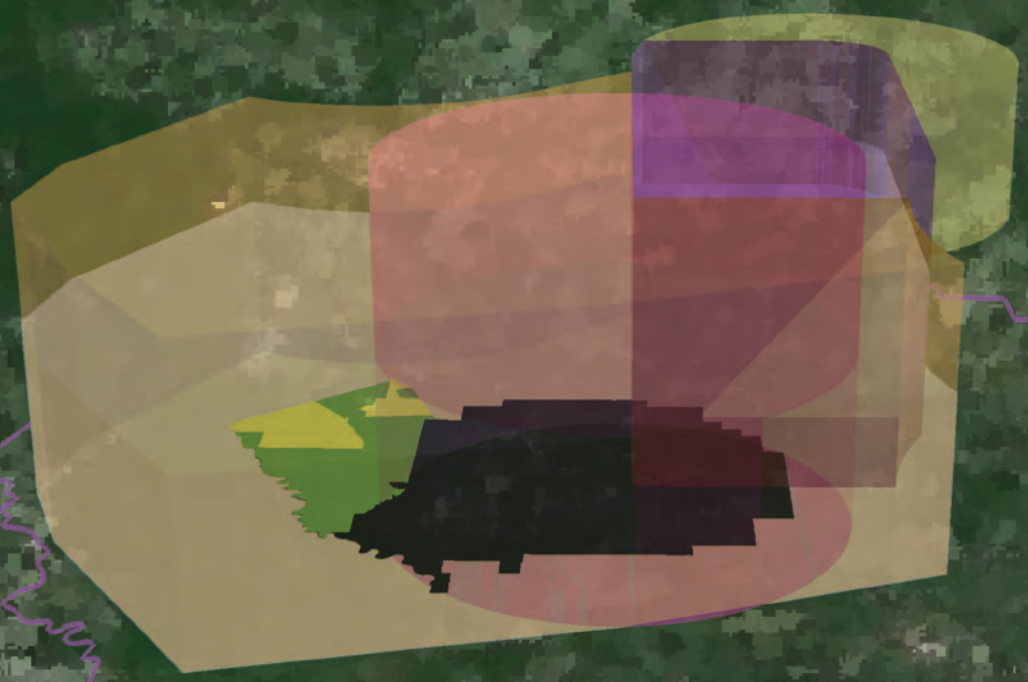
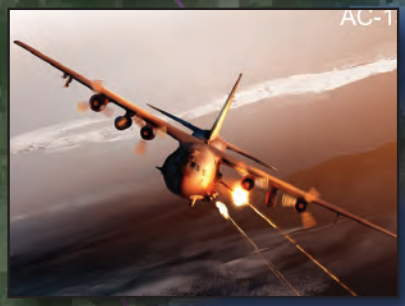
Final Environmental Assessment for the

Redesignation and Expansion of Restricted Airspace R-4403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration Rocket Engine Testing at Stennis Space Center

Hancock County and Pearl River County, Mississippi and St. Tammany Parish, Louisiana





October 2015

Final

ENVIRONMENTAL ASSESSMENT
FOR THE
REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 TO SUPPORT MILITARY AIR-TO-GROUND MUNITIONS TRAINING AND NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ROCKET ENGINE TESTING AT STENNIS SPACE CENTER
HANCOCK COUNTY AND PEARL RIVER COUNTY, MISSISSIPPI AND
ST. TAMMANY PARISH, LOUISIANA

OCTOBER 2015

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Final

Environmental Assessment for the Redesignation and Expansion of Restricted Airspace R-4403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration Rocket Engine Testing at Stennis Space Center

Lead Agencies:	Department of the Navy, Naval Special Warfare Command and National Aeronautics and Space Administration
Partnering Agencies:	U.S. Special Operations Command and Air Force Special Operations Command
Cooperating Agency:	Federal Aviation Administration
Proposed Action:	Redesignation and Expansion of Restricted Airspace R-4403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration Rocket Engine Testing at Stennis Space Center
Project Location:	Hancock and Pearl River counties, Mississippi and St. Tammany Parish, Louisiana
Document Type:	Environmental Assessment

Abstract

This Environmental Assessment (EA) has been prepared to evaluate the potential environmental impacts associated with redesignating and expanding Special Use Airspace (SUA) to support National Aeronautics and Space Administration (NASA) testing of the next generation of rockets and the Department of Defense (DOD) proposed air-to-ground live-fire and sensor training at Stennis Space Center (SSC) and the Department of the Navy (DON) Western Maneuver Area (WMA) in southern Mississippi. The purpose of the proposed action is to provide an adequately-sized and configured Restricted Airspace to ensure safe and effective operation of the NASA SSC test stands and provide a three-dimensional (3-D) training battlespace to enhance interoperability of air and ground DOD special operations forces. The SUA would provide containment capabilities that protect the general aviation community while supporting current and evolving NASA and DOD mission requirements.

