initiating consultation about the planned construction of the Instrument Development Facility at Goddard Space Flight Center (GSFC). As the State Historic Preservation Office, the Maryland Historical Trust (MHT) reviews all projects in Maryland that are undertaken, assisted, or permitted by a federal or state agency, and MHT comments on the proposed action pursuant to Section 106 of the National Historic Preservation Act and Sections 5A-325 and 5A-326 of the State Finance and Procurement Article.

As described in your letter, the undertaking will entail the demolition of five buildings that contribute to the GSFC Historic District and the eventual construction of between 46,500 and 250,000 square feet of offices, laboratories, meeting, and support space. We agree with your determination that the demolition of the historic buildings constitutes an "adverse effect" that requires resolution under 36 CFR 800.6. In addition to the groups listed in your letter, we recommend that GSFC contact the Anacostia Trails Certified Heritage Area, any GSFC employee or alumni groups, and generally as wide a range of potentially-interested parties as possible. As MHT and GSFC staff discussed on March 20, our preliminary recommendation for mitigation would be for some sort of public interpretation of the history of GSFC and the demolished buildings at the Visitors Center, online, or elsewhere.

Thank you for providing us this preliminary opportunity to comment. We look forward to ongoing consultation as the planning and design process proceeds. If you have any questions or we may be of assistance, please contact Jonathan Sager (regarding historic buildings and landscapes) at 410-514-7636 or Beth Cole (regarding archeology) at 410-514-7361.

Sincerely,

J. Rodney Little
Director \ State Historic Preservation Officer
Maryland Historical Trust

JRLAECJES
201402672
CC: Alan Binstock (GSFC)

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor

Richard Eberhart Hall, AICP, Secretary
Amanda Stakem Conn, Esq., Deputy Secretary

Maryland Historical Trust - 100 Community Place - Crownsville - Maryland - 21032
Tel: 410.514.7600 - Toll Free: 1.800.756.0119 - TTY users: Maryland Relay - MHT.Maryland.gov

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APPENDIX B

PUBLIC COMMENTS RECEIVED ON THE DRAFT EA

Peer, Deborah

To: Montgomery, Lizabeth R. {Beth} (GSFC-2500)
Subject: RE: Draft Environmental Assessment/NASA Goddard

From: Jackson, Dana
Sent: Tuesday, January 27, 2015 3:41 PM
To: Montgomery, Lizabeth R. {Beth} (GSFC-2500)
Cc: Lathon, Clyde - ARS
Subject: RE: Draft Environmental Assessment/NASA Goddard

Dear Lizabeth Montgomery:

Thanks for the opportunity to review and provide input for your draft EA. It sounds like this plan, from your description, will in addition to providing new facilities, also help NASA Goddard to meet some of your long range Environmental Management System goals for energy, stormwater, and water conservations.

Regards,
Dana

Dana S Jackson, PG
Senior Remedial Project Manager
Beltsville Agricultural Research Center
Safety, Occupational Health, and Environmental Staff
10300 Baltimore Avenue
Building 003, Room 121
Beltsville, MD 20705

Phone: 301 504 6025

Advanced Notice: On Leave Dec 22 through January 5th, 2015

From: Montgomery, Lizabeth R. {Beth} (GSFC-2500) [<mailto:lizabeth.r.montgomery@nasa.gov>]
Sent: Tuesday, January 27, 2015 2:06 PM
To: Jackson, Dana
Subject: Draft Environmental Assessment/NASA Goddard

Dear Dana Jackson,

NASA has prepared a Draft Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to analyze the potential environmental impacts of the Instrument Development Facility – Area Development Plan at NASA’s Goddard Space Flight Center (GSFC), Greenbelt, Maryland. NASA proposes to implement an Area Development Plan (ADP) to redevelop an approximately 10-acre site within the GSFC Greenbelt campus. The redevelopment of the site would occur in phases and would involve both the demolition of existing buildings and the construction of new facilities. Per the ADP, NASA would construct and operate up to four distinct but connected facilities aimed at improving aging infrastructure and promoting synergistic collaborations between scientist and engineers.

The first phase would include the demolition of several existing buildings (Buildings 16, 16A, 16B, 17, 84, and 86; and the buildings in Area 400) and the construction of the IDF on the site. The IDF would consist of approximately 4,645 square meters (m²) (50,000 square feet [ft²]) of laboratory and office space to accommodate approximately 100 staff and associated parking spaces. Follow on phases would include the demolition of Building 27 and the construction of up to three facilities with an additional 4,645 m² (50,000 ft²) of office and laboratory space each with the potential expansion of 930 m² (10,000 ft²). Personnel staffing the IDF would be relocated from existing facilities; thus, there would be no increase in personnel at GSFC.

Environmental impacts resulting from the proposed action and alternatives are discussed in the Draft EA. We invite you to review and comment on the Draft EA. NASA respectfully requests that any comments on the Draft EA be provided no later than 30 days from the date of this email for consideration during preparation of the Final EA. The Draft EA is available online at: <http://code250.gsfc.nasa.gov/docs/idf-adp-draftEA.pdf>.

Comments may be submitted to me via email or postal mail addressed to:

Lizabeth Montgomery
GSFC NEPA Program Manager
NASA Goddard Space Flight Center
Code 250, Building 26, Room N250
8800 Greenbelt Road
Greenbelt, MD 20771

If you have any questions or would like a hard copy of the Draft EA please contact me via email or telephone at (301) 286-0469.

Your input and comments are greatly appreciated and I look forward to hearing from you.

Sincerely,

Lizabeth Montgomery
GSFC NEPA Program Manager

This electronic message contains information generated by the USDA solely for the intended recipients. Any unauthorized interception of this message or the use or disclosure of the information it contains may violate the law and subject the violator to civil or criminal penalties. If you believe you have received this message in error, please notify the sender and delete the email immediately.

Peer, Deborah

To: Montgomery, Lizabeth R. {Beth} (GSFC-2500) (lizabeth.r.montgomery@nasa.gov)
Subject: Re: Draft Environmental Assessment/NASA Goddard
AMServiceURLStr: https://Slingshot.hdrinc.com:443/CFSS/control?view=services/FTService

From: Clark, Trevor
Sent: Wednesday, January 28, 2015 12:31 PM
To: Montgomery, Lizabeth R. {Beth} (GSFC-2500)
Cc: Genevieve LaRouche
Subject: Re: Draft Environmental Assessment/NASA Goddard

Dear Ms. Montgomery:

Please go to the following website to determine if federally endangered and/or threatened species within the Maryland, Delaware and Washington D.C. region have the potential to be impacted by your proposed project:

<<http://www.fws.gov/chesapeakebay/EndSppWeb/ProjectReview/Index.html>>

Please contact me if you have any questions. Thanks

--
Trevor Clark
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Chesapeake Bay Ecological Services Field Office
Endangered and Threatened Species Branch
177 Admiral Cochrane Drive
Annapolis, Maryland 21401

Peer, Deborah

From: Montgomery, Lizabeth R. {Beth} (GSFC-2500) <lizabeth.r.montgomery@nasa.gov>
Sent: Tuesday, February 10, 2015 11:12 AM
To: Peer, Deborah; Solomon, Patrick D
Subject: FW: Draft Environmental Assessment/NASA Goddard

From: Dettman, Shane
Sent: Thursday, January 29, 2015 10:21 AM
To: 'Osei, Christine'; Montgomery, Lizabeth R. {Beth} (GSFC-2500)
Cc: Martin, Maria; Levy, David W.
Subject: RE: Draft Environmental Assessment/NASA Goddard

Good morning,

NCPC has received the Draft Environmental Assessment and is in the process of determining whether it needs to prepare comments on the proposed action. It appears that the EA includes an analysis of the potential environmental impacts of a collection of projects that will be carried out in phases. While the individual projects / phases may be subject to NCPC's review authority under the National Capital Planning Act, the environmental assessment that is currently being circulated for public review is not such a project, and therefore, will not be formally referred to the Maryland State Clearinghouse and Prince George's County. NCPC staff appreciates that NASA has provided a draft copy of the EA to NCPC and the County, and we encourage the County to participate in the NEPA process through providing comments on the environmental analysis. Providing comments at this early stage is important to informing NASA of issues the County and NCPC may have in advance of formal project reviews. Following completion of the NEPA process, and prior to construction plans being prepared, the projects / phases must be submitted to NCPC for review pursuant to the Section 8722(b)(1) of the National Capital Planning Act. At that point the projects will be referred to the MD State Clearinghouse and the County for a 60 day comment period. Following this comment period, NCPC will conduct its formal review of the project(s) which typically take 30 days.

If you have any questions regarding NCPC's review process please contact David Levy at 202-482-7247

Thank you,

Shane L. Dettman
Director, Urban Design and Plan Review
National Capital Planning Commission

Peer, Deborah

To: Montgomery, Lizabeth R. {Beth} (GSFC-2500)
Subject: RE: Draft Environmental Assessment/NASA Goddard

AMServiceURLStr: <https://Slingshot.hdrinc.com:443/CFSS/control?view=services/FTService>

From: Brian Lusher
Sent: Thursday, February 26, 2015 4:30 PM
To: Montgomery, Lizabeth R. {Beth} (GSFC-2500)
Subject: RE: Draft Environmental Assessment/NASA Goddard

Beth,

Thank you for the opportunity to comment on Goddard's EA related to its plans for the implementation of an Instrument Development Facility Area Development Plan at GSFC, Maryland. It was informative to read the cultural resources summary and, assuming NASA will initiate Section 106 consultation at the appropriate time, I look forward to NASA's invitation to us to participate in the consultation, should NASA make a finding of adverse effect.

