FINAL SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT FOR THE NASA LANGLEY RESEARCH CENTER MASTER PLAN, HAMPTON, VIRGINIA

Lead Agency: National Aeronautics and Space Administration (NASA), Langley Research Center

Proposed Action: Construction and Operation of the Flight Dynamics Research Facility (FDRF)

For Further Information:

LaRC NEPA Team, MS 133
NASA Langley Research Center
Hampton, VA 23681-2199
LARC-NEPATeam@mail.nasa.gov

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Abstract: NASA proposes to change the site of a new Flight Dynamics Research Facility (FDRF) planned for construction at the Langley Research Center (LaRC). Construction and operation of the FDRF was originally addressed in the Environmental Assessment (EA) for the NASA LaRC Master Plan, published in June 2013. NASA has prepared this Supplemental EA focusing on the anticipated environmental impacts associated with the new site location and updated engineering design. The Proposed Action sites the FDRF in the area between Building 1200 and Building 1208 and utilizes a commercial off the shelf (COTS) design to cost-effectively achieve required flight dynamics research capabilities. The footprint of the FDRF would be up to 1,200 square meters (13,000 square feet) and the building height would be 45.1 meters (148 feet). This Supplemental EA addresses the environmental impacts associated with the Proposed Action and the No-Action Alternative. Environmental resources addressed in this Supplemental EA consist of the coastal zone, visual resources, cultural resources, and public health and safety. Analysis in this Supplemental EA indicates that the Proposed Action would result in no significant individual or cumulative environmental impacts.

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FINAL SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
NASA LANGLEY RESEARCH CENTER MASTER PLAN
FLIGHT DYNAMICS RESEARCH FACILITY

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1.0 BACKGROUND INFORMATION AND PURPOSE AND NEED

1.1 Introduction

An Environmental Assessment (EA) for the NASA Langley Research Center (LaRC) Master Plan was prepared in 2013 in accordance with the requirements of the National Environmental Policy Act of 1969, as amended (NEPA) (42 United States Code [U.S.C.] 4321 *et seq.*), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508), NASA's regulations (14 CFR Part 1216 Subpart 1216.3), and NASA Procedural Requirements (NPR) 8580.1A, *Implementing the National Environmental Policy Act and Executive Order 12114* (NASA, 2012). The result of the NASA LaRC Master Plan EA was a Finding of No Significant Impact (FONSI) for implementation.

Construction and operation of a Flight Dynamics Research Facility (FDRF) was addressed in the NASA LaRC Master Plan EA, however, the proposed site location has changed and more detailed information on the facility design has become available. As such, NASA has prepared this Supplemental EA focusing on the potential environmental impacts associated with the site location change and updated engineering design.

NASA provided this Supplemental EA for review by the public and state agencies. Feedback received during the public comment period was considered during the finalizing of the document.

1.2 Project Location

NASA LaRC, also referred to as the Center, is situated near the southern end of the lower Virginia Peninsula, approximately 241 kilometers (km) (150 miles [mi]) south of Washington, D.C. and 80 km (50 mi) southeast of Richmond, Virginia. The Center is situated between the Back River and Newport News, Poquoson City, Yorktown, and Hampton, Virginia (see Figure 1.1). The area to the east of LaRC is occupied by Joint Base Langley-Eustis (JBLE). JBLE is comprised of two military installations, Langley Air Force Base (LAFB) and Fort Eustis.

NASA LaRC is comprised of research facilities located in two areas approximately 4.8 km (3 mi) apart. The two areas, commonly called the West Area and the East Area, are divided by the runways of LAFB. The West Area occupies 309 hectares (764 acres) of land and contains the majority of LaRC's facilities. The proposed FDRF would be located in the West Area.

In the NASA LaRC Master Plan EA, the FDRF was to be located adjacent to Building 1212 and Building 1212 was proposed for office and shop space usage. Subsequently, after further consideration, the Building 1212 site was dismissed as an optimal location primarily because of budget and constructability constraints. A qualitative site evaluation and quantitative cost analysis for the two locations, along with a FDRF Site Evaluation Matrix, established ratings for environmental, site utilities, and other comparable aspects. Based on results of this alternate site tradeoff study, the site adjacent to Building 1200 was chosen as the optimal location for the FDRF. This new site is located on Langley Boulevard, between North Dryden Street and Doolittle Road; the site is within a 0.8 km (0.5 mi) of Building 1212, where model preparation would occur; clear of existing underground utilities; and supports building design requirements concerned with grade elevation. Adjacent buildings to the new structure would include 1190, 1200, and 1208 (see Figure 1.2). An economic analysis was also conducted to determine whether cost savings would occur

with the construction and operation of a new FDRF, as compared with the continued use of the existing facilities. Results indicated new construction as the optimal solution because of an estimated eleven percent savings in Net Present Value between the two options (Jacobs, 2016).

1.3 Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to construct a state-of-the art flight dynamics experimental testing facility. The new FDRF would be a single vertical up-flow wind tunnel that would have enhanced capabilities replacing and improving on those of the existing Flight Mechanics Facilities at LaRC. Flight Mechanics Facilities at LaRC include the 12-Foot Low Speed Tunnel (12-Foot Tunnel) and the 20-Foot Vertical Spin Tunnel (VST), which are planned for demolition.

The Proposed Action is needed to support a growing Agency demand for highly reliable Computational Fluid Dynamics predictions of advanced vehicle flight mechanics/stability and control characteristics. Developing these computational tools requires detailed experiments for code development and validation that the current facilities at LaRC are not able to support. The existing 12-Foot Tunnel and VST that FDRF would replace are over 75 years old, their output is limited, and they have significant corrosion due to their proximity to the Back River.

1.4 Scope of Analysis

As a Supplemental EA, this document is supported by and builds upon the content of the NASA LaRC Master Plan EA. This Supplemental EA identifies any potential environmental impacts that could occur as a result of the Proposed Action at its relocated site and No-Action Alternative. This Supplemental EA does not address the environmental impacts associated with construction and operation of the FDRF, originally identified and previously reviewed in the LaRC Master Plan EA, which are still applicable to the relocated site. The resources addressed in this document include Coastal Zone Management; Visual Resources and Viewshed; Cultural Resources; and Public Health and Safety, with a focus on airspace and noise.

