

*Final*

**Environmental Assessment  
Demolition of Building 1212B, the 7-by-10-Foot High Speed Tunnel  
NASA Langley Research Center**

**Lead Agency:** National Aeronautics and Space Administration, Langley Research Center (LaRC), Hampton, Virginia

**Proposed Action:** Demolition of Building 1212B, the 7-by-10-Foot High Speed Tunnel at NASA LaRC

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**Date:** May 2007

**Abstract:** NASA is proposing to demolish Building 1212B, the 7-by-10-Foot High Speed Tunnel (HST) at Langley Research Center (LaRC), located in Hampton, Virginia. In 1994 NASA closed the 7-by-10-Foot HST because it was underutilized and because comparable or superior wind tunnel capabilities existed at other NASA locations. The wind tunnel has not supported the NASA mission since 1994, and LaRC has determined that the tunnel has no foreseeable use. NASA Headquarters has approved the demolition based on the confirmation of no future government use and the lack of interest from non-governmental entities (industry, universities, etc.). The proposed demolition would reduce NASA's infrastructure and allow LaRC to redirect limited resources toward facilities that support NASA's overall mission, both currently and in the future. This Environmental Assessment (EA) identifies the environmental issues and impacts of both the Proposed Action (demolition of the 7-by-10-Foot HST) and the No Action alternative.

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**ENVIRONMENTAL ASSESSMENT  
DEMOLITION OF BUILDING 1212B, THE 7-BY-10-FOOT HIGH SPEED TUNNEL  
AT NASA LaRC, HAMPTON, VIRGINIA**

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## **EXECUTIVE SUMMARY**

This Environmental Assessment (EA) has been prepared to analyze the potential environmental impacts associated with NASA's proposed demolition of Building 1212B, the 7-by-10-Foot High Speed Tunnel (HST) at Langley Research Center (LaRC), located in Hampton, Virginia. The 7-by-10-Foot HST was completed in 1945 and used in aerodynamic research of military aircraft at high speed. In 1994 LaRC closed the tunnel because its technology was obsolete, it was underutilized, and comparable or superior capabilities were available at other NASA wind tunnels.

The purpose of the Proposed Action is to streamline LaRC's infrastructure and redirect limited maintenance funds toward facilities that support NASA's overall mission, both currently and in the future. Demolition of the 7-by-10-Foot HST is needed because it is not economically feasible to direct limited resources toward the ongoing maintenance of a facility that has been abandoned for several years and is no longer considered necessary.

Under Section 106 of the National Historic Preservation Act (NHPA), LaRC is required to consult with the Virginia State Historic Preservation Officer (VA SHPO) and the Advisory Council on Historic Preservation (ACHP), if a proposed undertaking may affect historic properties. LaRC has determined that the 7-by-10-Foot HST is eligible for listing in the National Register of Historic Places, not individually, but as a contributing element to a proposed historic district. Since 2004 LaRC has worked with interested parties including the VA SHPO, ACHP, the Smithsonian Air and Space Museum, the National Park Service Headquarters, NASA Headquarters, the Virginia Air and Space Center (Hampton, Virginia), and the local community to ensure that LaRC fully evaluates its options and mitigation measures regarding the potential loss of this facility. Several additional alternatives to demolition were evaluated in the Alternative Analysis Report (Appendix C), but demolition was determined to be the preferred alternative in order to meet LaRC's long-term mission and infrastructure goals. The Proposed Action (demolition of the facility) and the No Action alternative were carried forward for evaluation in this EA.

Numerous resources were eliminated from detailed consideration because the Proposed Action would not impact these resources (e.g. climate, aquatic vegetation). The EA documents that the Proposed Action would result in negligible impacts in the following resource categories: land use; noise; hazardous, regulated and solid wastes; health and safety; visual resources; air; and water.

The Proposed Action would result in an adverse effect to LaRC's cultural resources since the 7-by-10-Foot HST is a historic property. However, LaRC has worked closely with the consulting agencies to develop mitigation measures that ensure the preservation of the resource's history despite the loss of the structure itself.

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## **1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION**

### **1.1 Introduction**

This Environmental Assessment (EA) has been prepared to analyze the potential environmental impacts associated with NASA's proposed demolition of Building 1212B, the 7-by-10-Foot High Speed Tunnel (HST) at Langley Research Center (LaRC), located in Hampton, Virginia.

This EA was prepared in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code 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 Requirement 8580.1, "Implementing the National Environmental Policy Act and Executive Order 12114." Information contained in this EA will be used by NASA and the appropriate regulatory agencies to facilitate decision-making and determine if the Proposed Action is a major Federal action significantly affecting the quality of the environment. If the Proposed Action is determined to be significant, an Environmental Impact Statement may be prepared. If the Proposed Action is determined not to be significant, a Finding of No Significant Impact (FONSI) may be issued.

Chapter 1 of this EA includes background information, the purpose and need for the Proposed Action, and the planning and scoping actions being performed by NASA LaRC. Chapter 2 of this EA includes a description of the Proposed Action and the No Action alternative. Chapter 3 describes the existing conditions of various environmental resources in the area of the Proposed Action. Chapter 4 describes how those resources would be affected by implementation of the Proposed Action and the No Action alternative. Chapter 5 addresses the cumulative effects of other past, current, and future actions that may be implemented in the area of the Proposed Action, and the irreversible and irretrievable commitment of resources.

### **1.2 Project Location**

NASA LaRC is situated near the southern end of the lower Virginia Peninsula, approximately 241 kilometers (km) (150 miles) south of Washington, DC and 80 km (50 miles) southeast of Richmond, Virginia. LaRC is in the northern tip of the City of Hampton, and south of the City of Poquoson. Langley Air Force Base (LAFB) dominates land use along the southern edge of the Center. The area to the west of LaRC is one of the less developed areas of the City of Hampton. LaRC is located near several surface water bodies within the tidal zone of the Chesapeake Bay. To the east of LaRC, is the northwest and southwest branches of the Back River, beyond which is the Chesapeake Bay. Figure 1 shows the regional location of LaRC.

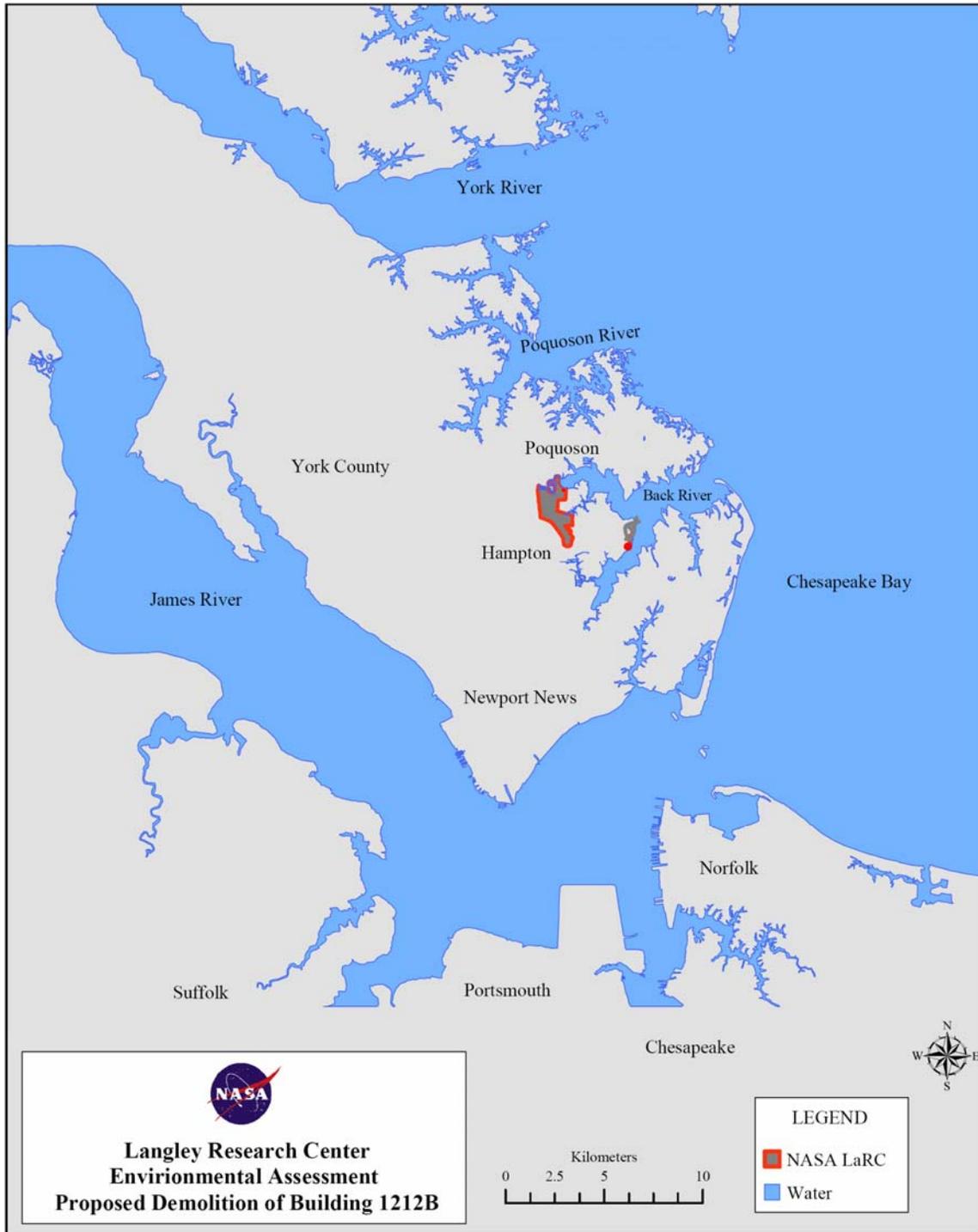


Figure 1 – NASA LaRC Regional Location

LaRC is comprised of research facilities located in two areas which are approximately five kilometers (3 miles) apart. The two areas, commonly called the West Area and the East Area, are divided by the runways of LAFB. The East Area is located on eight hectares (20 acres) of land leased by NASA from LAFB. This area is the original portion of LaRC and contains several wind tunnels, research facilities, and administrative offices. The West Area occupies 318 hectares (788 acres) of land and contains the majority of LaRC's facilities, including Building 1212B, the 7-by-10-Foot HST. Figure 2 shows LaRC's West and East Areas and the location of Building 1212B.

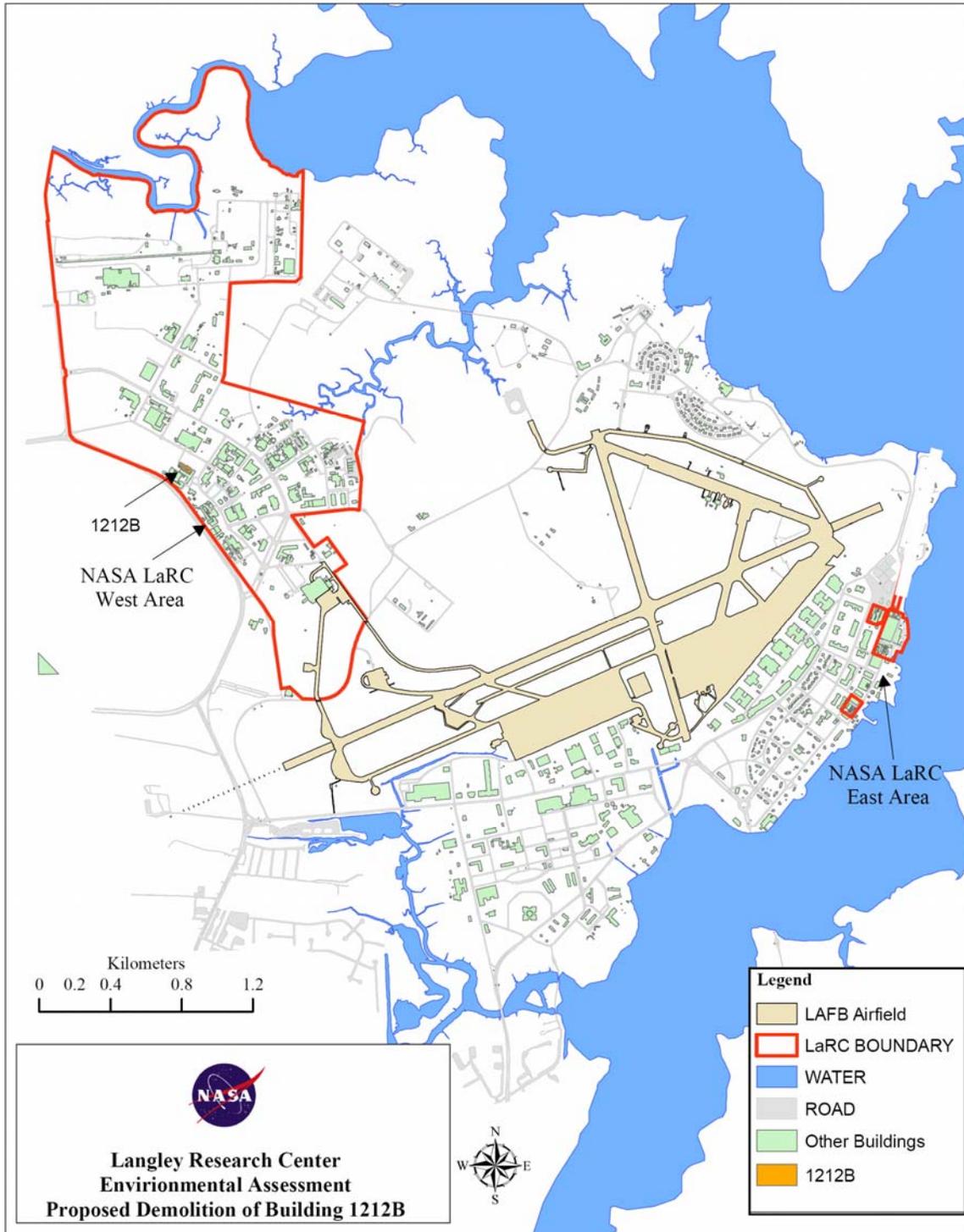


Figure 2 – NASA LaRC and Location of Building 1212B

### **1.3 Background**

The 7-by-10-Foot HST was completed in 1945 and used for aerodynamic research of military aircraft at high speed. The tunnel had an atmospheric, single-return circuit with a closed throat test section, and it could develop a maximum speed of approximately 1086 kilometers per hour (675 miles per hour). (See Appendix A – Facility Photographs and Drawings.) Although the tunnel did not incorporate any new or unique design features when first built, a number of subsequent modifications greatly enhanced its aerodynamic research capabilities. In 1946, a carefully designed “transonic bump” was installed. Air flowing over the bump was accelerated to the transonic range (up to and beyond the speed of sound) even though the main airflow remained subsonic. The tunnel once again was upgraded in the early 1950s when the tunnel was retrofitted with slotted walls and connected to a more powerful compressor. This boosted its speed to 1.2 times the speed of sound (Mach 1.2). Throughout the Cold War era, the tunnel facilitated important research on a number of military aircraft and missiles. By the late 1980s, the tunnel had been altered so that it no longer was capable of reaching Mach 1 airspeeds, but LaRC engineers continued to use the facility for limited research.

In 1994 LaRC decided to close the 7-by-10-Foot HST because its technology was obsolete, it was underutilized, and comparable or superior capabilities were available at other NASA wind tunnels. In 1996, NASA and the Department of Defense completed a nationwide study of government-owned wind tunnels, “NASA-Department of Defense Major Facilities Integrated Product Team Report,” dated 6/10/1996. The study included the development of an up-to-date national wind tunnel database, an assessment of needed wind tunnel capabilities, and recommended consolidations and/or closing of excess wind tunnel capability. The study recognized LaRC’s 7-by-10-Foot HST as inactive and identified at least twelve facilities located throughout the U.S. that had duplicate or more specialized subsonic capabilities. The report confirmed LaRC’s decision, and the 7-by-10-Foot HST has remained closed.

NASA continually evaluates its resources and infrastructure in order to align its capabilities to meet the Agency’s evolving mission. With the President’s 2004 vision to send humans back to the Moon and to Mars, research areas such as aeronautics are being scaled back to help redirect the Agency’s resources. Because there is no NASA mission or national requirement to use the 7-by-10-Foot HST (either as is, or with modified technology), LaRC personnel have determined there is no justification for spending limited infrastructure funds to maintain this facility.

### **1.4 Purpose and Need for the Proposed Action**

The purpose of the Proposed Action is to streamline LaRC’s infrastructure and redirect limited maintenance funds toward facilities that support NASA’s overall mission, both currently and in the future. Demolition of the 7-by-10-Foot HST is needed because it is not economically feasible to direct limited funding toward the ongoing maintenance of a facility that has been abandoned for several years and is no longer considered necessary.

### **1.5 NHPA Section 106 Consultation and NEPA Scoping Actions**

Under Section 106 of the National Historic Preservation Act, LaRC is required to consult with the Virginia State Historic Preservation Officer (VA SHPO) and the Advisory Council on Historic Preservation (ACHP), if a proposed undertaking may affect historic properties. LaRC

initiated the consultation process in the summer of 2004 by notifying the VA SHPO and ACHP of the proposed demolition of several of LaRC's facilities, including three National Historic Landmarks (NHLs) and the 7-by 10-Foot HST. Additionally, scoping letters were sent out to fifteen agencies and organizations. The scoping letter, notification list and later correspondence are included in Appendix B – Regulatory Correspondence.

Throughout 2005 and 2006, LaRC continued consultation and correspondence with interested party including ACHP, the Smithsonian Air and Space Museum, the National Park Service (NPS) Headquarters, the VA SHPO, and the Virginia Air and Space Center (Hampton, Virginia). In addition, LaRC held a public meeting regarding the proposed demolitions with interested parties from the local community on February 8, 2005. Approximately 70 people attended the meeting and expressed their concerns and suggestions, especially regarding the demolition of the NHLs, but there was no specific concern regarding the proposed demolition of the 7-by-10-Foot HST.

LaRC determined that, for the purposes of evaluating the proposed demolition of the 7-by-10-Foot HST, the facility would be considered eligible for listing in the National Register of Historic Places (National Register) as a contributing element to a proposed historic district. The VA SHPO concurred with this approach and requested that LaRC perform a complete analysis of potential alternatives to demolition. An Alternatives Analysis Report (Appendix C) was prepared and submitted to the VA SHPO on September 11, 2006. The VA SHPO concurred with the report's conclusion that demolition would be the preferred alternative in order to meet LaRC's long-term mission and infrastructure goals. (See letter dated October 24, 2006, page B-11.)

With the proposed loss of the facility, LaRC would implement mitigation measures. LaRC continued correspondence with the consulting agencies to determine the most appropriate mitigation measures, which are described in [Section 4.3.1.3](#), and documented in a Memorandum of Agreement (MOA), found in Appendix D.