Thanks!
Brian Lusher



Office of the Planning Director
Prince George's County Planning Department

14741 Governor Oden Bowie Drive
Upper Marlboro, Maryland 20772
TTY: (301) 952-4366
www.mncppc.org/pgco
301-952-3595

February 27, 2015

Ms. Lizabeth Montgomery
GSFC NEPA Program Manager
NASA Goddard Space Flight Center
Code 250, Building 26, Room N250
8800 Greenbelt Road
Greenbelt, MD 20771

**RE: Draft Environmental Assessment/NASA
Goddard Instrument Development Facility
Area Development Plan (MR-1502A)**

Dear Ms. Montgomery:

The Prince George's County Planning Department appreciates the opportunity to comment on the Draft Environmental Assessment (EA) to determine the potential environmental impacts of the Instrument Development Facility (IDF) Area Development Plan on the NASA Goddard Space Flight Center (GSFC) site. The first phase of this project would involve the demolition of several existing buildings and the construction of a 4,645-square-meter (50,000-square-foot) IDF that would include laboratory and office space to accommodate 100 staff persons. M-NCPPC staff would like to submit comments on the environmental impacts of the proposed action and alternatives discussed in the Draft EA.

Staff has evaluated the project and is prepared to submit the following comments and the enclosed supporting memorandum:

- According to the Draft EA, minor, short-term increases in ambient noise and vibration levels would result from the demolition of buildings on- and off-site, and with the construction of the proposed IDF facilities. It is suggested that construction activities would include the use of equipment exhaust mufflers, and be limited to working hours (i.e., between 7:00 a.m. and 5:00 p.m.) and to designated routes that contain a limited number of residential or sensitive structures in order to incur the least disturbance to nearby residents.
- Reduction of three forms of light pollution is recommended. Uplight, glare, and light trespass are encouraged to be implemented to the fullest extent practicable in the design of this project. Light pollution should be directed away from adjoining woodlands to the west and south of the site. The use of downward facing full cut off, fully shielded, and partially shielded lamps that help direct light down and prevent it from escaping from the site are encouraged. Automatic light shut offs should also be considered where practicable to ensure that lights are not left on after work hours or when they are not needed.
- The construction phase of the proposed action could affect localized air quality through airborne dust and other pollutants generated during demolition, drilling and removal of the existing foundations, and the excavation process. In addition, short-term impacts on soils would be

expected from soil disturbance and compaction resulting from construction and demolition activities. No long-term effect on soils would be expected.

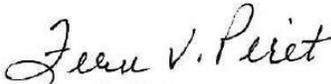
- According to the draft environmental assessment, long-term beneficial impacts on greenhouse gas (GHG) emissions would be expected from the energy efficiency standards that would be implemented for the operations of the proposed facilities and through the decommissioning of older, less efficient buildings on- and off-site. Emissions associated with operations are expected to be similar to, and consistent with, existing conditions at GSFC. Proposed renewable energy technologies would be expected to produce significantly lower emissions; however, some technologies, such as biomass heat, would result in a minor increase in emissions for GSFC and a modification to GSFC's existing Title V air quality permit would be expected to be required.
- The potential exists for existing soil contamination resulting from previous operations on-site, and also due to the proximity of the site to a historic trichloroethene (TCE) groundwater plume. Groundwater and soil monitoring is highly recommended prior to and during construction. Any areas onsite that are identified with contaminated soil should be remediated or disposed of according to Maryland Department of the Environment and the United States Environmental Protection Agency guidelines.
- Regarding water resources, no permanent adverse effects on water resources would be expected from implementing the proposed action. All construction is required to be conducted in accordance with erosion control and stormwater runoff laws and regulations to prevent any adverse effects on water quality. National Pollutant Discharge Elimination System (NPDES) Permits for Stormwater Associated with Construction Activities would be obtained as well as the approval from Maryland Department of the Environment (MDE) of a Stormwater Management Plan before any construction activity would begin. In accordance with the Clean Water Act, any project that involves the filling of wetlands or waters would require Section 401/ 404 nontidal wetland permits from MDE and/ or the U.S. Army Corps of Engineers.
- All phases of development would also have to be managed in accordance with the Goddard Procedural Requirement (GRP) 8000.5C, Water Management; and the 2007 Energy Independence and Security Act (EISA). The proposed stormwater management infrastructure would include the construction of a stormwater management facility in the vicinity of the proposed parking lot, storm drains and grassy swales, and the use of cisterns for the facility. According to the Draft EA, these strategies would provide better quality and detention than the existing stormwater management strategies on-site that were originally developed in the 1960s.
- According to the Draft EA, long-term, minor, beneficial impacts would be expected to result from the expected net decrease of impervious surfaces on-site with the new site layout, and off-site with the demolition of existing facilities.
- It has been determined that environmental impacts regarding this site are subject to the Maryland-Department of Natural Resources (M-DNR) Forest Conservation Act requirements, and not to the County's Tree Conservation Plan requirements of the Woodland Conservation Ordinance. No forest interior dwelling species (FIDS) will be directly affected, as no FIDS habitat is located on, or immediately adjoining the site. No rare, threatened or endangered species are known to exist within the vicinity of the site according to the Sensitive Species Protection Review Area (SSPRA) based on a review of the SSPRA GIS layer prepared by the

Ms. Lizabeth Montgomery
February 27, 2015
Page 3

Heritage and Wildlife Service, M-DNR. Decline and/or mortality of trees to remain could occur due to significant critical root zone (CRZ) disturbance, tree limb damage, changes in soil moisture, and soil compaction as a result of grading. Some terrestrial wildlife may be temporarily displaced from their typical edge habitats during operations and other construction related activities.

Finally, enclosed is a memorandum that includes the full evaluations and comments summarized above from the Environmental Planning Section of the Countywide Planning Division. Thank you again for allowing us the opportunity to comment on this project. If you should have any questions or need additional information, please contact Fatimah Hasan, Planner Coordinator, Special Projects Section, Countywide Planning Division, at 301-952-3580 or via email at Fatimah.Hasan@ppd.mncppc.org.

Sincerely,


Fern V. Piret
Planning Director

Enclosure

c: Redis C. Floyd, Clerk of the Council, Prince George's County Council
Derick Berlage, Chief, Countywide Planning Division
Maria Martin, Planning Supervisor, Special Projects Section, Countywide Planning Division
Fatimah Hasan, Planner Coordinator, Special Projects Section, Countywide Planning Division
Christine Osei, Mandatory Referral Project Manager, Special Projects Section, Countywide Planning Division
Katina Shoulars, Planning Supervisor, Environmental Planning Section, Countywide Planning Division
Marc Juba, Planner Coordinator, Environmental Planning Section, Countywide Planning Division

THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION



Countywide Planning Division
Environmental Planning Section

14741 Governor Oden Bowie Drive
Upper Marlboro, Maryland 20772
TTY: (301) 952-4366
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301-952-3650

February 27, 2015

MEMORANDUM

TO: Fatimah Hasan, Planner Coordinator, Special Projects Section
VIA: Katina Shoulars, Supervisor, Environmental Planning Section
FROM: Marc Juba, Senior Planner, Environmental Planning Section
SUBJECT: MR-1502A Draft Environmental Assessment/NASA Goddard

The Environmental Planning Section has reviewed the information submitted by the applicant, for a proposed National Aeronautics and Space Administration (NASA) Instrument Development Facility Area Development Plan also known as the Water Tower Redevelopment Site.

The proposal was evaluated to determine the potential for significant adverse impacts on environmental resources, including but not limited to air quality, noise and vibration, light, geology and soils, water resources, and biological resources. The following commentary is based on a review of the information provided by the applicant and an interpretation of aerial photographs and maps. A site visit was not conducted. The following comments are provided for your consideration.

Proposed Activity or Action

Five separate site layout alternatives were evaluated in a draft environmental assessment for this site by NASA, submitted with this application. Of the five alternative layouts, the Science and Engineering Corridor Alternative layout was selected by NASA for review with this application.

This preferred alternative proposes to implement an Area Development Plan (ADP) to redevelop approximately 10-acres within its Goddard Space Flight Center (GSFC) Greenbelt campus. A phased redevelopment of this site is proposed involving both the demolition of existing buildings onsite within the Water Tower Redevelopment Site, and off-site elsewhere on the GSFC Greenbelt campus. Per the ADP, four distinct but connected facilities would be proposed on the Water Tower Redevelopment site using a slightly larger footprint than that of the existing facilities currently at that location. The operations of buildings demolished at other locations on the GSFC Greenbelt campus will be moved to and consolidated at the new proposed facilities onsite.

The following actions are proposed under each of the four phases:

- 1) The first phase would include the demolition of several existing buildings. Some of the buildings (16, 16A, 16B, and 86) are onsite within the 10-acre Water Tower Redevelopment Site, while other buildings (17, 84, and 86; and the buildings in Area 400) are located outside of the 10-acre site at separate areas of the GSFC Greenbelt campus. Construction activities within this phase

would include the construction of a new Instrument Development Facility (IDF) on the northwest corner of the site. The IDF would consist of approximately 4,645 square meters (m²) (50,000 square feet [ft²]) of laboratory and office space to accommodate approximately 100 staff and associated parking spaces. Access drives, walkways, utilities, outdoor lighting, and stormwater management infrastructure associated with this building would also be constructed during this phase.

- 2) The remaining three phases would include the demolition of Building 27 within the 10-acre Water Tower Redevelopment Site and the construction of up to three additional facilities with an additional 4,645 m² (50,000 ft²) of office and laboratory space each with the potential expansion of 930 m² (10,000 ft²). Personnel proposed to staff the IDF would be relocated from existing facilities with no increase in personnel at GSFC. The facilities would be interconnected via pedestrian walkways located on the western edge of the Site. These walkways would also connect the site with a proposed central green space along the western edge of the site.
- 3) The existing water tower will remain undisturbed onsite.

Existing Conditions

Noise and Vibration: The proposed facilities will be situated in the middle of a larger existing developed campus. The limits of the site are bounded by Tiros Road to the north, Hubble Road and Building 34 to the east, Building 36 to the west, and a ravine and Explorer Road to the south. The site is not located along any major roads, and the proposed use is not required to be regulated for existing road noise under current state and county regulations. Existing noise sources onsite are primarily limited to commercial and light industrial operations associated with an existing warehouse, according to the draft environmental assessment.