1.5 Available Information and Assumptions

This Supplemental EA is based on the NASA LaRC Master Plan EA (NASA LaRC, 2013) and best available information at the time of publication. The main sources of information for the Supplemental EA include facilities planning reports, the Preliminary Engineering Report (PER) for the FDRF (Jacobs, 2016), the LaRC Environmental Resource Document (ERD) (NASA LaRC, 2016a), visual renderings of the FDRF prepared by the LaRC GIS Team, January 2017, and facility design information received from LaRC's Master Planner and the FDRF Project Team. The list of resources is provided in Chapter 4, References.

The timing of implementation of the Proposed Action is subject to funding availability. Construction is proposed to commence in Fiscal Year (FY) 2019 or FY 2020, provided Programmatic Construction of Facilities funding can be identified. It is assumed minor modifications to the plan or changes to the schedule would not affect the environmental impacts as described in this Supplemental EA. In the event major changes are made to the scope of the Proposed Action, LaRC would prepare additional environmental documentation at that time as appropriate.

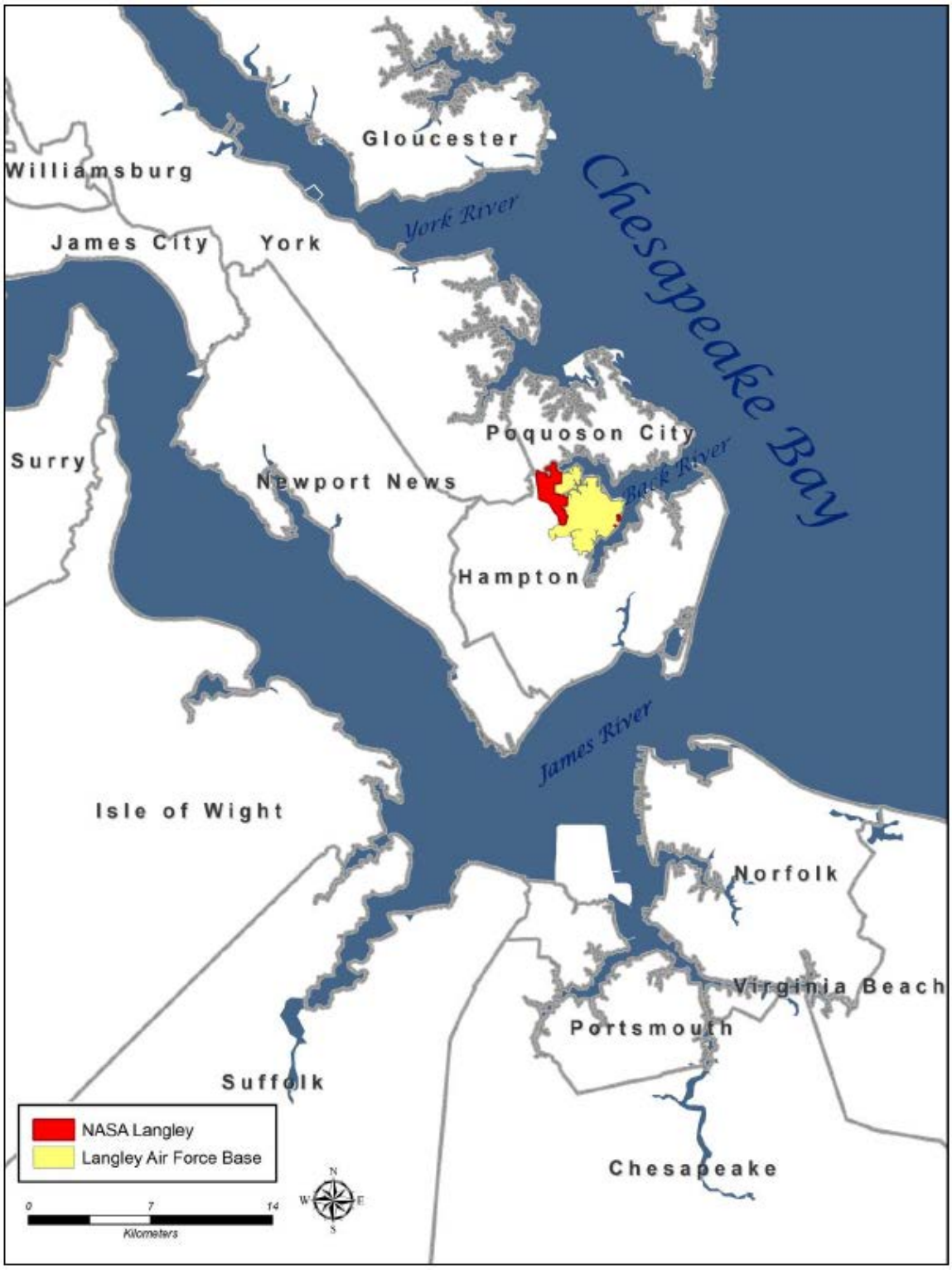

Figure 1.1 Regional Location of LaRC

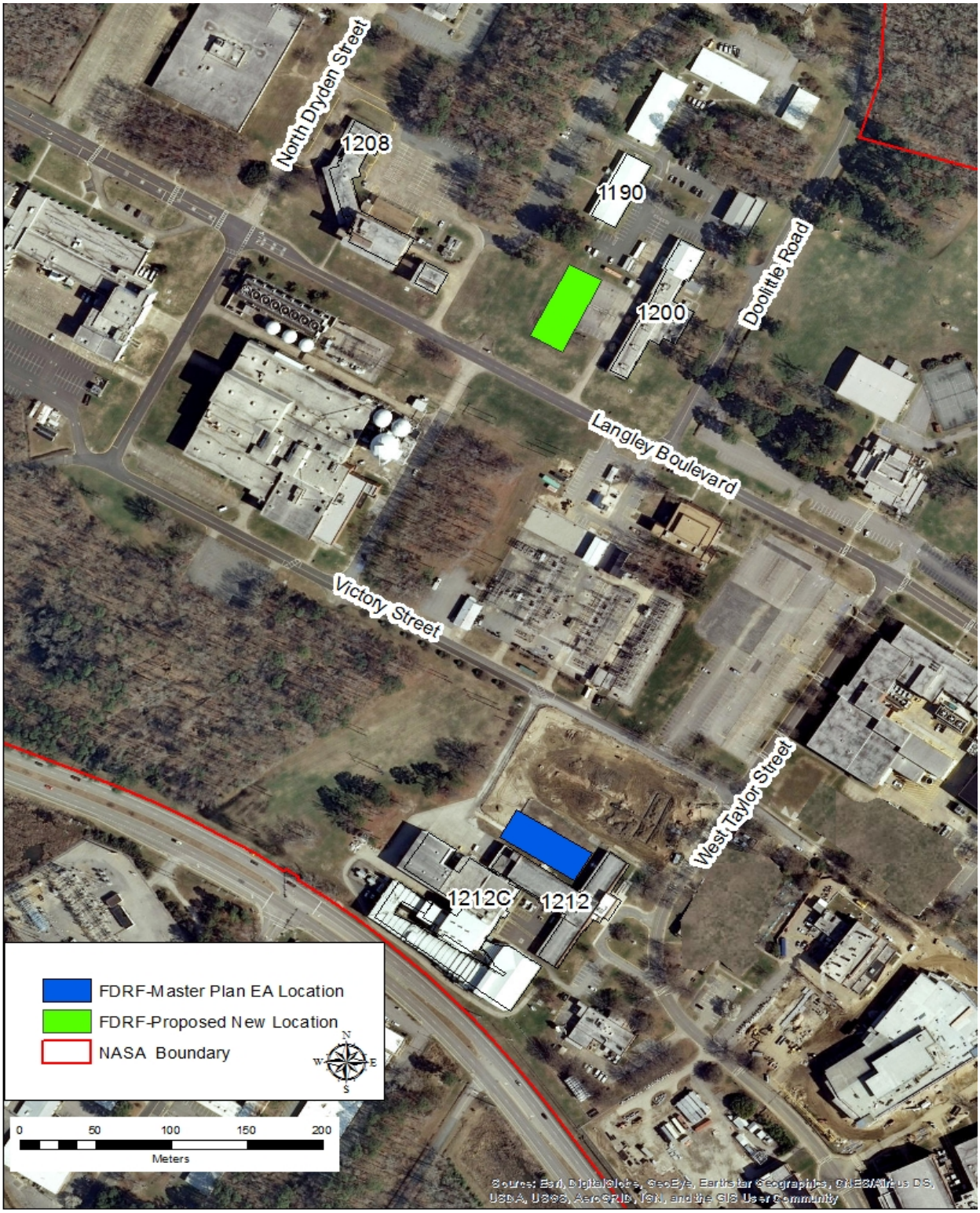

Figure 1.2 Previously and Currently Proposed Locations of the FDRF

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The Proposed Action includes the construction and operation of a new FDRF housing a single vertical wind tunnel. Activities associated with constructing the new facility would not deviate from standard construction practices at LaRC as described in the NASA LaRC Master Plan EA. The new building, referred to as the FDRF, would combine into one tunnel the existing free-flight model and rotary balance testing capabilities of the VST and the dynamic and flow visualization/flow diagnostic test techniques of the 12-Foot Tunnel. The Proposed Action includes the construction of a research facility with a single COTS vertical wind tunnel. Salvageable materials from the VST and 12-Foot Tunnel would be reused in the new FDRF.

The new FDRF would be located in the northern portion of the Center's core between Buildings 1200 and 1208 (Figure 1.2). The anticipated dimensions of the FDRF are 45.1 meters (m) (148 feet [ft]) tall by 52.4 m (172 ft) horizontal width by 27.4 m (90 ft) horizontal depth. Figure 2.1 shows the proposed FDRF building, demonstrating the external view (from the front). The proposed site is free of existing underground structures and utilities. The current grade elevation of the site is 11.00 feet, which supports setting the plenum finished first floor