## 2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

### 2.1 Proposed Action

The Proposed Action consists of the demolition of the wind tunnel circuit of Building 1212B, the 7-by-10-Foot HST, which has been abandoned since 1994. A facility photograph is provided in Figure 3. The only portion of Building 1212B that would remain intact would be Room 100 on the east side of the building (upstream of the test section) because it was recently converted to storage space for the neighboring 14-by-22-Foot Low Speed Tunnel.

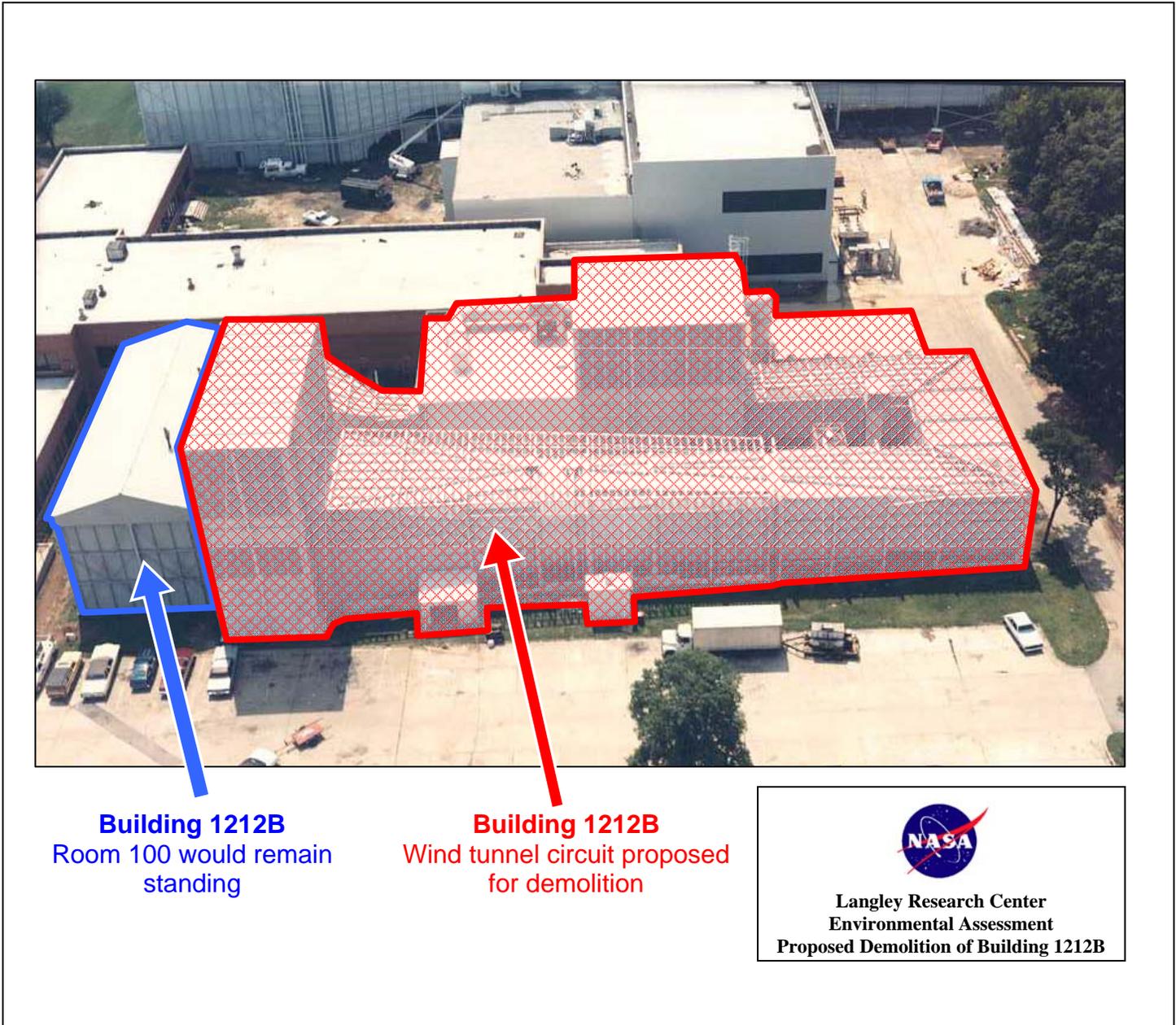


Figure 3 – Photograph of Building 1212B

Prior to demolition, the 7-by-10-Foot HST would be reviewed and inspected, ensuring that no LaRC property remains in the facility. Hazardous items such as asbestos containing materials and lead-based paints would be removed according to LaRC policy and applicable regulations. Utilities feeding the building would be disconnected and capped or otherwise terminated. These utilities include various storm sewers, 100-psi air connection, 6-foot air duct, electrical power, concrete electrical trenches, telephone, data cables, lighting cables and numerous cooling lines. The demolition would include removal of pile caps, the foundation and slab sections. The footprint of the facility is approximately 0.3 hectares (0.7 acres). After demolition, the area would be backfilled and graded to match existing surroundings.

The demolition debris material would be disposed of according to LaRC's policy for the disposal of construction/demolition debris. The selected demolition contractor would be requested to recycle debris such as concrete and steel. Hazardous or other regulated wastes would be disposed of following all applicable safety and environmental regulations. All other debris would be removed by the demolition contractor and disposed of offsite at a permitted landfill.

## **2.2 No Action Alternative**

Under the No Action alternative, NASA would not demolish the 7-by-10-Foot HST and the facility would remain in an abandoned status. LaRC personnel would continue to conduct semi-annual testing of the emergency lighting and fire alarm system, which has been performed since the facility was closed in 1994. Otherwise maintenance and repair of the facility would be minimal and the structure would continue to deteriorate. Currently, exterior portions of the facility's steel tunnel circuit have corrosion and rust damage.

The No Action alternative does not meet the objective of streamlining LaRC's infrastructure and directing limited maintenance funds toward facilities that contribute toward NASA's overall mission.

## **2.3 Alternatives Considered But Not Carried Forward**

Several alternatives were considered but eliminated from detailed analysis because they would not meet the purpose of the Proposed Action, to streamline LaRC's infrastructure and reduce the costs associated with maintaining facilities that are no longer needed to support NASA's overall mission. The alternatives also failed to meet the need for LaRC to redirect funding to facilities and operations that are critical in supporting the Agency's mission. LaRC analyzed and described these alternatives in a study entitled "Alternatives Analysis Report, Proposed Demolition of 7-by-10-Foot High Speed Tunnel (Building 1212B)" dated September 11, 2006. The report is included as Appendix C. The following alternatives were considered but not carried forward for analysis in this EA:

### *Restoration, Maintenance and Use of the Facility by NASA*

The current estimate to bring the wind tunnel back to operational status is approximately \$10 million dollars. There would be no benefit to NASA in expending such resources on a facility that is no longer needed. Existing facilities either already meet NASA's wind tunnel testing needs or would require much less expenditure on upgrades.

*Third Party Use of the Facility*

LaRC engaged several organizations to determine the feasibility of third party use of the facility either as originally intended or through adaptive reuse, such as a Historic Site/Heritage Tourism destination. Parties contacted include Old Dominion University, the City of Hampton, Virginia Air and Space Center, the NASA Aeronautics Support Team, and the National Institute of Aerospace (NIA). No third party was identified with both the interest and funding to repair, maintain and operate the facility.

*LaRC Management of the Facility as Historic Site/Heritage Tourism Destination*

Because the 7-by-10-Foot HST does not exhibit distinctive architecture nor was it the site of exceptional engineering advances in the field of aviation technology, it would not generate strong interest as a tourism destination. In addition, LaRC would have security concerns with public access to the Center, potential to incur maintenance/upgrade costs to ensure the facility remains structurally sound, and safety/liability concerns due to the deterioration of the structure.

*Mothballing to NPS Standards*

Since funding for any type of maintenance or repair of facilities is very scarce, NASA has determined that it is not sound management practice to expend resources to mothball a facility that has no foreseeable use.

Given NASA's reduced budget for the maintenance of facilities under its management, expending funds for the above alternatives could affect the safety and operation of the Agency's essential research facilities. Lack of adequate funding for proper maintenance could result in breakdowns and delays in LaRC's tunnel testing. Consequently, NASA has determined that implementing any of the alternatives listed above would be contrary to sound management practices and they were determined not to be viable alternatives to the Proposed Action.

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### **3.0 AFFECTED ENVIRONMENT**

This chapter describes relevant environmental conditions at LaRC for resources potentially affected by the Proposed Action and the No Action alternative. In compliance with guidelines contained in NEPA and CEQ regulations, and NPR 8580.1, the description of the existing environment focuses on those environmental resources potentially subject to impacts.

For the environmental impact analysis process, the resources to be analyzed are identified and the expected geographic scope of potential impacts is defined. The environment includes all areas and lands that might be affected, as well as the natural, cultural, and socioeconomic resources they contain or support.

#### **Resources Eliminated From Detailed Consideration**

Several resources were not evaluated in this EA because it was determined that implementation of the Proposed Action or the No Action alternative would have no (or negligible) impacts to these areas. A brief explanation of the reasons why each resource has been eliminated from further consideration in this EA is provided below.

*Wetlands.* The US Army Corps of Engineers (Corps) and the US Environmental Protection Agency (EPA) define 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. LaRC has a 2004 Corps confirmed delineation of wetlands at the Center. No wetlands occur in the vicinity of Building 1212B. As such, this resource was eliminated from further consideration.

*Terrestrial and Aquatic Vegetation.* Building 1212B is located in a previously developed area of the Center that does not support vegetation. Neither the Proposed Action nor the No Action alternative would result in the removal or addition of terrestrial or aquatic vegetation, so this resource was eliminated from further analysis.

*Threatened and Endangered Species.* Building 1212B is located on previously disturbed land that is part of a developed urban setting. According to a facility-wide threatened and endangered species survey conducted in 1995 at LaRC, no threatened or endangered species and no critical habitats are known to occur in this area. As such, this resource was eliminated from further analysis.

*Soils and Geology.* Both the Proposed Action and the No Action alternative would be too minor to have an effect on the geology of the region. The No Action alternative would have no impact on the soil in the project area, and the Proposed Action would have negligible impact. The proposed demolition would involve minimal ground disturbance to remove pile caps, the foundation and slab sections. The area would be backfilled and graded to match existing surroundings. Because any impact to the project area would be negligible, this resource was eliminated from further analysis.

*Socioeconomic Resources.* The No Action alternative would result in no change in the local socioeconomic status. The Proposed Action would have a minimal and short-term

socioeconomic benefit. The proposed demolition would be performed by contractors from the regional workforce or from elsewhere in Virginia. Because these are temporary jobs that would be filled by existing regional workforce, there would be no effect on area population or increase in the demand for housing or public services in the region. The regional socioeconomic impact would be negligible, so this resource was eliminated from further analysis.

*Climate.* Climate is the prevalent long-term weather conditions in a particular area. Climatic elements include precipitation, temperature, humidity, sunshine and wind velocity and other natural occurrences such as fog, frost, and hail storms. The Proposed Action and the No Action alternative would be too minor to have an effect on the local climate, so this resource was eliminated from further analysis.

*Environmental Justice.* Populations that are subject to environmental justice considerations are not located within or near the project area. Therefore, this resource was eliminated from further analysis.

*Wild and Scenic Rivers.* None of the waterways within the LaRC property qualify for the provisions of the Wild and Scenic Rivers Act, therefore, analysis of this resource was not carried forward in this EA.

*Transportation.* Implementation of the Proposed Action or the No Action alternative would not change the use of transportation resources in the region. Local highways currently accommodate the traffic generated by LaRC employees and other individuals traveling the roads on a daily basis. Removal of the demolition debris under the Proposed Action would be along an established haul route leading off the Center. The increase in truck traffic would be negligible and therefore, this resource was eliminated from further analysis.

*Recreation.* The overcrowding of recreational facilities is the typical recreation-related issue evaluated in environmental analysis. Implementation of the Proposed Action or the No Action alternative would not cause an increase in personnel nor would recreational facilities be affected. Therefore, recreational resources were eliminated from further analysis.

*Prime or Unique Farmland.* Because LaRC does not have any prime or unique farmland, this resource was eliminated from further analysis.

### **3.1 Land Use**

#### *Coastal Zone Management*

LaRC is located within the “coastal zone” as defined under the Virginia Department of Environmental Quality (DEQ) Virginia Coastal Zone Management Program (CZM Program). This program was established under the Coastal Zone Management Act as a partnership between US coastal states and the National Oceanic and Atmospheric Administration. Under the Virginia CZM Program a network of state agencies and local governments administer enforceable laws, regulations and policies in the following areas:

- Tidal and Nontidal Wetlands
- Fisheries
- Subaqueous Lands
- Dunes and Beaches

- Point Source Air Pollution
- Point Source Water Pollution
- Nonpoint Source Water Pollution
- Shoreline Sanitation
- Coastal Lands

All Federal actions and programs that directly affect Virginia's coastal zone must be carried out in a manner that is consistent with the State's coastal program's laws and enforceable policies and that protect Virginia's coastal resources. Virginia DEQ's Office of Environmental Impact Review may review Federal projects for consistency with enforceable policies during the NEPA process.

Not all of these enforceable programs are applicable to the site of LaRC's Proposed Action. Building 1212B is not located in or near an area that would have the potential to impact: Tidal and Nontidal Wetlands, Fisheries, Subaqueous Lands, Dunes/Beaches, or Shoreline Sanitation. The other policies relate to the management of air and water pollution and are addressed in [Section 3.7](#) and [Section 3.8](#) respectively.

#### *Functional Zones*

LaRC maintains a Center Master Plan that identifies the Center's strategic approach to programmatic facility planning. The Master Plan identifies the following LaRC functional zones (shown in Figure 4):

*Administration* - The LaRC administrative core, which contains the Center's Headquarters building, is distinguishable by its executive character.

*Air Force Transfer* - This is the most remote area of the campus at the northern edge. The intent is to abandon this area as operations are consolidated and the facilities are no longer needed. Plans are underway to transfer a portion of this zone to Langley Air Force Base.

*Center Operations and Services* - Most of the Center's oldest assets and most dense development are included in these areas. This heavy traffic zone either borders or embraces Langley Boulevard, the primary Center traffic artery.

*Labs and Science* - Labs are located in two main areas on either side of Langley Boulevard. Science offices are grouped along Dryden Avenue.

*Tunnels and Testing* - LaRC's large-scale tunnels are contained in this zone. These large tunnel complexes along the property boundary form a compact and strongly related functional grouping. The zone is characterized by noisy exhausts, vibration, and the remote, well-regulated potential for uncontrolled energy release.

*Aeronautics* - This area contains the aircraft hangar and associated site improvements and required open space. Considerable undeveloped land area exists here and is strictly utilized for functions directly connected to the hangar and flight line operations.

*Outreach* - Outreach offices include training facilities, student programs, the offices of public affairs, legislative affairs, news media, and affiliated universities/institutions.

*Vegetation Buffer* - Undeveloped areas are maintained as vegetation buffers along some portions of the LaRC fence line.

Building 1212B is located in the *Tunnels and Testing* portion of the Center. This area is a highly developed, industrial-type setting with minimal open or green space. Single and two-story brick offices and support facilities, as well as parking areas are dispersed among the wind tunnel facilities.

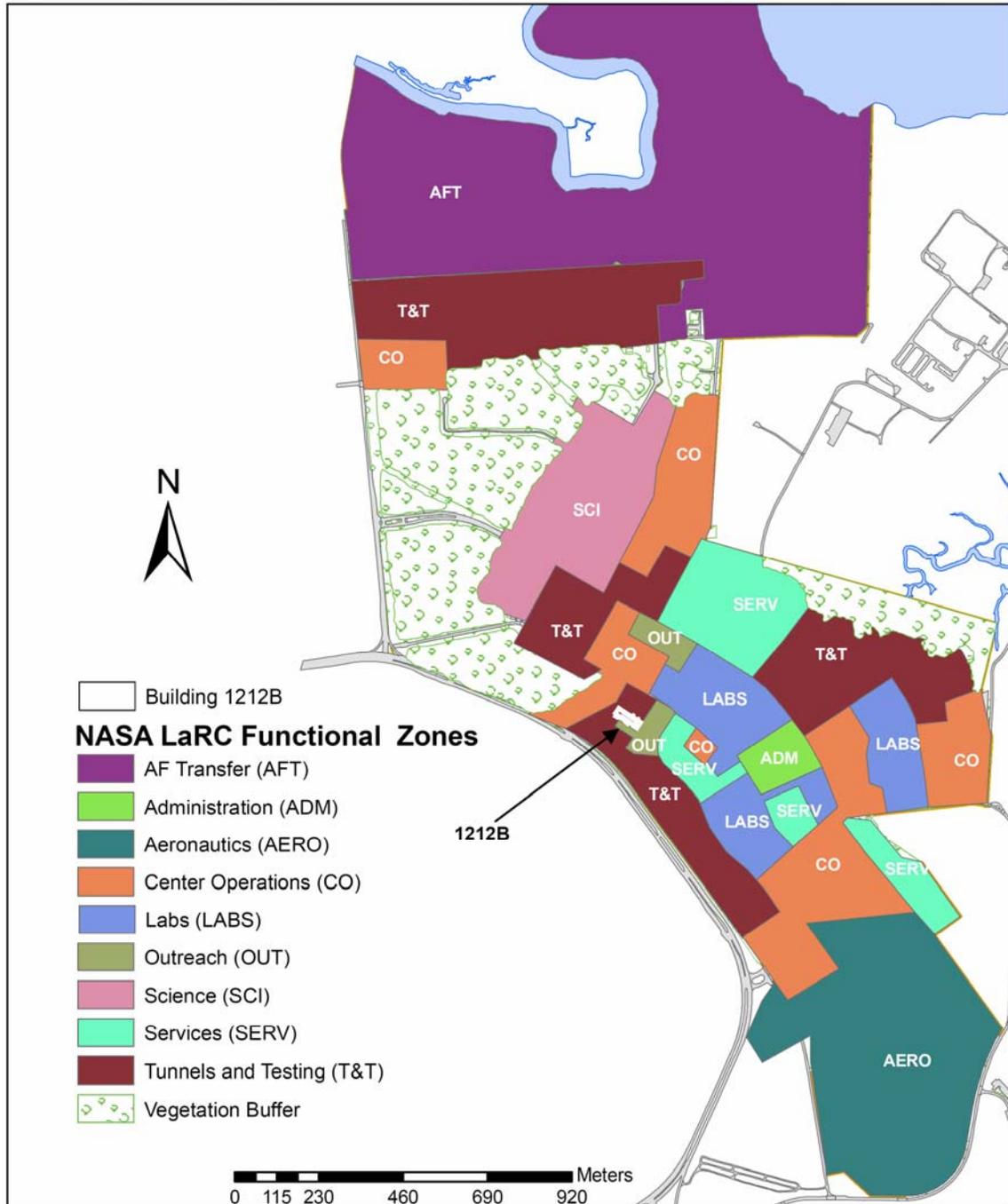


Figure 4 – NASA LaRC Functional Zones

### **3.2 Noise**

The fighter aircraft operating from LAFB are by far the dominant and most widespread noise source in the area. The Noise Contour Map of LAFB (Figure 5) is derived from the Air Installation Compatible Use Zone report prepared by LAFB. The decibel (dBA) contours on the map are calculated using the “Ldn” parameter, which is preferred by the EPA for assessing environmental noise impacts. It accounts for all the noise occurring throughout the 24-hour day but with a 10-decibel penalty added to the nighttime hours to account for people’s greater sensitivity to noise at night. Ldn levels up to 65 dBA are generally considered acceptable for residences. The project site is located in the 65 dBA area, but close to the 70 dBA contour.