Light: No baseline information was given regarding existing ambient lighting conditions for the site. The existing site is currently illuminated by multiple existing buildings and parking lots onsite, as well as by buildings and parking lots off-site that exist to the north, east, and west of the site. A forested area exists immediately to the south of the site; however, light may transmit to the southern end of the site through this forested area from existing lighting associated with building #17 and its respective parking lot.

Air Quality: The Clean Air Act, as amended, gives the United States Environmental Protection Agency (EPA) responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) that set acceptable concentration levels for six criteria of pollutants; Particulate Matter (measured as both particulate matter and fine particulate matter), sulfur dioxide, carbon monoxide, nitrogen oxides, ozone, and lead. While each state has the authority to adopt standards stricter than those established under the federal program, Maryland accepts the federal standards. Federal regulations designate Air Quality Control Regions (AQCRs) in violation of the NAAQS as nonattainment areas. Federal regulations designate AQCRs with levels below the NAAQS as attainment areas. According to the severity of the pollution problem, ozone nonattainment areas can be categorized as marginal, moderate, serious, severe or extreme. Prince George's County is within the National Capital Interstate Air Quality Control Region (AQCR 47). AQCR 47 is in the ozone transport region that includes 12 states and the District of Columbia. EPA has designated Prince George's County as follows: nonattainment for 1-hour O₃, 8-hour O₃ (2008 and 1997 standards), and PM_{2.5}. All other criteria pollutants are unclassified/attainment (USEPA 2013). According to 40 CFR Part 81, no Class 1 air quality protection areas are located within 10km (6.2 miles) of the GSFC. GSFC currently maintains a Title V permit (Permit#24-033-00675). A Title V permit is a legally enforceable document that permitting authorities

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issue to air pollution sources after the source has begun to operate. In this case, this permit is for air emissions from the overall campus operations primarily from fuel-burning equipment, electro-chemical plating, surface coating, and gasoline filling stations.

According to Table 3-4 of the environmental assessment the annual emissions for GSFC in 2012 were 22 tpy (tons per year) for NO_x, 3 tpy for VOCs, 32 tpy for SO₂, 1 tpy for PM₁₀, and 1 tpy for PM_{2.5}.

Geology and Soils: The site is mostly developed with a combination of buildings and paved surfaces. An area of approximately 0.08 acres of woodlands occupies the southwestern corner of the site. No existing topographical information was submitted with this application. Utilizing M-NCPPC contour information provided by PGAtlas for the site, it appears that the highest elevation of the site is at the base of the existing water tower at approximately 236 feet in elevation. The site slopes downwards in all directions from this highpoint. Much of the developed portion of the site is gently sloping with the topography becoming steeper off-site to the east, south, and west.

The draft environmental assessment indicates that only two soil types are found within the Water Tower Redevelopment Site; however, according to the U.S. Department of Agriculture (USDA) Web Soil Survey, the site is actually composed of three soil types. These soils include: Urban land-Beltsville complex (UrbB), 0-5 percent slopes; Urban land-Russett-Christiana complex (UrrB), 0-5 percent slopes; and Christiana-Downer complex, 10-15 percent slopes. No Marlboro Clays are located onsite according to PGAtlas; however, approximately 2/3rds of the site is associated with Christiana complexes.

According to the draft environmental assessment, Building 27 located onsite currently serves as the central vehicle maintenance, repair, and fueling area for the campus. This area previously housed underground storage tanks that have been formally closed and currently houses active aboveground storage tanks. Building 27B, which is also onsite, historically housed Class C explosives. This building is currently used for storage of environmental field activities. GSFC also possesses small unidentified quantities of radioactive material on the campus, which may or may not have been stored within the site. Although an environmental site assessment conducted in 2010 reported that there were no known releases of hazardous substances and petroleum products on or near the site, no subsequent studies have been conducted to date. Therefore the possibility exists for soil contamination within this area from accidental spillage of chemicals from subsequent operations of these two buildings.

The draft environmental assessment also indicates that a historic trichloroethene (TCE) plume is present between 70 to 80 feet below the ground surface onsite in the shallow unconfined Upper Patapsco Aquifer. The report indicates that it is unlikely that the near surface soils onsite are contaminated as a result of the TCE groundwater plume. The report states that past remediation efforts have eliminated risks associated with both groundwater and soil pollution, and that the site is above the fringe of the plume. However, the report indicates that a very small potential for soil vapor intrusion might still remain.

Water Resources: The site currently straddles two watersheds. Half of site drains to the northeast into the Upper Beaverdam Creek sub-watershed, which is part of the Anacostia watershed that flows into the Potomac River Basin. This area is not associated with a stronghold watershed. The other half of the site is located in a stronghold watershed that drains to the southwest into the Baldhill Branch sub-watershed, which is part of the Western Branch Watershed that flows into the Patuxent River Basin.

The majority of the site is currently comprised of impermeable surfaces. Stormwater is currently conveyed off-site to detention ponds that are subsequently released into each of the sub-watersheds associated with the site.

No 100-year floodplain study was submitted for this site with this application. According to Federal Emergency Management Agency (FEMA) mapping and PGAtlas, no 100-year floodplains appear to be associated with this site. No wetlands or streams appear to be associated with this site or are located within 100' of the site based on information obtained from PGAtlas.

Biological Resources: Both the draft environmental assessment and PG Atlas indicate that the site is not associated with any regulated environmental features; however, 0.08 acres of existing woodlands exists on-site. This site has no previous Tree Conservation Plan (TCP) approvals or letters of exemption associated with it, as it is part of a larger federally-owned property that is under the jurisdiction of the Maryland-Department of Natural Resources (M-DNR) for compliance with the Forest Conservation Act.

Environmental Consequences

Noise and Vibration: According to the draft environmental assessment, minor, short-term increases in ambient noise and vibration levels would result from the demolition of buildings on- and off-site, and with the construction of the proposed IDF facilities. The report indicates that additional noise would cause adverse effects on personnel in surrounding facilities during the duration of these activities. The potential also exists for vibration-sensitive buildings to be impacted by construction. The impact will be realized for sensitive receptors in close proximity to the on-site construction activities. Increased truck traffic is likely; demolition activities are proposed to be minimized through restricting them during working hours (i.e., between 7:00 a.m. and 5:00 p.m.), and through the use of equipment exhaust mufflers. It is suggested that construction be limited to designated routes that contain a limited number of residential or sensitive structures in order to incur the least disturbance to nearby residents. Once construction and demolition activities are completed, operation noise levels are expected to return to noise levels that currently exist on-site.

Light: Schematics for proposed exterior lighting for the site were not submitted with this application. Reduction of three forms of light pollution: uplight, glare, and light trespass are encouraged to be implemented to the fullest extent practicable in the design of this project. Light pollution should be directed away from adjoining woodlands to the west and south of the site. The use of downward facing full cut off, fully shielded, and partially shielded lamps that help direct light down and prevent it from escaping from the site are encouraged. Automatic light shut offs should also be considered where practicable to ensure that lights are not left on after work hours or when they are not needed.

Air Quality: The proposed action could affect localized air quality through airborne dust and other pollutants generated during demolition and construction activities.

According to the draft environmental assessment, long-term beneficial impacts on greenhouse gas (GHG) emissions would be expected from the energy efficiency standards that would be implemented for the operations of the proposed facilities and through the decommissioning of older, less efficient buildings on- and off-site. Emissions associated with operations are expected to be similar to, and consistent with, existing conditions at GSFC. Proposed renewable energy technologies would be expected to produce significantly lower emissions; however, some technologies, such as biomass heat, would result in a minor increase in emissions for GSFC and a modification to GSFC's existing Title V air quality permit would be expected to be required.

Geology and Soils: Short-term impacts on soils would be expected from soil disturbance and compaction resulting from construction and demolition activities. No long-term effect on soils would be expected.

Based on available information, construction impacts will include demolition, drilling and removal of the existing foundations; dust hazards and vibrations from the excavation process on- and off-site.

The potential exists for existing soil contamination resulting from previous operations onsite, and also due to the proximity of the site to a historic TCE groundwater plume. Groundwater and soil monitoring is highly recommended prior to and during construction. Any areas onsite that are identified with contaminated soil should be remediated or disposed of according to Maryland Department of the Environment and the United States Environmental Protection Agency guidelines.

Water Resources: No permanent adverse effects on water resources would be expected from implementing the proposed action. All construction is required to be conducted in accordance with erosion control and stormwater runoff laws and regulations to prevent any adverse effects on water quality. National Pollutant Discharge Elimination System (NPDES) Permits for Stormwater Associated with Construction Activities would be obtained as well as the approval from the Maryland Department of the Environment (MDE) of a Stormwater Management Plan before any construction activity would begin. In accordance with the Clean Water Act, any project that involves the filling of wetlands or waters would require Section 401/ 404 nontidal wetland permits from MDE and/ or the U.S. Army Corps of Engineers.

All phases of development would also have to be managed in accordance with the Goddard Procedural Requirement (GRP) 8000.5C, Water Management; and the 2007 Energy Independence and Security Act (EISA). The proposed stormwater management infrastructure would include the construction of a stormwater management facility in the vicinity of the proposed parking lot, storm drains and grassy swales, and the use of cisterns for the facility. According to the draft environmental assessment, these strategies would provide better quality and detention than the existing stormwater management strategies on-site that were originally developed in the 1960s.

According to the draft environmental report, long-term, minor, beneficial impacts would be expected to result from the expected net decrease of impervious surfaces on-site with the new site layout, and off-site with the demolition of existing facilities.

Biological Resources: Approximately 0.08 acres of woodland clearing is proposed onsite. This site is subject to the Maryland-Department of Natural Resources Forest Conservation Act requirements, and not to the County's TCP Requirements of the Woodland Conservation Ordinance. No forest interior dwelling species (FIDS) will be directly affected, as no FIDS habitat is located on, or immediately adjoining the site. No rare, threatened or endangered species are known to exist within the vicinity of the site according to the Sensitive Species Protection Review Area (SSPRA) based on a review of the SSPRA GIS layer prepared by the Heritage and Wildlife Service, M-DNR. Decline and/or mortality of trees to remain could occur due to significant critical root zone (CRZ) disturbance, tree limb damage, changes in soil moisture, and soil compaction as a result of grading. Some terrestrial wildlife may be temporarily displaced from their typical edge habitats during operations and other construction related activities.

