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National Aeronautics and Space Administration

Draft Environmental Impact Statement for Proposed Demolition and Environmental Cleanup Activities at Santa Susana Field Laboratory

Ventura County, California

Prepared for
George C. Marshall Space Flight Center
Huntsville, Alabama

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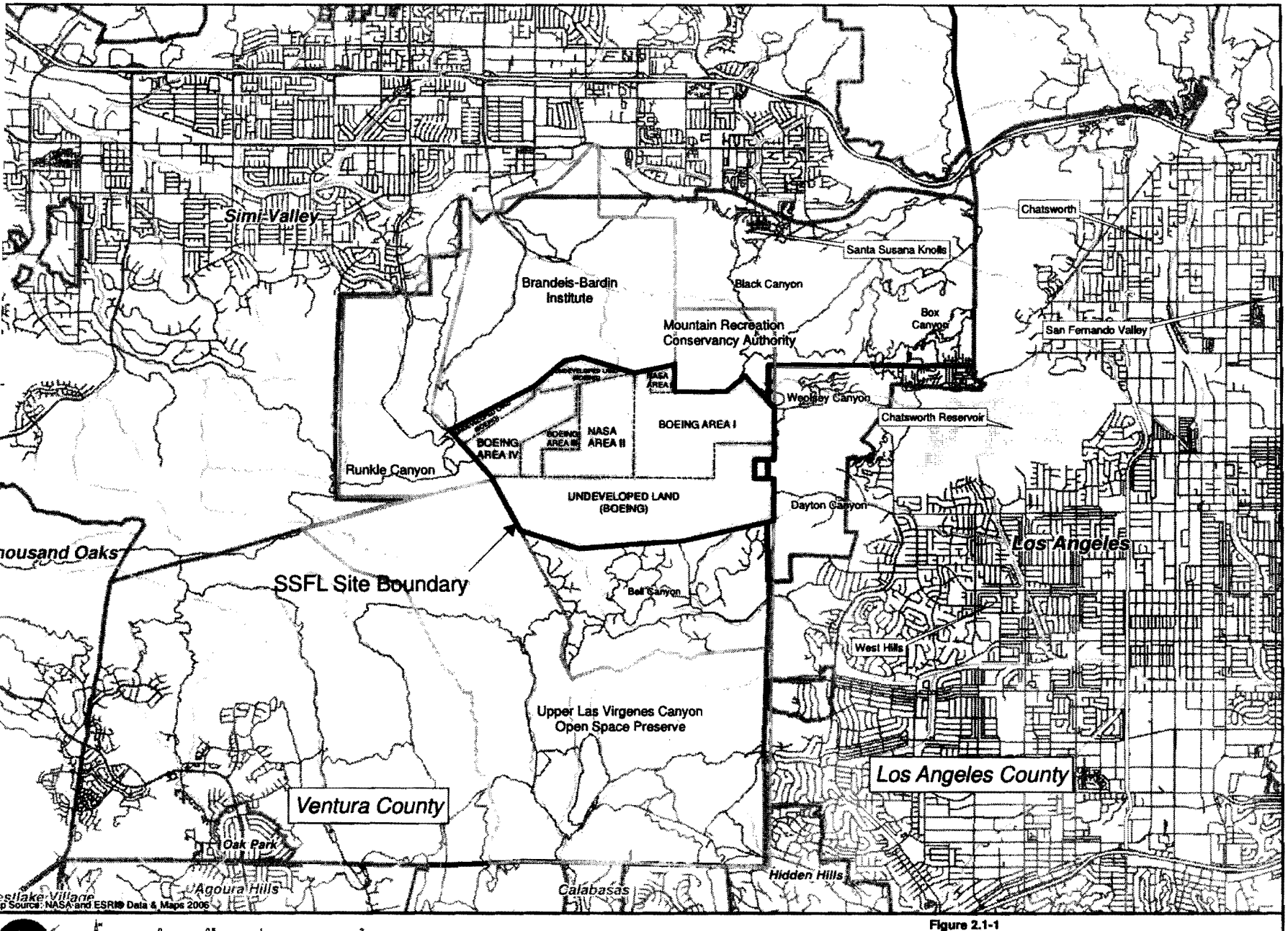

Figure 2.1-1
SSFL Location Map
NASA - Santa Susana Field Laboratory
EIS for Proposed Demolition and Environmental Cleanup

Document: O:\NASA\SSFL\maps\EIS_2011\EIS_SiteLocation.mxd

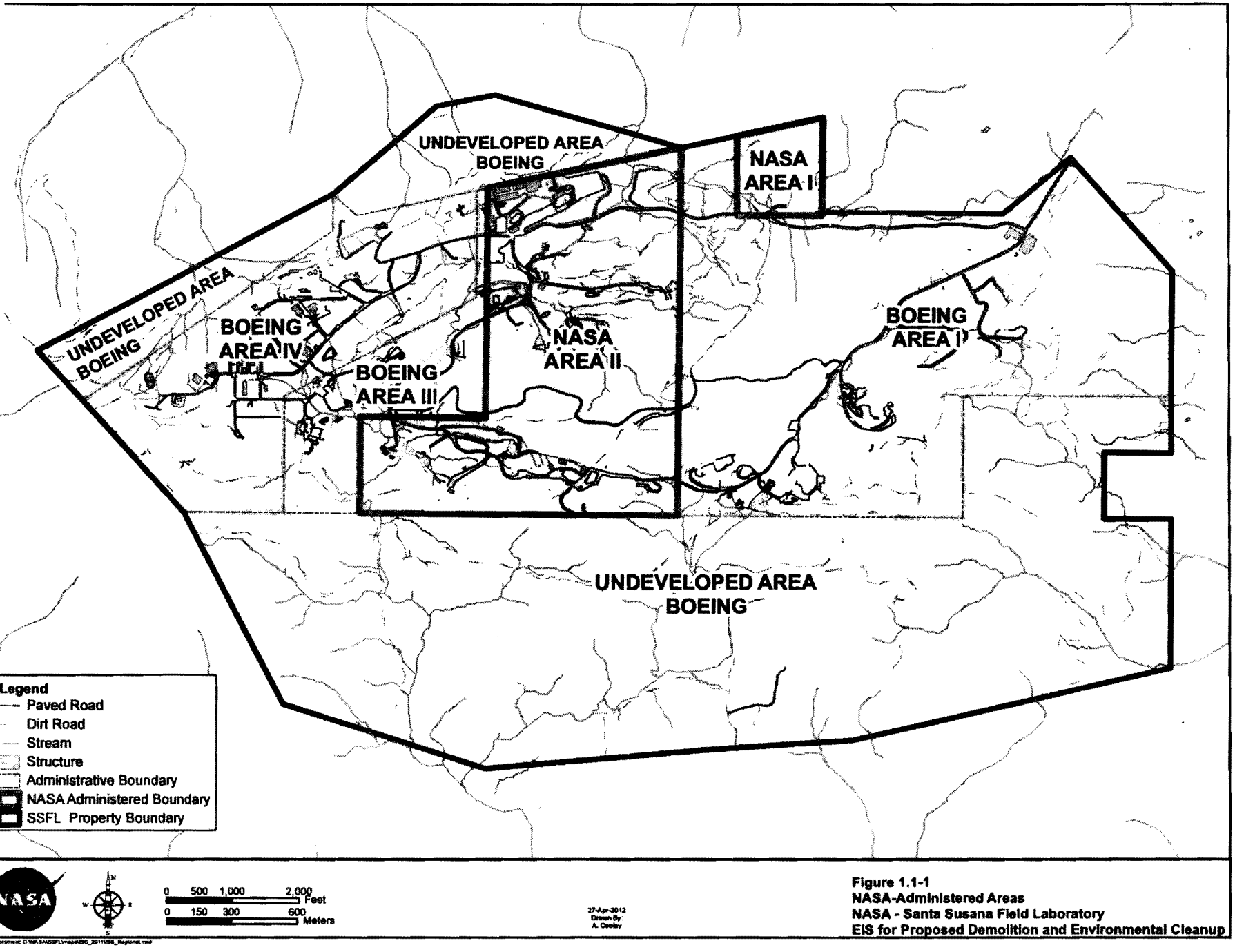

Figure 1.1-1
NASA-Administered Areas
NASA - Santa Susana Field Laboratory
EIS for Proposed Demolition and Environmental Cleanup

Executive Summary

The National Aeronautics and Space Administration (NASA) developed this draft Environmental Impact Statement (EIS) to evaluate potential environmental impacts from its Proposed Action to conduct demolition activity and remediation of groundwater and soil on the NASA-administered property at Santa Susana Field Laboratory (SSFL).