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Date:	**October 2015**

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EXECUTIVE SUMMARY

The United States (U.S.) Department of the Navy (DON) and the National Aeronautics and Space Administration (NASA) have prepared this Final Environmental Assessment (EA) to identify and evaluate the potential environmental impacts associated with redesignating and expanding Special Use Airspace (SUA) to support NASA testing of the next generation of rocket engines, as well as air-to-ground live-fire and sensor training by the Department of Defense (DOD) at Stennis Space Center (SSC) and the DON Western Maneuver Area (WMA) in southern Mississippi. This Final EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508), and DON's procedures for implementing NEPA (32 CFR 775). The DON/Naval Special Warfare (NSW) Command and NASA are the lead agencies for the proposed action; U.S. Special Operations Command (SOCOM) and Air Force Special Operations Command (AFSOC) are partnering agencies; and the Federal Aviation Administration (FAA) is a cooperating agency (per 40 CFR 1501.6) for this EA.

SSC is a NASA installation located in southern Mississippi about 57 miles northeast of New Orleans, Louisiana, and 45 miles west of Gulfport, Mississippi (Figure ES-1). SSC was established in 1961 for the static testing of NASA rocket engines, but has evolved into a multidisciplinary Federal city composed of more than 30 other resident Federal, State, academic, private organizations, and technology-based companies engaged in various space, environmental, and national defense programs. NSW Command is a major tenant at SSC and has trained within the adjacent jungle and riverine training environment for approximately 15 years.

The DON and NASA propose the following three main actions in the vicinity of SSC, Mississippi:

1) Remove existing Restricted Area (RA) R-4403 at SSC and replace it with an expanded area that would be redesignated as R-4403A, B, C, E, and F;
2) Establish two munitions target areas and a sensor training area for DOD air-to-ground training underlying R-4403C, E, and F; and
3) Use the new R-4403A, B, C, E, and F airspace areas to accommodate ongoing and evolving DOD and NASA testing and training requirements.

Land Areas Underlying Proposed R-4403A, B, C, E, and F

NASA-owned SSC Fee Area (Hereafter, Fee Area)

- 13,817-acre "Federal city" (a term used widely by NASA and recognized locally in reference to the Fee Area)

NASA Acoustic Buffer Zone (Hereafter, Buffer Zone)

- The 124,984-acre U.S. Government restrictive easement surrounding the Fee Area that prevents inhabited structures owned by approximately 500 different land owners, mostly private

DON Western Maneuver Area (WMA)

- A sub area within the Buffer Zone area that supports NSW training
- 5,200 acres, of which 3,200 acres are currently owned by DON and 2,000 acres are planned for DON acquisition

Privately Owned Land outside the Buffer Zone

- 5,018-acre area located north of the Buffer Zone in unincorporated Hancock and Pearl River counties.

Lands underlying the proposed R-4403A, B, C, E, and F area include Federal, State, and privately owned land areas (Figure ES-1). Major land areas are summarized in the box to the right.