Conclusion

Thank you for the opportunity to comment on the Water Tower Redevelopment Site. If you have questions regarding these comments, please contact the Environmental Planning Section at 301-952-3650.



Sustain~~able~~_____Attain~~able~~

March 13, 2015

Ms. Lizabeth Montgomery
GSFC NEPA Program Manager,
NASA Goddard Space Flight Center
Code 250, Building 26, Room N250
8800 Greenbelt Road
Greenbelt, MD 20771

STATE CLEARINGHOUSE RECOMMENDATION

State Application Identifier: MD20150128-0054

Applicant: NASA Goddard Space Flight Center

Project Description: Draft Environmental Assessment (EA): Instrument Development Facility Area Development
Plan at NASA Goddard Space Flight Center, Maryland

Project Location: Prince George's County - City of Greenbelt

Approving Authority: National Aeronautics and Space Administration NASA

Recommendation: **Consistent Contingent Upon Certain Action(s)**

Dear Ms. Montgomery:

In accordance with Presidential Executive Order 12372 and Code of Maryland Regulation 34.02.01.04-.06, the State Clearinghouse has coordinated the intergovernmental review of the referenced project. This letter, with attachments, constitutes the State process review and recommendation based upon comments received to date. This recommendation is valid for a period of three years from the date of this letter.

Review comments were requested from the Maryland Department(s) of Natural Resources, Transportation, the Environment, the Maryland Department of Planning, including the Maryland Historical Trust, Prince George's County and City of Greenbelt. As of this date, the Maryland Department of Natural Resources and City of Greenbelt have not submitted comments. **This recommendation is contingent upon the applicant considering and addressing any problems or conditions that may be identified by their review. Any comments received will be forwarded.**

The Maryland Department of Transportation and the Maryland Department of Planning found this project to be consistent with their plans, programs and objectives.

The Department of Transportation stated that "as far as can be determined at this time, the subject has no unacceptable impacts on plans or programs."

The Maryland Department of Planning encourages the project to consider policies aimed at reducing commuting by single-occupancy vehicle. Ridesharing and preferential parking for high-occupancy vehicles may help reduce congestion on local roadways during AM and PM peak-hour travel.

Prince George's County found this project to be generally consistent with their plans, programs and objectives, but

Lawrence J. Hogan, Jr., Governor
Boyd K. Rutherford, Lt. Governor

David R. Craig, Secretary

301 West Preston Street - Suite 1101 - Baltimore - Maryland - 21201
Tel: 410.767.4500 - Toll Free: 1.877.767.6272 - TTY users: Maryland Relay - Planning.Maryland.gov

included certain qualifying comments summarized below.

Prince George's County proposed that the Instrument Development Facility (IDF) would be constructed as a Net Zero Energy Building (NZEB). It would be designed to reduce site energy use through energy efficiency and renewable energy building technology. Prince George's County Department of Energy supports new construction that incorporates energy efficiency and renewable energy and technology.

The Maryland Department of Environment and the Maryland Historical Trust stated that their finding(s) of consistency is/are contingent upon the applicant taking the action(s) summarized below.

The Maryland Historical Trust stated that their finding of consistency is contingent upon the applicant's completion of the review process required under Section 106 of the National Historic Preservation Act. This project will affect historic properties. NASA and MHT are consulting pursuant to Section 106 of the National Historic Preservation Act.

The Maryland Department of Environment comments are as follows:

1. Any above ground or underground petroleum storage tanks, which may be utilized, must be installed and maintained in accordance with applicable State and federal laws and regulations. Underground storage tanks must be registered and the installation must be conducted and performed by a contractor certified to install underground storage tanks by the Land Management Administration in accordance with COMAR 26.10. Contact the Oil Control Program at (410) 537-3442 for additional information.
2. If the proposed project involves demolition – Any above ground or underground petroleum storage tanks that may be on site must have contents and tanks along with any contamination removed. Please contact the Oil Control Program at (410) 537-3442 for additional information.
3. Any solid waste including construction, demolition and land clearing debris, generated from the subject project, must be properly disposed of at a permitted solid waste acceptance facility, or recycled if possible. Contact the Solid Waste Program at (410) 537-3315 for additional information regarding solid waste activities and contact the Waste Diversion and Utilization Program at (410) 537-3314 for additional information regarding recycling activities.
4. The Waste Diversion and Utilization Program should be contacted directly at (410) 537-3314 by those facilities which generate or propose to generate or handle hazardous wastes to ensure these activities are being conducted in compliance with applicable State and federal laws and regulations. The Program should also be contacted prior to construction activities to ensure that the treatment, storage or disposal of hazardous wastes and low-level radioactive wastes at the facility will be conducted in compliance with applicable State and federal laws and regulations.
5. Any contract specifying “lead paint abatement” must comply with Code of Maryland Regulations (COMAR) 26.16.01 - Accreditation and Training for Lead Paint Abatement Services. If a property was built before 1950 and will be used as rental housing, then compliance with COMAR 26.16.02 - Reduction of Lead Risk in Housing; and Environment Article Title 6, Subtitle 8, is required. Additional guidance regarding projects where lead paint may be encountered can be obtained by contacting the Environmental Lead Division at (410) 537-3825.
6. The proposed project may involve rehabilitation, redevelopment, revitalization, or property acquisition of commercial, industrial property. Accordingly, MDE's Brownfields Site Assessment and Voluntary Cleanup Programs (VCP) may provide valuable assistance to you in this project. These programs involve environmental site assessment in

Ms. Lizabeth Montgomery
March 13, 2015
Page 3
State Application Identifier: **MD20150128-0054**

accordance with accepted industry and financial institution standards for property transfer. For specific information about these programs and eligibility, please contact the Land Restoration Program at (410) 537-3437.

7. Additional comments from the Science Services Administration are attached.

Any statement of consideration given to the comments(s) should be submitted to the approving authority, with a copy to the State Clearinghouse. The State Application Identifier Number must be placed on any correspondence pertaining to this project. The State Clearinghouse must be kept informed if the approving authority cannot accommodate the recommendation.

Please remember, you must comply with all applicable state and local laws and regulations. If you need assistance or have questions, contact the State Clearinghouse staff person noted above at 410-767-4490 or through e-mail at nasrin.rahman@maryland.gov. **Also please complete the attached form and return it to the State Clearinghouse as soon as the status of the project is known. Any substitutions of this form must include the State Application Identifier Number. This will ensure that our files are complete.**

Thank you for your cooperation with the MIRC process.

Sincerely,



Linda C. Janey, J.D., Assistant Secretary

LCJ:NR

Enclosure(s)

cc: National Aeronautics and Space Administration (NASA)

Amanda Degen - MDE

Kathleen Herbert - PGEO

John Leocha/LaVerne Gray -

Dan Rosen - MDPI-R

Tina Quinichette - MDOT

Mayor - GREENB

MDPLR&WC

Peter Conrad - MDPL

Greg Golden - DNR

Bihui Xu - MDPI-T

Beth Cole - MHT

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Draft Environmental Assessment (EA): Instrument Development Facility Area
Development Plan at NASA Goddard Space Flight Center, Maryland
Maryland Department of the Environment - Science Services Administration

REVIEW FINDING: R2 Contingent Upon Certain Actions
(MD2015 0128-0054)

The following additional comments are intended to alert interested parties to issues regarding water quality standards. The comments address:

A. Water Quality Impairments: Section 303(d) of the federal Clean Water Act requires the State to identify impaired waters and establish Total Maximum Daily Loads (TMDLs) for the substances causing the impairments. A TMDL is the maximum amount of a substance that can be assimilated by a waterbody such that it still meets water quality standards.

Planners should be aware of existing water quality impairments identified on Maryland's 303(d) list. The Project is situated in the Anacostia River and Western Branch watersheds, identified by the MD 8-digit codes 02140205 and 02131103 which are currently impaired by several substances and subject to regulations regarding the Clean Water Act.

Planners may find a list of nearby impaired waters by entering the 8-digit basin code into an on-line database linked to the following URL:
<http://www.mde.state.md.us/programs/Water/TMDL/Integrated303dReports/Pages/303d.aspx>.

This list is updated every even calendar year. Planners should review this list periodically to help ensure that local decisions consider water quality protection and restoration needs. **Briefly, the current impairments that are relevant to the Project include the following:**

Anacostia River (02140205):

Nutrients:	Tidal. A TMDL has been written and approved by EPA.
Sediments:	Tidal. A TMDL has been written and approved by EPA.
Bacteria:	Tidal. A TMDL has been written and approved by EPA.
BOD:	Tidal. A TMDL has been written and approved by EPA.
PCB's:	Tidal. A TMDL has been written and approved by EPA.
Trash:	Tidal. A TMDL has been written and approved by EPA.
PCB's:	Non-tidal. A TMDL has been written and approved by EPA.
Sediments:	Non-tidal. A TMDL has been written and approved by EPA.
Nutrients:	Non-tidal. A TMDL has been written and approved by EPA.
Bacteria:	Non-tidal. A TMDL has been written and approved by EPA.

Anacostia River (02140205):

BOD: Non-tidal. A TMDL has been written and approved by EPA.
Trash: Non-tidal. A TMDL has been written and approved by EPA.
Chlorides: Non-tidal. A TMDL is pending development.
Sulfates: Non-tidal. A TMDL is pending development.
Heptachlor Epoxide: Non-tidal. A TMDL is pending development.

Western Branch (02131103):

Nutrients: Tidal. A TMDL has been written and approved by EPA.
Sediments: Tidal. A TMDL has been written and approved by EPA.
BOD: Tidal. A TMDL has been written and approved by EPA.
Biological: Non-tidal. A TMDL is pending development.