ES-1.0 Purpose and Need for Action

The purpose of the Proposed Action is to remediate the environment to a level that meets NASA's cleanup responsibilities and to perform demolition actions necessary to support both remediation and property disposition of the NASA-administered portion of SSFL.

This draft EIS informs NASA decision makers, regulating agencies, and the public of the potential environmental consequences of implementing the proposed demolition of SSFL site structures and the proposed groundwater and soil remediation. NASA has prepared this draft EIS in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended; the implementing regulations issued by the White House's Council on Environmental Quality (CEQ) (40 *Code of Federal Regulations* [CFR] Parts 1500-1508); the guidance letter submitted by CEQ dated June 19, 2012, and the (NASA) "Procedures for Implementing the National Environmental Policy Act (NEPA)" (14 CFR 1216.1 through 1216.3). NASA will use the EIS to comply with Section 106 of the National Historic Preservation Act (NHPA) in lieu of the procedures set forth in Sections 800.3 through 800.6 in accordance with Section 800.8(c) of the NHPA.

ES-2.0 Background

SSFL is located in southeastern Ventura County, California. NASA administers part of Area I (the Liquid Oxygen [LOX] Plant Area, (41.7 acres) and all of Area II (409.5 acres). The Boeing Company (Boeing) owns the remainder of the 2,850 acres of SSFL property.

Since 1948, site activities at SSFL included research, development, and testing of liquid-fueled rocket engines and components. From the 1950s through the early 1970s Rocketdyne (one predecessor to Boeing) conducted operations in Areas I and III in support of various government space programs and in Area II on behalf of the United States (U.S.) Air Force (USAF), and then of NASA. NASA gradually discontinued test activities in the 1980s and conducted its final tests in 2006. Area II was deeded to the USAF in 1958 and to NASA in 1973. The LOX Plant in Area I was transferred to NASA in 1976. NASA reported its Santa Susana property as excess to its mission needs in September 2009.

Historical use of test stands and other operations at SSFL resulted in environmental contamination. Extensive site investigations were conducted by NASA and contamination was documented in five remedial investigation (RI) reports submitted to the Department of Toxic Substance Control (DTSC). In August 2007, NASA, Boeing, the U.S. Department of Energy (DOE), and DTSC signed a Consent Order for Corrective Action (State of California DTSC Docket No. P3-07/08-003, 2007) (2007 Consent Order) that addressed the cleanup of soils and groundwater at SSFL (California Environmental Protection Agency [CalEPA] DTSC, 2007). The 2007 Consent Order identified the required activities for cleanup of soil, groundwater, and surface water at SSFL. In 2010, NASA and DTSC executed an Agreement in Principle for soil cleanup. Subsequently, on December 6, 2010, NASA and DTSC executed an Administrative Order on Consent for Remedial Action (AOC) (State of California DTSC Docket No. HAS-CO_10/11-038, 2010) that stipulates specific remedial requirements, including characterization and cleanup of soil contamination on the NASA-administered areas of SSFL to Look-Up Table values (CalEPA DTSC, 2010), available online: http://www.dtsc-ssfl.com/files/lib_look-uptables/chemical/66073_06112013LUTand_cover.pdf.

ES-2.1 Public Involvement

ES-2.1.1 EIS Scoping

NASA published several notifications of its intent to prepare an EIS and conduct scoping. The Notice of Intent (NOI), published in the *Federal Register* (FR) on July 6, 2011 (76 FR 39443-39444), invited agencies, organizations,

tribal governments, individuals, and interested parties to participate in developing the scope and identifying environmental issues for the EIS. NASA accepted written and verbal comments at public scoping meetings and throughout the 74-day scoping period (July 8 through September 19, 2011). NASA hosted public meetings (August 16, 17, and 18, 2011) at which the public was invited to speak, and 55 oral submittals were transcribed by a court reporter. Technical experts were available for questions and discussion during a poster session followed by NASA's presentation and Question and Answer session.

Two hundred thirty one submittals from agencies, organizations, and individuals were received by e-mail, U.S. postage, or hand delivery at the meetings. Because many submittals contained multiple comments, a total of 756 comments were identified. The majority of comments may be grouped in four general areas:

- Retain or limit the range of alternatives
- Preserve the valuable natural, historical, and cultural resources at SSFL
- Address transportation routes and effects of potentially increased traffic
- Consider multiple cleanup technologies

NASA also held a Community Informational Update on the EIS on March 27, 2012, to describe the areas for remediation and the technical approaches being considered to achieve soil and groundwater cleanup. Subsequently, NASA received comments from Senator Boxer's office and the White House's CEQ regarding the relevance of including alternatives other than cleanup to background under the 2010 AOC. In a letter to Senator Boxer, Nancy H. Sutley, Chair of CEQ noted:

> *CEQ encourages agencies to carry out robust alternatives analyses that consider all reasonable alternatives, including those that are not within agencies' authorities. The real focus, however, must always be on a meaningful consideration of alternatives. In this particular situation, where NASA has signed the Agreement and committed to a cleanup standard to background, nothing under NEPA or CEQ regulations constrains NASA from looking beyond cleanup to background, even though some may consider the analysis unnecessary and inconsistent with the agreement NASA signed with the State. However, there is no requirement that NASA consider alternatives that cleanup to standards that differ from the agreement with the State. The Supreme Court has stated that the concept of alternatives must be bounded by some notion of feasibility, Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 551 (1978) and under the specific facts of the cleanup at this time, feasibility is most sufficiently defined within the scope of cleanup to background. There would, of course, have to be a no-action alternative considered.*

The letter later states:

> *In view of NASA's administrative cleanup resolution with the State of California, which turns upon NASA's commitment to clean the site to local background levels, CEQ's view is that – under this rule of reason – NASA is not compelled to consider less comprehensive cleanup measures as alternatives.*

With this direction, NASA issued the following statement:

> *We received comments from Senator Boxer and the Council on Environmental Quality regarding the evaluation of alternatives for the preparation of our Environmental Impact Statement. As a result, NASA has chosen to streamline its review in the Draft Environmental Impact Statement (DEIS) and analyze only the alternatives of (a) cleanup to background and (b) the no-action alternative.*

NASA's decision was published on NASA's website at http://ssfl.msfc.nasa.gov/environmental-cleanup/environmental-impact-statement/. Numerous letters from interested parties were received requesting NASA to reconsider its decision to limit alternatives. Among them is a legal memorandum prepared for the Santa Ynez Band of Chumash Indians that questions the legality of limiting the scope of an EIS to only a Proposed Action and a No Action Alternative. It also states, "The administrative order NASA consented to prior to NEPA analysis is

invalid for failure to first prepare an EIS – and is not binding on NASA, a federal agency, under the Supremacy Clause of the Constitution."