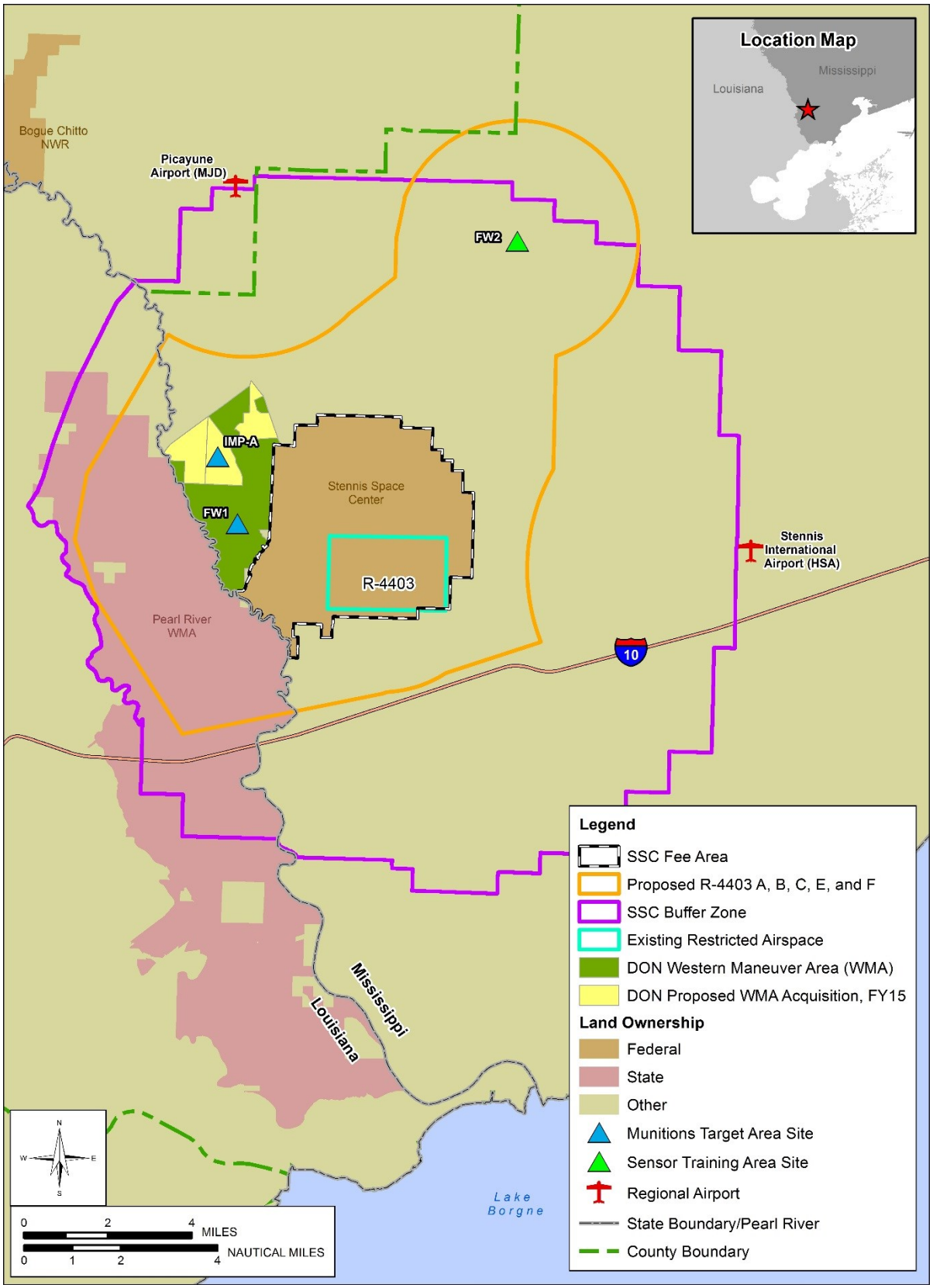

Figure ES-1. Proposed R-4403A, B, C, E, and F and Vicinity

ES.1 Purpose and Need

The purpose of the new R-4403A, B, C, E, and F airspace at SSC is to protect the public, including the general aviation community, while supporting NASA engine testing and DOD tenant missions at SSC. The existing R-4403 airspace is not sufficiently sized to accommodate current and evolving NASA and DOD mission requirements at SSC. The new R-4403A, B, C, E, and F airspace is needed to segregate non-participating aircraft users from potentially hazardous activities associated with current and evolving NASA and DOD airspace and ground uses.

ES.2 Proposed Action and Alternatives

ES.2.1 Proposed Airspace R-4403A Configuration

R-4403A, B, C, E, and F would be composed of six contiguous and integrated airspace units to replace the existing R-4403 (Table ES-1). The proposed configurations and varied altitudes reflect each user's mission requirements, while promoting the efficient use of the National Airspace System.