B. TMDLs: Development and implementation of the any Plan should take into account consistency with TMDLs developed for the impaired waterbodies referenced above. Decisions made prior to the development of a TMDL should strive to ensure no net increase of impairing substances. TMDLs are made available on an updated basis at the following web site:
<http://www.mde.state.md.us/programs/Water/TMDL/CurrentStatus/Pages/Programs/WaterPrograms/TMDL/Sumittals/index.aspx>

Special protections for high-quality waters in the local vicinity, which are identified pursuant to Maryland's anti-degradation policy;

C. Anti-degradation of Water Quality: Maryland requires special protections for waters of very high quality (Tier II waters). The policies and procedures that govern these special waters are commonly called "anti-degradation policies." This policy states that "proposed amendments to county plans or discharge permits for discharge to Tier II waters that will result in a new, or an increased, permitted annual discharge of pollutants and a potential impact to water quality, shall evaluate alternatives to eliminate or reduce discharges or impacts." These permitted annual discharges are not just traditional Point Sources, it can include all discharges such as Stormwater.

Beaverdam Creek 1 and Bald Hill Branch 1, which are located within the vicinity of the Project, have been designated as Tier II streams. The Project is within the Catchment (watershed) of the Beaverdam Creek 2 and Bald Hill Branch 1 segments. (See Additional Comments and attached map)

The applicant should utilize enhanced BMPs or additional controls, potentially above those minimally required, to protect high quality Tier II stream resources. (See attached Erosion and sediment control checklist) All items shall be considered, if applicable to the project. For more

information regarding any disturbances (i.e. Construction) within a Tier II Catchment contact Angel Valdez at 410-537-3606.

Planners should be aware of legal obligations related to Tier II waters described in the Code of Maryland Regulations (COMAR) 26.08.02.04 with respect to current and future land use plans. Information on Tier II waters can be obtained online at: <http://www.dsd.state.md.us/comar/comarhtml/26/26.08.02.04.htm> and policy implementation procedures are located at <http://www.dsd.state.md.us/comar/comarhtml/26/26.08.02.04-1.htm>

Planners should also note that since the Code of Maryland Regulations is subject to periodic updates. A list of Tier II waters pending Departmental listing in COMAR can be found, with a discussion and maps for each county, at the following website:

<http://www.mde.state.md.us/programs/Water/TMDL/Water%20Quality%20Standards/Pages/HighQualityWatersMap.aspx>

ADDITIONAL COMMENTS

For questions regarding Antidegradation please contact Angel Valdez at 410-537-3606.

Table 1: General Comments regarding Current Antidegradation Implementation Procedures.

For all land disturbing projects that do not implement a no-discharge alternative and therefore may adversely impact Tier II waters, MDE will require:	
1.	MDE approval of all design elements and practices required by mandatory implementation of Environmental Site Design (ESD) to the maximum extent practicable and applicable innovative development practices as currently required by COMAR 26.08.02.04-1(K)(2) and the 2007 Stormwater manual (see, http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/Pages/Programs/WaterPrograms/SedimentandStormwater/swm2007.aspx). MDE is also recommending ESD be employed for projects that are individually of minimal impact to Tier II resources, to account for the total cumulative effects of each project.)
2.	Mandatory Riparian buffers determined in consideration of slope and soil type, with a minimum of 100 ft in all areas. Buffer requirements are based on similar requirements in the Critical Areas Program and the Chesapeake Bay Riparian Buffer/Reforestation Goals and other water quality objectives). Additional buffers beyond the minimum 100' will be required on sites with slopes greater than 5% and/or with poorly infiltrating soils. See Table 2 for guidance.
3.	*Biological, chemical, and flow monitoring in the Tier II watershed by the

	applicant to determine remaining AC and any cumulative impacts of current and future developments for larger projects and/or in watersheds with little remaining forest buffering/AC.
4.	Additional practices to protect the Tier II watershed may also be required, such as enhanced sediment and erosion control practices, depending on the potential for project-specific impacts to water quality. See also 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control document located: http://www.mde.maryland.gov/programs/Water/StormwaterManagementProgram/SoilErosionandSedimentControl/Documents/2011%20MD%20Standard%20and%20Specifications%20for%20Soil%20Erosion%20and%20Sediment%20Control.pdf
Where 1 and 2 above cannot be fully implemented	Applicant is required to submit a detailed hydrologic study and alternatives analysis to demonstrate assimilative capacity will be maintained. If it is determined by MDE assimilative capacity still will not be maintained after the above analysis, an SEJ will be required.

Also, ESD is now being required for Program Open Space and School Construction projects. See
http://www.bpw.state.md.us/static_files/advisories/2009-1.pdf

Maryland riparian buffering requirements in Tier II watersheds developed from modified USDA Forest Service recommendations*. These can also be found in the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control Table A.2 on page A.5. At a minimum, projects needing a state 401 Water Quality Certification will be required to implement the expanded Tier II buffers.

Soils	Slopes			
	0-5%	5-15%	15-25%	>25%
ab	100	130	160	190
c	120	150	180	210
d	140	170	200	230

*Johnson, C. W. and Buffler, S. 2008. Riparian buffer design guidelines for water quality and wildlife habitat functions on agricultural landscapes in the Intermountain West, Gen. Tech. Rep. RMRS-GTR-203. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Also Available at http://www.fs.fed.us/rm/pubs/rmrs_gtr203.pdf

Chesapeake Bay TMDL

With the completion of the Chesapeake Bay TMDL, the Chesapeake Bay Program Office (CBPO) will be able to provide loading data at a more refined scale than in the past. MDE will be able to use the CBPO data to estimate pollution allocations at the jurisdictional level (which will include Federal Facilities) to provide allocations to the Facilities. These allocations, both Wasteload (WLA) and Load Allocation (LA) could call for a reduction in both Point Sources and Nonpoint Sources. Facilities should be aware of reductions and associated implementation required by WIPs or FIPs.

Stormwater

The project should consider all Maryland Stormwater Management Controls. Site Designs should consider all Environmental Site Design to the Maximum Extent Practicable and “Green Building” Alternatives. Designs that reduce impervious surface and BMPs that increase runoff infiltration are highly encouraged.

Further Information:

<http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/Pages/Programs/WaterPrograms/SedimentandStormwater/swm2007.aspx>

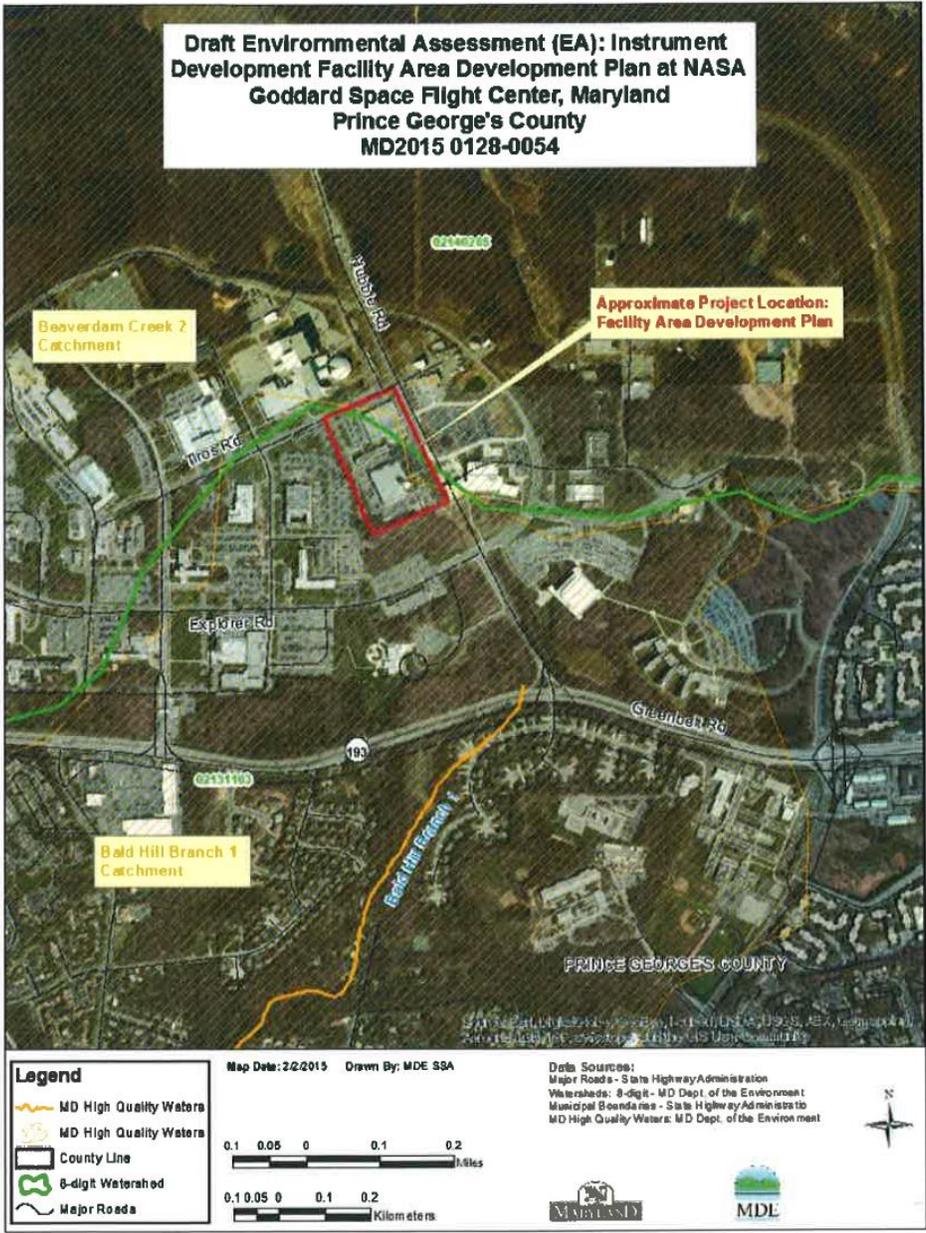
Environmental Site Design (Chapter 5):