ES-2.1.2 Consultation under Section 106 of the National Historic Preservation Act

The NHPA requires NASA to consult with federal, state, and local agencies, Native American Tribes, other organizations, and members of the public having a potential interest in the Proposed Action. NASA posted on its website a form for interested parties to request participation in the Section 106 consultation process under NHPA regulations 36 CFR 800. More than 35 individuals have been involved during the consultation, with additional parties having joined as recently as March 2013. Consulting parties have varying interests in the site and include representatives from Federally-Recognized and members of State-Recognized Tribes. Consulting parties have met onsite at SSFL and via teleconference to discuss the potential impacts to historic properties such as the Burro Flats Cave and the historic test stand districts. Ongoing consultation will culminate with recording efforts to minimize or mitigate any adverse effects in the Record of Decision (ROD), which completes the EIS process. The ROD is the formal document that states NASA's decision, identifies the alternatives considered, and discusses mitigation plans, commitments by the agency, and monitoring.

ES-2.2 Selection of Alternatives to Evaluate

NASA originally proposed to evaluate a range of alternatives including the "cleanup to background" alternative required by the 2010 AOC, the No Action alternative required by NEPA, and other alternatives that are consistent with those evaluated under a Superfund or Resource Conservation and Recovery Act (RCRA) cleanup process. Following receipt of comments from some members of the public, DTSC, Senator Boxer, and guidance from the White House's CEQ, the EIS considers only the "cleanup to background" and the No Action alternatives.

The Proposed Action includes multiple variations on approaches to achieving the Look-Up Table values prescribed by the 2010 AOC. As such, the Proposed Action includes the demolition of up to 100 percent of the existing structures, consideration of numerous soil cleanup technologies to meet the 2010 AOC Look-Up Table values, and consideration of several technologies to achieve the groundwater cleanup to meet the 2007 Consent Order. These different methods and technologies (used separately or in combination) were evaluated for their impacts on the environment and their effectiveness in meeting the 2010 AOC (for soil cleanup) and 2007 Consent Order (for groundwater cleanup). These were evaluated in accordance with relevant federal, state, and local regulations.

ES-3.0 Alternatives Evaluated

ES-3.1 Demolition, Soil Cleanup to Background Levels, and Groundwater Cleanup

ES-3.1.1 Proposed Demolition Activities

The demolition of up to all existing structures on NASA-administered property provides the most conservative assessment (worst-case scenario) of impacts. Dismantled components would be contained, as appropriate, and transported for offsite recycling or disposal. The structures include Alfa, Bravo, and Coca test stands and inactive ancillary structures that could include the following:

- Aboveground and subsurface structures
- Building foundations
- Utility poles
- Piping
- Administrative and operations buildings
- Water tanks
- Aboveground and belowground storage tanks
- Observation lookouts, roadways, and drainageways

NASA could begin demolition in 2014 and complete it in 2015 ahead of the proposed soil and groundwater cleanup activities. The 2010 AOC mandates that NASA complete soil remediation at SSFL and remove soils by the end of 2017.

ES-3.1.2 Proposed Soil Cleanup Activities

The 2010 AOC requires that NASA remediate the soils to Look-Up Table values provided by DTSC. These values were developed using local background values and laboratory method reporting limits. Viable cleanup technologies were identified based on their effectiveness to clean up the specific contaminants at the site under the environmental conditions at SSFL. The contamination can be separated into two groups of soils: treatable and non-treatable soils.

Treatable soils may contain polycyclic aromatic hydrocarbons (PAHs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPHs), and volatile organic compounds (VOCs). These soils have the potential of being cleaned to 2010 AOC standards using technologies discussed later in this document; however, it still must be demonstrated that implementation of these remedial technologies can meet the 2010 AOC requirements. Currently, excavation and offsite disposal is the only proven remedial technology to meet 2010 AOC standards.

Non-treatable soils may contain dioxins, polychlorinated biphenyls (PCBs), metals, pesticides, and energetics.

While some technologies might be able to treat some of the constituents in a class, (one type of metal in the class of all metals, for example), even if one in the class is not able to be treated, then the class is considered non-treatable. Mixed soil is considered a co-location of treatable and non-treatable soils that would require some excavation and some potential use of technical alternatives.

In the vast majority of contaminated areas on NASA-administered land at SSFL, the top 2 feet (ft) of soil contain non-treatable chemicals and cannot be remediated using any of the technologies. The only way to get the non-treatable chemicals to background levels (2010 AOC requirements) is by excavating and disposing the soil offsite and offsite disposal–an estimated 320,000 cubic yards (yd^3).

ES-3.1.2.1 Excavation and Offsite Disposal

The EIS provides a comparative analysis of the excavation and offsite disposal of both the minimal anticipated excavation amount of about 320,000 yd^3 (assuming treatment technologies are proven effective) and the maximum anticipated excavation amount of about 500,000 yd^3 (assuming the treatment technologies are not effective).

ES-3.1.2.2 Potential Soil Treatment Technologies

The EIS provides a comparative analysis of the potential impacts from the other technologies that might be used separately or in combination to remediate the treatable soils underneath (after excavation):

- Soil vapor extraction (SVE)
- Ex situ treatment using land farming
- Ex situ treatment using thermal desorption
- Ex situ and in situ chemical oxidation
- In situ anaerobic or aerobic biological treatment

ES-3.1.3 Proposed Groundwater Cleanup Activities

Groundwater would be cleaned up consistent with a risk-based protocol required by the 2007 Consent Order. Viable remediation technologies were identified based on their effectiveness to clean up the specific contaminants at the site. The EIS provides a comparative analysis of the potential effects from the following technologies used separately or in combination:

- Pump and treat
- Vacuum extraction
- Heat-driven extraction
- In situ chemical oxidation
- In situ enhanced bioremediation
- Monitored natural attenuation
- Institutional controls

ES-3.2 No Action Alternative

The No Action Alternative considers a continuation of current activities, with no other action as described and evaluated in this EIS. NASA would not demolish test stands or ancillary structures on the NASA-administered property of SSFL, and would not conduct monitoring of test stands. NASA would not conduct soil remediation at the site or groundwater treatment beyond the groundwater extraction and treatment system (GETS) and interim source removal action (ISRA) activities currently underway. Ongoing groundwater and surface water sampling on the site would continue. Once those remedial programs were concluded, no further remedial action would occur. Contaminants not captured by those programs would remain in place or attenuate naturally over time.

ES-4.0 How The EIS Was Conducted

NASA identified specific activities involved in implementing the Proposed Action, then evaluated how much of an impact the activities would have on the environment. For the EIS, impacts were analyzed by environmental resource areas that make up the natural and human environment to include physical, social, and cultural issues that could affect or be affected by the Proposed Action. NASA identified 11 major environmental resource areas including cultural resources; biological resources; air quality; water resources; hazardous and nonhazardous materials; traffic and transportation; soils, landslide potential, topography and paleontological resources; health and safety; site infrastructure and utilities; noise and environmental justice.

For each of the 11 environmental resource areas, a region of influence (ROI) was determined that includes the entire vicinity surrounding the resource area that could be affected. The EIS evaluated how much of an impact there would be in each resource area in the appropriate ROI for the Proposed Action and the No Action Alternative. The evaluation involved examining the types and intensities of the potential impacts. It considered, for example, whether impacts would be local to the SSFL site or have wider, more regional impacts. It looked at whether impacts would be short term, occurring only during site work, or long term, lasting after the work was complete. Table ES-1 lists the evaluation criteria for analyzing potential impacts and an impact's level of significance.