Table ES-1. Existing R-4403 and Proposed R-4403A, B, C, E, and F Airspace Description

Airspace	Primary Purpose/Function	Altitudes (ft MSL)	Lateral Boundaries/ Footprint	Times of Use (Central U.S. Zone)
Existing				
R-4403	NASA rocket engine testing operations	Surface – 5,000	2.5 NM diagonal/ 4.9 square miles	Intermittent 0600 – 2300, and other times by NOTAM
Proposed				
R-4403A	NASA rocket engine testing operations	Surface – 12,000	2.5 NM radius/ 26 square miles	Intermittent, 1000 to 0300, activated by NOTAM at least 24 hours in advance
R-4403B		Surface – 6,000	100 square miles	
R-4403C	DOD inter-operability training	Surface – 10,000	70 square miles	2000 – 0500, activated by NOTAM at least 24 hours in advance, and 1800-2000 November 1 to March 1 (not to exceed 20 days per year)
R-4403E		Surface – 10,000	30 square miles	
R-4403F		4,000 – 10,000	13 square miles	

Notes: ft = foot/feet; MSL = Mean Sea Level; NM = Nautical Mile; NOTAM = Notice to Airmen.

The airspace is designated "joint-use" and Houston Air Route Traffic Control Center is assigned as the controlling agency. During periods when the airspace is not required by the using agencies (i.e., NASA and NSW) for its designated purpose, the airspace would be returned to the controlling agency for use by civil air traffic within the National Airspace System.

The altitudes and lateral boundaries of the airspace components are depicted in Figure ES-2.