Primary noises generated at LaRC itself include the wind tunnels, the compressor stations, and the substations. Most of the wind tunnels are closed-loop tunnels in which the test gas medium is recirculated and the noise generated by the tunnel is contained largely within the building. The daily operation of motor vehicles in and around LaRC is considered a minor source of noise.

LaRC’s Industrial Hygiene staff monitors noise levels both inside and outside of the Center facilities to ensure excessive noise does not harm human health or the environment. In addition, the Industrial Hygiene staff insures proper controls are in place to protect Center personnel from exposure to excessive noise levels in accordance with OSHA requirements.

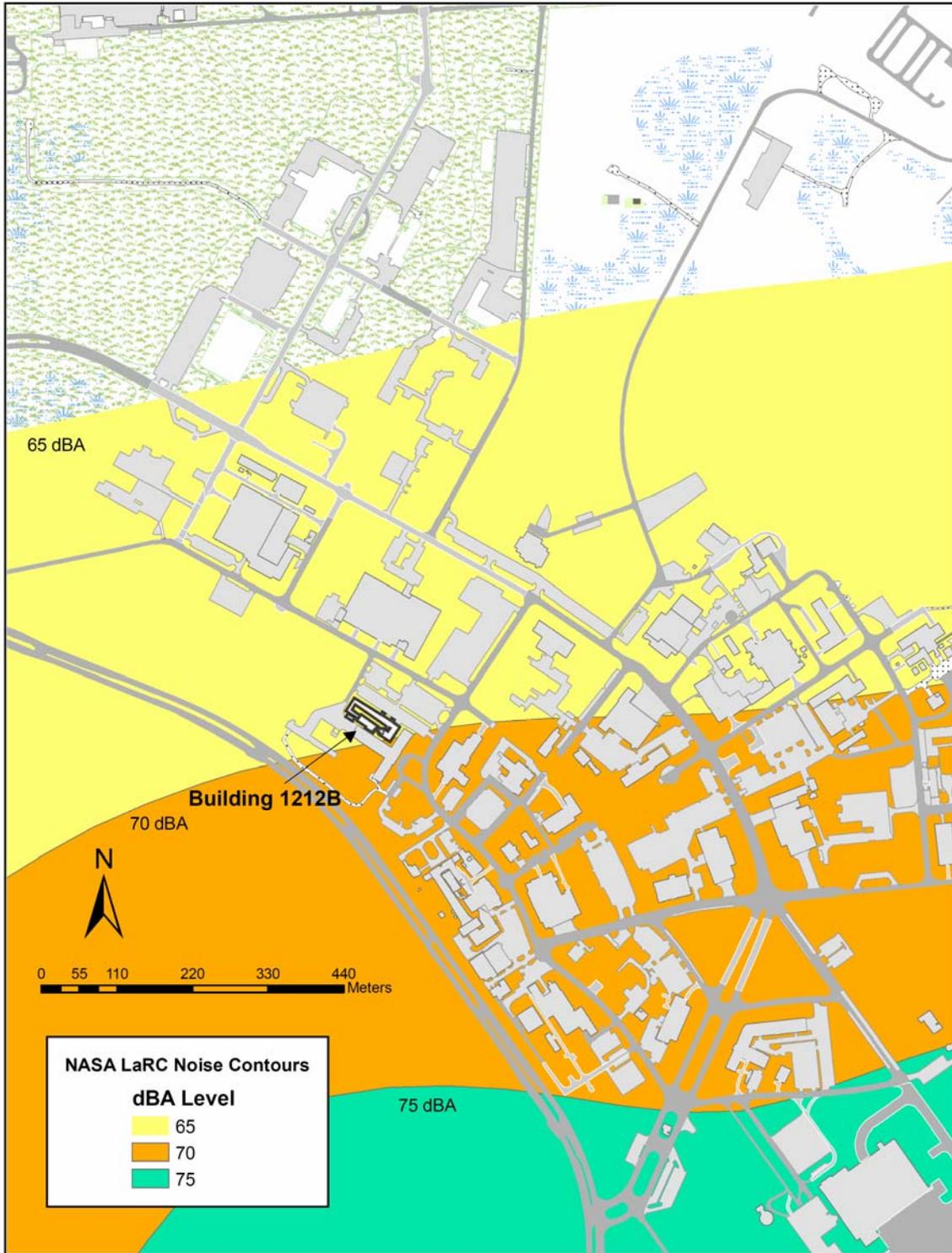


Figure 5 – Noise Contours from LAFB Flight Operations

### **3.3 Cultural Resources**

Cultural resources are any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious or other purposes. They include archaeological resources, traditional resources, and historic architectural resources. Traditional resources are associated with cultural practices and beliefs of a living community that are rooted in its history and are important in maintaining the continuing cultural identity of the community. Archaeological resources are locations where prehistoric or historic activity measurably altered the earth or produced deposits of physical remains (e.g., arrowheads, bottles). Historic architectural resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. Historic properties (as defined in 36 CFR 60.4) are significant archaeological, architectural, or traditional resources that are either eligible for listing, or listed in, the National Register. LaRC's historic properties are described in Sections 3.3.1 through 3.3.3 below.

The management of cultural resources is primarily regulated by the National Historic Preservation Act. Section 106 requires Federal agencies to take into account the effects of their undertakings on historic properties. Impacts to cultural resources may be considered adverse if the resources have been determined to be eligible for listing in the National Register. Section 110 advocates proactive management of resources through the incorporation of historic preservation into the comprehensive plans of agencies, facilities, or programs. The act requires agencies to compile cultural resource inventories which should be integrated into its systems for property administration, land use planning and project planning.

LaRC's Cultural Resource Management Plan provides guidance, procedures and important information to ensure the proper management of cultural resources at the Center. It outlines LaRC's strategy for ensuring that historic resources are not adversely affected by daily maintenance and repair operations or by other projects, such as major construction or rehabilitation. Compliance with the plan permits LaRC to effectively accomplish historic preservation responsibilities in conjunction with its mission and programs.

#### **Historical Setting**

Southeastern Virginia was inhabited by Kecoughtan Indians when the first English settlers arrived in the early 17<sup>th</sup> century. English colonists quickly expanded throughout the Chesapeake Bay, and several American plantations were later established in the area of Hampton that would become NASA Langley Research Center. Much of the area was still used as farmland when the Federal government purchased the property in 1917. Under the National Advisory Committee for Aeronautics (NACA), the forerunner to NASA, LaRC became the first government aeronautical laboratory in the US.

LaRC's first wind tunnel became operational in 1920, and for several decades LaRC's focus was research and experimentation in the newly emergent field of military aeronautics. In 1958, President Eisenhower signed the National Aeronautics and Space Act establishing the agency of NASA. The new agency quickly incorporated other organizations and eventually established ten research and spaceflight centers located around the United States.

LaRC's contributions to the Agency's overall mission have continued as NASA's focus has evolved over the years. Research performed at LaRC in the 1950s and 1960s helped aircraft break the sound barrier and played a major role in helping Americans reach the moon. In the 1970s, research at the Center focused on aircraft design to cut emissions and noise, and on testing space shuttle concepts. In the 1980s, triggered by the Cold War, LaRC and its complex of over 20 wind tunnels performed critical military aircraft research. From the 1980s to the present, with computer-enhanced wind tunnels and laboratories, research aircraft and spacecraft, and flight simulators, LaRC has continued to provide research support and technological advances in numerous areas. Today LaRC supports the Agency missions with five core competencies: Aerosciences; Structures and Materials; Systems Analysis; Characterization of Atmospheres; and Engineering and Safety.

### **3.3.1 Traditional Resources**

Several State-recognized tribes reside in eastern Virginia; however, there are no traditional resources located at LaRC.

### **3.3.2 Archaeological Resources**

Since archaeological investigations began in the mid-1970s, LaRC has discovered Native American artifacts as well as the remains of colonial and early American plantations. LaRC has conducted at least eight archaeological surveys in accordance with Section 106 and 110 of the NHPA. The archaeological surveys have identified more than 20 archaeological sites on the LaRC West Area. One of these sites, known as the Chesterville Plantation, has been named to the National Register. The Chesterville Plantation was the birthplace of George Wythe, an original signer of the Declaration of Independence. The site has been preserved in place in the northern part of the LaRC West Area (see Figure 6). At least ten other archaeological sites are potentially eligible for listing in the National Register. These sites would require additional survey work if any future LaRC activity involving ground disturbance were planned at or near any of the sites.

The ground beneath Building 1212B and the immediate surroundings have not been surveyed for archaeological resources. However, this is a highly industrialized area that has experienced previous ground disturbance, so the discovery of archaeological resources would not be anticipated in this area.

### **3.3.3 Architectural Resources**

LaRC has five architectural resources that have been designated as National Historic Landmarks: the Variable Density Tunnel, the 8-Foot High Speed Tunnel, the Full Scale Tunnel, the Rendezvous Docking Simulator, and the Lunar Lander Facility (see Figure 6). These properties were identified during a 1985 survey performed by the NPS as part of the "Man in Space" theme study. The wind tunnels provided the technological base from which the early space program was initiated, and the training facilities were critical in preparing astronauts to operate in space and land on the moon.

With the exception of LaRC's five NHL properties, most of the Center's architectural resources are not individually eligible for the National Register. Many are, however, eligible as

contributing elements to historic districts, as first proposed following a 1998 NPS Survey. NASA is in the process of completing a Center-wide reconnaissance-level Architectural Survey of all buildings that are 45 years or older. The survey will be completed in the fall of 2007, and the results will be used to establish the LaRC historic districts and identify contributing historic properties.

Because the survey is not yet complete, and in order to facilitate consultation and evaluation of the issues associated with the proposed demolition, LaRC determined that 7-by-10-Foot HST is eligible for listing in the National Register, not individually, but as a contributing resource to a proposed historic district. The VA SHPO concurred with this approach as documented in the correspondence contained in Appendix B. The facility would not be individually eligible for the National Register because it lacks individual uniqueness, has no remarkable design features, and has undergone several modifications.

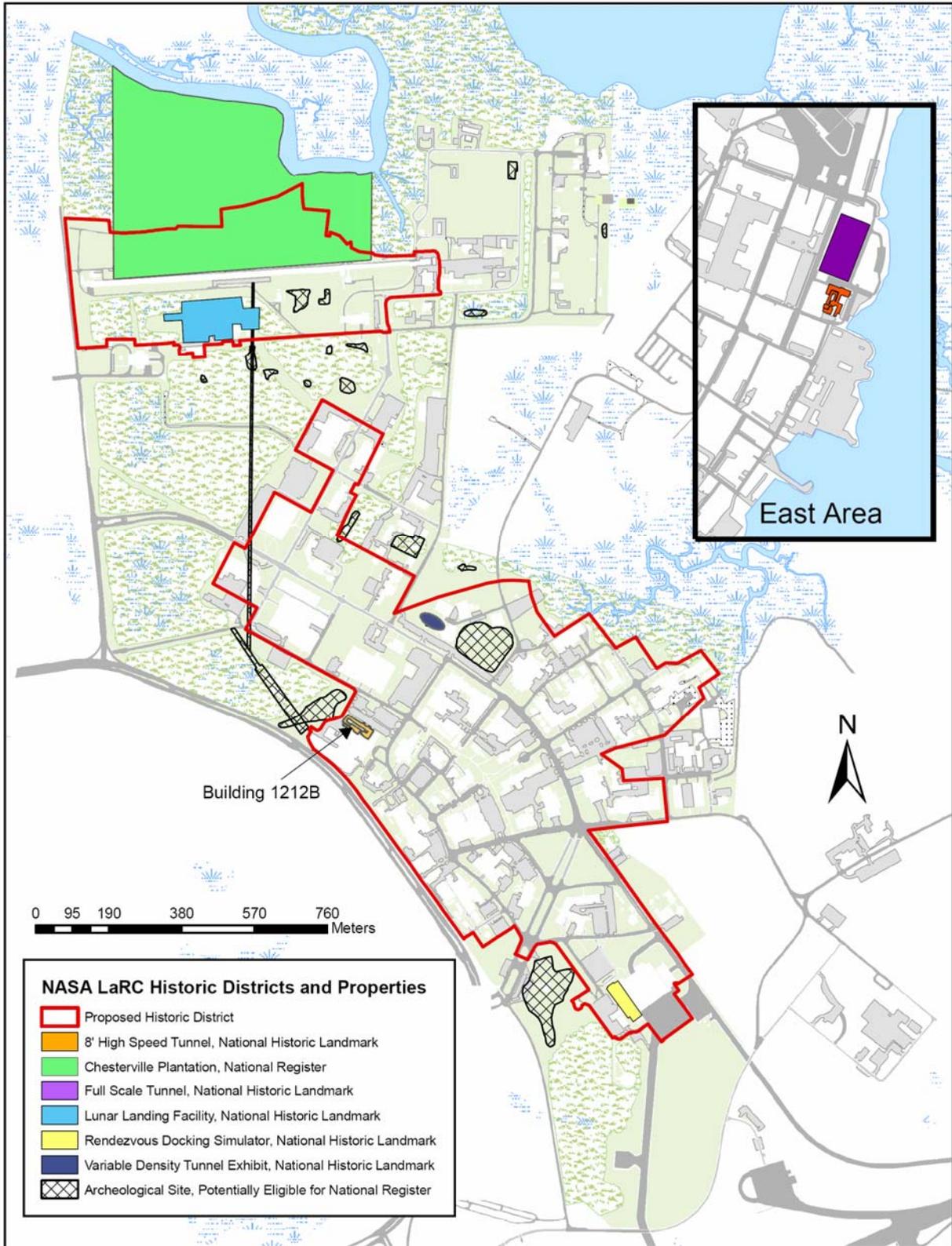


Figure 6 – NASA LaRC Historic Districts and Properties

### **3.4 Hazardous, Regulated and Solid Waste**

LaRC has established a pollution prevention policy with the goal of minimizing the volume and toxicity of wastes generated at the Center to the extent technically and economically feasible. Source reduction, recycling, recovery and reuse are utilized whenever possible.

Hazardous wastes generated at LaRC are managed and disposed according to established Center policies and applicable laws and regulations. LaRC is an EPA-permitted large quantity generator of hazardous waste. The Center is not authorized to transport hazardous waste off-site, store hazardous waste beyond a 90-day accumulation period, or treat or dispose of hazardous waste on-site. The hazardous wastes generated at LaRC include of a wide variety of items, such as solvents, fuels, oils, gases, batteries, fluorescent light bulbs and laboratory chemicals. Waste generated from remediation projects such as paint removal and spill cleanup are sampled and analyzed to ensure proper waste characterization and disposal. Any materials that contain hazardous waste or exhibit hazardous characteristics are transported by an appropriately permitted contractor to a permitted hazardous waste disposal facility.

LaRC ensures the proper management and disposal of materials containing polychlorinated biphenyls (PCBs). All large transformers at the Center that contained PCBs have been retrofilled or removed. Many of the older facilities at the Center still have small PCB light ballasts or capacitors. LaRC ensures that PCB materials are properly packaged, transported and disposed of at an approved disposal facility.

LaRC generates large volumes of municipal solid waste. The major items are paper, wood, metals, cardboard, plastics, grass and tree clippings, glass, and remediation and maintenance wastes. LaRC currently recycles white and mixed paper, cardboard, toner cartridges, scrap metal, used oil, batteries, fluorescent light bulbs, and used tires. Non-hazardous, non-regulated, solid materials that are not collected for recycling are consolidated and transported for disposal to a local landfill or for energy recovery at Hampton's Refuse-Fired Steam Generating Facility.

The management and disposal of asbestos is described below in Section 3.5, *Health and Safety*.

### **3.5 Health and Safety**

LaRC adheres to the Occupational Safety and Health Administration Act, and applicable Federal, State and local safety and health regulations. In addition LaRC also implements its own health and safety requirements many of which are referenced in LAPD 1700.1, "Safety Program". LAPD 1700.1 sets forth the Center's Safety Policy, which is to provide employees a safe and healthful work environment that is free from hazards that can cause or result in loss of life or injury or damage to equipment and property. OSHA has recognized LaRC as a leader in health and safety by awarding the Center the Star designation level of achievement in the Voluntary Protection Program (VPP).

As part of its Safety Program, all contractors performing work at LaRC must comply with all applicable safety and health regulations, including OSHA, Agency and Center regulations. Contractors are responsible for providing their own employees with a safe and healthful workplace, and for ensuring their work is performed in a safe manner. Every major on-site contractor must have a designated on-site Safety Officer and site-specific safety and health plan.

For off-site contractors performing temporary work at the Center, supervisory personnel must attend a safety briefing provided by the LaRC Safety Office prior to project startup.

LaRC complies with all Federal and State regulations applicable to asbestos. Asbestos removal contractors are required to obtain applicable permits and use only permitted landfills for disposal. Asbestos waste is double-bagged and wetted and shipped in closed containers.

### **3.6 Visual Resources**

The aesthetic quality 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. Viewsheds are defined as areas or structures of particular importance that are visible to and from the project site. They may include the natural environment and/or certain features of the built environment.

At NASA LaRC the visual resources are man-made features. Buildings and structures at LaRC reflect two broad architectural themes, an entirely functional architecture, such as specialized test facilities, and institutional architecture, typical of various period architectural styles. Building 1212B is of the former designation and is considered to be “fluid.” Fluid functional architecture includes the following elements:

- Spherical and cylindrical building forms.
- Exposed structural elements.
- Silver or white color.
- Large scale elements which become dominant focal points throughout the Center.
- Functional elements clearly articulated.

Other types of architecture on LaRC include Brick Box, Metal Box, Panel Type, Open Volume, and New Campus.

### **3.7 Air Quality**

LaRC is located within the Hampton Roads Intrastate Air Quality Control Region (AQCR). The Hampton Roads AQCR includes four counties (Isle of Wight, James City, Southampton, and York) as well as ten cities (Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg). Air quality in the Hampton Roads AQCR is currently designated as attainment for all criteria pollutants except for ozone. On April 15, 2004, the EPA designated the Hampton Roads area as a “marginal non-attainment” area for the newly established 8-Hour Ozone standard effective as of June 15, 2004. The area has a maximum attainment date for the 8-Hour Ozone standard of June 2007.