elevation of the FDRF at 12.45 feet, to comply with the requirements. The facility would be situated next to an existing asphalt parking area. The new FDRF can be seen in its proposed location in Figure 1.2; the anticipated footprint of the building is up to 1,200 square m (13,000 square ft). Additional activities associated with the Proposed Action in the project area include providing building and site access to the new FDRF; excavation and digging activities; landscaping modifications; and utility upgrades and installation.

2.2 No-Action Alternative

The No-Action Alternative involves continuing use of the existing 75-year-old flight dynamics facilities located in LaRC's East Area, which includes the VST and the 12-Foot Tunnel. Associated aging buildings and infrastructure would be operated under a "run to failure" maintenance approach. This reactive rather than proactive approach could result in expensive, unplanned, and rushed repairs, which could potentially compromise the Center's operational and research capabilities. The No-Action Alternative would not facilitate LaRC's goal of improving current and future mission performance capability.

2.3 Alternatives Eliminated From Further Analysis

The following alternatives for flight dynamics research capabilities at NASA LaRC were considered and dismissed; these alternatives are consistent with those discussed in the LaRC Master Plan EA.

2.3.1 Renovating Existing Facilities

With this alternative, no new construction or other infrastructure upgrades would occur. It was determined that this alternative would not meet the Center's identified needs, because most of the existing buildings are poorly suited as candidates for renovation. Many of the facilities would have to be "virtually demolished" during renovation because the major systems and layout of the facilities are outdated and inefficient. The costs and payback period for renovation of existing

Figure 2.1 Rendering of FDRF (front)

facilities, in addition to the potential displacement and disruption to employees, resulted in this alternative being eliminated from further consideration.

2.3.2 Leasing of Space and Services

Leasing of space and services does not meet the Center's needs. Leasing is not a viable option for a number of reasons: (1) no facility was found in the United States with the required dynamic pressures, test section capacity, flow quality, and test rig configuration; (2) there are logistical issues due to the difficulty in the preparation and transfer of models and test articles (other contingent research is at LaRC and collaboration is crucial); (3) security is a problem because testing will require restricted access that meets NASA's guidelines.