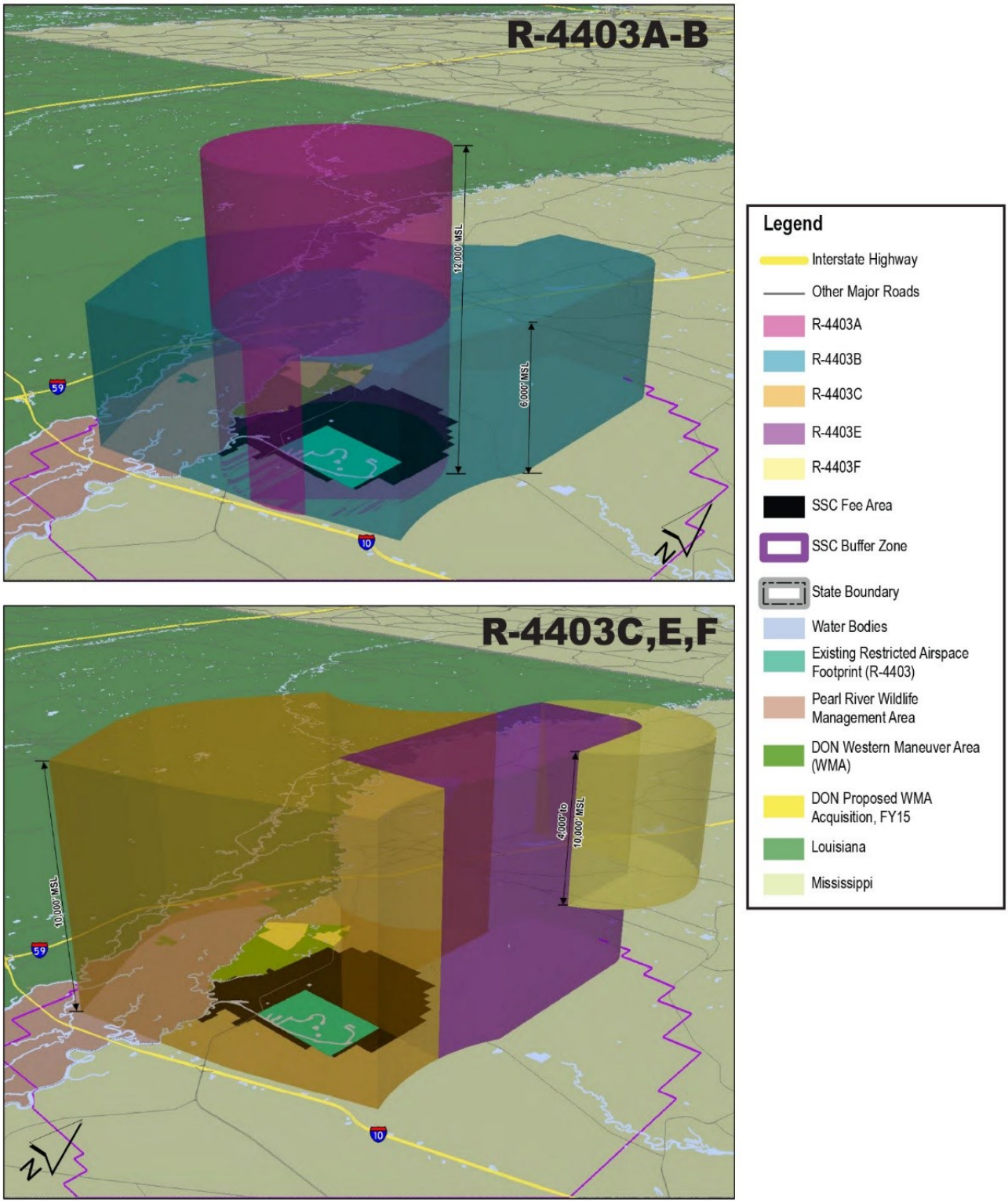

Figure ES-2. Proposed R-4403A, B, C, E, and F (3D Model)

ES.2.3 Proposed Operations in R-44403A, B, C, E, and F

ES.2.3.1 Proposed NASA Operations

R-4403A would be activated by NASA to protect non-participating aircraft from the potential high altitude turbulence that would result from the flaring of hydrogen through flare stacks in conjunction with the rocket engine testing events at the NASA Test Stand Complex. The rocket engine testing could occur 20 to 40 times per year. The testing events would last approximately 10 to 20 minutes; however, due to the complexity of the rocket engine testing, R-4403A restricted airspace would be activated for 7 to 12 hours.

R-4403B would be activated by NASA for a variety of testing events, including the testing of untethered autonomous flight vehicles. The testing events would occur approximately three times per year. The testing events would last 8 to 10 minutes; however, due to the complexity of these testing events, R-4403B restricted airspace would be activated for 7 to 12 hours. The untethered autonomous flight vehicles would be tested within the Fee Area at a 365-acre proposed launch location. Two emergency landing locations and an alternative location are also analyzed as part of this proposed action. Launch and landing sites are located in previously disturbed, largely undeveloped areas that are designated for test operations (NASA 2011).

Potential environmental impacts at all sites have been analyzed based on current planning efforts and available test information. Although the proposed action establishes the airspace to support the proposed test sites, detailed specifications for the design, construction, management, and maintenance of these areas have not been developed pending the evolution of untethered autonomous flight vehicle program requirements. Therefore, these areas may be subject to further site-specific planning and engineering actions as appropriate per the NASA safety and certification process.

In order to make an informed analysis of potential environmental impacts under NEPA with the best available data, conservative planning assumptions were applied to the proposed launch location, emergency landing locations, and potential alternative location. Key assumptions are as follows:

- Up to a total of 300 acres of forested area at the launch site or alternative location would be converted into open grassy areas in order to provide adequate flight safety clearance.
- No site preparation, including vegetative clearance, would be required at the emergency landing sites. However, some disturbance at these sites may occur in the rare event that they are used for emergency landing, such as the physical impacts from the emergency landing and equipment and activity for recovery operations.
- Wetlands present within the proposed launch location, emergency landing locations, and potential alternative location would be avoided.

The extent of the earth disturbing activity ultimately required will be further defined in site-specific planning and engineering actions.

ES.2.3.2 Proposed DOD Operations

Airspace Operations. DOD flight operations to support interoperability training would primarily be conducted by AFSOC within R-4403C, E, and F (see Figure ES-2). Training flights would also be conducted by other Special Operations Units and Commands that train within the WMA and SSC. AFSOC would utilize the proposed R-4403C, E, and F to support new air-to-ground training and to increase the frequency of existing training activities such as evasive maneuver, tactical airlift, and laser operations. Aircraft used by AFSOC include, but are not limited to, AC-130s, CV-22 tilt-wing rotorcraft, and other nonstandard aviation (NSAv) platforms. Other platforms expected to utilize the proposed airspace include helicopters (MH-60, MH-47, and MH-6) and Unmanned Aircraft Systems (UAS). These aircraft may activate and occupy the airspace alone, but most commonly, a NSW Riverine Complex, Stennis training event will have one AC-130, up to two helicopters or tiltrotor aircraft, and up to two UAS (non-weaponized, Class 3). During the (no more than) 10-day annual Emerald Warrior training exercise, there may be up to 10 aircraft occupying the proposed airspace. In addition, the proposed airspace would support the following DOD interoperability training:

- low-level air-to-ground downrange firing of small arms from helicopters at the existing Small Arms Range Complex (SARC);
- air-to-ground firing of Short Range Training Ammunition (SRTA) from low-level helicopters within the existing live-fire riverine training areas in the WMA;
- continued use of eight existing Helicopter Landing Zone (HLZs);
- use of flares from various aircraft; and
- ongoing and emerging UAS operations.

DOD units would activate the airspace units on an as-needed basis. Activation would be intermittent when the respective DOD unit schedules interoperability training events at NSW Riverine Complex, Stennis including 8- to 10-day-long large-scale, joint force training exercises.

Munitions Target Areas and Sensor Training Area. The siting of two munitions target areas and a sensor training area has been incorporated into the design for the proposed R-4403C, E, and F restricted airspace. The siting of these three areas is as follows:

- Southern target area (FW1): within WMA lands currently owned by DON.
- Northern target area (IMP-A): within the proposed WMA area scheduled for acquisition.
- Sensor training area (FW2): within the northern portion of the Buffer Zone on land currently owned by NASA.

The FW1, IMP-A, and FW2 nomenclature used above was developed at an early planning stage for the proposed action and are retained here for reference and consistency with the joint FAA proposal for the redesignation and expansion of R-4403A, B, C, E, and F.

Although the proposed action establishes the airspace to support the proposed munitions target areas and sensor training area, detailed specifications for the design, construction, management, and maintenance of these areas has not been developed pending processing of the land acquisition and

subsequent range design. Therefore, these areas may be subject to further site-specific range planning and engineering actions as appropriate per the range certification process.

In order to make an informed analysis of potential environmental impacts under NEPA with the best available data, conservative planning assumptions were applied to areas that would be impacted by development and operation of the munitions target areas and the sensor training area. Specifically, based on existing operational air-to-ground gunnery target areas, military range planners recommended a standard AC-130 gunnery target area of approximately 5 acres in size would be appropriate. Therefore, for the purposes of the analysis in this EA, a conceptual 5-acre area for the southern target area (FW1) and another 5-acre area in the northern target area (IMP-A) were assumed to be directly affected by the proposed action, and standard protocol for periodic range maintenance and operational range clearance (ORC) would be conducted. The proposed 5-acre areas were sited based on the latitude and longitude for the IMP-A and FW1 locations as used in the proposed configuration of R-4403C, E, and F and a planning analysis of a generalized configuration that would best meet operational needs while minimizing environmental impacts. In addition, two new access roads were assumed to be required for the southern target area (FW1). Figure ES-3 depicts the estimated 5-acre area for the northern target area and Figure ES-4 depicts the estimated 5-acre area for the southern target area and the general location of access roads. The potential impacts related to the associated Weapon Danger Zones (WDZs) were also assessed based on the IMP-A and FW1 locations as well as the proposed configuration of the munitions target area. Based on a typical sensor training area configuration to include the development of a semi-improved mobile vehicle target track, mobile sensor target with trailer, and perimeter fencing and security upgrades, the total disturbance for the proposed sensor training area (FW2) would be approximately 2 acres in size within the approximately 100-acre site shown in Figure ES-5.

ES.3 Alternatives

ES.3.1 No Action Alternative

Under the No Action Alternative, the existing R-4403 configuration would be maintained, sites for DOD air-to-ground training would not be established, and NASA and DOD missions would be restricted to existing established uses or future uses that could operate within the confines of the existing airspace environment. NASA's use of R-4403 for rocket engine testing and DOD's interoperability training within the NSW Riverine Complex, Stennis would continue with current limitations.

ES.3.2 Alternative 1: Preferred Alternative

Alternative 1, the preferred alternative, best meets the purpose and need for the proposed action. Under Alternative 1, the existing R-4403 would be removed and the new R-4403A, B, C, E, and F would be established. This RA would overlie a 110.5-square mile area to include the Fee Area, approximately 42 percent of the Buffer Zone (including the WMA), and an approximate 5,018-acre privately owned land area outside of the Buffer Zone (see Figure ES-1). The following sites would be established: a northern target area (IMP-A) and a southern target area (FW1) to accommodate the delivery of munitions, and a sensor training area (FW2) for simulated (no drop) air-to-ground training.