The Virginia DEQ administers the State’s air Operating Permit Program. LaRC qualifies as a synthetic minor because its air emissions fall below prescribed thresholds. LaRC’s State operating permit establishes Center-wide emission limits as well as emission limits for specific stationary air pollution sources. There are no permitted air emission sources at Building 1212B.

### **3.8 Water Resources**

Water resources include surface waters and floodplains located at LaRC as well as the surrounding watershed areas potentially affected by runoff from the Center.

### *Surface Waters*

LaRC is located on the coastal basin of the Back River, which flows into the Chesapeake Bay. Most of the LaRC West Area drains into the Brick Kiln Creek or Tabbs Creek, both of which join the Back River Northwest Branch. A small portion of the West Area in the south drains to Tides Mill Creek, which joins the Back River Southwest Branch. The entire East Area drains to the Back River. An upstream segment of Brick Kiln Creek, all of Tabbs Creek, and the Back River are listed as impaired waters by the EPA. All local waterways are influenced by tides in the Chesapeake Bay.

The Center operates under three water discharge permits. A permit from the Hampton Roads Sanitation District (HRSD) allows LaRC to discharge non-hazardous industrial wastewater and sanitary sewage to the HRSD sanitary sewer system. The Center has two water permits under the Virginia Pollutant Discharge Elimination System (VPDES), which regulate industrial process wastewater and storm water discharges from the Center. LaRC has ten permitted outfalls and the VPDES permit requires frequent sampling and monitoring of the effluent from the outfalls to ensure compliance with permit limits. Figure 7 shows the locations of the West area outfalls and the project site. Building 1212B drains to Tabbs Creek (outfalls 008 and 009).

LaRC has few water pollution sources due to the relatively low level of industrial operations at LaRC. The major pollutants are the chemicals used to treat the boilers and cooling towers, and these are discharged in accordance with LaRC's permit from the Virginia DEQ. LaRC employs various Best Management Practices to prevent or mitigate storm water and/or sewer system pollution from facility activities. Land-clearing and construction activities are carried out in compliance with appropriate State requirements.

### *Floodplains*

Floodplains are the flood-prone, lowland areas adjoining inland and coastal water. The 100-year floodplain area is considered the area where there is a one percent chance of flooding in any given year. Due to its proximity to the Chesapeake Bay and Back River, approximately one-third of the West Area of LaRC and all of the LaRC East Area are within the 100-year floodplain. The elevation for the 100-year floodplain for LaRC is estimated by FEMA to be 2.6 meters (8.5 feet) above mean sea level (MSL) with accompanying waves at about 3.3 meters (11 feet) above MSL near the Center. The stillwater level for the 500-year floodplain is 2.9 meters (9.8 feet) above MSL. Figure 6 shows the extent of the floodplains on LaRC and the location of the project site. Building 1212B is located in the 500-year floodplain.

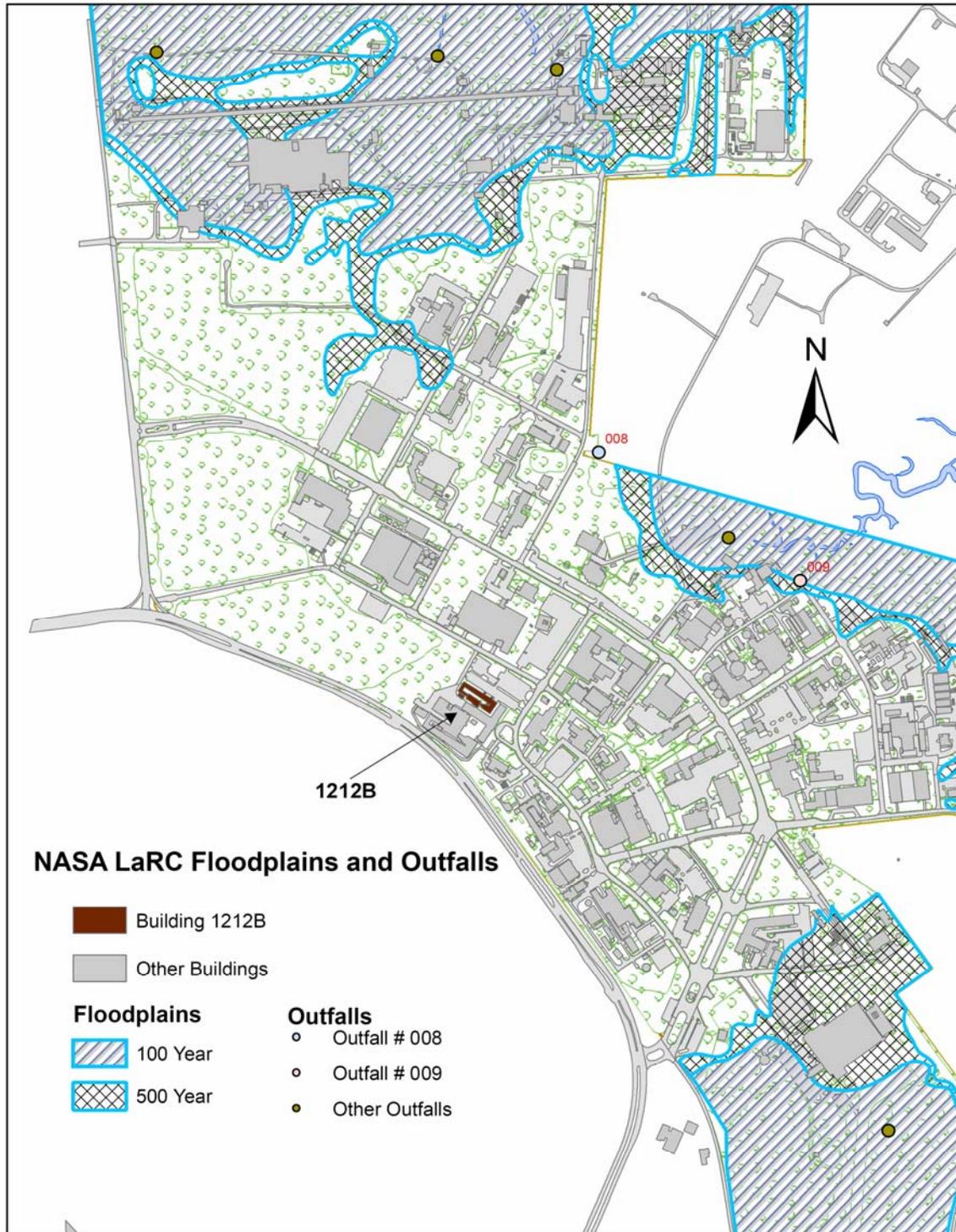


Figure 7 – NASA LaRC Floodplains and Outfalls

### 3.9 Fish and Wildlife

LaRC supports several fish and wildlife species with its unimproved lands providing habitat for fur-bearing (game) mammals, small mammals, birds, reptiles, amphibians, and fish. Tall fencing

surrounding LaRC property limits movement of many larger animals on and off the property from adjacent unimproved lands.

The project area is highly developed and offers limited value to native wildlife. Some species that would be expected in this area would include common rodents, such as house mouse or white-footed mouse; birds such as American robin, blue jay, fish crow, and common grackle, and reptiles such as eastern box turtle. The Center also attracts some white-tailed deer, raccoons, and Virginia opossum that forage from the adjacent woods and wetland areas.

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## **4.0 ENVIRONMENTAL IMPACTS**

This chapter describes the potential impacts or effects of the Proposed Action and the No Action alternative on the selected environmental resources. Analysis of the impacts will follow the same sequence of environmental resources discussed in Chapter 3. The cumulative effects on the environment of the Proposed Action on other past, present, and reasonably foreseeable actions at LaRC are presented in Chapter 5.

### **4.1 Land Use**

#### **4.1.1 Proposed Action**

##### *Coastal Zone Management*

Since LaRC is located within the “coastal zone” as defined under the Virginia DEQ’s Virginia Coastal Zone Management Program, proposed LaRC activities must be consistent with the enforceable policies regarding coastal resources. As noted in Section 3.1, the following enforceable policies are not applicable to the location of the Proposed Action: Tidal and Nontidal Wetlands, Fisheries, Subaqueous Lands, Dunes/Beaches, or Shoreline Sanitation. The remaining Coastal Zone Management Program policies relate to air and water pollution, and are addressed in [Section 4.7](#) and [Section 4.8](#) respectively. As described in these sections, the Proposed Action would be consistent with the Coastal Zone Management Program’s enforceable policies.

##### *Functional Zones*

Demolition of the 7-by-10-Foot HST would involve a change in land use from industrial to open space. Building 1212B is located in the *Tunnels and Testing* portion of the Center. This area is a highly developed, industrial-type setting with minimal open or green space. Single and two-story brick offices and support facilities, as well as parking areas are dispersed among the wind tunnel facilities. The Proposed Action would result in a localized environmental improvement due to an increase in green space and vegetation.

#### **4.1.2 No Action**

Under the No Action alternative, the Functional Zone category of the area would not change. Leaving the building as abandoned would preclude the use of the area for other uses beneficial to the future of LaRC. Implementation of the No Action alternative would result in no change to the land use resource.

### **4.2 Noise**

#### **4.2.1 Proposed Action**

With the implementation of the Proposed Action there would be a minor, temporary, and localized increase in noise levels in the immediate demolition area. The demolition contractors would require the use of potentially noisy equipment and vehicles, but the effects would be restricted to the duration of the active demolition project. As noted in Figure 5, Building 1212B is located in the 65 dBA zone based on noise levels generated from LAFB. Since the facility is located in a highly developed area of the Center, there are additional noise sources at this location and sporadic high noise levels are not unusual. The additional noise generated by the proposed demolition would be negligible.

## **4.2.2 No Action**

Under the No Action alternative, the facility would not be demolished and there would be no change in noise levels in the area. Implementation of the No Action alternative would have no effect on LaRC's noise environment.

## **4.3 Cultural Resources**

### **4.3.1 Proposed Action**

#### *4.3.1.1 Traditional Resources*

There are no traditional resources located at LaRC so the Proposed Action would have no effect on traditional resources.

#### *4.3.1.2 Archaeological Resources*

There would be no impact to known archaeological resources in the area. The closest archaeological site is approximately 50 meters to the northwest of Building 1212B, and would not be disturbed during the demolition process. The ground beneath Building 1212B and the immediate surroundings have not been surveyed for archaeological resources. However, this is a highly industrialized area that has experienced previous ground disturbance, so the discovery of archaeological resources would not be anticipated in this area. In addition, the proposed demolition project would involve minimal ground disturbance activity.

#### *4.3.1.3 Architectural Resources*

The 7-by-10-Foot HST is considered eligible for listing on the National Register as a contributing element to a proposed LaRC historic district. The proposed demolition would constitute an adverse effect on this historic resource. In consultation with the VA SHPO, ACHP and the NPS, LaRC has developed the following mitigation measures:

1. LaRC would prepare Historic American Engineering Record (HAER) documentation consistent with Level I standards of the Secretary of the Interior's Standards and Guidelines for Architectural and Engineering Documentation (48 Federal Register 44730-38). HAER documentation combines drawings, history, and photographs to produce a comprehensive, multidisciplinary record of the facility. It conveys what is most important about a particular structure. Large black-and-white photographs record the environmental setting, and significant details, both inside and out. The HAER documentation would properly record the history and contributions the facility made to NASA's legacy.
2. LaRC would further document the facility by obtaining photographs and written records of the facility, recording interviews of persons who worked in the tunnel, and developing a web-based presentation of the facility.
3. LaRC would coordinate with the Smithsonian and the Virginia Air and Space Center, and other interested parties to determine if there are architectural elements of the building, or artifacts within the building, that may be salvaged for curation or display purposes.

The mitigation measures would be finalized and documented in an MOA between NASA and the VA SHPO. The MOA is included in Appendix D. The mitigation activities would be completed prior to the implementation of the Proposed Action.

LaRC maintains a notable collection of historic resources including five National Historic Landmarks, which are considered “the best of the best.” However, the 7-by-10-Foot HST is not a singularly valuable historic asset. Because the facility is a minor historic resource and because mitigation measures would be implemented, the loss of the 7-by-10-Foot HST would not constitute a substantial impact to LaRC’s cultural resources.

#### **4.3.2 No Action**

Under the No Action alternative the facility would not receive structural maintenance and upkeep, and the exterior of the facility would continue to deteriorate. Under the NHPA, allowing a historic property to deteriorate through neglect is considered an adverse impact. As the 7-by-10-Foot HST continues to deteriorate, there would be a slight but increasing adverse impact to the historic property over time.

### **4.4 Hazardous, Regulated and Solid Waste**

#### **4.4.1 Proposed Action**

As much as possible, hazardous or toxic items have already been removed from the facility. Hazardous items that may remain in the buildings include fluorescent light bulbs, lead paint and mercury switches. Asbestos containing materials remain in the building and these items would be disposed as described in [Section 4.5](#). There is no record of PCBs at Building 1212B. The demolition contractor would inspect the building prior to demolition, and any hazardous or toxic substances would be removed and disposed of in accordance with LaRC’s waste management procedures and applicable Federal, State, and local regulations.

Demolition of The 7-by-10-Foot HST would be carried out following LaRC’s principles of pollution prevention, with preference given to recycling/reuse of waste materials before disposal. Materials generated from the demolition such as steel structural elements and other metals would be recycled if feasible. The disposal of materials that cannot be recycled would result in a temporary, minor increase in waste generated at the Center, but it would be a negligible addition to the quantities of solid waste generated regularly by the Center’s activities. Furthermore, demolition contractors would be required to follow applicable Best Management Practices to further reduce waste and pollution.

Implementation of the Proposed Action would not have a substantial impact on the environment resulting from hazardous, toxic and solid waste.

#### **4.4.2 No Action**

Under the No Action alternative, the building would not be demolished and it would remain in abandoned status. This alternative would result in no change to the current status of hazardous, toxic and solid wastes at the Center.

## **4.5 Health and Safety**

### **4.5.1 Proposed Action**

Demolition of the facility would be carried out by qualified and properly licensed demolition contractors. All contractors performing work at LaRC are required to comply with all applicable safety and health regulations, including OSHA and NASA regulations. Contractors involved in the demolition project would be required to prepare and follow a Health and Safety Plan that complies with the regulations to ensure the safety of human health and the environment during the demolitions.

The LaRC center-wide survey conducted during 1991 found asbestos containing materials present in the wallboard and steam pipe lines in the basement of Building 1212B. LaRC would contract with a qualified asbestos removal contractor who would be required to obtain applicable permits and use only permitted landfills for disposal. The asbestos waste would be double-bagged, wetted, and shipped in closed containers.

### **4.5.2 No Action**

Minimal repair or maintenance has been performed on the 7-by-10-Foot HST since closure. Currently, exterior portions of the facility's steel tunnel circuit have corrosion and rust damage. Following heavy rain events, standing water accumulates on the floor inside the tunnel section. The continuing deterioration of the steel wind tunnel circuit would become an increasing safety and liability concern over time. The asbestos in the facility could eventually begin to disintegrate or crumble, potentially emitting asbestos fibers to the air. The No Action alternative would gradually create a minor negative impact to the health and safety conditions within the localized area of Building 1212B.

## **4.6 Visual Resources**

### **4.6.1 Proposed Action**

The proposed demolition of the 7-by-10-Foot HST would remove an aging facility from the landscape and create open space within an industrialized area. Although visual resources in the immediate project area would be temporarily degraded during the active demolition project, the resulting open space would provide enhanced visual quality at this area of the Center.

### **4.6.2 No Action**

With the No Action alternative, only the minimal required maintenance (testing of emergency lighting and fire systems) would be conducted. Without maintenance, the exterior of the facility would continue to deteriorate. Currently, exterior portions of the facility's steel tunnel circuit have corrosion and rust damage. Gradually the wind tunnel would become an "eye sore" in a highly visible area of the Center. The No Action alternative would result in a slight degradation, over time, of the Center's visual resources.

## **4.7 Air Quality**

### **4.7.1 Proposed Action**

The proposed demolition activity 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 demolition vehicles and from demolition equipment 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.

The Proposed Action would not involve Point Source Air Pollution, so the action would be consistent with the enforceable air management policies of the Coastal Zone Management Act. There would be no substantial impact to air quality resulting from the Proposed Action.

### **4.7.2 No Action**

Under the No Action alternative, the building would not be demolished and it would remain in abandoned status. This alternative would result in no impact to the air quality at the Center.

## **4.8 Water Resources**

### **4.8.1 Proposed Action**

The Proposed Action would result in minimal impact to LaRC's water resources. The demolition activity could produce a minor and temporary increase in suspended solids in the stormwater reaching the two outfalls that drain the affected area. Since demolition of the building would involve no removal of vegetation and only minimal soil disturbance, the impact on water resources would be very slight. The area of ground disturbance is smaller than the threshold requiring a VPDES general construction permit. The demolition contractors would adhere to the standards of LaRC's current VPDES permit (General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems) that requires LaRC to implement Best Management Practices (BMPs) mitigating stormwater pollution from Center activities. These BMPs include employee training, preventive maintenance, visual inspections, spill prevention and response, sediment and erosion control, good housekeeping, and record keeping and reporting. Once the demolition has been completed, there would be no long-term impact to the quality or quantity of stormwater drainage to the outfalls.

The demolition project would comply with provisions of Executive Order 11988, *Floodplain Management*, and the Chesapeake Bay Preservation Act. The Virginia Coastal Zone Management Program maintains enforceable policies related to point source and non-point source water pollution. The Proposed Action does not involve point source water pollution, but does have the potential to generate a non-point water pollution source. The Coastal Zone Management Program requires soil-disturbing projects to be designed to reduce soil erosion and to decrease inputs of chemical nutrients and sediments to the State's waters. Since LaRC would implement necessary BMPs to reduce erosion and pollution, the Proposed Action would be consistent with the Coastal Zone Management Program.

#### **4.8.2 No Action**

Under the No Action alternative, the buildings would not be demolished, and there would be no environmental consequences to LaRC's water resources.

### **4.9 Fish and Wildlife**

#### **4.9.1 Proposed Action**

Disturbance for the proposed action would be limited to the local demolition area on NASA LaRC property. The activity and noise generated from demolition activities may temporarily displace wildlife from the immediate vicinity of the project area. It is expected that no long-term impacts to animal species would occur.

#### **4.9.2 No Action**

Under the No Action alternative, the building would not be demolished and it would remain in abandoned status. The baseline fish and wildlife resources would remain unchanged.

## **5.0 CUMULATIVE EFFECTS**

This section provides a description of past, present, and reasonably foreseeable actions; an analysis of cumulative effects of these actions; and a description of the irreversible and irretrievable commitment of resources associated with the Proposed Action.

The CEQ regulations require that all Federal agencies include cumulative impacts in their environmental analyses (40 CFR 1508.25(c)). 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" (40 CFR 1508.7). This includes those that may be "individually minor but collectively significant actions taking place over time" (40 CFR 1508.7).