<http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/MarylandStormwaterDesignManual/Documents/www.mde.state.md.us/assets/document/chapter5.pdf>

Redevelopment Regulations:

<http://www.dsd.state.md.us/comar/comarhtml/26/26.17.02.05.htm>

**Draft Environmental Assessment (EA): Instrument
Development Facility Area Development Plan at NASA
Goddard Space Flight Center, Maryland
Prince George's County
MD2015 0128-0054**





Maryland Department of the Environment
 Antidegradation Review Checklist
 (Erosion and Sediment Control)



<p>Enhanced Minimization</p>
<p>The applicant must utilize enhanced BMPs or additional controls, potentially above those minimally required, to protect high quality Tier II stream resources. All items shall be considered, if applicable to the project. Circle/Check off applicable practices incorporated. Provide documentation of incorporation. Note: If this project will impact a Tier II stream segment with no assimilative capacity, all impacts must be fully offset to satisfy the Antidegradation Review. Additional comments may be provided during the course of the review.</p>
<p>A. Erosion and Sediment Plan</p>
<p>Initial Considerations:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Limited extent and duration of disturbance: Phasing and/or sequencing is included <input type="checkbox"/> Accelerated stabilization (proper justification must be provided for waivers of the following standards): <ul style="list-style-type: none"> (A) Work done in a given day should disturb no more area than can be stabilized by the end of that workday, and/or (B) Initial soil disturbance or redisturbance, permanent or temporary stabilization shall be completed within 3 calendar days for all perimeter sediment control structures, dikes, perimeter slopes, and all slopes greater than 3:1; stabilization shall be completed within 7 days for all other disturbed or graded areas on the project site. <input type="checkbox"/> Enhanced scheduling: <ul style="list-style-type: none"> To the maximum extent practicable activities should take place during times when sediment transport are likely to be lower as predicted by NOAA 1 or 3 day weather forecast or <input type="checkbox"/> Vegetated expanded riparian buffers: <ul style="list-style-type: none"> 100 foot minimum, according to slopes and soils, according to Table 1 at the end of this document. Documentation of protection from clearing/major disturbances in perpetuity is required. Note: This does not apply to repair/replacement activities. <input type="checkbox"/> Enhanced inspections: <ul style="list-style-type: none"> Conduct inspections on a daily basis. Log books may be reviewed.
<p>Additional Considerations:</p> <p>Grading and Stabilization-</p> <ul style="list-style-type: none"> <input type="checkbox"/> Enhanced stockpile management: <ul style="list-style-type: none"> (A) locate piles > 100 ft from stream resources, or (B) silt fenced or bermed when active and seeded or covered with an impermeable cover when inactive <input type="checkbox"/> Hydroseeding with chemical stabilization additives or other controls such as soil binders <input type="checkbox"/> Incorporates biotechnical sediment and erosion controls such as live stakes <input type="checkbox"/> Mulch application depth shall not exceed 6'. Note: mulch spreading potentially may not be allowed within the riparian buffer or streamside management zones (applicable to utility projects).

<p>A. Erosion and Sediment Plan, continued</p>
<p>Filtering-</p> <ul style="list-style-type: none"><input type="checkbox"/> Near stream and wetland resources upgrade silt fencing to super silt fencing or an equivalent measure (i.e. large compostable filter logs)<input type="checkbox"/> Incorporates compostable practices (filter blankets, filter berms, filter logs, etc.)
<p>Sediment Trapping-</p> <ul style="list-style-type: none"><input type="checkbox"/> For road adjacent work: Trash rack, oil/water separator, and/or skimmers included in basin design<input type="checkbox"/> Sediment basin with forebays or designs to maximize detention time (for example includes baffle boards)<input type="checkbox"/> Incorporates flocculants or other chemical additives (may require additional approvals or conditions for use)<input type="checkbox"/> Incorporates special practices to protect Tier II -Use III cold water fisheries (for example NRCS terracing)
<p>Dewatering-</p> <ul style="list-style-type: none"><input type="checkbox"/> Enhanced buffer management:<ul style="list-style-type: none">(A) discharge should take place beyond the existing stable vegetated buffer of 100 ft or(B) discharge within the buffer shall occur through Agency approved <u>secondary or redundant control</u> (i.e. multiple filtering devices in manifold, sediment bag treated with sediment filtration aid, etc.)
<p>Miscellaneous Practices-</p> <ul style="list-style-type: none"><input type="checkbox"/> Signage and flagging shall be installed to notify workers of sensitive high quality resources within the buffer zone<input type="checkbox"/> Enhanced Temporary Access Waterways Crossing:<ul style="list-style-type: none">(A) Where applicable, complete an alternative crossing analysis to avoid any in-stream impacts (i.e. horizontal directional drilling)(B) temporary access bridges shall be utilized over fords;<input type="checkbox"/> Vehicles operating within the stream buffer must carry emergency spill kits
<p>Additionally-</p> <ul style="list-style-type: none"><input type="checkbox"/> Incorporates any number of the applicable project specific BMPs located in Table 2 at the end of this document.
<p>If applicable, in an attachment please describe in a narrative other environmentally sound and economically feasible BMPs to be used before, during, and after the land disturbing activity that have been incorporated into your Erosion and Sediment Control Plan.</p>

Table 1: Expanded Tier II Riparian Buffer

Maryland riparian buffering requirements in Tier II catchments developed from a modified USDA Forest Service recommendation.

Adjusted Average Optimal Buffer Width Key for HQ Waters (minimum width 100 feet)				
Soils	Slopes (%)			
	0-5%	5-15%	15-25%	>25%
ab	100	130	160	190
c	120	150	180	210
d	140	170	200	230

Table 2: Enhanced BMPs for Project Specific Activities	
For each row, check the box if one of the BMPs is incorporated. Then, circle the appropriate letter(s) of the applicable BMP applied. Additional documentation may be required.	
<input type="checkbox"/> In-Stream Work (Structure related)	<ul style="list-style-type: none"> A. Avoid/minimize rip-rap usage B. Incorporate bioengineering into design practices C. For work involving repairs/replacement of infrastructure transporting water with other materials with the potential to impact water quality (for example a pipe carrying hyper chlorinated water for water treatment): <ul style="list-style-type: none"> 1. After creating diversion, test collected water prior to discharge to surface waters to determine if water meets water the current freshwater aquatic life chronic criterion for the substance. 2. Treatment must be employed for all potential discharge which does not meet criteria. 3. If treatment was necessary, a monitoring report should be submitted to SSA/MDE once work is complete.
<input type="checkbox"/> In-stream Grout Placement (with Stream Diversion)	<ul style="list-style-type: none"> A. Plans shall reflect the following: <ul style="list-style-type: none"> 1. An emergency treatment plan should be in place to address accidental material release; and 2. Minimum cure time of 36 hours must be noted on appropriate plan sheets.
<input type="checkbox"/> In-stream Grout Placement (without Stream Diversion)	<ul style="list-style-type: none"> A. An Agency approved pH monitoring plan shall be in place during the activity to reflect the following: <ul style="list-style-type: none"> 1. On-site stream conditions 2. Active monitoring of multi-point locations, both immediately upstream and farther downstream of work area (similar to VA study, i.e. every 10 m for 100 m total distance) 3. A treatment plan to be implemented as necessary pending real time pH monitoring outcomes 4. All sampling data will be provided to MDE/SSA upon completion of proposed work



Sustainable _____ Attainable

PROJECT STATUS FORM

Please complete this form and return it to the State Clearinghouse upon receipt of notification that the project has been approved or not approved by the approving authority.

TO: Maryland State Clearinghouse
 Maryland Department of Planning
 301 West Preston Street
 Room 1104
 Baltimore, MD 21201-2305

DATE: _____
 (Please fill in the date form completed)

FROM: _____
 (Name of person completing this form.)

PHONE: _____
 (Area Code & Phone number)

RE: State Application Identifier: MD20150128-0054
Project Description: Draft Environmental Assessment (EA): Instrument Development Facility Area Development Plan at NASA Goddard Space Flight Center, Maryland

PROJECT APPROVAL	
This project/plan was:	<input type="checkbox"/> Approved <input type="checkbox"/> Approved with Modification <input type="checkbox"/> Disapproved
Name of Approving Authority:	Date Approved:
_____	_____

FUNDING APPROVAL	
<i>The funding (if applicable) has been approved for the period of:</i>	
_____, 201__ to _____, 201__ as follows:	
Federal \$:	Local \$: State \$: Other \$:
_____	_____ _____ _____

OTHER
<input type="checkbox"/> <i>Further comment or explanation is attached</i>

Lawrence J. Hogan, Jr., Governor
 Boyd K. Rutherford, Lt. Governor

David R. Craig, Secretary

MDPCH-1F

301 West Preston Street - Suite 1101 - Baltimore - Maryland - 21201
 Tel: 410.767.4500 - Toll Free: 1.877.767.6272 - TTY users: Maryland Relay - Planning.Maryland.gov



Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor
Mark J. Belton, Secretary
Frank W. Dawson, III, Deputy Secretary

March 24, 2015

Lizabeth Montgomery
NASA Goddard Space Flight Center
8800 Greenbelt Road
Greenbelt, MD 20771

RE: Environmental Review for Draft EA for Instrument Development Facility – Area Development Plan at NASA’s Goddard Space Flight Center, Greenbelt, Prince George’s County, MD.

Dear Ms. Montgomery:

The Wildlife and Heritage Service has determined that there are no State or Federal records for rare, threatened or endangered species within the boundaries of the project site as delineated. As a result, we have no specific comments or requirements pertaining to protection measures at this time. This statement should not be interpreted however as meaning that rare, threatened or endangered species are not in fact present. If appropriate habitat is available, certain species could be present without documentation because adequate surveys have not been conducted.