TABLE ES-1
Evaluation Criteria for Analyzing Environmental Impacts
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

	Intensity of Impact
No Impact	No impacts would be expected
Negligible	Impacts would not be expected to be measurable, or would be measurable but too small to cause any change in the environment
Minor	Impacts would be measurable but within the capacity of the affected system to absorb the change
Moderate	Impacts would be measurable but within the capacity of the affected system to absorb the change and the impacts could be compensated for with mitigation and resources so the impact would not be substantial
Significant	Impacts would be measurable but not within the capacity of the affected system to absorb the change, and without major mitigation, could be severe and long lasting
	Type of Impact
Beneficial	Would result in some level of environmental improvement
Negative	Would have an adverse effect on the natural or human environmental to include, physical, social, or cultural environment
	Context of Impact
Local	Would occur within the NASA-administered property at SSFL
Regional	Would occur outside the NASA-administered property at SSFL

TABLE ES-1
Evaluation Criteria for Analyzing Environmental Impacts
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

	Duration of Impact (How Long)
Short term	Would occur only during the proposed demolition and immediate remediation period
Long Term	Would continue beyond the proposed demolition and immediate remediation period

ES-5.0 Summary of Environmental Consequences

In each resource area, a number of items were considered and evaluated. The highest level of intensity (negligible, minor, moderate, significant) for any of the individual items evaluated in a resource area determines that resource area's overall impact. For example, if the intensity of one impact within a resource area was identified as significant, then that resource area was considered to have an overall significant impact. Table ES-2 summarizes the results of the Proposed Action impact analysis for each resource area.

TABLE ES-2
Summary of Impacts for the Proposed Demolition and Environmental Cleanup at NASA's Santa Susana Field Laboratory
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

Significant Impacts	Moderate Impacts	Minor or Negligible Impacts	Beneficial Impacts
- Soils, Landslide Potential, Topography, and Paleontological Resources - Cultural Resources - Biological Resources - Traffic and Transportation	- Water Resources - Air Quality and Greenhouse Gas Emissions - Environmental Justice - Health and Safety	- Site Infrastructure and Utilities - Noise - Hazardous and Nonhazardous Materials and Waste	- Biology - Hazardous Waste

ES-5.1 Significant Impacts

ES-5.1.1 Soils, Landslide Potential, Topography, and Paleontological Resources

The primary impact to soils from demolition would be erosion and there would be a ***moderate, negative, regional***, and ***short-term*** impact. Demolition might temporarily increase landslide potential by loosening the soil around the structures to be demolished, having a ***minor, negative, local***, and ***short-term*** impact. Removing underground components of structures to be demolished would potentially affect the topography of the NASA-administered property, though this activity would primarily be surficial, and would have a ***negligible*** to ***minor, negative, local,*** and ***long-term*** impact. Demolition would not be expected to affect surrounding soils, and therefore, would not impact paleontological resources.

Impacts from soil cleanup to this resource area would result primarily from ground disturbance as a result of 320,000 yd^3 of contaminated soil or more being excavated. Because of the use of this invasive remediation, erosion effects would be ***significant, negative, local*** to ***regional,*** and ***short term.*** The potential for landslides would be ***minor, negative, local,*** and ***short term.*** Finally, the changes to topography potentially would be ***negligible*** to ***minor, negative, local,*** and ***short term,*** depending on the backfill used in the excavated areas or remediated soils left after treatment. The potential to encounter paleontological resources is low, and therefore, would have a ***negligible, negative, local,*** and ***long-term*** potential impact.

ES-5.1.2 Cultural Resources

Cultural resources include historic architectural resources, an Indian Sacred Site, and archeological resources.

The Proposed Action calls for the demolition of historic structures on NASA-administered land at SSFL. Demolition would have a ***significant, negative, local,*** and ***long-term*** impact to all of the historic architectural resources. Historic architectural resources are the Alfa, Bravo, and Coca Test Area Historic Districts. These comprise 45 structures in total, of which 9 are individually eligible for the National Register of Historic Places (NRHP) and 36 are eligible as contributing resources to historic districts. The historic structures would be gone from the site.

Disturbance of the site during cleanup would have a ***significant, negative, regional,*** and ***long-term*** impact on archeological resources at SSFL. Ground disturbance activities also would have adverse effects under Section 106 of the NHPA on these resources. Based on research and archeological surveys of the entire NASA-administered land at SSFL, the Proposed Action would adversely and significantly impact approximately 0.65 acre of the Burro Flats Painted Cave archeological site. Listed in the NRHP and the California Register of Historic Resources in May 1976, the site consists of pictographs (rock art paintings), petroglyphs (rock art that has been scored or incised into the rock surface), mortars, tooling, and habitat. The cave's period of significance is believed to be 1000 to 1499 A.D. The Proposed Action also could impact a second potentially NRHP-eligible archeological site in the northern portion of the project area.

SSFL has been formally identified by the Santa Ynez Band of Chumash Indians as an Indian Sacred Site under Executive Order 13007. The Proposed Action would have a ***significant, negative, regional,*** and ***long-term*** impact on the Sacred Site.

ES-5.1.3 Biological Resources

Impacts to biological resources were analyzed based on field surveys (2010 and 2011), other SSFL studies, readily available resource data, literature reviews, ongoing regulatory discussions, and professional opinion. The criteria for evaluating biological resources in the EIS include disturbance, displacement, and mortality of plant and wildlife species and destruction of sensitive habitat. The structures to be demolished and staging areas for demolition equipment are in already developed areas. Migratory birds and sensitive wildlife species have been observed nesting on test stands, transformer poles, and other structures. These wildlife species would be expected to vacate the area during demolition and would possibly return when demolition ends.

As described in ES Section 3.1.2, because (at a minimum) the top 2 ft of soil would be excavated, all existing biological resources within the contaminated areas, including 32 acres of sensitive habitats, would be eliminated. The Proposed Action would result in a ***significant, negative, regional,*** and ***long-term*** impact because of the amount of ground disturbance that would occur. Additionally, changes to soil profiles (the micro and macro fauna of the soil ecosystems) are expected to be ***significant.*** The extensive level of excavation necessary to meet the 2010 AOC would lead to soil instability, decreased vegetative biodiversity, and increased spread of invasive weeds.

ES-5.1.4 Traffic and Transportation

Impacts are analyzed in Traffic and Transportation in three categories: (1) roadway operations and level of service; (2) potential exposure of school children to truck traffic; and (3) potential safety effects from the project-related truck trips, pavement conditions, and parking. Two areas of impact are considered: first, roadways within SSFL and the local roadway network (Woolsey Canyon, Roscoe, and Topanga Canyon); and second, the regional network including I-405, I-5, I-210, and SR 14.

The primary impacts on this resource area would result from truck traffic along the routes accessing SSFL and from onsite demolition, construction, and environmental cleanup activity. The EIS evaluated demolition of up to 100 percent of existing structures, and excavation of the top 2 ft of soil for offsite disposal. These actions would generate the largest volume of offsite traffic and therefore provide the most conservative analysis. Demolition would generate approximately 94,536 tons of debris (test stands and other structures) and excavation would generate approximately 500,000 yd^3 of soil. The high volume of heavy vehicle trips needed to haul this waste material offsite would result in a ***significant, negative, regional,*** and ***long-term*** impact to local pavement conditions on some roadways leading to SSFL (Roscoe, Valley Circle, and Woolsey Canyon).

Moderate, negative, local, and ***short-term*** impacts to the safety of children would be expected because of an increased exposure to truck traffic. The Proposed Action is estimated to generate an average of 142 truck trips

every day. Twenty-eight peak-hour truck trips (14 incoming and 14 outgoing) would occur in both the morning and afternoon school peak hours. Importantly, it is estimated that up to 315,435 student trips (whether traveling by car, bus, bicycle, or on foot) could be exposed to the project-related truck traffic during the 3-year construction period. These estimates are based on both the demolition and environmental remediation; the majority of truck trips are related to remediation. Part of the truck route is on a steep, windy road with some blind curves, increasing the potential for an accident to occur. The potential for even one accident involving a child is significant and unacceptable.

As discussed in ES Section 3.1.2, NASA is evaluating whether technologies can effectively treat rather than excavate some soil to Look-Up Table values. This approach could reduce the volume of soil to be transported offsite for disposal by approximately 36 percent (320,000 yd^3 compared to 500,000 $yd^3$of soil); therefore, fewer truck trips would be needed. Traffic from soil remediation (after excavation is complete) and groundwater cleanup would be limited to the onsite work because offsite disposal would not be necessary.