Cumulative effects are most likely to arise when a relationship exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in close proximity to the proposed action would be expected to have more potential for a relationship than actions that may be geographically separated. Similarly, actions that coincide, even partially, in time would tend to offer a higher potential for cumulative effects. The scope of the cumulative impacts analysis involves both the geographic extent of the effects and the timeframe in which the effects could be expected to occur.

In this EA, the region of influence is NASA LaRC and the timeframe includes the planned timing of the Proposed Action (FY 2007) continuing into the foreseeable future. An effort has been made to identify all actions that are being considered and that are in the planning phase at this time. To the extent that details regarding such actions exist and the actions have a potential to interact with the proposed action in this EA, these actions are included in this cumulative analysis.

### **5.1 Past, Present and Reasonably Foreseeable Actions**

As an active research facility, LaRC undergoes continual change in order to align its capabilities with the Agency's overall mission. Like any major research installation, LaRC requires new construction, facility improvements and infrastructure upgrades to ensure the Center's resources are appropriate for carrying out its research. Many of LaRC's recent past, present and foreseeable future actions are related to an overarching NASA objective to streamline the Center's infrastructure and restructure/modernize the Center's facilities. To meet NASA's evolving mission requirements, LaRC will continue to pursue projects that transform LaRC into more modern, efficient, and technologically advanced Center.

In 2004-6 LaRC carried out a project to demolish fourteen dilapidated, abandoned or unnecessary buildings in order to reduce LaRC's infrastructure. None of the buildings were culturally or historically important. An EA for this demolition project was developed in May 2003, and LaRC concluded that this action resulted in no significant impacts.

In the 2008-10 timeframe, LaRC is proposing to demolish several wind tunnels of historic significance:

- Building 640, 8-Foot Transonic Tunnel
- Building 641, 8-Foot High Speed Tunnel
- Building 643, the 30-Foot by 60-Foot Full Scale Tunnel
- Building 1146, 16-Foot Transonic Tunnel

The 8-Foot High Speed Tunnel and Full Scale Tunnel are designated National Historic Landmarks, and the other two wind tunnels are potentially eligible for listing in the National Register as contributing elements to a proposed LaRC historic district. LaRC has been consulting with the VA SHPO, ACHP, the NPS, local residents, NASA Headquarters, and others concerning the proposed action, potential alternatives, and/or mitigation measures.

In the 2008-22 timeframe, LaRC is proposing to implement a major 3-phase modernization and upgrade project called the New Town Project. Site improvements would include new construction of approximately 40,000 square meters (430,000 square feet) and demolition of over 65,000 square meters (700,000 square feet) as well as upgrades to roadwork, parking lots, utilities, and an extended pedestrian walkway. Planned improvements would focus on enhancing the current and future mission performance capabilities while ensuring the quality of life for LaRC's residents. This major repair-by-replacement initiative would demolish aging and poorly maintained facilities to be replaced by modern offices and research laboratories. LaRC is currently performing a Center-wide Phase I architectural review of LaRC's infrastructure, which will enable NASA to evaluate the effect that the New Town Project would have on LaRC's cultural resources. A complete NEPA analysis documenting the environmental effects of the proposed New Town project would be performed prior to implementation.

## **5.2 Analysis of Cumulative Impacts**

The following analysis examines how the impacts of these other actions might be affected by the Proposed Action at LaRC and throughout NASA as an Agency. The analysis examines whether such a relationship would result in potentially significant impacts not identified when the Proposed Action is considered alone.

The Proposed Action has an adverse effect on LaRC's cultural resources, but this impact would be mitigated by the measures described in [Section 4.3.1.3](#). The proposed demolition of four historic wind tunnels (Buildings 640, 641, 643 and 1146) would have a cumulative adverse effect on LaRC's cultural resources. The New Town Project could also have a cumulative impact on LaRC's cultural resources, but the extent of this impact will not be known until the Center-wide architectural survey has been completed (fall of 2007).

In order to mitigate the potential cumulative cultural resource impact of the proposed future projects, LaRC would work closely with the VA SHPO, ACHP, the NPS, and other interested parties to ensure that LaRC preserves its aeronautical heritage through mitigation measures. NASA would develop a MOA to ensure that all parties agree to the proposed mitigation measures. These measures could include sharing artifacts with the Smithsonian Institution and the Virginia Air and Space Museum; designating additional resources to the National Register; and developing Historic American Engineering Record (HAER) documentation, virtual reality documentation, and oral histories of the LaRC's historic properties.

### **5.3 Irreversible and Irretrievable Commitment of Resources**

NEPA requires that environmental analysis include identification of “...any irreversible and irretrievable commitments of resources” which would be involved if the Proposed Action were implemented. Irreversible and irretrievable commitment of resources is related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects mainly result from the use or destruction of a specific resource (e.g., minerals and energy) that cannot be replaced within a reasonable timeframe. Irretrievable commitment of resources involves the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of an endangered species or the disturbance of a cultural site).

For the Proposed Action, most resource commitments are neither irreversible nor irretrievable. Most environmental consequences are short term and temporary (such as minor soil disturbance during demolition) or longer lasting but negligible (e.g., landfill space used to dispose of demolition debris). Demolition of the facility would require the use of fossil fuel in construction vehicles and equipment. The loss of this nonrenewable resource would be irretrievable, however the effect of this loss on future generations would not be substantial.

The demolition of the 7-by-10-Foot HST would result in the loss of an irretrievable cultural resource. However it is acknowledged by LaRC and the consulting agencies that the facility does not represent an important historic resource. It does not meet the qualifications for listing in the National Register as an individual property. In addition the mitigation measures implemented by LaRC to preserve the memory and history of the facility would compensate for the irretrievable loss of the asset itself.

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## 6.0 REFERENCES

Council on Environmental Quality (CEQ). Considering Cumulative Effects Under the National Environmental Policy Act. 1997. <http://www.nepa.gov/nepa/ccenepa/ccenepa.htm>

NASA. NASA Procedural Requirement (NPR) 8580.1, Implementing The National Environmental Policy Act And Executive Order 12114. 2001.  
[http://nodis3.gsfc.nasa.gov/npg\\_img/N\\_PR\\_8580\\_0001\\_/N\\_PR\\_8580\\_0001\\_.pdf](http://nodis3.gsfc.nasa.gov/npg_img/N_PR_8580_0001_/N_PR_8580_0001_.pdf)

NASA Langley Research Center. Center Master Plan. 2006.  
<http://gis-www.larc.nasa.gov/masterplan/>

NASA Langley Research Center. Draft Cultural Resource Management Plan. September 2006.

NASA Langley Research Center. Final Environmental Assessment, Demolition of Fourteen Buildings at NASA Langley Research Center. May 2003.

NASA Langley Research Center. Final Environmental Assessment, Renovation and Addition to Building 1194 at NASA Langley Research Center. March 2004.

NASA Langley Research Center. Langley Procedural Requirement (LPR) 8800.1, LaRC Environmental Program Manual. 2005. <http://lms-r.larc.nasa.gov/admin/documents/LPR8800-1.pdf>

NASA Langley Research Center. NASA LaRC Environmental Resource Document. 2005 Update.

National Register of Historic Places. 2006. [www.nationalregisterofhistoricplaces.com](http://www.nationalregisterofhistoricplaces.com)

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## **7.0 LIST OF PERSONS CONTACTED** **(In addition to those listed in the table in Appendix B)**

Mr. William Bolger, National Historic Landmarks Program Manager, National Park Service, Philadelphia, PA.

Ms. Ethel R. Eaton, Manager, Office of Review and Compliance, Virginia Department of Historic Resources, Richmond, VA.

Ms. Mary Gainer, GIS Analyst, Center Operations Directorate, NASA LaRC, Hampton, VA.

Mr. Rodney Harris, Facilities Master Planner, Center Operations Directorate, NASA LaRC, Hampton, VA.

Ms. Kristin Kirchen, Architectural Historian, Office of Review and Compliance, Virginia Department of Historic Resources, Richmond, VA.

Mr. Roger Ferguson, Environmental Management Team, NASA LaRC, Hampton, VA.

Mr. Kenneth Kumor, NEPA Coordinator, Environmental Management Division, NASA Headquarters, Washington, DC.

Dr. J. Lawrence Lee, Engineer-Historian, National Park Service, Washington, DC.

Mr. Thomas McCulloch, Historic Preservation Specialist, Advisory Council on Historic Preservation Washington, DC.

Ms. Tina Borghild Norwood, Federal Preservation Officer, NHPA Compliance, Environmental Management Division, NASA Headquarters, Washington, DC.

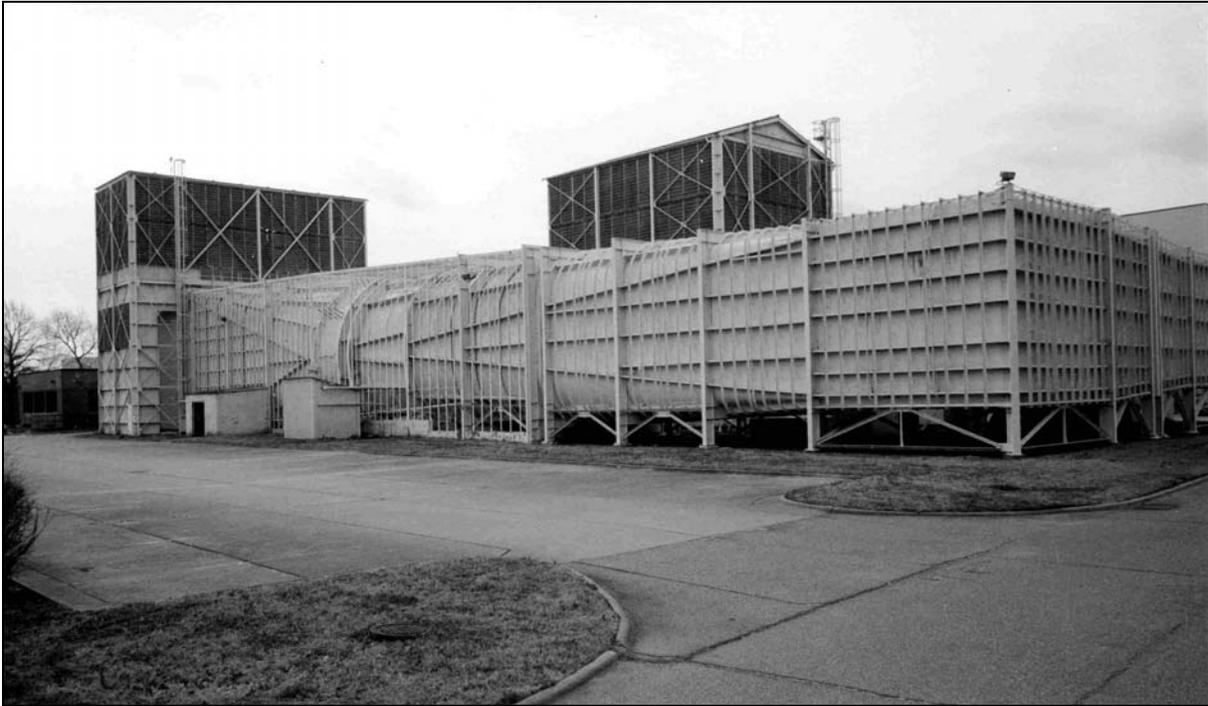
Mr. Paul Robert, Environmental Management Division, NASA Headquarters, Washington, DC.

Mr. Frank Quinto, Research Facilities Branch, NASA LaRC, Hampton, VA.

Ms. Joanna Wilson, Archaeologist, Office of Review and Compliance, Virginia Department of Historic Resources, Richmond, VA.

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**APPENDIX A**  
**FACILITY PHOTOGRAPHS AND DRAWINGS**



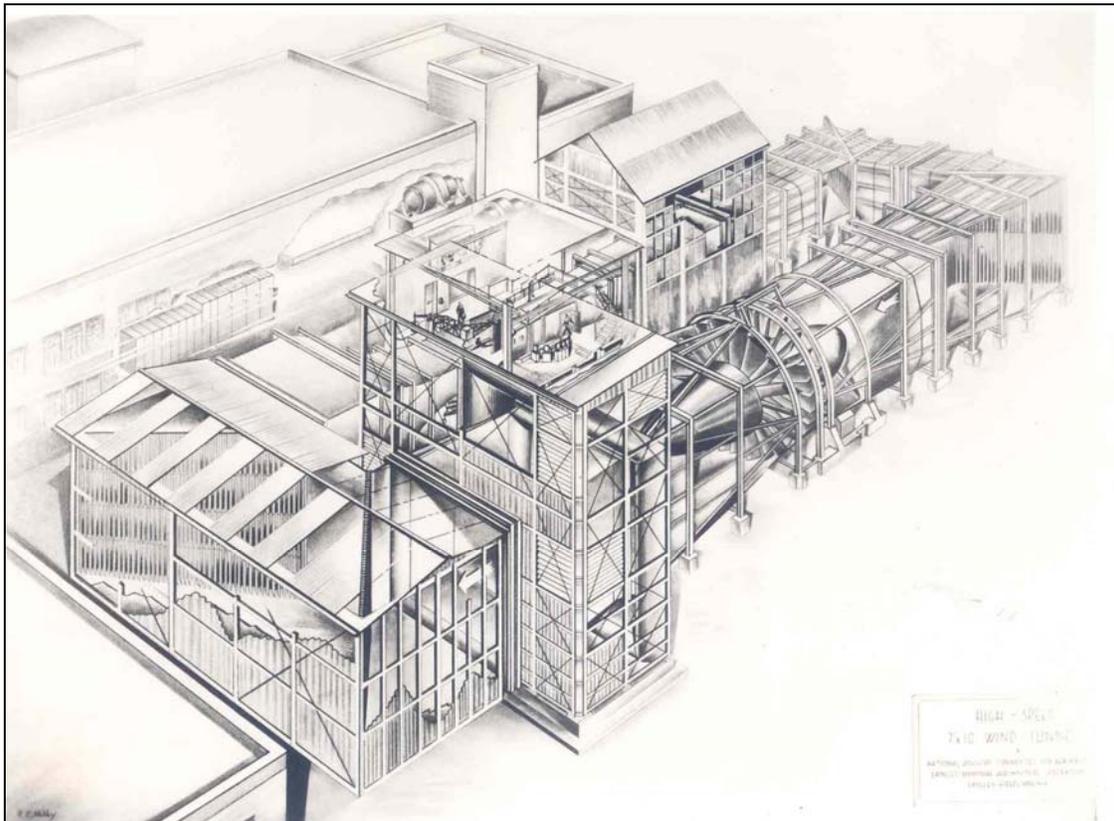
Building 1212B, 7-by-10-Foot HST



Interior of the 7-by-10-Foot HST



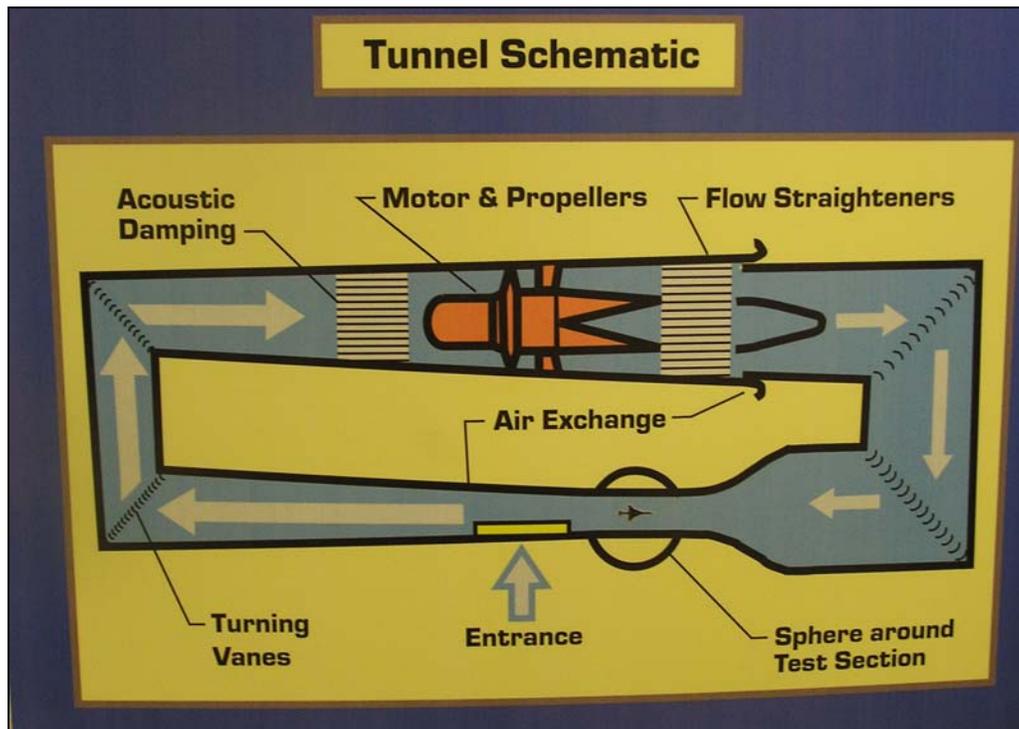
Model inside 7-by-10-Foot HST



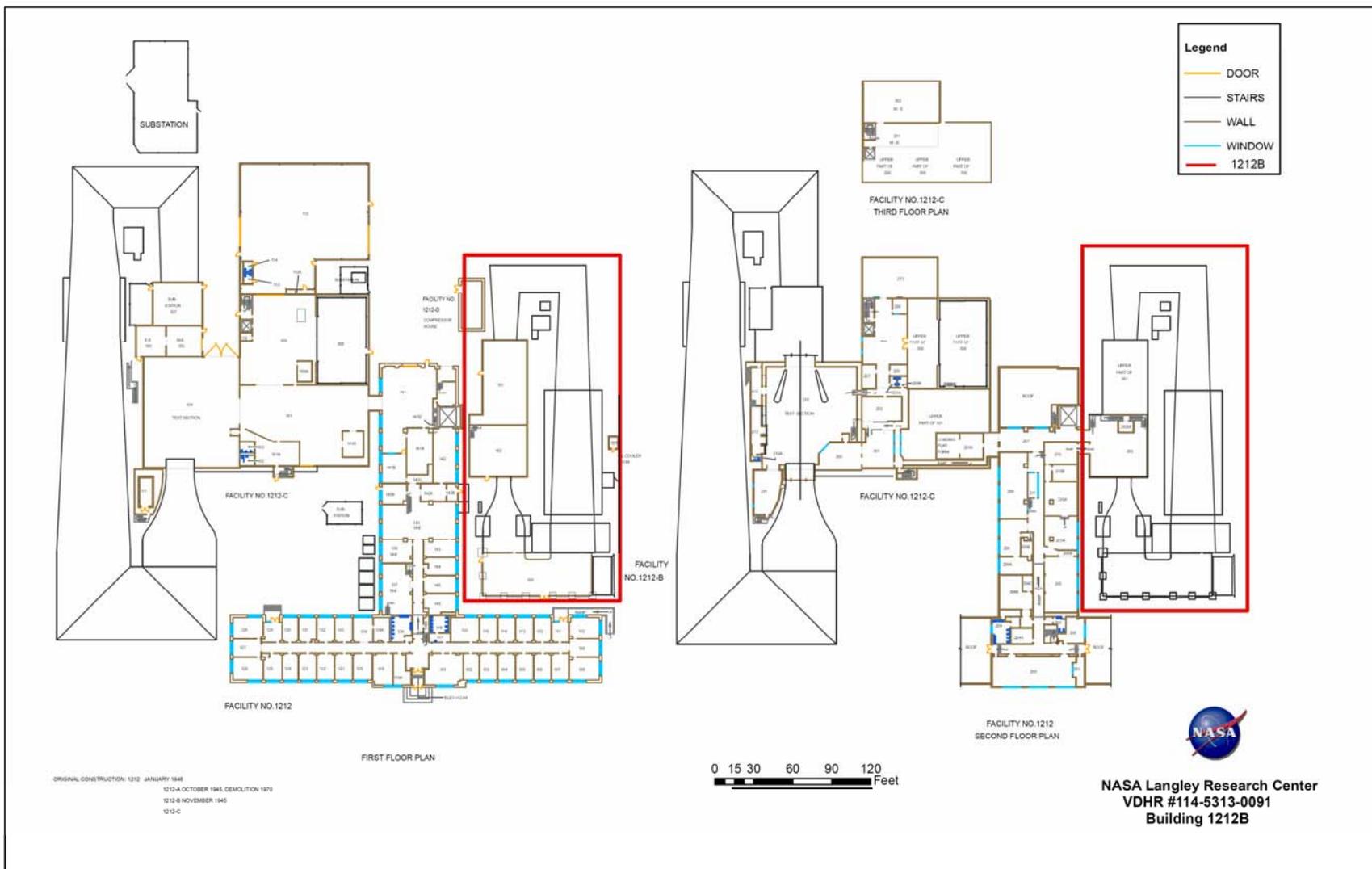
Cutaway Diagram of Building 1212B, 7-by-10-Foot HST