2.3.3 Using Previously Identified FDRF Site

The initial scope of the PER was to locate the FDRF adjacent to Building 1212. Following preliminary investigations and conceptual design development, budgetary and constructability constraints downgraded this location. Through evaluation of factors such as cost and elevation, stakeholders determined that Building 1200 would be the ideal location for the new FDRF, resulting in the elimination of this alternative from further consideration (Jacobs, 2016).

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

This chapter provides information on the existing environmental conditions at LaRC and the environmental impacts of the Proposed Action and the No-Action Alternative. Information on the existing environment focuses on those environmental resources potentially subject to impacts not previously identified in the NASA LaRC Master Plan EA. Detailed information on each environmental resource's baseline conditions is provided in the 2016 LaRC ERD. Required by NPR 8580.1A, *Implementing NEPA and Executive Order 12114*, the ERD provides a detailed and comprehensive baseline of current environmental conditions at the Center. The ERD is updated at a minimum of every five (5) years or as Center conditions change. NASA's NEPA Program promotes incorporating ERDs by reference to streamline NEPA documentation. LaRC's ERD is available here:

https://environmental.larc.nasa.gov/files/2016/11/LaRC-ERD-2016.pdf

Impacts are defined in general terms and are qualified as adverse or beneficial, and as short-term or long-term. For the purposes of this Supplemental EA, beneficial impacts would improve resources/conditions and adverse impacts would deplete or negatively alter resources/conditions. In terms of duration, short-term impacts are generally considered those impacts that would have temporary effects. For example, air quality impacts from fugitive dust associated with construction would be considered short-term as they would only last for the duration of the construction activities. Long-term impacts are generally considered those impacts that would result in permanent effects. For example, the loss of vegetation or the increase in traffic associated with new development would be considered long-term.

The following defines the thresholds of change for the intensity of impacts:

- **Negligible** - would not be detectable and would have no discernible effect.
- **Minor** - would be slightly detectable, but would not have an overall effect.
- **Moderate** - would be clearly detectable and could have an appreciable effect.
- **Major** - would have a substantial, highly noticeable effect.

3.1 Coastal Zone Management Federal Consistency Determination

This EA provides information for LaRC's Federal Consistency Determination (FCD) and follows Virginia's Department of Environmental Quality's (DEQ) recommended outline for FCDs per 15 CFR §930. Federal lands, the use of which is by law subject solely to the discretion of or which is held in trust by the federal government, its officers or agents, are excluded from Virginia's coastal management area; however, Federal agency activities within the coastal zone must be carried out in a manner consistent to the maximum extent practicable with the applicable enforceable policies.

The following Virginia Coastal Zone Management Policies (VCPs) do not apply to the Proposed Action and No-Action Alternatives due to the project not having any impacts on these resource areas:

- *Fisheries Management* – This project will not impact the conservation or enhancement of finfish and shellfish resources, commercial/recreational fisheries, or recreational opportunities.

- *Subaqueous Lands Management* – No subaqueous lands exist at the project site.
- *Wetlands Management* – No wetlands exist at the project site.
- *Dunes Management* – No dunes exist at the project site.
- *Shoreline Sanitation* – No septic systems are associated with this project.
- *Coastal Lands Management Program* – The project does not intersect any designated Chesapeake Bay Resource Protection Area and Resource Management Area.

The remaining applicable VCPs are described below:

- *Point Source Air Pollution Control* – The federal Clean Air Act provides a legally enforceable State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards. LaRC has a State Operating permit that establishes emission limits for specific stationary air pollution sources as well as Center-wide emission limits. The Center is not required to have a Title V Federal Operating Permit. LaRC qualifies as a synthetic minor source because its air emissions are limited below the prescribed thresholds by its air permit. The Center's air permit contains enforceable conditions that limit the amount of air pollutants that LaRC may emit.

- *Non-Point Source Water Pollution Control* – Virginia's Erosion and Sediment Control (ESC) Law requires soil-disturbing projects to be designed to reduce soil erosion and to decrease inputs of chemical nutrients and sediments to the Chesapeake Bay, its tributaries, and other rivers and waters of the Commonwealth. For any soil disturbing projects at the Center, LaRC environmental staff review design plans to ensure appropriate permits are secured and controls implemented. Additionally, NASA LaRC has DEQ-approved Annual Standards and Specifications for ESC and Stormwater Management (SWM) on file with DEQ. This project will operate under NASA LaRC's approved program.

- *Point Source Water Pollution Control* – Point source pollution control is accomplished through the implementation of the National Pollutant Discharge Elimination System (NPDES) permit program established pursuant to §402 of the federal Clean Water Act and administered in Virginia as the VPDES permit program. NASA LaRC operates under VPDES permit #VA0024741 which regulates discharges from storm water runoff and industrial operations, and VPDES permit #VA6750198 which regulates discharges from the Langley Exchange car wash operation. Additionally, NASA LaRC operates under a Phase II General MS4 permit. As part of NASA MS4 Program, the project will be tracked and inspected under the MS4 construction stormwater management program (Minimum Control Measure 4).

Construction Impacts Review

Point Source Air Pollution Control – Construction activities would result in emissions from vehicle/equipment exhaust and from fugitive dust. These effects would be minor and short-term. In relation to the large number of personal and Government vehicles operating on the Center, the additional emissions resulting from construction vehicles would be negligible. In addition, fugitive dust would be minimized by using control methods outlined in 9 VAC 5-50-60 *et seq.* of the Virginia Regulations for the Control and Abatement of Air Pollution. These precautions may include the use of water for dust control, covering of open equipment for conveying materials, prompt removal of spilled or tracked dirt from paved streets, and removal of dried sediments resulting from soil erosion. No open burning is associated with this project.