ES-5.2 Moderate Impacts

ES-5.2.1 Water Resources

Evaluation criteria for water resources include changes in surface water and groundwater hydrology (drainage, stormwater runoff, local flooding, or percolation) and impacts to surface water or groundwater quality.

Demolition would have a ***moderate, negative, local,*** and ***long-term*** impact on water resources. Demolition would remove impervious surfaces and disturb soil, thus increasing the potential for erosion. Demolition also would increase the potential for accidental releases of hazardous materials from construction equipment (fuel and lubricants) and from the demolished structures (lead-based paint and asbestos).

Soil and groundwater cleanup technologies would result in increased erosion potential, changes in hydrology (both surface water and groundwater), impairment of Section 303(d)-listed water bodies, and impacts to the quality of surface water and groundwater. ***Moderate, negative, local,*** and ***long-term*** impacts on surface and groundwater quality would result from excavation of up to 500,000 yd^3 of soil, ex situ treatments, or the insertion of injection wells. These would have the greatest potential for ground disturbance by increasing sedimentation and the potential for contamination migration. The potential changes in hydrology would be ***minor*** to ***moderate, negative, local,*** and ***long term***, and would depend on the design of the soil remediation and its proximity to excavated areas.

ES-5.2.2 Air Quality and Greenhouse Gas Emissions

Moderate, negative, regional, and ***short-term*** impacts on air quality and climate change could result from operating equipment, vehicles, and power sources, and from dust generation due to demolition and excavation of up to 500,000 yd^3 of soil. National Ambient Air Quality Standards (NAAQS) criteria pollutants (a set of air pollutants that cause smog, acid rain, and other health hazards) were estimated. Additionally, CEQ thresholds for greenhouse gas (GHG) emissions were estimated.

Potential emissions were estimated for demolition and environmental cleanup equipment operation, truck travel associated with material and equipment hauling, and worker commutes. Fugitive dust emissions also were estimated for demolition and earth-moving activities. Although these activities might occur anytime between 2014 and the beginning of 2016, the air quality analysis assumed that site activities would begin in January 2014 and be completed within 12 months.

A screening assessment was performed to evaluate the potential impact from operating soil and groundwater remedial technologies. Technologies that would require a significant power source, use combustion, generate fugitive dust or VOC emissions, or rely on heavy-duty trucks or equipment were evaluated qualitatively based on preliminary engineering data or industry standard practices. Additionally, how long the technology would need to operate was considered. Table ES-3 provides the potential emissions from proposed demolition and environmental cleanup.

TABLE ES-3
Potential Emissions from Proposed Demolition and Environmental Cleanup
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

General Conformity *de minimis* Threshold	NAAQS	CEQ (GHG Emissions)
Demolition	Below	Below
Excavation/Offsite Disposal	Above	Above
Other Technologies	Below	Below

The General Conformity rule was created to prevent federal projects from jeopardizing a state's ability to achieve air quality standards. The General Conformity evaluation determines whether a proposed project's emissions for criteria pollutants are above or below *de minimis* threshold levels.

ES-5.2.3 Environmental Justice

The EIS assessed potential impacts on minority and low-income populations within the ROI, based on 49 census block groups (depicted in Figure 3.12-2) that are either adjacent to the SSFL property and potentially could be affected by remedial activities; or adjacent to or near (within approximately 1 mile of) the local roadway network used by trucks accessing SSFL during implementation of the Proposed Action. The impacts for the proposed action would be ***moderate, negative, local***, and ***short term*** for environmental justice resource areas.

Of the 49 block groups evaluated, 18 Los Angeles County block groups have at least 50 percent minority populations, and 9 of those block groups have a minority population that is meaningfully greater than the population of the ROI. Six block groups were identified as low-income populations.

There are five block groups in Ventura County that are adjacent to SSFL. The Summit and Mountain View mobile home communities along Woolsey Canyon Road were specifically analyzed, as requested by local community members. This block group is 17 percent minority, which is below the average for the ROI and the county, and has a 0 percent poverty rate. None of the Ventura County block groups meets the criteria for minority or low-income populations and, as such, there is little or no potential for disproportionate impacts to minority and low-income populations living in proximity to SSFL.

A further analysis was conducted on minority and low-income populations lying along the local roadway network used by trucks accessing SSFL. Overall, 33 block groups in the region of influence are adjacent to the truck routes and 13 block groups are near (not adjacent to but within 1 mile of) the truck routes. In assessing these, the block groups were assigned a potential environmental justice impact score based on their proximity to truck routes, percent minority population, percent poverty rate, etc. This assessment indicated that none of these block groups meets the criteria for minority or low-income populations and, as such, there is little potential for disproportionately high or adverse environmental justice effects related to increased truck traffic.

ES-5.2.4 Health and Safety

Moderate, negative, local, and ***short-term*** impacts to health and safety of onsite work crews would be expected from demolition and environmental cleanup activities. The potential for injury or exposure is broad and includes exposure to hazardous materials, safety hazards to utilities (gas and electric), physical hazards such as slips and falls or being struck by heavy equipment or debris, and natural hazards such as poison oak, stinging insects, and rattlesnakes. Additional health and safety factors might include dust generated from demolition activities, which potentially could expose workers to contaminated soil. Removal of contaminated soil and improvement to groundwater from the Proposed Action would result in ***moderate, beneficial, local,*** and ***long-term*** impacts to future users of the site.

ES-5.3 Minor and Negligible Impacts

ES-5.3.1 Site Infrastructure and Utilities

The Proposed Action would result in a potential for impacts to potable water supply; systems that provide natural gas, sewer, and electrical service; and the communications system. ***Minor, negative, local,*** and ***short-term*** impacts are associated with the removal of natural gas and electrical infrastructure because of the inherent safety concerns with explosion, electrocution, and fire.

Proposed soil cleanup technologies potentially requiring utility service to operate include SVE, ex situ treatment using thermal desorption, in situ physical treatment using soil mixing, in situ chemical oxidation, and in situ anaerobic or aerobic biological treatment. Groundwater cleanup technologies include pump-and-treat, vacuum extraction, and heat-driven extraction. To maintain utility service to these technologies might require rerouting or expansion of service before site work. Interruption of services creates a potential ***negligible, negative, local,*** and ***long-term*** impact.

ES-5.3.2 Noise

The EIS compared existing noise levels on NASA-administered property to estimated future noise levels associated with proposed demolition and environmental cleanup activities. ***Minor, negative, local,*** and ***short-term*** (an estimated period of 3 years) noise impacts would result from increased traffic volumes. Existing noise levels range from 52- to 61-decibel (A-weighted) (dBA) community noise equivalent level (CNEL) at a distance of 100 ft. An estimated 3,476 truck trips from demolition and between 16,800 and 26,000 additional trucks for excavation and disposal would result in an increase of 3-dBA change in noise levels along the designated truck routes at a distance of 100 ft. Under the Proposed Action, the frequency and duration of truck traffic would be measurably and noticeably higher than the existing conditions; as such, the overall increase in noise would be perceptible.

ES-5.3.3 Hazardous and Nonhazardous Materials and Waste

Demolishing test stands, buildings, and ancillary structures on the NASA-administered property at SSFL would result in a ***minor, negative, regional***, and ***long-term*** impact by generating waste materials including hazardous wastes, nonhazardous wastes, mixed wastes, and/or other classifications with specific management or disposal requirements. NASA would characterize materials as hazardous or nonhazardous after demolition and before materials were loaded onto trucks or trailers for transport to an offsite approved waste facility.