Aerial View of Building 1212B



Tunnel Schematic of 7-by-10-Foot HST



Floor Plan for Building 1212B

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**APPENDIX B**  
**REGULATORY CORRESPONDENCE**

National Aeronautics and  
Space Administration  
**Langley Research Center**  
Hampton, VA 23681-2199



446

July 22, 2004

Dr. Ethel Eaton  
Director of Project Review  
Virginia Department of Historic Resources  
2801 Kensington Avenue  
Richmond VA 23221

Subject: Demolition of Various Buildings and Infrastructure at NASA Langley Research Center, Hampton, Virginia

Ref: Programmatic Agreement Among NASA, the National Conference of State Historic Preservation Officers, and The Advisory Council on Historic Preservation

Dear Dr. Eaton,

The National Aeronautics and Space Administration (NASA) will be preparing a Programmatic Environmental Assessment (EA) for the proposed demolition of various buildings and infrastructure at NASA Langley Research Center (LaRC), located in Hampton, Virginia. The purpose of this letter is to provide you with some preliminary information regarding the proposed demolitions and to begin the consultation process to ensure NASA complies with applicable requirements of the NHPA. The proposed action would involve demolition of the following:

1. Building 640 (the 8-Foot Transonic Tunnel),
2. Building 641 (the 8-Foot High Speed Tunnel only), VDHR# 114-0139
3. Building 1146 (the 16-Foot Transonic Tunnel only) and associated Buildings 1146A-C and 1146G-M,
4. Building 1212B (the 7 X 10-Foot Subsonic Tunnel Circuit only),
5. Building 1297 (the Gantry), VDHR# 114-0140 and associated Buildings 1297A-G,
6. Building 643 (the 30 X 60 Foot Full Scale Tunnel), VDHR# 114-0142.

Buildings 641, 643, and 1297 (the Gantry) are National Historic Landmarks (NHL's); are listed on the National Register of Historic Places; and are part of the Programmatic Agreement (PA) referenced above. Buildings 640, 641, and 643 are located on LaRC's East Side on Langley Air Force Base (LAFB) property, and are within a proposed Langley Air Field Historic District. Buildings 640 and 1146 may be potentially eligible for listing as National Historic Landmarks, and the Building 1212B Tunnel is over 50 years of age.

In the Programmatic EA, NASA plans to evaluate the proposed action, the no-action alternative, and one alternative each for the three NHL's and for Building 1146. In addition to preparing the Programmatic EA, NASA intends to comply with the PA and Section 106 requirements of the NHPA by preparing HABS/HAER documentation for the three NHL's. Enclosed for your review is the PA, the Virginia Department of Historical Resources Project Review Forms for each of the buildings identified for demolition, and maps showing the location of the NHL's. Also included are photographs of the respective buildings, along with neighboring facilities (both NASA and LAFB) that are at least 50 years of age.

Below are the numbers to reference for the HAER documentation in your files:

8 ft. high speed tunnel (Bldg. 641) - Survey # HAER VA-118-B  
8 ft. transonic tunnel (Bldg. 640) - Survey # HAER VA-118-D  
Full Scale Tunnel (Bldg. 643) - Survey # HAER VA-118-A

We would like to schedule a meeting with your department to review the requirements in the PA and to discuss the best procedures for the remaining structures. We could either meet at your offices in Richmond or at NASA LaRC if you would like to schedule a field visit of the structures to be impacted.

Please contact me with any questions and or comments.



Rodney T. Harris  
Master Planner,  
Integrated Asset  
Management Team

Phone: 757-864-6118  
Fax: 757-864-8096  
E-mail: [rodney.t.harris@larc.nasa.gov](mailto:rodney.t.harris@larc.nasa.gov)

Enclosures

**Letter to Potentially Concerned Agencies, Organizations and Individuals**

The July 22, 2004 scoping letter (above) was sent to the following:

Langley Air Force Base	Mr. Thomas Wittkamp EIAP Manager 37 Sweeney Blvd., Bldg. 328 Langley AFB, VA 23665-2170
James City County	Mr. Sanford B. Wanner County Administrator 101C Mounts Bay Road Williamsburg, VA 23185-6569
City of Newport News	Mr. Randall W. Hildebrandt Assistant City Manager 2400 Washington Ave. Newport News, VA 23607
York County	Mr. James O. McReynolds County Administrator P.O. Box 532 Yorktown, VA 23690-0532
City of Williamsburg	Mr. Jackson Tuttle City Manager 401 Lafayette Street Williamsburg, VA 23185
City of Hampton	Mr. George Wallace City Manager 22 Lincoln Street Hampton, VA 23662
Hampton Roads Planning District Commission	Mr. Arthur L. Collins Executive Director The Regional Building 723 Woodlake Drive Chesapeake, VA 23320
City of Poquoson	Mr. Charles W. Burgess, Jr. City Manager 500 City Hall Ave. Poquoson, VA 23662
Virginia Air and Space Center	Mr. Todd C. Bridgford Executive Director 600 Settlers Landing Rd Hampton, VA 23669
Virginia DEQ	Ms. Ellie Irons Office of Environmental Impact Review P.O. Box 10009 Richmond, VA 23240
Virginia Historical Society	Mr. Charles F. Bryan, Jr. President P.O. Box 7311 Richmond, VA 23221-0311

## Appendix B – Regulatory Correspondence

National Park Service	Dr. John H. Sprinkle, Jr. National Historic Landmarks Program 1849 C Street NW (2280) Washington, DC 20240
Smithsonian National Air and Space Museum	Dr. Peter Jakab Chairman of Aeronautics Division P.O. Box 37012 Washington D.C. 20013-7012  Dr. Roger Launius Chairman of Space History Division P.O. Box 37012 Washington D.C. 20013-7012
U.S. EPA, Region 3	Mr. William Arguto Environmental Review Coordinator 1650 Arch Street, EA-30 Philadelphia, PA 19106
Council on Environmental Quality	The Honorable James L. Connaughton Chair, Council on Environmental Quality Executive Office of the President Washington, D.C. 20006

TRIP REPORT – February 10, 2005, meeting at NASA Langley Research Center, Hampton, VA, in regard to the possible demolition of six facilities.

J. Lawrence Lee  
*[Engineer-Historian, National Park Service]*

*[Excerpts regarding Building 1212B]:*

Building 1212B is one of several remaining 7 x 10-foot tunnels. While it represents one of the most common “workhorse” size wind tunnel designs, it possesses no particularly remarkable features.

The other three buildings in this group, 640, 1146, and 1212B, have considerably less historical significance than do the [other three buildings proposed for demolition], though 1146 merits more consideration for preservation than either 640 or 1212B.

While I would argue that all of LaRC holds historical significance, some facilities are clearly more significant than others. If any of these buildings are to be preserved, it seems likely that those having less significance may have to be sacrificed. In my opinion, the demolition of buildings 640, 1146, 1212B would result in minimal loss of historical knowledge or attraction.

National Aeronautics and  
Space Administration

**Langley Research Center**  
100 NASA Road  
Hampton, VA 23681-2199



May 2, 2006

Reply to Attn. of: 300

Department of Historic Resources  
Office of Review and Compliance  
ATTN: Joanna Wilson and Kristin Hill  
2801 Kensington Avenue  
Richmond, VA 23221

Subject: Eligibility of Site 114-5313-0091 at NASA Langley Research Center

Dear Ms. Wilson and Ms. Hill:

NASA Langley Research Center (LaRC) is proposing to demolish the 7 by 10 Foot High Speed Tunnel (Building 1212B), Site 114-5313-0091, in Fiscal Year 2007. As you are aware, NASA LaRC is in the process of completing a Center-wide architectural survey on all structures 45 years old and older. However, this survey will not be completed in sufficient time to coordinate with the demolition plans and budget schedule for the 7 by 10 Foot High Speed Tunnel. Therefore, NASA LaRC is assuming for purposes of the proposed demolition that Site 114-5313-0091 is eligible for the National Register of Historic Places as a primary resource within the proposed historic district as defined in 1998 by Jody Cook, Architectural Historian with the National Park Service. A brief history, photograph, floor plan and a USGS map showing the location of the structure are enclosed as an attachment to this letter.

In the early 1990s, NASA completed an Agency-wide analysis and review of all of its major wind tunnel and research facilities. NASA made a decision to close the 7 by 10 Foot High Speed Tunnel in 1994 because it was under utilized and duplicate capabilities existed at several other NASA Centers. NASA is undergoing a fundamental transformation in both business practices and mission that has significantly impacted aeronautics research. Over the past several years, NASA LaRC's budget has consistently been reduced and as such, critical maintenance funds are focused on core facilities that are essential to NASA's mission.

To offset the impacts of our proposed decision to demolish the 7 by 10 Foot High Speed Tunnel, NASA LaRC is in the process of preparing HABS/HAER Level 1 documentation for this structure. The HABS/HAER document will be provided to your office for review by the end of June 2006. In addition, NASA may coordinate with the National Air and Space Museum to preserve artifacts or other items that may be used for exhibits. NASA

also plans to prepare an Environmental Assessment prior to reaching a decision on the proposed demolition. The EA will be forwarded to your office for review and comment.

Please do not hesitate to contact me at 757-864-6118 if you have any questions.

Cordially,



Rodney T. Harris  
Historic Preservation Officer

Enclosures



**COMMONWEALTH of VIRGINIA**  
**Department of Historic Resources**  
 2801 Kensington Avenue, Richmond, Virginia 23221

L. Preston Bryant, Jr.  
 Secretary of Natural Resources

*Harris*  
 June 2, 2006

Mr. Rodney T. Harris  
 Facility Preservation Officer  
 NASA Langley Research Center  
 Hampton, VA 23681-2199

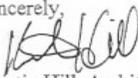
Re: Eligibility and demolition of site 114-5313-0091, NASA Langley  
 DHR file no. 2002-1560

Dear Mr. Harris:

Thank you for submitting information about the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act. I understand from your letter and our previous meeting on the issue that NASA Langley wishes to demolish site 114-5313-0091 (Building 1212B, 7 by 10 foot High Speed Tunnel) in Fiscal Year 2007. Because the Center-wide architectural survey is not yet complete, NASA is willing to treat the site as eligible for the purposes of Section 106, and you are proposing Level 1 HABS/HAER documentation as mitigation.

While DHR could certainly agree to treat the site as eligible pending the completion of the survey, the demolition of an eligible property would constitute an adverse effect and require a Memorandum of Agreement in addition to the offered mitigation. Moreover, DHR staff, along with representatives of the Advisory Council and the National Park Service, traveled to Langley in February 2005 to discuss the proposed demolition of six structures (including Building 1212B) and offered extensive guidance about how to proceed with the process. One of the most important points made by our office during that meeting and in our follow-up letter was that NASA must fully investigate and evaluate alternatives, a sentiment echoed by the ACHP and NPS. Please refer to an attached copy of our March 18, 2005 letter for our guidance on the Section 106 process in the context of the proposed demolitions.

We look forward to receiving an alternatives analysis for Building 1212B and any other historic properties that NASA would like to demolish. Until alternatives are explored in consultation with all consulting parties, it is premature to discuss mitigation or an MOA.

Sincerely,  
  
 Kristin Hill, Architectural Historian  
 Office of Review and Compliance

*ref: 06050060*

Kathleen S. Kilpatrick  
 Director

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

*Caroline,  
 F.Y.I.  
 Rod*

0606 0046

JUN -7 AM 8:36

**ACTION** \_\_\_\_\_  
*223 300 300*

**INFO** *COD (Harris) CAM*  
*300*  
*Matthew 106*

**DUE DATE** \_\_\_\_\_ **ASSIGNED BY** *ab*

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

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

Tidewater Region Office  
 14415 Old Courthouse Way, 2<sup>nd</sup> Floor  
 Newport News, VA 23608  
 Tel: (757) 886-2807  
 Fax: (757) 886-2808

Roanoke Region Office  
 1030 Penmar Ave., SE  
 Roanoke, VA 24013  
 Tel: (540) 857-7585  
 Fax: (540) 857-7588

Winchester Region Office  
 107 N. Kent Street, Suite 203  
 Winchester, VA 22601  
 Tel: (540) 722-3427  
 Fax: (540) 722-7535

National Aeronautics and  
Space Administration  
**Langley Research Center**  
Hampton, VA 23681-2199



September 11, 2006

Reply to Attn of 300

Department of Historic Resources  
Office of Review and Compliance  
ATTN: Joanna Wilson and Kristin Hill  
2801 Kensington Avenue  
Richmond, Virginia 23221

SUBJECT: Alternatives Analysis for Site 114-5313-0091, NASA Langley Research Center, DHR File No. 2002-1560

Dear Ms. Wilson and Ms. Hill,

Thank you for your June 2, 2006, response to the information we sent you regarding the National Register of Historic Places eligibility and proposed demolition of Site 114-5313-0091 (Building 1212B, 7- by 10-Foot High Speed Tunnel) at NASA Langley Research Center (LaRC). This letter, with attached report, continues NASA's Section 106 consultation with your office, the Advisory Council on Historic Preservation (ACHP) and the National Park Service (NPS) regarding this facility.

NASA has identified the 7- by 10-Foot High Speed Tunnel (HST) as a historic property and determined that its demolition will constitute an adverse effect. In order to continue to fulfill our responsibilities under Section 106 of the National Historic Preservation Act (NHPA), and in following the guidance received from your office, the ACHP and the NPS, NASA has performed an evaluation of alternatives for the wind tunnel facility. The attached report includes an analysis of the suggested alternatives you provided to us in your March 18, 2005 letter, as well as photographs, a floor plan and map showing the location of the facility.

The alternatives analysis report identifies NASA's preferred alternative as demolition, based on a number of factors, including NASA's need to fulfill its mission in the most scientifically justifiable and cost-effective manner. The report presents the reasoning and justification for this decision. Since the preferred alternative constitutes an adverse effect under the NHPA Section 106 implementing regulations, NASA has identified mitigation

measures for the proposed demolition. Based on continued consultation with the VDHR and ACHP and the NPS, NASA also proposes to develop a Memorandum of Agreement (MOA) to document the proposed action and mitigation measures.

NASA requests your review of the enclosed information and response to our preferred alternative, proposed mitigation measures, and intent to develop a MOA. Your response is requested by October 18, 2006. You will recall that our Demolition Project Status Report dated August 24, 2006 mentions our intention to manage the proposed demolition of 1212B separately from the other four NASA facilities that are demolition candidates.

A copy of the report has also been provided to the ACHP and the NPS for their review and comment.

Please do not hesitate to contact me at 757-864-6118 if you have any questions.

Cordially,



Rodney T. Harris  
Center Master Planner  
Historic Preservation Officer  
NASA Langley Research Center  
Capital Assets Management

cc:  
ACHP  
NPS

Attachments



## COMMONWEALTH of VIRGINIA

L. Preston Bryant, Jr.  
Secretary of Natural Resources

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

Kathleen S. Kilpatrick  
Director

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

October 24, 2006

Rodney T. Harris  
Center Master Planner  
Historic Preservation Officer  
NASA Langley Research Center  
Hampton, VA 23681-2199

Re: Alternatives Analysis for Building 1212B, 7-by 10-foot High Speed Tunnel  
DHR file no. 2002-1560

Dear Mr. Harris:

Thank you for providing the alternatives analysis for the proposed demolition of Building 1212B. We believe that this document represents a good faith effort by NASA to consider alternatives to avoid or minimize the adverse effect resulting from the demolition of a property that is considered eligible for listing on the National Register of Historic Places. Because this building is not one of the National Historic Landmarks demonstrating distinctive architectural and engineering advances in the field of aviation technology, we agree that the mothballing and historic site/heritage tourism options are not particularly strong. We concur with your finding of *adverse effect* and we look forward to working with you to develop a Memorandum of Agreement to mitigate the loss of this structure. The mitigation you have proposed is acceptable. We would also suggest that some oral history interviews from staff who worked in the tunnel would add an important dimension to the physical documentation of the structure.

Thank you for providing our office with an opportunity to comment on your alternatives analysis. The report provided is what we were envisioning in our letter of March 18, 2005. If you have any questions, Joanna Wilson can be reached at (804) 367-2323 ext. 140 and Kristin Kirchen can be reached at ext. 111. We look forward to receiving a draft MOA in electronic format for our review and comment.