Non-Point Source Water Pollution Control – Since the Proposed Action would disturb more than 929 square m (10,000 square ft), the project would develop a site specific ESC Plan showing compliance with the state's 19 Minimum Standards as defined in 9VAC25-840. This plan would be reviewed and approved under NASA LaRC's Annual Standards and Specification Program. Should the land disturbance go over one acre, the project would develop a site specific Stormwater Pollution Prevention Plan (SWPPP) and obtain coverage under DEQ's Construction General

Permit (CGP/VAR10). During construction, the contractor's performance and adherence to the permits and plans would be monitored by LaRC environmental staff and a construction inspection team which includes Department of Environmental Quality certified inspectors.

A Stormwater Management (SWM) Plan consistent with the requirements of the Virginia Stormwater Management Act and regulations, in particular *Part II B – Technical Criteria for Regulated Land-Disturbing Activities* (9 VAC 25-870-62 through 9 VAC 25-870-92), would be developed prior to construction and implemented during construction. Prior to land disturbance, this Plan would be approved by NASA LaRC under the LaRC's Annual Standards and Specification Program. Compliance with the water quality design criteria set in 9 VAC 25-870-63 shall be determined by utilizing the Virginia Runoff Reduction Method (VRRM). The BMPs approved in 9 VAC 25-870-65 and listed in the Virginia Stormwater BMP Clearinghouse Website would be approved for use as ways to reduce the phosphorus load and runoff volume in accordance with the VRRM.

Point Source Water Pollution Control – Construction contractors would comply with LaRC's water permit requirements to ensure that no point source pollution occurs. Construction activities would be monitored by LaRC environmental staff and the construction inspection team to ensure compliance with permits.

Consistency Determination
Based upon the information, data, and analysis in this EA, NASA LaRC finds that the construction of the FDRF is consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Zone Management Program. NASA LaRC received DEQ's concurrence with this finding on June 29, 2017.

3.2 Visual Resources/Viewshed

The aesthetic character of an area or community is composed of visual resources. Physical features that make up the visible landscape include land, water, vegetation, and man-made features, such as buildings, roadways, and structures.

Affected Environment
The proposed FDRF facility would be located within the West Area of the NASA LaRC property. The West Area began to develop in 1940 and development is ongoing. The majority of LaRC's facilities are located on a campus-like grid of streets. Buildings are generally constructed of concrete, steel, masonry block, and brick. Many buildings and structures are two to three stories high, although some with specialized functions reach 15.2 to 18.3 m (50 to 60 ft) in height. The Impact Dynamics Research Facility (Gantry) is the largest structure on the Center, measuring 122 m (400 ft) long by 73 m (240 ft) high.

The West Area includes three distinct sections with differing building styles and densities: the Middle Section, North Quadrant, and Downtown. The Middle Section is northwest of Downtown LaRC. The Middle Section contains the densest and oldest development, and is described as having a campus-like feel, with buildings set back further from the road and larger areas of open lawn and patches of woods than seen Downtown. Within the Middle Section, most buildings were constructed between 1950 and 1970, and exhibit modern movement styles such as International

Style and Brutalism constructed in light-colored brick and poured concrete (Taylor and Striker, 2011). North of the Middle Section, the North Quadrant consists of widely spaced buildings and structures. The buildings are generally larger and support specialized research facilities. The North Quadrant lacks a conscious design plan and development pattern; infrastructure such as curbs, gutters, and sidewalks do not exist.

Environmental Impacts of the Proposed Action
The FDRF would be constructed in an area that is currently open space between Buildings 1200 and 1208. The anticipated vertical and horizontal dimensions of the FDRF are 45.1 m (148 ft) tall, by 52.4 m (172 ft) horizontal width by 27.4 m (90 ft) horizontal depth. The setback of the facility from Langley Boulevard would be approximately 27.4 m (90 ft), similar to that of other buildings along Langley Boulevard. Although the FDRF would be taller than most structures in the LaRC West Area, there is significant variation in building styles at LaRC due to the highly-specialized functions and activities that occur within many of them. The proposed FDRF would be generally similar to structures in the vicinity in scale, massing, materials, and setback. Renderings of the new FDRF and surrounding infrastructure, as well as visibility from off site, are included in Appendix B. During construction, there would be temporary impacts to LaRC viewsheds caused by construction equipment, but only in the vicinity of the FDRF facility. The Proposed Action would result in minor short-term adverse impacts and negligible long-term adverse impacts to the viewsheds at LaRC. Therefore, the Proposed Action would result in no significant impacts to visual resources.

No-Action Alternative
Under the No-Action Alternative, there would be no impact to viewsheds at NASA LaRC.

3.3 Cultural Resources

The National Historic Preservation Act (NHPA) requires NASA LaRC to identify archaeological and architectural resources that are listed or eligible for listing in the National Register of Historic Places. Section 106 of the NHPA requires NASA LaRC to consider the effects of its undertakings (such as building construction) on historic properties.

Affected Environment
There is no change in the affected environment from that described in the NASA LaRC Master Plan EA published in June 2013. The Area of Potential Effect (APE) for the Proposed Action is the entire West Area portion of the NASA LaRC Historic District. The District was listed in the National Register of Historic Places in June 2012. According to the National Register of Historic Places Nomination form, the District includes 252 structures, of which 143 are contributing elements to the District and three are National Historic Landmarks (Taylor and Striker, 2011).

An archaeological survey was completed within areas of proposed construction disturbance for the Proposed Action in December 2016. Soils were found to be disturbed by grading, filling, and previous installation of utilities. No archaeological sites were identified (NASA LaRC, 2016b).

Environmental Impacts of the Proposed Action
Construction of the FDRF in the new location would not have an adverse effect on the integrity of the LaRC Historic District. The new FDRF building would be within the character of the District

and of similar scale to the District's other buildings, including other existing wind tunnels. The concrete exterior and color is consistent with other buildings in the District and the geometric elements would be complementary to surrounding buildings. No archaeological resources have been identified in the proposed project area. Therefore, construction of the FDRF would not affect archaeological resources. In accordance with Section 106 of the NHPA, LaRC consulted with the Virginia State Historic Preservation Office (SHPO) regarding potential impacts to historic properties resulting from the Proposed Action. The SHPO concurred with LaRC's determination of No Adverse Effect on archaeological resources and the District (Appendix A). Therefore, the Proposed Action would result in no significant impact to cultural resources.