Among the soil cleanup technologies, excavation with offsite disposal is the only activity that would result in ***negligible, negative, regional,*** and ***long-term*** impacts for nonhazardous waste disposal facilities and ***minor*** to ***moderate*** impacts for hazardous waste disposal facilities. The potential for the release of contamination during environmental cleanup activities would result in a ***minor, negative, local*** to ***regional,*** and ***long-term*** impact. The volume of contaminated soil requiring excavation and offsite disposal to meet the Look-Up Table values is significant and would have a ***significant, beneficial, local,*** and ***long-term*** impact from hazardous and nonhazardous wastes because these waste are being removed from the site and would no longer be present.

ES-5.4 Summary of Impacts, Best Management Practices, and Mitigation Measures

Table ES-4 provides a summary of the resource area impacts and mitigation measures described in ES Sections 5.1 through 5.3.

ES-6.0 Summary of Cumulative Impacts

Cumulative activities were identified that might occur in the same area or timeframe as the Proposed Action. These activities were evaluated to identify potential environmental impacts that, when added to the Proposed Action's impacts, would result in a cumulative effect as a result of past, present, and reasonably foreseeable future actions. The EIS considered the Proposed Action with the adjacent environmental cleanup activities being conducted by DOE and Boeing. When considered together, cumulative impacts would result from trucks on the local roadway networks, further degraded roadway conditions, and increased noise levels. Similarly, soil and vegetation removal and other SSFL restoration and remediation activities were considered. Finally, the amount of

hazardous and nonhazardous material transported and disposed of would cumulatively burden the designated disposal facilities. Table ES-5 provides a summary of cumulative effects specific to each environmental resource analyzed in this EIS.

'ABLE ES-4
ummary of Impacts and Mitigation Measures at Santa Susana Field Laboratory
IASA SSFL EIS for the Proposed Demolition and Environmental Cleanup

Resource Area	Project Alternatives[a]		Best Management Practices and Mitigation Measures[a]	Impact After Best Management Practices and Mitigation Measures Implementation[a]
	Proposed Action	No Action		
ection 4.2 - Soils, andslide Potential, opography, and aleontological esources	Significant, negative, regional, long term ●	Negligible, negative, local, short term ○	Soils BMP-1 (Site selection and preparation to minimize erosion and slope failure) Water BMP-1 (Develop SWPPP) Air Quality MM-3 (Develop Dust Control Plan) Biology BMP-1 (Revegetation and topsoil replacement) Biology BMP-2 (Revegetation with erosion control)	Negligible to minor, negative, local, long term ○
ection 4.3 - Cultural esources	Significant, negative, regional, long term *Adverse effect under Section 106* ●	No impact ▽	Cultural MM-1 (Retain a test stand) Cultural MM-2 (HABS/HAER evaluation) Cultural MM-3 (Ethnographic study) Cultural MM-4 (Burro Flats delineation) Cultural MM-5 (Prevent vandalism of cultural resources)	Pending consultation
ection 4.4 - iological Resources	Significant, negative, regional, long term ●	Negligible, negative, local, long term ○	Biology BMP-1 (Revegetation and topsoil replacement) Biology BMP-2 (Revegetation with erosion control) Biology BMP-3 (Remove wells and restore with an approved native seed mix) Biology BMP-4 (Consulting with USFWS) Biology BMP-5 (Proper permitting) Biology MM-1 (Protection of sensitive species) Biology MM-2 (Avoid Santa Susana tarplant) Biology MM-3 (Noxious weed management) Biology MM-4 (Protection of migratory birds) Biology MM-5 (Protection of red-legged frog) Water BMP-1 (Develop SWPPP) Air Quality MM-3 (Develop a Dust Control Plan)	Dependent on USFWS, RWQCB, and USACE consultation[b]
	Moderate, beneficial, regional, long term ■	Moderate, negative, regional, long term ◎		N/A
ection 4.5 - Traffic nd Transportation	Significant, negative, regional, long term ●	Minor, negative, regional, long term ○	Traffic MM-1 (Develop Construction Transportation Control Plan) Traffic MM-2 (Road repairs)	Minor, negative, regional, long term ○

TABLE ES-4

Summary of Impacts and Mitigation Measures at Santa Susana Field Laboratory

NASA SSFL EIS for the Proposed Demolition and Environmental Cleanup

Resource Area	Project Alternatives[a]		Best Management Practices and Mitigation Measures[a]	Impact After Best Management Practices and Mitigation Measures Implementation[a]
	Proposed Action	No Action		
Section 4.6 - Water Resources	Moderate, negative, local, long term ●	Moderate, negative, potentially regional, long term ●	Water BMP-1 (Develop SWPPP)	Negligible, negative, local, long term ○
	Moderate, beneficial, regional, long term ■	Moderate, negative, potentially regional, long term ●		Moderate, beneficial, local, long term ■
Section 4.7 - Air Quality and Greenhouse Gas Emissions	Moderate, negative, regional, short term ●	Negligible, negative, regional, short term ○	Air Quality BMP-1 (Dust control) Air Quality MM-1 (Purchase NOx Offsets) Air Quality MM-2 (Select closer disposal facilities or use alternative-fueled equipment and vehicles) Air Quality MM-3 (Develop Dust Control Plan)	Moderate, negative, regional, short term[c, d] ●
Section 4.8 - Environmental Justice	Moderate, negative, local, short term ●	Negligible, negative, local, short term ○	Traffic MM-1 (Develop Construction Transportation Control Plan)	Moderate, negative, local, short term ●
Section 4.9 - Health and Safety	Moderate, negative, local, short term ●	Moderate, negative, local, long term ●	Health BMP-1 (Develop Health and Safety Plan) Health BMP-2 (Update SSFL Standard Operating Procedures) Health BMP-3 (Develop Hazardous Substance Control and Emergency Response Plan) Air Quality MM-3 (Develop Dust Control Plan)	Negligible, negative, local, long term ○
	Moderate, beneficial, local, long term ■	Moderate, negative, local, long term ●		Negligible, negative, local, long term ○
Section 4.10 - Site Infrastructure and Utilities	Minor, negative, local, short term ●	No impact ▽	Infrastructure BMP-1 (Coordination with Utility Provider) Infrastructure-MM-1 (Infrastructure and utilities removed prior to soil excavation activities)	Minor, negative, local, short term ●
Section 4.11 - Noise	Minor, negative, local, short term ●	Negligible, negative, local, short and long term ○	Noise MM-1 (Daylight hour work restrictions) Noise-MM-2 (Equipment and truck maintenance)	Negligible, negative, local, short term ○

'ABLE ES-4

;ummary of Impacts and Mitigation Measures at Santa Susana Field Laboratory

VASA SSFL EIS for the Proposed Demolition and Environmental Cleanup

Resource Area	Project Alternatives[a]		Best Management Practices and Mitigation Measures[a]	Impact After Best Management Practices and Mitigation Measures Implementation[a]
	Proposed Action	No Action		
;ection 4.12 - Hazardous and Nonhazardous Materials and Waste	Minor, negative, regional, long term ○	Moderate, negative, local to regional, long term ○	Haz BMP-1 (Hazardous material handling protocol) Haz BMP-2 (Develop Hazardous Materials Business Management Plan) Health BMP-1 (Develop Health and Safety Plan) Water BMP-1 (Develop SWPPP) Air Quality MM-3 (Develop Dust Control Plan)	Minor, negative, local, short term ○
	Significant, beneficial, local, long term ■			Significant, beneficial, local, long-term ■

Notes:

● or ■ = Significant

◐ or ◧ = Moderate

○ or ◻ = Minor

○ or □ = Negligible

▽ = No impact

Circular symbols represent negative impacts while square symbols represent beneficial impacts, and the degree to which the symbol is filled represents the severity of the impact.