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2015.0129.pg



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
<http://www.fws.gov/chesapeakebay>

May 22, 2015

Ms. Lizabeth Montgomery
GSFC NEPA Program Manager
NASA/Goddard Space Flight Center, Code 250
8800 Greenbelt Road
Greenbelt, MD 20771

RE: NLAA Determination for Northern long-eared bat for Implementation of an Instrument Development Facility at NASA Goddard Space Flight Center, Prince George's County, Maryland

Dear Ms. Montgomery:

This letter is in response to Deborah Peer's of HDR, Inc. request for review of the Final Environmental Assessment (EA) for the Implementation of an Instrument Facility Area Development Plan at NASA Goddard Space Flight Center located in Prince George's County, Maryland. The EA states that NASA would construct and operate up to four distinct but connected facilities as part of the Engineering Renewal initiative aimed at improving aging engineering capabilities. NASA Phase I includes the deconstruction of existing buildings and construction of the Instrument Development Facility (IDF). Phases II, III, and IV include the construction of three additional facilities and deconstruction of other facilities yet to be determined. Approximately 0.08 acres of forest edge will be removed in Phase IV of the project to accommodate construction of a parking lot. The following comments are provided pursuant to Section 7 of the Endangered Species Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq).

The proposed project is located in Prince George's County, MD which is considered to be part of the historic range for northern long-eared bat (*Myotis septentrionalis*), which is Federally listed as an threatened species. The northern long-eared bat is a temperate, insectivorous migratory bat that hibernates in mines and caves in the winter and summers in wooded areas. Since the site is not located within the buffer of a known hibernacula or maternity roost and the clearing is minimal (<1 acre), the project is not likely to have an adverse effect on this species. Except for occasional transient individuals, no other Federal proposed or listed endangered or threatened species under our jurisdiction are known to exist within the project impact area. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.



We appreciate the opportunity to provide information relevant to threatened and endangered fish and wildlife resources. This ESA determination does not exempt this project from obtaining all permits and approvals that may be required by other state or federal agencies. Should you have any questions or concerns regarding this letter, please contact Julie Slacum of my Endangered Species staff at (410) 573-4595 or by email at Julie_thompson@fws.gov.

Sincerely,



For
Genevieve LaRouche
Field Supervisor

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**Response Matrix for Comments
on the
Draft Environmental Assessment Instrument Development Facility Area Development Plan at
NASA Goddard Space Flight Center, Maryland**

#	Comment	Reviewing Agency	NASA Response
1	Thanks for the opportunity to review and provide input for your draft EA. It sounds like this plan, from your description, will in addition to providing new facilities, also help NASA Goddard to meet some of your long range Environmental Management System goals for energy, stormwater, and water conservations.	USDA ARS, Beltsville	Comment noted.
2	Please go to the following website to determine if federally endangered and/or threatened species within the Maryland, Delaware and Washington D.C. region have the potential to be impacted by your proposed project: http://www.fws.gov/chesapeakebay/EndSppWeb/ProjectReview/Index.html	USFWS	Comment noted. Status and potential occurrence of protected species is included in Section 3.7.2 of the EA. Information from IPaC has also been added to the section.
3	It appears that the EA includes an analysis of the potential environmental impacts of a collection of projects that will be carried out in phases. While the individual projects / phases may be subject to NCPC's review authority under the National Capital Planning Act, the environmental assessment that is currently being circulated for public review is not such a project, and therefore, <u>will not be formally referred to the Maryland State Clearinghouse and Prince George's County.</u> NCPC staff appreciates that NASA has provided a draft copy of the EA to NCPC and the County, and we encourage the County to participate in the NEPA process through providing comments on the environmental analysis. Providing comments at this early stage is important to informing NASA of issues the County and NCPC may have in advance of formal project reviews.	NCPC	Comment noted.
4	Following completion of the NEPA process, and prior to construction plans being prepared, the projects / phases must be submitted to NCPC for review pursuant to the Section 8722(b)(1) of the National Capital Planning Act. At that point the projects will be referred to the MD State Clearinghouse and the County for a 60 day comment period. Following this comment period, NCPC will conduct its formal review of the project(s) which typically take 30 days.	NCPC	The GSFC will coordinate a review of its construction plans with the NCPC as design progresses, in accordance with the National Capital Planning Act.

**Response Matrix for Comments
on the
Draft Environmental Assessment Instrument Development Facility Area Development Plan at
NASA Goddard Space Flight Center, Maryland**

#	Comment	Reviewing Agency	NASA Response
5	Thank you for the opportunity to comment on Goddard's EA related to its plans for the implementation of an Instrument Development Facility Area Development Plan at GSFC, Maryland. It was informative to read the cultural resources summary and, assuming NASA will initiate Section 106 consultation at the appropriate time, I look forward to NASA's invitation to us to participate in the consultation, should NASA make a finding of adverse effect.	ACHP	Comment noted. The Section 106 process was initiated with the Maryland Historical Trust (SHPO) in May 2014. Additional project information was provided to other consulting parties starting in October 2014. NASA will continue to consult with the SHPO, City of Greenbelt, Maryland-National Capital Park and Planning Commission (M-NCPPC), Advisory Council on Historic Preservation (ACHP), and other identified consulting parties. ..
6	According to the Draft EA, minor, short-term increases in ambient noise and vibration levels would result from the demolition of buildings on- and off-site, and with the construction of the proposed IDF facilities. It is suggested that construction activities would include the use of equipment exhaust mufflers, and be limited to working hours (i.e., between 7:00a.m. and 5:00 p.m.) and to designated routes that contain a limited number of residential or sensitive structures in order to incur the least disturbance to nearby residents.	MNCPPC/ PG County	Comment noted. See Section 3.4.3.1.1 of the EA for noise mitigation including use of mufflers and restricting use of heavy construction equipment and construction activities generating loud noises to working hours.
7	Reduction of three forms of light pollution is recommended. Uplight, glare, and light trespass are encouraged to be implemented to the fullest extent practicable in the design of this project. Light pollution should be directed away from adjoining woodlands to the west and south of the site. The use of downward facing full cut off, fully shielded, and partially shielded lamps that help direct light down and prevent it from escaping from the site are encouraged. Automatic light shut offs should also be considered where practicable to ensure that lights are not left on after work hours or when they are not needed.	MNCPPC/ PG County	GSFC would implement light pollution reduction strategies as addressed in the added text in Section 3.10.3 of the EA.
8	The construction phase of the proposed action could affect localized air quality through airborne dust and other pollutants generated during demolition, drilling and removal of the existing foundations, and the excavation process. In addition, short-term impacts on soils would be expected from soil disturbance and compaction resulting from construction and demolition activities. No long-term effect on soils would be expected.	MNCPPC/ PG County	Comment noted. Impacts from construction on air quality and on soils are addressed in EA Sections 3.3.3 and 3.6.3, respectively.

**Response Matrix for Comments
on the
Draft Environmental Assessment Instrument Development Facility Area Development Plan at
NASA Goddard Space Flight Center, Maryland**

#	Comment	Reviewing Agency	NASA Response
9	<p>According to the draft environmental assessment, long-term beneficial impacts on greenhouse gas (GHG) emissions would be expected from the energy efficiency standards that would be implemented for the operations of the proposed facilities and through the decommissioning of older, less efficient buildings on- and off-site. Emissions associated with operations are expected to be similar to, and consistent with, existing conditions at GSFC. Proposed renewable energy technologies would be expected to produce significantly lower emissions; however, some technologies, such as biomass heat, would result in a minor increase in emissions for GSFC and a modification to GSFC's existing Title V air quality permit would be expected to be required.</p>	MNCPPC/ PG County	Comment noted. These points are provided in Section 3.3.3 of the EA.
10	<p>The potential exists for existing soil contamination resulting from previous operations on-site, and also due to the proximity of the site to a historic trichloroethene (TCE) groundwater plume. Groundwater and soil monitoring is highly recommended prior to and during construction. Any areas onsite that are identified with contaminated soil should be remediated or disposed of according to Maryland Department of the Environment and the United States Environmental Protection Agency guidelines.</p>	MNCPPC/ PG County	These points are discussed in the Hazardous Waste and Human Health and Safety sections of the EA (see Sections 3.11.3 and 3.12.3, respectively).
11	<p>Regarding water resources, no permanent adverse effects on water resources would be expected from implementing the proposed action. All construction is required to be conducted in accordance with erosion control and storm water runoff laws and regulations to prevent any adverse effects on water quality. National Pollutant Discharge Elimination System (NPDES) Permits for Stormwater Associated with Construction Activities would be obtained as well as the approval from Maryland Department of the Environment (MOE) of a Stormwater Management Plan before any construction activity would begin. In accordance with the Clean Water Act, any project that involves the filling of wetlands or waters would require Section 401 1404 nontidal wetland permits from MOE and/ or the U.S. Army Corps of Engineers.</p>	MNCPPC/ PG County	As stated in the EA, GSFC will coordinate with permitting agencies for construction and deconstruction activities, as appropriate. No impacts on wetlands are expected, and a net decrease in impervious surfaces would occur under the Proposed Action, as stated in Section 3.8.3 of the EA.