No-Action Alternative
Under the No-Action Alternative, there would be no impact to cultural resources at NASA LaRC.

3.4 Public Health and Safety

In this Supplemental EA, aspects of public health and safety related to the construction and operation of the new FDRF are considered; these aspects include airspace issues such as building height and lighting requirements associated with the proximity to LAFB. Interior and ambient noise requirements associated with operations are also discussed. Other environmental resources associated with public health and safety are addressed in the LaRC Master Plan EA.

When considering the proximity of the new FDRF Building to LAFB, building height and lighting become important factors due to the presence of aircraft. While fighter aircraft are the dominant and most widespread noise in the area, another primary source of noise generation at LaRC is from wind tunnel operations.

Affected Environment
There is no change to the affected environment from that described in the NASA LaRC Master Plan EA published in June 2013.

Environmental Impacts of the Proposed Action

Airspace
Since LaRC is located adjacent to an active military airport (LAFB), construction activities with the potential to impact navigable airspace must comply with Title 14 of the Code of Federal Regulations (14 CFR) Part 77, "Safe, Efficient Use, and Preservation of the Navigable Airspace" (Federal Aviation Regulation [FAR] Part 77), which establishes standards and Federal Aviation Administration (FAA) notification requirements for objects potentially affecting air navigation. According to the regulation, an object constitutes an obstruction to navigation if it satisfies one or more of the following criteria:

- Is 61 m (200 ft) above ground level or 61 m (200 ft) above airport elevation (whichever is greater) up to 4.8 km (3 mi) (for runway lengths >975 m [3,200 ft]) from the airport;
- Is 152 m (499 ft) or more above ground level at the object site; or
- Penetrates an imaginary surface.

14 CFR Part 77.21, *Department of Defense Airport Imaginary Surfaces*, establishes a structure of imaginary surfaces in relation to an airport runway which consists of the departure surfaces, transitional surfaces, inner horizontal surface, conical surface, and outer horizontal surface. Imaginary surfaces exist primarily to prevent existing or proposed manmade objects, objects of natural growth or terrain from extending upward into navigable airspace. More detail on obstruction standards and imaginary surfaces is available at FAR Part 77.

Additionally, 14 CFR Part 77.9 requests filing notification with FAA for the following construction and alteration types:

- Exceedances of 61 m (200 ft) above ground level;
- Exceedances of an imaginary surface extending upward and outward at slopes of 110 to 1 for a horizontal distance of 6,096 m (20,000 ft) from the nearest point of the nearest runway of each airport; 50 to 1 for a horizontal distance of 3,048 m (10,000 ft) from the nearest point of the nearest runway; or 25 to 1 for a horizontal distance of 1,524 m (5,000 ft) from the nearest point of the nearest landing and takeoff area of each heliport;
- Any highway, railroad, or other traverse way for mobile objects that would exceed any of the above standards; and
- Any construction or alteration located on an airport.

The FDRF site is located approximately 2.2 km (1.34 mi) from the airfield at LAFB and is located within the inner horizontal surface, which has a height restriction of 45.7 m (150 ft) above the established airfield elevation. Figure 3.1 shows the location of the FDRF in relation to the imaginary surfaces associated with the airfield at LAFB. The FDRF site elevation is 3.4 m (11 ft) and the airfield elevation is 1.8 m (6 ft). The total height of the FDRF at project completion, taking into account the 1.5 m (5 ft) delta between the two elevations, would not exceed 45 m (148 ft), which is below the imaginary surface and other height restrictions noted above. While the structure itself would not penetrate the inner horizontal imaginary surface, it is anticipated that tower cranes exceeding 45.7 m (150 ft) in height would be used during construction of the facility. In accordance with FAR Part 77, LaRC would coordinate with LAFB to ensure the FAA notification, obstruction marking, and lighting requirements were met for the building and any temporary construction equipment (e.g., cranes) exceeding the height restrictions. Additionally, LaRC would ensure that any required exterior warning lighting is incorporated into the FDRF design. As such, the Proposed Action would have minor, short-term adverse impacts and negligible long-term adverse impacts on navigable airspace at LaRC. Therefore, the Proposed Action would result in no significant impacts to airspace.

Noise

Noise associated with construction activities, including the use of heavy equipment and machinery, is addressed in detail in the NASA LaRC Master Plan EA. Noise associated with the operation of the FDRF is considered in this section.

According to the noise contour map from the latest Air Installations Compatible Use Zone (AICUZ) report prepared by LAFB, the FDRF site is located within the 70 decibel (dBA) zone (LAFB, 2007). Noise levels associated with FDRF operations are expected to be lower than several other wind tunnels at the Center. According to a 1994 environmental noise study (Ebasco, 1995),

the 8-Foot High Temperature Tunnel and the National Transonic Facility produce noticeable sound, with levels ranging from 69-79 dBA well outside of LaRC's fence line.