BMP = best management practice
HABS/HAER = Historic American Building Survey/ Historic American Engineering Record
MM = mitigation measure
NOx = nitrogen oxide
RWQCB = Regional Water Quality Board
SWPPP = Stormwater Pollution Prevention Plan
USFWS = U.S. Fish and Wildlife Service
USACE = U.S. Army Corps of Engineers

Potential impacts, BMPs, and mitigation measures are discussed further in relevant portions of Section 4.
Mitigation measures selection dependent on USFWS and USACE consultation process.
Standard mitigation measures are prescribed to offset fugitive dust emissions by Ventura County Air Pollution Control District Rule 55 and implemented under the ISRA program mplemented by NASA.
The extent to which GHG emissions would be reduced by Air Quality-MM-2 is dependent on the extent to which alternative fuels are implemented in construction equipment and haul rucks.

TABLE ES-5
Summary of Cumulative Impacts without Mitigations or Best Management Practices
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

Resource Area	Cumulative Impact[a]	Notes
Soils, Landslide Potential, Topography, and Paleontological Resources	Moderate, Negative	Joint remediation and demolition activities by Boeing, DOE, and NASA can result in increased erosion of soil resulting in increased dust, water contamination, and loss of top soil, thus affecting air quality, water quality, and biological resources.
Cultural Resources	Significant, Negative	Boeing and NASA remediation could require the removal of soils at Burros Flats Cave site resulting in the disturbance of a known archeological site with significance to Native Americans as well as impact to the Indian Sacred Site.
Biological Resources	Significant, Negative	Boeing, DOE, and NASA activities can impact natural habitat, wetlands, and sensitive plants and wildlife. Removal of soils increases the loss of native plants thus reducing habitat. Remediation activities near or on wetlands can disturb these protected habitats.
	Moderate, Beneficial	Remediation of contaminated areas could reduce contamination in the area.
Traffic and Transportation	Significant, Negative	Combined Boeing, DOE, and NASA truck traffic can damage roads. Combined Boeing, DOE, and NASA activities can increase the amount of traffic to which children are exposed posing both a safety risk and health risk as children travel to and from school.
Water Resources	Moderate, Negative	Boeing, DOE, and NASA activities can result in decreased surface water and ground water quality, and change the groundwater hydrology at SSFL.
	Significant, Beneficial	Erosion and movement of soils can increase sediment and contaminants in water. Remediation could improve water quality.
Air Quality and Greenhouse Gas Emissions	Moderate, Negative	Combined air emissions from Boeing, DOE, and NASA activities can decrease air quality by increasing dust, particulate matter, smog, etc. Climate change is affected by the increased GHG emissions from the combined truck traffic.
Environmental Justice	Moderate, Negative	Combined Boeing, DOE, and NASA activities can increase the amount of traffic to which children are exposed posing both a safety risk and health risk as children travel to and from school.
Health and Safety	Moderate, Negative	Combined Boeing, DOE, and NASA activities can result in more exposure to hazardous materials, safety hazards, structural hazards, and natural hazards.
Infrastructure and Utilities	Moderate, Negative	Boeing, DOE, and NASA remediation can increase the probability of prolonged loss of utilities.
Noise	Minor, Negative	Combined Boeing, DOE, and NASA truck traffic can increase the noise level and disturbance to the local community.
Hazardous and Nonhazardous Materials and Waste	Moderate, Negative	More hazardous waste would be generated as a result of the removal of contaminated soils and groundwater by Boeing, DOE, and NASA.
	Significant, Beneficial	Remediation could reduce hazardous materials.

Note:
[a] Potential impacts are discussed further in relevant portions of Section 4.

ES-7.0 Summary of Proposed Mitigations

The EIS considers mitigation measures that may address potential impacts. Mitigation includes avoiding, minimizing, rectifying, reducing, eliminating, or "compensating for an impact by replacing or providing substitute resources or environments" (40 CFR 1508.20). Table 6.1-1 lists the mitigation measures identified in the individual resources analyses provided in Section 4 of the EIS. These measures include BMPs and environmental protection measures, as well as required measures identified through other regulations or consultation.

ES-8.0 Incomplete and Unavailable Information

NEPA requires that "when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking" (40 CFR 1502.22). NASA acknowledges studies are ongoing to refine the specific locations where soil treatment is needed to meet the Look-Up Table values.

NASA has looked broadly at a range of reasonable remedial technologies. This EIS considers the demolition of up to all structures on the site and provides a comparative analysis of the potential environmental impacts from implementing a range of remediation technologies that effectively could achieve the Proposed Action Look-Up Table values. The analysis assumes that the technologies considered are feasible, implementable, and effective, and focuses on the potential environmental effects from each type of cleanup technology. Ongoing studies to evaluate their effectiveness may eliminate some the technologies considered during the preparation of the EIS. Taking this comprehensive approach informs decision makers about where impacts may occur, where avoidance or mitigation measures might be appropriate, and which technologies would be effective in meeting the project goals.

Should substantial new information become available that conflicts with the EIS and indicates significant increases in potential environmental impacts from the Proposed Action, the environmental impact analysis would be updated as needed.

ES-9.0 Required Permits, License, and Approvals

The methods NASA would use to demolish existing structures and to perform soil and groundwater cleanup have been evaluated in accordance with federal, state, and local regulations relevant to each environmental resource area analyzed in this EIS.

The following permits, licenses, and approvals likely would be required for the Proposed Action and would be obtained before implementation of the proposed demolition or environmental cleanup activities:

- Clean Water Act (CWA) Section 404 Dredge and Fill Permit, USACE
- CWA Section 401 Water Quality Certification, RWQCB
- California General Permit for Stormwater Discharges Associated with Construction Activity, State Water Resources Control Board
- National Pollutant Discharge Elimination System Permit, Los Angeles RWQCB
- Biological Opinion, USFWS
- Endangered Species Act, Section 7 Consultation with USFWS
- Section 106 Consultation, State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (ACHP), Consulting Parties, and NASA

Other specific permits, licenses, and approvals might be required depending on the selection of specific soil or groundwater cleanup technologies. These include a VOC and SVOC emissions permit, hazardous materials storage permit, Class V injection permit, and/or an air permit.

ES-10.0 Agency Consultations

Federal and state agencies, Native American Tribes, other organizations, and members of the public having a potential interest in the Proposed Action were consulted and invited (under NEPA and the NASA Procedural Requirements 8580.1 [NASA, 2001, 2008a]) to participate in the decision-making process during NASA's environmental review process for the proposed demolition and environmental cleanup activities at SSFL. NASA currently is consulting with the SHPO and the ACHP, and individuals who requested to be NHPA Section 106 consulting parties for this project, in mitigation measures to address effects on historic properties. Mitigation is proposed as part of the EIS and will be finalized in the ROD in accordance with Section 106. NASA also is consulting with USFWS to finalize a Biological Opinion and to develop mitigation to protect migratory birds and to minimize the effects on federally listed species. NASA is coordinating with the California Department of Fish and Wildlife to effectively evaluate and minimize the effects on State-listed rare and sensitive species. Finally, NASA is consulting with the USACE to minimize project impacts on wetlands and waters of the U.S.

ES-11.0 Unavoidable Adverse Impacts

Implementing the Proposed Action to meet the 2010 AOC would result in the excavation of non-treatable soils to a depth of 2 ft (and in some places to 20 ft deep) from approximately 105 acres. There is the potential for the 105 acres to increase in size as NASA completes its soil sampling work in 2013. Some of these acres are covered by roads, buildings, or parking lots (roughly 43 acres or 41 percent). The rest (62 acres or 49 percent) is open space and would require the removal of all existing vegetation such as shrubs, plants, and trees. Additionally, removing the large volume of soil would change soil profiles (the micro and macro fauna of the soil ecosystems) over the 105 acres and lead to soil instability, decreased vegetative biodiversity, and increased spread of invasive weeds. The impact to natural vegetation communities includes some species of interest to Native Americans. Additionally the removal of natural vegetation communities and the digging up and removal of the non-treatable soils could have an adverse impact on the Indian Sacred Site and also may impact some archeological sites if they cannot be avoided.