Sincerely,

Ethel R. Eaton, Manager  
Office of Review and Compliance

Cc: Tom McCulloch, ACHP  
J. Lawrence Lee, NPS

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

Capital Region Office  
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Tidewater Region Office  
14415 Old Courthouse Way, 2<sup>nd</sup> Floor  
Newport News, VA 23608  
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Fax: (757) 886-2808

Roanoke Region Office  
1030 Penmar Ave., SE  
Roanoke, VA 24013  
Tel: (540) 857-7585  
Fax: (540) 857-7588

Northern Region Office  
5357 Main Street  
PO Box 519  
Stephens City, VA 22655  
Tel: (540) 868-7031  
Fax: (540) 868-7033

National Aeronautics and  
Space Administration  
**Langley Research Center**  
Hampton, VA 23681-2199



November 30, 2006

Reply to Attn of: 300

Advisory Council on Historic Preservation  
Mr. Thomas McCulloch  
Historic Preservation Specialist  
1100 Pennsylvania Ave., NW, Ste. 803  
Washington, DC 20004

SUBJECT: Notification of Impact to a Historic Property at NASA Langley Research Center

Dear Mr. McCulloch,

NASA Langley Research Center (LaRC), located in Hampton, Virginia, is proposing to demolish the 7-Foot by 10-Foot High Speed Tunnel (Building 1212B). In consultation with the Virginia State Historic Preservation Officer (SHPO), NASA has determined that the 7-Foot by 10-Foot High Speed Tunnel is eligible for listing on the National Register of Historic Places, not individually, but as a contributing resource within a proposed historic district as defined in 1998 by Jody Cook, Architectural Historian with the National Park Service. As such, the proposed undertaking will result in an adverse effect to a historic property. In order to proceed with the proposed undertaking, and pursuant to the requirements of 36 CFR 800.6(a)(1), NASA is notifying you of the adverse effect and inviting you to participate in the consultation. NASA plans to execute a memorandum of agreement (MOA) for the proposed undertaking with the SHPO and the Council, should you agree to participate.

In the early 1990s NASA completed an agency-wide analysis and review of all of its major wind tunnel and research facilities. NASA made a decision to close the 7- by 10-Foot High Speed Tunnel in 1994 because it was under utilized and duplicate capabilities existed at several other NASA Centers. NASA is undergoing a fundamental transformation in both business practices and mission that has significantly impacted aeronautics research. Over the past several years, NASA LaRC's budget has consistently been reduced and as such, critical maintenance funds are focused on core facilities that are essential to NASA's mission.

In order to minimize the adverse effect of demolition, NASA plans to carry out the following mitigation measures:

1. Prepare HAER Level 1 documentation of the 7-by 10-Foot HST to properly record the history and contributions the facility made to NASA's legacy.
2. Further document the facility by obtaining panoramic interior photographs, aerial spherical exterior photographs and oral histories of the wind tunnel to create virtual tour data for the Center's Master Plan web page.

For your review, we have enclosed a map showing the location of the 7-Foot by 10-Foot High Speed Tunnel, and the response letter from the SHPO showing concurrence with LaRC's proposed mitigation.

Should you agree to be a consulting party regarding this undertaking, your response is requested by January 2, 2007. Please do not hesitate to contact me at 757-864-6118 if you have any questions or require additional information.

Respectfully,



Rodney T. Harris  
Center Master Planner  
Historic Preservation Officer

Enclosures



Preserving America's Heritage

December 29, 2006

Mr. Rodney T. Harris  
Center Master Planner  
Historic Preservation Officer  
National Aeronautics and Space Administration  
Langley Research Center  
Hampton, VA 23681-2199

**REF: Proposed Demolition of Building 121B at NASA Langley Research Center  
Hampton, Virginia**

Dear Mr. Harris:

On December 7, 2006, the ACHP received your notification and supporting documentation regarding the adverse effects of the referenced project on properties listed on and eligible for listing on the National Register of Historic Places. Based upon the information you provided, we do not believe that our participation in consultation to resolve adverse effects is needed. However, should circumstances change and you determine that our participation is required, please notify us. Pursuant to 36 CFR 800.6(b)(iv), you will need to file the final Memorandum of Agreement and related documentation at the conclusion of the consultation process. The filing of the Agreement with us is required in order to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with your notification of adverse effect. If you have any questions or require further assistance, please contact Tom McCulloch at 202-606-8554, or via email at [tmcculloch@achp.gov](mailto:tmcculloch@achp.gov).

Sincerely,

Raymond V. Wallace  
Historic Preservation Technician  
Federal Property Management Section  
Office of Federal Agency Programs

ADVISORY COUNCIL ON HISTORIC PRESERVATION

1100 Pennsylvania Avenue NW, Suite 809 • Washington, DC 20004

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**APPENDIX C**  
**ALTERNATIVES ANALYSIS REPORT**

**Alternatives Analysis Report**  
**Proposed Demolition of 7- by 10-Foot High Speed Tunnel (Building 1212B)**  
**Site 114-5313-0091, DHR File No. 2002-1560**  
**NASA Langley Research Center, Hampton, Virginia,**

**Introduction**

This report has been prepared by NASA Langley Research Center (LaRC) to analyze alternatives to the proposed demolition of the 7- by 10-Foot High Speed Tunnel (Building 1212B) located at NASA LaRC, Hampton, Virginia. NASA LaRC has determined that the 7- by 10-Foot High Speed Tunnel (HST) is eligible for listing on the National Register of Historic Places (NRHP) as a primary resource within a proposed LaRC historic district as first recommended in 1998 by Jody Cook, Architectural Historian with the National Park Service. The proposed undertaking would demolish the steel wind tunnel circuit of the facility and leave intact the attached office building as well as the portion of the wind tunnel that was converted into storage for the neighboring 14- by 22-Foot Low Speed Tunnel (LST).

The information contained herein supports ongoing consultation under Section 106 of the National Historic Preservation Act between NASA LaRC, the Virginia Department of Historic Resources (VDHR), and the Advisory Council on Historic Preservation (ACHP), regarding potential adverse effects from the proposed undertaking.

**Status and Condition of the 7- by 10-Foot High Speed Tunnel (Building 1212B)**

The 7-by 10-Foot HST is located in a highly developed area of LaRC that is part of a future proposed redevelopment plan at LaRC called the “New Town Project.” The HST facility consists of a large steel rectangular and cylindrical tunnel circuit that adjoins a square brick office and control room building. The wind tunnel circuit is similar in configuration and appearance to the adjacent 14- by 22-Foot LST (Building 1212C) which is approximately twice as large. See Appendix A for photographs, a floor plan and map showing the location of the facility.

NASA LaRC closed the 7- by 10-Foot HST in 1994. Throughout the mid to late 1990s, the facility was included as part of the tour of several LaRC facilities that was provided to visitors by the Virginia Air and Space Center (VASC). Located in downtown Hampton, Virginia, the VASC has served as NASA LaRC’s official Visitors’ Center since the VASC opened in 1992. The tours were given on a daily basis and included a visit to the control room of the HST and a walk through of the steel tunnel circuit to view the test section and wind tunnel fan blades. A guide, either from the VASC or a retired LaRC researcher would narrate the tour. As a result of the terrorist attacks that occurred on September 11, 2001, the VASC discontinued regular tours of NASA LaRC due to security restrictions.

In 1999, the motor generator that runs the direct drive current for the HST was removed from the facility’s main control room and laboratory to allow room for model preparation in support of flight dynamics research being performed in the adjacent 14- by 22-Foot LST. Additionally, in

1999, the plenum area of the HST was converted into a storage location to house the models that were being tested in the 14-by-22-Foot LST.

Minimal repair or maintenance has been performed on the 7-by 10-Foot HST since closure. The annual maintenance performed on the interior of the tunnel circuit involves semi-annual testing of the emergency lighting and fire alarm system. Currently, exterior portions of the facility's steel tunnel circuit have corrosion and rust damage. Following heavy rain events, standing water can be found on the floor inside the tunnel section. While the closed facility is still available as a visitor tour stop, the deteriorating condition of the steel wind tunnel circuit has become a serious safety and liability concern. Additionally, the heightened security requirements following 9/11 have greatly reduced the frequency or interest in providing tours of the facility. Due to the safety and security issues, NASA plans to discontinue allowing any tours of the facility.

### **Analysis of Alternatives**

Following NASA's Section 106 consultation in 2005, VDHR suggested eight alternatives for the disposition of Building 1212B (March 18, 2005 letter, included in Appendix B). The following sections analyze these possible alternatives. VDHR also recommended that NASA LaRC consider four issues for each alternative discussed: accessibility, feasibility, cost/benefit and security. These issues are summarized at the end of each alternative discussion. A ninth alternative, moving the facility off of LaRC property, was not carried forward for analysis because of the impracticality and prohibitive cost of such a venture.

***Alternative 1. Continued use by NASA LaRC.*** The 7- by 10-Foot HST was closed by NASA LaRC in 1994. In conjunction with the Department of Defense, NASA completed a nationwide study of government-owned wind tunnels (NASA-Department of Defense [DoD] Major Facilities Integrated Product Team (MFIPT) Report, dated June 10, 1996, available at: <http://www.hq.nasa.gov/office/codej/codejx/ipt.htm>). The purpose of the Integrated Product Team on Facilities was to minimize the total operations and maintenance and investment cost to the U.S. for space and aeronautics research, development, test and evaluation infrastructure, while meeting national security, space exploration, technology development and system acquisition needs. The study included the development of an up-to-date national wind tunnel facility data base, an assessment of needed wind tunnel capabilities, and recommended consolidations and/or closing of excess wind tunnel capability. The study recognized LaRC's 7-by 10-Foot HST as inactive and identified at least 12 facilities located throughout the U.S. that had duplicate or more specialized subsonic capabilities (a facility was considered subsonic if the test section was at least 6 feet in one dimension and operated over the Mach range of 0 to 0.6). Because duplicate capabilities existed elsewhere and the facility was under-utilized prior to its closing in 1994, the 7- by 10-Foot HST has remained closed. Currently, there is no NASA mission or national requirement or need to use the facility (either as is, or with modified technology). As such, continued use by NASA is not an acceptable alternative for the facility.

Additional information regarding numerous studies and actions related to the evaluation of NASA's facilities, infrastructure and capabilities is included in GAO report is available at: <http://www.gao.gov/archive/1996/ns96187.pdf>. Also, the 2004 RAND report which is available at: [http://www.rand.org/pubs/monographs/2004/RAND\\_MG178.pdf](http://www.rand.org/pubs/monographs/2004/RAND_MG178.pdf)

*Accessibility.* Continued use by NASA would not change the current general access to the facility. Given the configuration of the wind tunnel circuit and its very specialized technology properties, making ADA accessibility modifications to the facility for continued use would be difficult, costly and it could compromise the testing capability of the wind tunnel.

*Feasibility.* At least 12 other wind tunnels at NASA LaRC and throughout the nation can perform the same or more specialized functions, and do not require updating or modifications. Because this wind tunnel does not meet NASA's current needs for wind tunnel testing facilities, continued use is not feasible.

*Cost/Benefit.* The current estimate to bring the wind tunnel back to operational status is approximately \$10 million dollars. This includes replacing the motor generator for the direct drive to power the tunnel, installing new computer and testing systems, repair of the corroded sections of the tunnel circuit, and structural upgrades to existing portions of the facility. There would be no benefit to NASA in expending such resources on a facility that is no longer needed. Existing facilities either already meet these needs or would require much less expenditure on upgrades. Additionally, the HST is located in an area planned for future redevelopment so NASA would not benefit from choosing this alternative.

*Security.* Continued use by NASA would not change the security situation at the facility.

***Alternative 2. Third party use, either as originally intended or through adaptive reuse.*** NASA LaRC has solicited outside organizations and private industry regarding the possible use of the 7-by 10-Foot HST, either as originally intended, for wind tunnel research or through adaptive reuse. Parties contacted include Old Dominion University, the City of Hampton, VASC, the NASA Aeronautics Support Team, and the National Institute of Aerospace (NIA). The NIA includes a consortium of the following research centers: the Center for Adaptive Aerospace Vehicle Technology (University of Maryland), the Center for Planetary Atmospheric and Flight Sciences (North Carolina State University), the Center for Multifunctional Aerospace Materials (Virginia Tech), the Center for High Confidence Cooperative Systems (North Carolina A&T State University), the Center of Nanotechnology for Advance Sensors, Actuators and Microsystems (University of Virginia), and the Center for Aerospace Systems Engineering, Modeling and Simulation (Georgia Tech). While the organizations appreciated the opportunity to investigate the possible use of the facility, they identified either the lack of need or desire to use the facility (either as originally intended or through adaptive reuse), or that the capital required to staff and operate the facility was prohibitive. In cases where the lack of capital presented the obstacle to adaptive reuse, NASA also does not have the resources to subsidize third party use of their facilities. As such, third party use is not a viable alternative for the facility.

*Accessibility.* Given the configuration of the wind tunnel circuit and its very specialized technology properties, making ADA accessibility modifications to the facility for continued use would be difficult, costly and could compromise the testing capability of

the wind tunnel. If necessary, for adaptive reuse, ADA accessibility modifications could be made, although the historic integrity of the HST would be affected. General access issues regarding this alternative are addressed in the Security section below.

*Feasibility.* NASA has allowed third party use of other wind tunnels at LaRC, such as the 16-Foot Transonic Tunnel and the Full Scale (30 by 60 Foot) Tunnel. This was possible because the facilities offered useful and needed research capabilities to third parties in conjunction with reasonable and manageable operation and maintenance costs. Third party use for this facility does not appear to be feasible due to lack of need, interest or funding to operate the wind tunnel.

*Cost/Benefit.* As no third party has been identified with both the interest and funding to repair, maintain and operate the HST either as originally intended or through adaptive reuse, an evaluation of cost/benefit for this alternative is difficult to perform. If the tunnel were operated by a third party, NASA would incur nominal costs as the facility would rely on connected infrastructure, such as electricity, compressed air and water. While NASA would require reimbursement from the third party for maintenance and utility costs, NASA would not profit from this alternative. Additionally, NASA would not benefit from this alternative as the HST is located in an area planned for future redevelopment.

*Security.* Third party use would introduce additional security burden on NASA LaRC. All personnel that would be using the facility would have to undergo a U.S. government background investigation. Additionally, NASA LaRC would have to approve and/or monitor the research projects being performed in the facility. At times, national security conditions could preclude use of the facility by third parties.

***Alternative 3. Historic Site/Heritage Tourism Destination – under NASA Langley control.*** As a secure Federal facility, and in the post 9/11 environment, NASA LaRC does not allow general public access on to the Center. All visitors must have a current LaRC or DoD badge or be accompanied by a badged escort. Only in unique situations are public tours of the Center allowed and these must be pre-arranged through the LaRC Office of External Affairs.

The VASC, located in downtown Hampton, serves as LaRC's official Visitors' Center (<http://www.vasc.org/index.html>). Under a Memorandum of Agreement, and in partnership with LaRC, the VASC has permanent exhibits that include the Adventures in Flight Gallery, Air and Spacecraft, and the Space Gallery, all of which showcase LaRC's contributions to aeronautics and the space program. NASA provides \$1.75 million annually in funding and grants to the VASC for permanent exhibits, educational resources, and traveling displays (e.g., the Virginia State Fair) to allow for public involvement in and interpretation of NASA's history and legacy. Over the years, NASA's partnership with the VASC has been extremely successful and operation of the visitors' center off LaRC property allows the public a much greater opportunity to appreciate NASA's history. Since its opening in 1992, the VASC has served over four million visitors. This past year the VASC experienced a record breaking 438,000 admissions, a seven percent increase compared to the previous year. The key elements to this growth have been the continued upgrading of exhibits, and the addition of interactive and state-of-the-art technologies,

many of which involve NASA contributions. The VASC is the top attraction in Hampton, and the second most-visited science museum in Virginia. Due to NASA's commitment and involvement in supporting the VASC as NASA's off-site visitors' center, NASA has determined that operating the HST as a heritage tourism destination on site at LaRC is not an acceptable alternative.

*Accessibility.* If the facility were turned into a tourism destination, ADA accessibility modifications could be made, although the historic integrity of the HST would be affected. General access issues regarding this alternative are addressed in the Security section below.

*Feasibility.* Since its closure in 1994, the HST has been available as a visitor tour stop. Currently, the deteriorating condition of the steel wind tunnel circuit poses safety concerns and NASA does not have the funding to continue to maintain or repair the facility in a manner acceptable for public tours. Additionally, heightened security requirements following 9/11 have greatly reduced the frequency of or interest in tours of the facility. As such, NASA has determined that operating the HST as a permanent heritage/tourism destination site is no longer feasible.

*Cost/Benefit.* NASA does not have the funding to repair and maintain the HST as a heritage/tourism site. The HST is located in an area planned for redevelopment. Aside from being viewed as a good steward of its historic resources, NASA would not benefit from turning the HST into a tourist destination and there would be no offset to the funds expended for operating the facility as such.

*Security.* Operation of the wind tunnel as a heritage/tourism site would introduce an additional security burden on NASA LaRC. Public tours require clearance through LaRC's Office of Public Affairs and visitors must be escorted at all times while on LaRC property. At times, national security conditions could preclude providing tours of the facility.

***Alternative 4. Historic Site/Heritage Tourism Destination, operated by third party.*** Similar issues apply to this alternative as to #2 and #3 above. NASA has solicited outside organizations and groups regarding the possible adaptive reuse of the facility. No third party has offered to operate the facility as a heritage tourism destination. Also, the additional security required for this alternative would be a burden to NASA LaRC. The official visitor center for NASA LaRC is located at VASC and as such, is available for public interpretation of the LaRC wind tunnels and research performed by NASA both in the past and presently.

*Accessibility.* If the facility were turned in to a tourism destination, ADA accessibility modifications could be made, although the historic integrity of the HST would be affected. General access issues for this alternative are addressed in the Security section below.

*Feasibility.* Operation of the facility as a heritage/tourism destination by a third party does not appear to be feasible. No third parties have shown an interest in operating the facility as such.

*Cost/Benefit.* As no third party has been identified with both the interest and funding to repair, maintain and operate the wind tunnel as a heritage/tourism site, an evaluation of cost/benefit for this alternative is difficult to perform. If the tunnel were operated by a third party as a heritage tourism site, NASA would incur nominal costs as the facility would rely on connected infrastructure, such as electricity, compressed air and water. The HST is located in an area planned for redevelopment. Aside from being viewed as a good steward of its historic resources, NASA would not benefit from third party operation of the HST as a tourist destination.

*Security.* Operation of the wind tunnel by a third party as a heritage/tourism site would introduce an additional security burden on NASA LaRC. Public tours require clearance through LaRC's Office of Public Affairs and visitors must be escorted at all times while on LaRC property. At times, national security conditions could preclude providing tours of the facility.

***Alternative 5. Repair/Maintenance.*** In addition to the \$10 million that would be required initially to repair the HST, current estimates for annual maintenance of the 7-by 10-Foot HST are approximately \$200 thousand. This estimate includes annual general maintenance and utility costs, as well as the prorated cost for corrosion control (stripping and repainting the tunnel's steel shell, estimated at \$2 million every 10 to 12 years). NASA's budget for the maintenance of facilities under its management has been steadily reduced in recent years, while at the same time pressure has increased to conduct cutting-edge research. Expending funds on a deactivated facility that cannot help meet current Agency mission needs could affect the operation and safety of other LaRC research facilities that are essential to the Agency's mission. Furthermore, the Administration has mandated that NASA reduce its infrastructure throughout its organization. Lack of adequate funding for proper maintenance of mission essential facilities could result in breakdowns and delays. Consequently, NASA has determined that expending resources to repair and maintain the facility that is no longer needed is not a viable alternative.