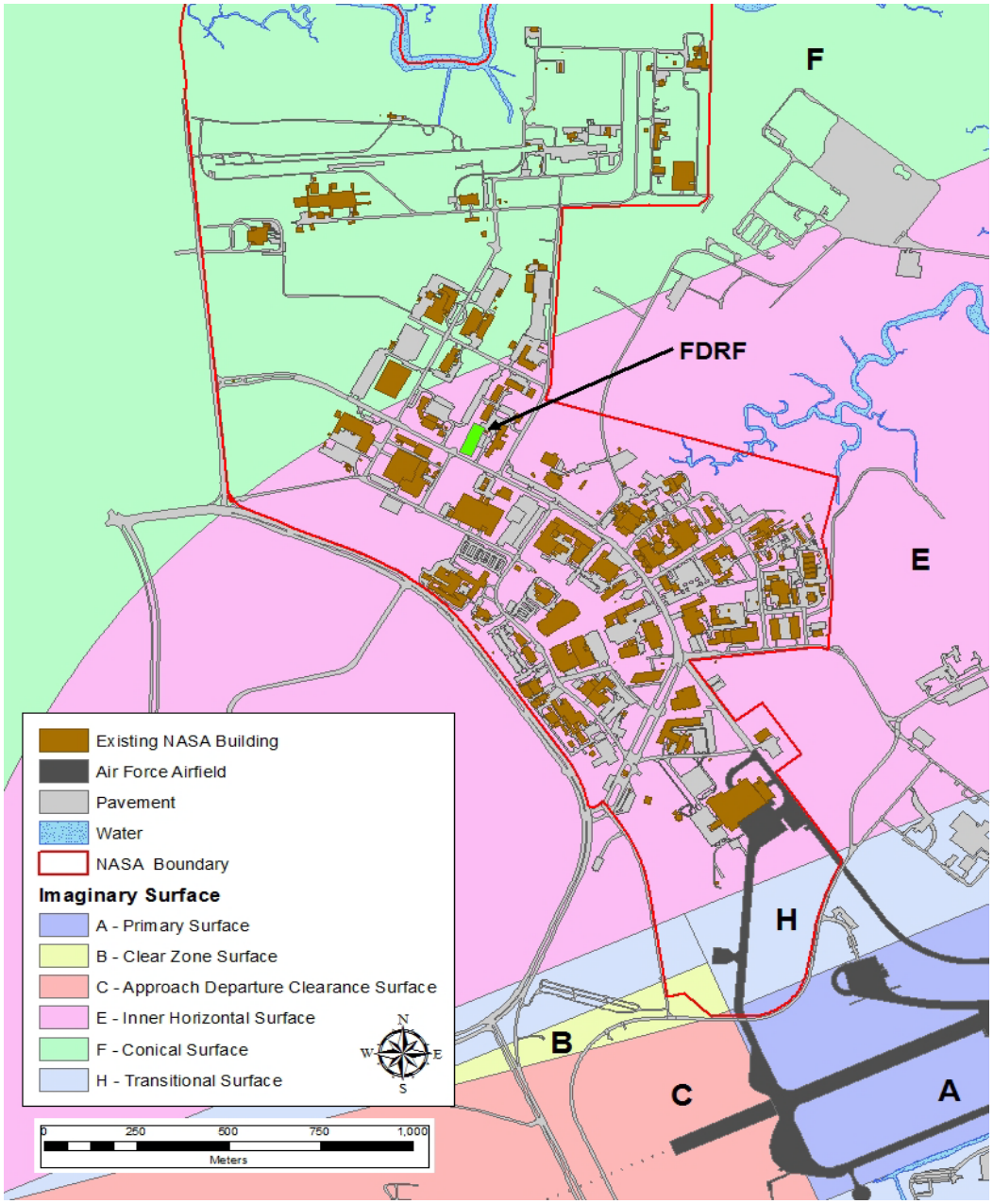

Figure 3.1 Imaginary Surfaces Near FDRF

Noise level observations and studies associated with two operating 14R4 Wind Tunnel facilities in Texas offer realistic projections of expected noise levels at the proposed FDRF; however, the FDRF would likely produce more noise, with up to six fans (the 14R4 has four fans), and a larger chiller. Exterior noise levels of 14R4 facilities are estimated at 55-92 dBA for full-speed wind tunnel operations and 55-61 dBA for full-speed chiller operations (SkyVenture, 2013). The Austin facility interior was observed to produce 56-111 dBA internally during operations, while the vent

to the exterior produced between 87-88 dBA (SkyVenture, 2011). A different internal noise test produced between 73-115 dBA in Austin and 87-96 dBA at Frisco (iFly Austin, 2013; iFly Frisco, 2013).

The closest on-site sensitive receptors would be personnel working within the FDRF, in the adjacent Buildings 1200, 1190 and 1208, and pedestrians walking along the sidewalks near the FDRF. Noise levels for the new FDRF are anticipated to be consistent with safety guidelines for protecting Center personnel, reaching 100 dBA or lower inside the FDRF, with a maximum of 82 dBA for the sidewalk approximately 30.48 m (100 ft) away along Langley Boulevard, and a maximum of 67 dBA at LaRC's fence line, which is 427 m (1,400 ft) from the FDRF. During operation of the FDRF, personnel working inside the facility would be required to follow the safety procedures specified in LaRC's Noise Control and Hearing Conservation Program. Personnel working in adjacent buildings and walking near the facility would experience short-term nuisance noise, similar to the noise generated from other wind tunnel operations at the Center.

The nearest off-site sensitive receptors, a trailer park community, is located at least 579 m (1,900 ft) away, across Commander Shepard Boulevard. During operation of the FDRF, residents would experience noise levels less than 67 dBA which is lower than expected traffic noise levels of 70 to 80 dBA along Commander Shepard Boulevard.

As such, it is anticipated that operation of the FDRF would result in minor, long-term adverse impacts to noise levels on the Center and negligible, long-term adverse impacts to noise levels in the surrounding community. Therefore, the Proposed Action would result in no significant noise impacts.

No-Action Alternative
Under the No-Action Alternative, there would be no change in noise levels or airspace issues at the Center.

3.5 Cumulative Impacts

The CEQ regulations require that all Federal agencies include cumulative impacts in their environmental analyses. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." This includes those that may be "individually minor but collectively significant actions taking place over time."

Although the FDRF was originally planned for a different location on the LaRC campus, cumulative impacts of activities in the past, present, and reasonably foreseeable future associated with the FDRF are consistent with those identified in the NASA LaRC Master Plan EA. Therefore, the Proposed Action would result in no significant cumulative environmental impacts.

4.0 REFERENCES

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5.0 PREPARERS AND CONTRIBUTORS

Individuals listed below contributed to the completion of this Supplemental EA by writing portions of the text, contributing background and supporting information, or providing technical review/comment on the internal draft.

Wesley Miksa
LaRC NEPA Program Manager
Center Operations Directorate
NASA Langley Research Center

Sarah Michailof
Cultural Resource Specialist
Straughan Environmental, Inc.

Caroline Diehl
Environmental Scientist
Straughan Environmental, Inc.
NASA LaRC

Christine Wysocki
Environmental Planner
Straughan Environmental, Inc.