Some demolition is necessary to access and remediate contaminated soils beneath or adjacent to structures. The remaining demolition is anticipated to be completed to facilitate the disposition of the property because the structures may be covered in lead paint or have no anticipated beneficial future use. Demolition of structures such as the test stands would have an adverse impact on the historic districts for which they are the key anchor facilities.

Lastly, in anticipation of the transport of at least 320,000 yd^3 (and potentially 500,000 yd^3) of soil from NASA-administered property, plus the DOE and Boeing cleanup work requiring heavy-duty truck traffic, the impact to the local roads could be significant. Because the 2010 AOC requires cleanup to background levels, the excavation and offsite disposal is unavoidable.

ES-12.0 Relationship Between Local Short-term Use of the Environment and Long-term Productivity

NEPA requires an analysis of the relationship between a project's short-term impacts on the environment and the effects of those impacts on the maintenance and enhancement of the long-term productivity of the environment. Impacts that limit future uses of the site are of particular concern. "Short term" refers to the total duration of demolition and soil cleanup activities until the property is recognized as suitable for transfer, while "long term" refers to an indefinite period beyond property transfer. While the Proposed Action (i.e., short-term use) would likely result in impacts that would reduce the long-term environmental productivity of the NASA-administered portion of SSFL, cleanup of soils to Look-Up Table values, would provide a beneficial long-term impact for the overall reduction of contaminants across the site and reducing exposing risk to wildlife and humans.

Demolition activities could include the removal of historic structures that individually are eligible for NRHP listing or contribute to an NRHP-eligible district. Proposed demolition and excavation activities could have long-term

impacts on productivity or use of historic properties, archeological features, and an Indian Sacred Site, and could result in a reduction in native vegetation.

ES-13.0 Maintenance and Enhancement of Irreversible and Irretrievable Commitments of Resources

NEPA and NASA Procedural Requirement 8580.1 (NASA, 2001, 2008a) require that an agency analyze the extent to which the Proposed Action could commit non-renewable resources that would be irreversible or irretrievable to future generations. Construction of some remedial technologies would consume a small quantity of building materials. Petroleum, oils, and fuels would be used by construction and demolition equipment, transport vehicles, and crew vehicles. Soil remediation (SVE, ex situ treatment using thermal desorption) and groundwater remediation (pump-and-treat, vacuum extraction, and heat-driven extraction) would consume energy. Water also would be needed for dust suppression and to operate certain drilling and remediation equipment. Much of the concrete and building materials recovered from demolition would be disposed as nonhazardous waste because materials such as concrete, steel, soils, or water tested to be uncontaminated could be reclaimed, recycled, and/or reused.

Paleontological resources might be encountered during deeper earthwork. Archeological resources and historic resources have been documented on the NASA-administered property at SSFL. These resources are considered nonrenewable and, if affected, the impact essentially would be irreversible. NASA is consulting with SHPO and the federal ACHP to develop appropriate measures to avoid negative impacts where possible or, otherwise, to mitigate impacts to these resources.

ABLE 2.2-7
›mparison of Soil Remediation Technologies
ASA SSFL EIS for Proposed Demolition and Environmental Cleanup

Technology	Constituent Treatment	Excavation	Site Restoration	Onsite Trucks	Stockpiling	Offsite Trucks	Permits Required?	Construction	Energy Needs	Soil Monitoring	Duration
cavation and offsite sposal	All	Yes	Yes	Yes	Yes	Yes	CWA Permit[a]	Staging Area	No	No	23 months[b]
il washing[c]	Organic, Inorganic	Yes	Replacement of soils	Yes	Yes	Yes	CWA Permit[a]	Staging Area/ Treatment Area	No	Yes	1.5 to 2.5 years
il vapor extraction[d]	VOCs	No	No	Yes	No	No	VOC Emission Permit	SVE Wells	Yes	Yes	2 to 5 years
situ treatment using nd farming[e]	VOCs, SVOCs	Yes	Replacement of soils	Yes	Yes	No	CWA Permit[a]	Staging/ Treatment Area	No	Yes	2 to 4 years
situ treatment using idation[d]	VOCs, SVOCs	Yes	Replacement of soils	Yes	No	No	CWA Permit[a]	Temporary Mixing Structure	Yes	Yes	1 to 2 years
situ treatment using ermal desorption[f]	VOCs, SVOCs	Yes	Replacement of soils	Yes	No	No	CWA Permit[a] VOC/SVOC Emission Permit	Temporary Thermal Desorption Chamber	Yes	Yes	1 to 2 years
situ chemical idation[g]	VOCs, SVOCs	No	Grading of disturbed soils	Yes	No	No	Injection Permit	Injection Wells or Boreholes	No	Yes	2.5 to 4 years
situ anaerobic or robic biological eatment[h]	VOCs, SVOCs	No	Grading of disturbed soils	Yes	No	No	Injection Permit	Injection Wells or Boreholes	No	Yes	3.5 to 5.5 years

otes:
ote that information is common to all action alternatives.
ootnote assumptions:
Subject to Clean Water Act (CWA) Section 404 and Section 401 permitting if soil treatment requires the disturbance of a jurisdictional water body (wetlands, drainages, and ponds)
Completion of cleanup and soil hauling by the end of 2017.
4 months to mobilize equipment, 5 months and 53 trucks per day to move soil to treatment area, no major weather complications.
3 months to install wells and equipment, multiple SVE systems would be deployed simultaneously, systems are optimized against surface leaks, and sites have similar subsurface conditions ir permeability, depth to water).
4 months to set up treatment area, 5 months and 34 trucks per day to move soil to treatment area, a large area is readily available without requiring extensive grading, <20% failed soil eatment, no major weather complications.
- months to install equipment, 5 months and 34 trucks per day to move soil to treatment area, nominal thermal system operation, power is readily available, no major weather complications.
Bench testing to optimize dosages, 9 months to install injection and monitoring wells, a relatively aggressive flux and re-application planned.
Microcosm bench testing required, 9 months to install injection and monitoring wells, reinjection applications would be required to promote full dispersion throughout target zone.

TABLE 2.4-1
Alternatives Comparison
NASA SSFL EIS for the Proposed Demolition and Environmental Cleanup

Technology	Proposed Action	Alternative 1	Alternative 2	Alternative 3	No Action Alternative
Description	Demolition, Soil Cleanup to Background Levels, Groundwater Cleanup	Demolition, Soil Cleanup to Suburban Residential Look-Up Table Values, Groundwater Cleanup	Demolition, Soil Cleanup to Commercial/Industrial Look-Up Table Values, Groundwater Cleanup	Demolition, Soil Cleanup to Recreational Look-Up Table Values, Groundwater Cleanup	No action taken for demolition, soil, or groundwater remediation other than currently approved activities
Meets the 2010 AOC Commitments	Yes	No	No	No	No
Cubic Yards of Soil Remediated	500,000	182,000	92,000	58,000	0
Acres of Soil Removed	105	18	10	6	0
Total Trucks Required for Soil Removal (assuming soils are hauled offsite)	26,441	9,568	4,860	3,031	0
Frequency (trucks per day) for Soil Removal	53	19	10	6	0
Backfill Volume (yd^3) —1/3 of total volume	167,000	61,000	31,000	19,000	0
Total Trucks Required for Backfill Hauling (assuming backfill sourced offsite) [a]	8,814	3,189	1,620	1,010	0
Frequency (trucks per day) for Backfill Hauling [b]	18	6	3	2	0
Hauling Duration (months)	23	23	23	23	0
Daily Material Handled (tons per day) [b]	1,698	614	312	195	0

Notes:
[a] Assumes truck capacity of 19 yd^3/truck or 24 tons/truck
[b] Assumes completion by the end of 2017