**Response Matrix for Comments
on the
Draft Environmental Assessment Instrument Development Facility Area Development Plan at
NASA Goddard Space Flight Center, Maryland**

#	Comment	Reviewing Agency	NASA Response
12	All phases of development would also have to be managed in accordance with the Goddard Procedural Requirement (GRP) 8000.5C, Water Management; and the 2007 Energy Independence and Security Act (EISA). The proposed stormwater management infrastructure would include the construction of a storm water management facility in the vicinity of the proposed parking lot, storm drains and grassy swales for the facility. According to the Draft EA, these strategies would provide better quality and detention than the existing stormwater management strategies on-site that were originally developed in the 1960s.	MNCPPC/ PG County	Comment noted. These points are provided in Section 3.8 of the EA.
13	According to the Draft EA, long-term, minor, beneficial impacts would be expected to result from the expected net decrease of impervious surfaces on-site with the new site layout, and offsite with the demolition of existing facilities.	MNCPPC/ PG County	Comment noted. These points are provided in the Water Resources and the Utilities, Infrastructure and Transportation sections of the EA (see Sections 3.8.3 and 3.10.3, respectively).
14	It has been determined that environmental impacts regarding this site are subject to the Maryland-Department of Natural Resources (M-DNR) Forest Conservation Act requirements, and not to the County's Tree Conservation Plan requirements of the Woodland Conservation Ordinance. No forest interior dwelling species (FIDS) will be directly affected, as no FIDS habitat is located on, or immediately adjoining the site. No rare, threatened or endangered species are known to exist within the vicinity of the site according to the Sensitive Species Protection Review Area (SSPRA) based on a review of the SSPRA GIS layer prepared by the Heritage and Wildlife Service, M-DNR. Decline and/or mortality of trees to remain could occur due to significant critical root zone (CRZ) disturbance, tree limb damage, changes in soil moisture, and soil compaction as a result of grading. Some terrestrial wildlife may be temporarily displaced from their typical edge habitats during operations and other construction related activities.	MNCPPC/ PG County	Text added to Section 3.7.3 to further address potential impacts on trees from construction activities. Impacts on wildlife are provided in the same section.
15	The Maryland Department of Planning encourages the project to consider policies aimed at reducing commuting by single-occupancy vehicle. Ridesharing and preferential parking for high-occupancy vehicles may help reduce congestion on local roadways during AM and PM peak-hour travel.	MDE	Comment noted. Sections 3.10.3.1.1 and 3.10.3.1.2 address impacts on transportation and design strategies that would reduce congestion and vehicle transit.

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16	The Maryland Historical Trust stated that their finding of consistency is contingent upon the applicant's completion of the review process required under Section 106 of the National Historic Preservation Act. This project will affect historic properties. NASA and MHT are consulting pursuant to Section 106 of the National Historic Preservation Act.	MDE	Comment noted. Please see response to Comment 5.
17	Any above ground or underground petroleum storage tanks, which may be utilized, must be installed and maintained in accordance with applicable State and federal laws and regulations. Underground storage tanks must be registered and the installation must be conducted and performed by a contractor certified to install underground storage tanks by the Land Management Administration in accordance with COMAR 26.10. Contact the Oil Control Program at (410) 537-3442 for additional information.	MDE	Comment noted. Section 3.11.2 addresses aboveground and underground storage tanks, which are operated under the GSFC's current Oil Operations Permit in accordance with COMAR 26.10.
18	If the proposed project involves demolition – Any above ground or underground petroleum storage tanks that may be on site must have contents and tanks along with any contamination removed. Please contact the Oil Control Program at (410) 537-3442 for additional information.	MDE	Comment noted. Please see response to Comment 17.
19	Any solid waste including construction, demolition and land clearing debris, generated from the subject project, must be properly disposed of at a permitted solid waste acceptance facility, or recycled if possible. Contact the Solid Waste Program at (410) 537-3315 for additional information regarding solid waste activities and contact the Waste Diversion and Utilization Program at (410) 537-3314 for additional information regarding recycling activities.	MDE	Comment noted. As detailed in Section 3.10.3 of the EA, solid waste would be managed as appropriate.
20	The Waste Diversion and Utilization Program should be contacted directly at (410) 537-3314 by those facilities which generate or propose to generate or handle hazardous wastes to ensure these activities are being conducted in compliance with applicable State and federal laws and regulations. The Program should also be contacted prior to construction activities to ensure that the treatment, storage or disposal of hazardous wastes and low-level radioactive wastes at the facility will be conducted in compliance with applicable State and federal laws and regulations.	MDE	Comment noted. As detailed in Section 3.11, hazardous materials would be appropriately managed.

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21	Any contract specifying "lead paint abatement" must comply with Code of Maryland Regulations (COMAR) 26.16.01 - Accreditation and Training for Lead Paint Abatement Services. If a property was built before 1950 and will be used as rental housing, then compliance with COMAR 26.16.02- Reduction of Lead Risk in Housing; and Environment Article Title 6, Subtitle 8, is required. Additional guidance regarding projects where lead paint may be encountered can be obtained by contacting the Environmental Lead Division at (410) 537-3825.	MDE	Comment noted. As detailed in Section 3.11, materials potentially containing lead-based paint would be appropriately managed.
22	The proposed project may involve rehabilitation, redevelopment, revitalization, or property acquisition of commercial, industrial property. Accordingly, MDE's Brownfields Site Assessment and Voluntary Cleanup Programs (VCP) may provide valuable assistance to you in this project. These programs involve environmental site assessment in State Application Identifier: MD20150128-0054 accordance with accepted industry and financial institution standards for property transfer. For specific information about these programs and eligibility, please contact the Land Restoration Program at (410) 537-3437.	MDE	Comment noted. Brownfields are not expected to be an issue with this project but NASA would address any such issue as required.
23	Planners should be aware of existing water quality impairments identified on Maryland's 303(d) list. The Project is situated in the Anacostia River and Western Branch watersheds, identified by the MD 8-digit codes 02140205 and 02131103 which are currently impaired by several substances and subject to regulations regarding the Clean Water Act.	MDE	Comment noted. Section 3.8.2 discusses the Anacostia watershed and nearby streams and Section 3.8.3 addresses potential impacts on compliance with water quality regulations including the Clean Water Act.
24	Beaverdam Creek 1 and Bald Hill Branch 1, which are located within the vicinity of the Project, have been designated as Tier II streams. The Project is within the Catchment (watershed) of the Beaverdam Creek 2 and Bald Hill Branch 1 segments. The applicant should utilize enhanced BMPs or additional controls, potentially above those minimally required, to protect high quality Tier II stream resources.	MDE	As indicated in Section 3.8.1, NASA would employ low-impact development, environmental site design (ESD) techniques, and best management practices (BMPs) to manage storm water and reduce downstream water quality impacts to ensure compliance with water quality regulations. Text added to Section 3.8.2 to include discussion on the Beaverdam Creek and Bald Hill Branch watersheds proximal to the project area.

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25	<p>General Comments regarding Current Antidegradation Implementation Procedures:</p> <p>1. MDE approval of all design elements and practices required by mandatory implementation of Environmental Site Design (ESD) to the maximum extent practicable and applicable innovative development practices as currently required by COMAR 26.08.02.04-1(K)(2) and the 2007 Stormwater manual (see http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/Pages/Programs/WaterPrograms/SedimentandStormwater/swm2007.aspx). MDE is also recommending ESD be employed for projects that are individually of minimal impact to Tier II resources, to account for the total cumulative effects of each project.)</p> <p>2. Mandatory Riparian buffers determined in consideration of slope and soil type, with a minimum of 100 ft in all areas. Buffer requirements are based on similar requirements in the Critical Areas Program and the Chesapeake Bay Riparian Buffer/Reforestation Goals and other water quality objectives). Additional buffers beyond the minimum 100' will be required on sites with slopes greater than 5% and/or with poorly infiltrating soils.</p> <p>3. *Biological, chemical, and flow monitoring in the Tier II watershed by the applicant to determine remaining AC and any cumulative impacts of current and future developments for larger projects and/or in watersheds with little remaining forest buffering/AC.</p> <p>4. Additional practices to protect the Tier II watershed may also be required, such as enhanced sediment and erosion control practices, depending on the potential for project-specific impacts to water quality. See also 2011 Maryland Standards and Specifications for Soil Erosion and Sediment <i>Control</i> document located: http://www.mde.marvland.gov/programs/Water/StormwaterManagementProgram/SoilErosionandSedimentControl/Documents/2011 %20MD%20Standard %20and%20Specifications%20for%20Soil%20Erosion%20and%20Sediment%20Control.pdf</p> <p>* Where 1 and 2, above, cannot be implemented, Applicant is required to submit a detailed hydrologic study and alternatives analysis to demonstrate assimilative capacity will be maintained. If it is determined by MDE assimilative capacity still will not fully be maintained after the above analysis, an SEJ will be required.</p>	MDE	<ol style="list-style-type: none"> 1. As indicated in existing and added text in Section 3.8.1, the project would use ESD techniques and BMPs for storm water management to the maximum extent practicable. 2. Comment noted. There are no perennial or intermittent streams within 100 feet of the project site. The existing forest stand to the south of the site, combined with the various storm water management strategies (e.g., low-impact development, EMP, and BMPs) described in Sections 3.8.1, 3.8.2, and 3.8.3 of the EA, would inhibit more-than-minimal impacts on water resources. 3. Comment noted. 4. Comment noted. Please see response to Comment 24.

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26	The Wildlife Heritage Service has determined that there are no State or Federal records for rare, threatened, or endangered species within the boundaries of the project site as delineated. As a result, we have no specific comments or requirements pertaining to protection measures at this time. This statement should not be interpreted however as meaning that rare, threatened, or endangered species are not in fact present. If appropriate habitat is available certain species could be present without documentation because adequate surveys have not been conducted.	MDNR	Comment noted. Please see response to Comment 2.
27	The proposed project is located in Prince George's County, MD which is considered to be part of the historic range for northern long-eared bat (<i>Myotis septentrionalis</i>), which is Federally listed as a threatened species. The northern long-eared bat is a temperate, insectivorous migratory bat that hibernates in mines and caves in the winter and summers in wooded areas. Since the site is not located within the buffer of a known hibernacula or maternity roost and the clearing is minimal (<1 acre), the project is not likely to have an adverse effect on this species. Except for occasional transient individuals, no other Federal proposed or listed endangered or threatened species under our jurisdiction are known to exist within the project impact area. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.	USFWS	Comment noted.

Table Key (in order of listing):

USDA ARS, Beltsville – United States Department of Agriculture Agricultural Research Station, Beltsville
 USFWS – United States Fish and Wildlife Service
 NCPC – National Capital Planning Commission
 ACHP – Advisory Council on Historic Properties
 MNCPPC – Maryland-National Capital Parks and Planning Commission
 PG County – Prince George's County
 MDE – Maryland Department of the Environment
 MDNR – Maryland Department of Natural Resources