Chimere Lesane-Matthews
Environmental Planner
Straughan Environmental, Inc.

Peter Van Dyke
Environmental Protection Specialist
Center Operations Directorate
NASA Langely Research Center

APPENDIX A

CONSULTATION LETTERS

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COMMONWEALTH of VIRGINIA

Molly Joseph Ward
Secretary of Natural Resources

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

Julie V. Langan
Director

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

March 10, 2017

Mr. Wesley E. Miksa
Historic Preservation Officer
NASA – Langley Research Center, MS 133
Hampton, VA 23681

Re: New Flight Dynamics Research Facility
City of Hampton, VA
DHR File No. 2016-0795

Dear Mr. Miksa:

We have received for review the project referenced above submitted to DHR is accordance with the Programmatic Agreement (PA) executed between our agencies. The project, as presented, involves the construction of a new vertical wind tunnel within the NASA LaRC Historic District (DHR ID #144-5313) and demolition of the 12-Foot Low Speed Tunnel (DHR ID #114-5313-0405) and the 20-Foot Vertical Spin Tunnel (DHR ID #114-5313-0406). Our comments are provided as assistance to NASA in meeting its responsibilities under the PA and Section 106 of the National Historic Preservation Act.

The two existing tunnels to be demolished are classified under the PA as Category 3 buildings. As such, demolition may occur without consultation with our office provided that the Standard Documentation Measures have been completed. NASA has completed the necessary documentation and no further consideration of these resources is necessary.

An archaeological study entitled *Phase I Archaeological Survey of the +/-0.85 Hectare (+/-2.1 Acre) NASA LaRC Flight Dynamics Research Facility Project Area, NASA Langley Research Center, Hampton, Virginia* prepared by Dutton + Associates identified no sites within the project area and no further survey is necessary.

Based on the submitted plans, we find that the proposed new facility respects the overall character of the historic district in terms of height, scale, massing, and detailing. As such and in consideration of the sum of the information provided, we concur with NASA's finding of *no adverse effect* for this undertaking. If you have any questions regarding these comments, please contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Director
Review and Compliance Division

Western Region Office
962 Kime Lane
Salem, VA 24153
Tel: (540) 387-5443
Fax: (540) 387-5446

Northern Region Office
5357 Main Street
PO Box 519
Stephens City, VA 22655
Tel: (540) 868-7029
Fax: (540) 868-7033

Eastern Region Office
2801 Kensington Avenue
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

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APPENDIX B

RENDERINGS OF THE FDRF

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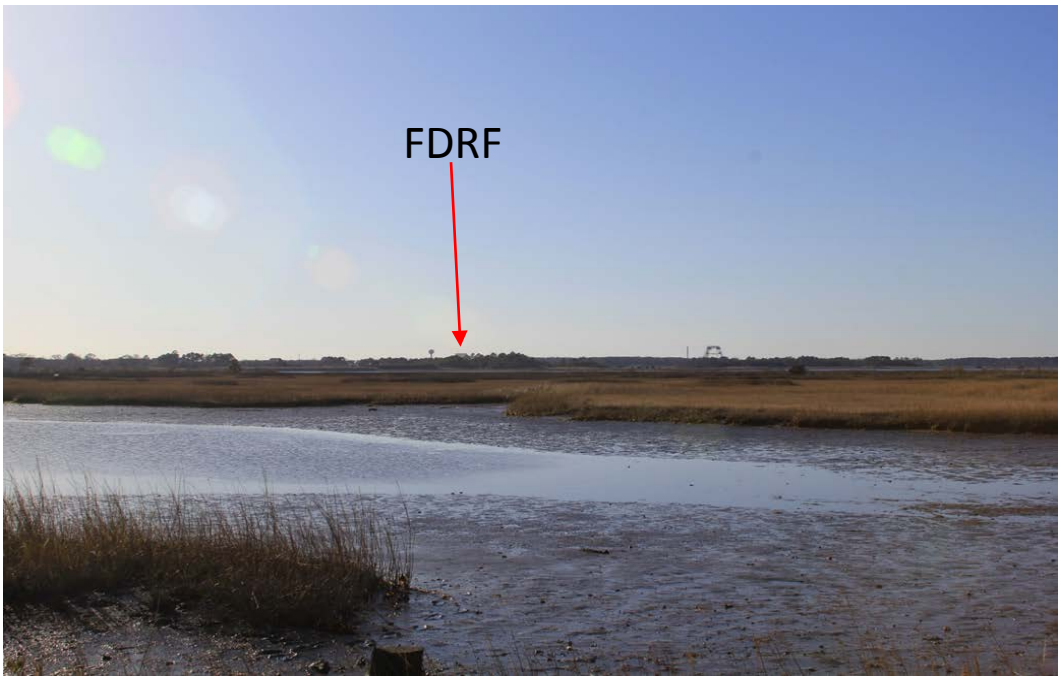
Looking East from Langley Boulevard

Looking West from Langley Boulevard



View Looking East from End of Poquoson Avenue, 2.7 miles off the Center

Looking West

APPENDIX C

LIST OF ABBREVIATIONS AND ACRONYMS

APE	Area of Potential Effect
AICUZ	Air Installations Compatible Use Zone
Center	Langley Research Center
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CoF	Construction of Facilities
COTS	Commercial Off-The-Shelf
CZMA	Coastal Zone Management Act of 1972
dBA	Decibels, A-weighted Scale
EA	Environmental Assessment
ESC	Erosion and Sediment Control
ERD	Environmental Resource Document
FDRF	Flight Dynamics Research Facility
FONSI	Finding of No Significant Impact
ft	Feet
JBLE	Joint Base Langley-Eustis
km	Kilometer
LAFB	Langley Air Force Base
LaRC	Langley Research Center
m	Meters
mi	Miles
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NPR	NASA Procedural Requirement
PER	Preliminary Engineering Report
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
USC	United States Code
VCP	Virginia Coastal Zone Management Policies
VRRM	Virginia Runoff Reduction Method
VSMP	Virginia Stormwater Management Program
VST	Vertical Spin Tunnel

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End.