*Accessibility.* Making ADA accessibility modifications to the facility as part of the repair and maintenance would not be prudent use of NASA's limited funding. Repair and maintenance would not affect the general access to the facility.

*Feasibility.* NASA has determined that repair and maintenance of the HST is not feasible. The facility is no longer needed and NASA has determined that expending resources on unneeded infrastructure is not a sound management practice.

*Cost/Benefit.* Aside from being viewed as a good steward of its historic resources, NASA would not benefit by repairing and maintaining an unneeded facility. NASA has determined that the \$200 thousand per year that would be required for this alternative is critical funding that needs to be spent on mission essential facilities. Additionally, the

HST is located in an area planned for future redevelopment and as such, NASA would not benefit from choosing this alternative.

*Security.* There would be no change in security requirements if NASA were to repair and maintain the facility.

***Alternative 6. Mothballing (to National Park Service Standards).*** This alternative encounters similar issues to #5 above. While the cost to mothball the facility has yet to be determined, NASA assumes it would be less than the cost to repair and maintain the facility (\$200K per year). As funding for any type of maintenance or repair of facilities is very scarce, NASA has determined that it is not a sound management practice to expend resources to mothball a facility. Additionally, the HST is located in an area planned for future redevelopment. The purpose of the New Town redevelopment project is to upgrade and replace mission essential facilities, and eliminate unneeded infrastructure. The plan does not allow for mothballing of facilities, and as such, NASA has determined that this alternative is not viable.

*Accessibility.* General access to a mothballed facility would only be allowed to authorized personnel. It would not be necessary to consider ADA accessibility for a mothballed building.

*Feasibility.* NASA does not believe that mothballing unneeded and unused buildings is a sound management practice and since HST is located in an area planned for future development, mothballing would preclude this plan. As such, NASA has determined that mothballing the HST is not feasible.

*Cost/Benefit.* The costs of mothballing the HST have not been assessed, although they would probably be lower than the cost of maintaining the building in working condition under other alternatives. In addition to being a good steward of its historic resources, another possible benefit to mothballing the facility would be the chance that a future use for the facility is identified. However, this is unlikely given that duplicate and superior subsonic testing capabilities are available elsewhere. The expenditure of resources and the impact to NASA's future redevelopment plan outweigh these benefits.

*Security.* There would be no change in security requirements if NASA were to mothball the facility.

***Alternative 7. No Action.*** This alternative would require the least expenditure of resources for NASA LaRC. Currently, the plenum area of HST has been converted to storage for the 14- by 22-Foot LST. The remainder of the tunnel is unoccupied. Without maintenance, the exterior of the facility would continue to deteriorate. The wind tunnel would become an "eye sore" in a highly visible area of the Center, and NASA would be out of compliance with the NHPA. Allowing a historic property to deteriorate through neglect is considered an adverse impact and as such would require mitigation. Furthermore, this alternative would not allow for the future redevelopment of the property, thereby restricting NASA's ability to meet its mission requirements. As such, NASA has determined that the no action alternative is not acceptable.

*Accessibility.* ADA accessibility modifications would not be required for an unoccupied, unused building. General access to an unoccupied, unused building would only be allowed to authorized personnel.

*Feasibility.* Continuing current management practices is feasible, but will not further NASA's mission.

*Cost/Benefit.* While taking no action would require the least expenditure of resources, NASA would not benefit from this alternative as the facility would continue to deteriorate. There would be minimal costs incurred by NASA as periodic maintenance would still be performed to check the emergency lighting and fire system within the facility. Additionally, NASA would not benefit from this alternative as the HST is located in an area planned for redevelopment.

*Security.* There would be no change to the current security requirements.

**Alternative 8. Demolition.** Demolition of the HST would involve removal of the tunnel circuit portion of the facility. The attached office building as well as the portion of the wind tunnel that was converted into model storage for the neighboring 14-by 22-Foot LST would be left in tact (see attached floor plan). NASA as an agency has been directed by the Administration to reduce infrastructure (see the March 1997 Presidential Decision Directive/National Science and Technology Council, "Status of Federal Laboratory Reform" available at: <http://www.fas.org/irp/offdocs/pdd5status.html>). As such, the Agency must plan for the disposal of some of its assets which includes the demolition of certain facilities where the cost/benefit analysis favors such an outcome and where no reasonable alternative can be found. While funds for general facility maintenance come from LaRC, the funding to demolish the HST would come from NASA Headquarters. To meet mission goals, which include scheduling the construction of new facilities for planned research, NASA LaRC must ensure its associated demolition needs are part of NASA Headquarters' planning process.

NASA has determined that demolishing the HST would achieve the following:

- remove an aging facility that is no longer operational or needed to support NASA's mission;
- reduce expenditure of maintenance funds on an unused facility;
- support future redevelopment plans of the area.

*Accessibility.* Demolition would obviate the need for general access or ADA accessibility. Any new construction would comply with current ADA standards, incorporating them at the design level.

*Feasibility.* NASA LaRC has determined that demolition of the HST can be funded and is therefore feasible.

*Cost/Benefit.* The current estimate to demolish the tunnel circuit of the HST is \$550 thousand. Comparison of this alternative to repair and maintenance results is an estimated payback period of 3-4 years. The payback periods for mothballing and no

action would be longer as it is anticipated that these alternatives would require less annual expense compared to repair and maintenance. NASA would benefit from demolishing the HST by reducing unneeded infrastructure and freeing up space for future development to support NASA's mission. This benefit would be balanced by the loss of a property that has been determined eligible for listing on the National Register as a contributing element to a proposed historic district. However, appropriate mitigation measures would be carried out.

*Security.* Demolition of the HST would not have an effect on the security at NASA LaRC.

### **Preferred Alternative**

Upon analysis of the above alternatives, NASA LaRC has decided that demolition of the 7-by 10-Foot HST is the preferred alternative. Although the facility is identified as eligible for listing on the NRHP as a contributing resource to a proposed historic district, NASA has determined that it lacks individual uniqueness and demolition of the facility would result in a minimal loss of NASA's history. This determination is consistent with comments received from the NPS regarding NASA's demolition initiative, specifically, that "Building 1212B is one of several remaining 7 x 10-foot tunnels. While it represents one of the most common "workhorse" size wind tunnel designs, it possesses no particularly remarkable features." Additionally, the demolition of Building 1212B "would result in minimal loss of historical knowledge or attraction."

(TRIP REPORT – February 10, 2005, meeting at NASA Langley Research Center, Hampton, VA, in regard to the possible demolition of six facilities, J. Lawrence Lee)

NASA has determined that demolition of the 7-by 10-Foot HST would remove a facility that is out-dated, no longer operational and technologically obsolete. In addition, it would reduce the expenditure of maintenance funds on an unused facility and allow for the future redevelopment of the property to support NASA LaRC for the future. It is important to note that this decision was not made without serious consideration and evaluation of alternatives. As an agency, NASA is currently undergoing a monumental transformation in both business practices and mission. To successfully execute the President's Vision for Space Exploration, NASA must refocus its organization, and realign programs, personnel and resources while continuing to comply with federal laws such as NHPA. A major component of this transformation will involve phasing out under-utilized buildings and facilities as mandated by the Administration, and making improvements to key infrastructure that supports the new vision. NASA plans to meet these future needs while preserving its history through carrying out mitigation measures to minimize the adverse impacts resulting from demolition of the facility.

### **Mitigation Measures**

NASA is committed to preservation of its historic resources wherever it is realistically feasible and compatible with our goals and overall mission. Demolition of the 7-by 10-Foot HST would result in an adverse impact to a property that LaRC has determined is eligible for listing on the NRHP as a contributing resource to a proposed historic district. As such, NASA proposes to

prepare a Memorandum of Agreement with VDHR and if applicable, the ACHP and the NPS, to establish agreed-upon mitigation measures.

NASA proposes to carry out the following mitigation measures to minimize the adverse effect of demolition:

1. Prepare HAER Level 1 documentation of the 7-by 10-Foot HST to properly record the history and contributions the facility made to NASA's legacy.
2. Further document the facility by obtaining panoramic interior photographs and aerial spherical exterior photographs of the wind tunnel to create virtual tour data for the Center's Master Plan web page.

## **Conclusion**

NASA recognizes that today's mission and program rest on events dating back to the days of NACA and before. While many of these historic achievements are represented in the aircraft and equipment used by pilots and astronauts throughout the years, the physical environment, including facilities such as the 7- by 10-Foot HST, provide a tangible context to remind us of our past. While demolition of the HST would result in the loss of structure that has contributed to NASA's mission, NASA has ensured that numerous opportunities exist both locally and throughout the country for public participation in and interpretation of NASA's history and legacy. As previously described, NASA provides significant support annually to the VASC and their operation as NASA LaRC's Visitors' Center. Nationally, NASA actively participates in providing artifacts to the National Air and Space Museum and other venues to allow for public appreciation and viewing of NASA's history.

NASA strives to be a good steward of the mission-critical resources entrusted to us by the American public. As such, we must focus those resources, including funding, on supporting current mission requirements and preserving the most significant of past mission contributions. Fulfilling our commitments with the International Space Station, retiring the Space Shuttle in 2010, and developing the Crew Exploration Vehicle for missions to the Moon, Mars, and beyond are extremely challenging goals. As such, NASA must work creatively to preserve our past while still preparing for our future.

## **References**

NASA. 1996. [NASA-DoD Major Facilities Integrated Product Team (MFIPT) Report, dated June 10, 1996. <<http://www.hq.nasa.gov/office/codej/codejx/ipt.htm>>.

Park, Sharon C. 1993. National Park Service Preservation Brief 31, Mothballing Historic Buildings. Accessed July 21, 2006 <<http://www.cr.nps.gov/hps/tps/briefs/brief31.htm>>.

RAND. 2004 "An Assessment of NASA's Capabilities to Serve National Needs" <[http://www.rand.org/pubs/monographs/2004/RAND\\_MG178.pdf](http://www.rand.org/pubs/monographs/2004/RAND_MG178.pdf)>

U.S. Government Accounting Office. 1996. Report to the Chairman, Subcommittee on National Security, International Affairs, and Criminal Justice, Committee on Government Reform and Oversight, House of Representatives, “NASA Infrastructure: Challenges to Achieving Reductions and Efficiencies” Appendix II. <<http://www.gao.gov/archive/1996/ns96187.pdf>>. September 1996

**APPENDIX D**  
**MEMORANDUM OF AGREEMENT**

**MEMORANDUM OF AGREEMENT  
BETWEEN  
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND  
THE VIRGINIA STATE HISTORIC PRESERVATION OFFICE  
REGARDING  
DEMOLITION OF THE 7-FOOT BY 10-FOOT HIGH SPEED TUNNEL**

**March 2007**

WHEREAS, the National Aeronautics and Space Administration (NASA) proposes to demolish the 7-Foot by 10-Foot High Speed Tunnel (Site 114-5313-0091, Building 1212B), located at NASA's Langley Research Center in the City of Hampton; and

WHEREAS, pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act of 1966 (NHPA) as amended, NASA is required to take into account the effects of federal undertakings on properties included in or eligible for inclusion in the National Register of Historic Places (NRHP) and to consult with the State Historic Preservation Office (SHPO); and

WHEREAS, NASA, in consultation with the SHPO, has determined that the proposed undertaking will have an adverse effect on the 7-Foot by 10-Foot High Speed Tunnel, a property eligible for listing in the National Register of Historic Places as a contributing resource to a proposed historic district, and

WHEREAS, NASA and the SHPO agree that there is a lack of prudent and feasible alternatives to the demolition of the 7-Foot by 10-Foot High Speed Tunnel due to the facility's out-dated technology, restricted public access, and NASA mission requirements to streamline unneeded infrastructure; and

WHEREAS, NASA intends to use the provisions of this Agreement, and the completion of an Environmental Assessment of the Project, to address applicable requirements of Sections 110(a)(1) and 110(b) of the NHPA, Section 106 of the NHPA, and 32 CFR 989 of the National Environmental Policy Act (NEPA);

WHEREAS, NASA has invited the participation of the Advisory Council on Historic Preservation (Council), and the Council has declined to participate;

NOW, THEREFORE, NASA and the SHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to satisfy NASA's Section 106 responsibilities to take into account the effects of federal undertakings on historic properties.

## Stipulations

NASA shall ensure that the following stipulations are carried out:

### I. MITIGATION

Prior to demolition of the 7-Foot by 10-Foot High Speed Tunnel, NASA will perform the following actions:

- a. Recordation – NASA shall prepare Historic American Engineering Record (HAER) documentation of the property consistent with Level I standards of the *Secretary of the Interior's Standards and Guidelines for Architectural and Engineering Documentation* (48 Federal Register 44730-38). Copies of this documentation will be made available to the SHPO for review and approval prior to demolition. The SHPO shall provide its review within 30 calendar days following receipt of documentation from NASA and absent receipt of approval or response by the SHPO within that time period, NASA may presume that the documentation is approved by the SHPO.
- b. Artifact Salvage and Curation – NASA shall consult with parties that have expressed interest in preserving architectural elements of the building to determine if there are any such elements, or artifacts within the building, that may be salvaged for curation or display purposes.
- c. Public Interpretation – NASA, in consultation with the SHPO, shall develop and implement a plan to allow for public interpretation of the history of the 7-Foot by 10-Foot High Speed Tunnel. The plan shall include, but need not be limited to, the following elements:
  1. Photographs and written records which describe the 7-Foot by 10-Foot High Speed Tunnel.
  2. Videotape interviews of persons who worked in the 7-Foot by 10-Foot High Speed Tunnel and associated research programs.
  3. Development of a web-based presentation on the 7-Foot by 10-Foot High Speed Tunnel incorporating photographs, video clips and written materials for display through the NASA website.

The plan will be provided to the SHPO for review and approval within 6 months of the last signature on this Agreement. The SHPO shall provide its review within 30 calendar days following receipt of the plan from NASA and absent receipt of approval or response by the SHPO within that time period, NASA may presume that the plan is approved by the SHPO. The plan shall be fully implemented and a copy of the photographs, records, video clips and the presentation shall be placed on file at either the NASA History Office, the LaRC Technical Library, or the VASC to comply with 16 USC 470a(a)(7)(A), and shall be provided to the SHPO Archives within 1 year of the last signature on this Agreement.

## II. CURATION

All architectural elements, artifacts, appropriate research notes, maps, drawing and photographic records collected as part of this project will be cared for in a repository approved by NASA and the SHPO and in accordance with the requirements in 36 CFR 79, *Curation of Federally Owned and Administered Archeological Collections*. NASA will use reasonable efforts to utilize a repository that will make such items available to educational institutions and individual scholars for appropriate exhibit and/or research under the operating policies of the selected repository.

## **III. DISPUTE RESOLUTION**

- a. Should any party to this agreement object in writing to NASA regarding the proposed action with respect to this undertaking covered by this agreement or to implementation of this agreement, NASA will consult with the objecting party to resolve the objection.
- b. If after initiating such consultation, NASA determines that the objection cannot be resolved through consultation, NASA shall forward all documentation relevant to the objection to the Council, including the proposed response to the objection.
- c. Within thirty (30) days after receipt of all pertinent documentation, the Council shall exercise one of the following options:
  1. Advise NASA that the Council concurs with NASA's proposed response to the objection, whereupon NASA will respond to the objection accordingly; or
  2. Provide NASA with recommendations, which NASA shall take into account in reaching a final decision regarding its response to the objection; or
  3. Notify NASA that the objection will be referred for comment pursuant to 36 CFR 800.7(a)(4), and proceed to refer the objection and comment. NASA shall take the resulting comment into account in accordance with 36 CFR 800.7(c)(4) and Section 110(l) of the NHPA.
- d. Should the Council not exercise one of the above options within thirty (30) days after receipt of all pertinent documentation, NASA may assume the Council's concurrence in its proposed response to the objection.
- e. NASA shall take into account any Council recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection; NASA's responsibility to carry out all the actions under this agreement that are not the subjects of the objections shall remain unchanged.

- f. At any time during implementation of the measures stipulated in this agreement, should an objection pertaining to this agreement be raised by a member of the public, NASA shall notify the parties to this agreement and take the objection into account, consulting with the objector and, should the objector so request, with any of the parties to this agreement to resolve the objection.

#### **IV. AMENDMENTS AND TERMINATION**

- a. Any party to this agreement may propose to NASA that the agreement be amended, whereupon NASA will consult with the other parties to this agreement to consider such an amendment. All signatories to the agreement must agree to the proposed amendment in accordance with 36 CFR 800.6(c)(7).
- b. If NASA decides it will not proceed with the undertaking, it shall so notify the SHPO, as well as other parties involved in this consultation and this agreement shall become null and void.
- c. If NASA determines that it cannot implement the terms of this agreement, or if NASA or the SHPO determines that the agreement is not being properly implemented, NASA or the SHPO may propose to the other parties to this agreement that it be amended or terminated.
- d. This agreement may be terminated by any signatory to the agreement in accordance with the procedures described in 36 CFR 800.6(c)(8). Termination shall include the submission of a technical report by NASA on any work done up to and including the date of termination. If NASA is unable to execute another memorandum of agreement following termination, NASA may choose to modify or abandon the project.

#### **V. DURATION OF AGREEMENT**

- a. This agreement will continue in full force and effect until five (5) years after the date of the last signature. At any time in the six-month period prior to such date, NASA may request the signatory parties to consider an extension or modification of this agreement. No extension or modification will be effective unless all parties to the agreement have agreed with it in writing.

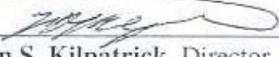
#### **VI. FAILURE TO CARRY OUT THE TERMS OF THE AGREEMENT**

In the event that the terms of this agreement are not carried out, NASA shall comply with 36 CFR Part 800 with regard to actions covered by this agreement.

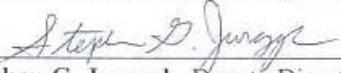
Execution of this Memorandum of Agreement by NASA and the SHPO and its submission to the Council in accordance with 36 CFR 800.6(b)(1)(iv) shall, pursuant to 36 CFR 800.6(c), be considered to be an agreement with the Council for the purposes of Section 110(1) of the NHPA. Execution and submission of the Memorandum of Agreement and implementation of its terms evidences that NASA has afforded the Council an opportunity to comment on the proposed

undertaking and its effects on historic properties, and that NASA has taken into account the effects of the undertaking on historic properties.

**VIRGINIA DEPARTMENT OF HISTORIC RESOURCES**

By:  Date: 3/29/07  
Kathleen S. Kilpatrick, Director  
State Historic Preservation Officer

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

By:  Date: 3/13/07  
Stephen G. Jurczyk, Deputy Director  
Langley Research Center