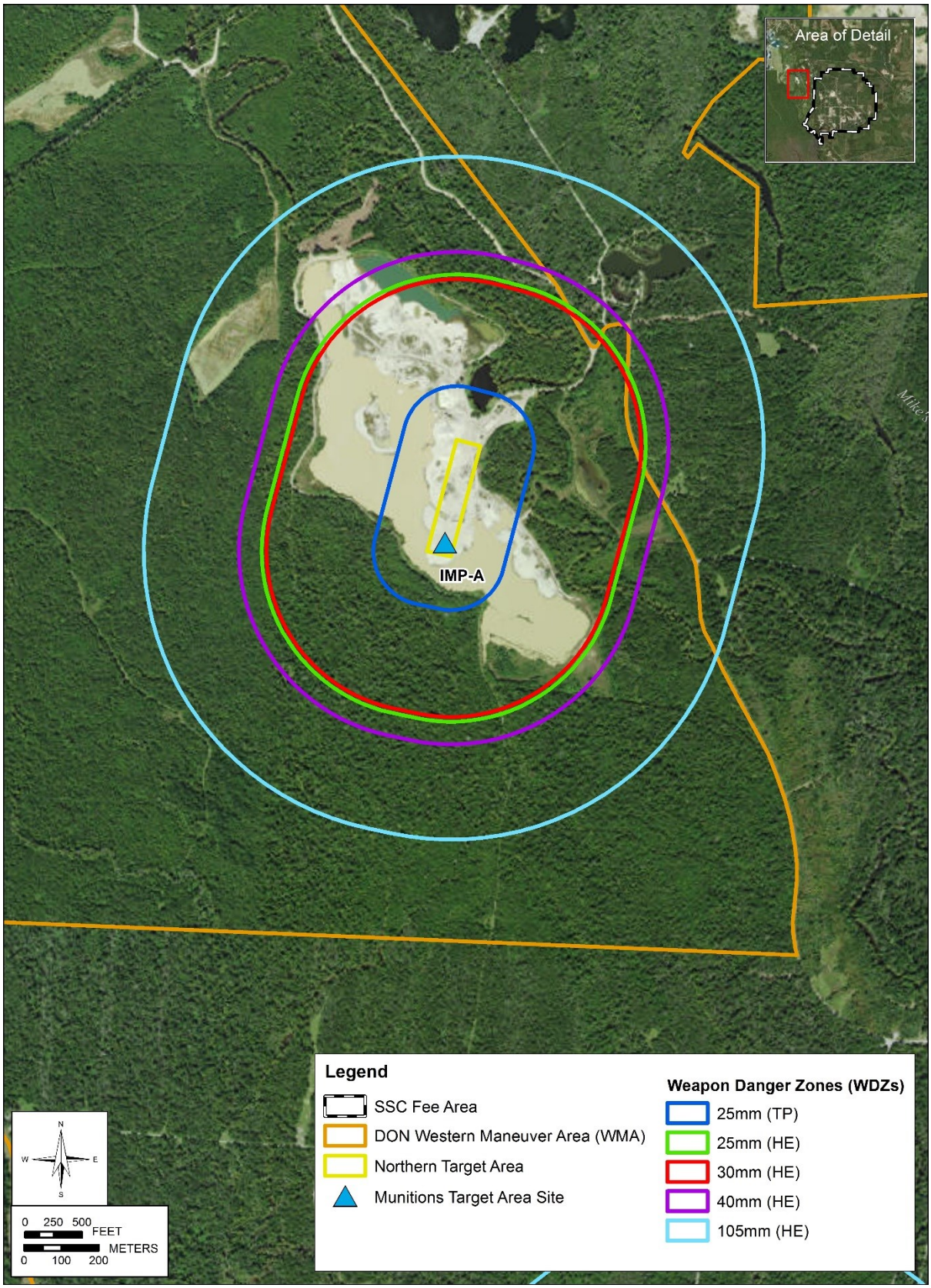

Figure ES-3. Northern Target Area (IMP-A) Detail

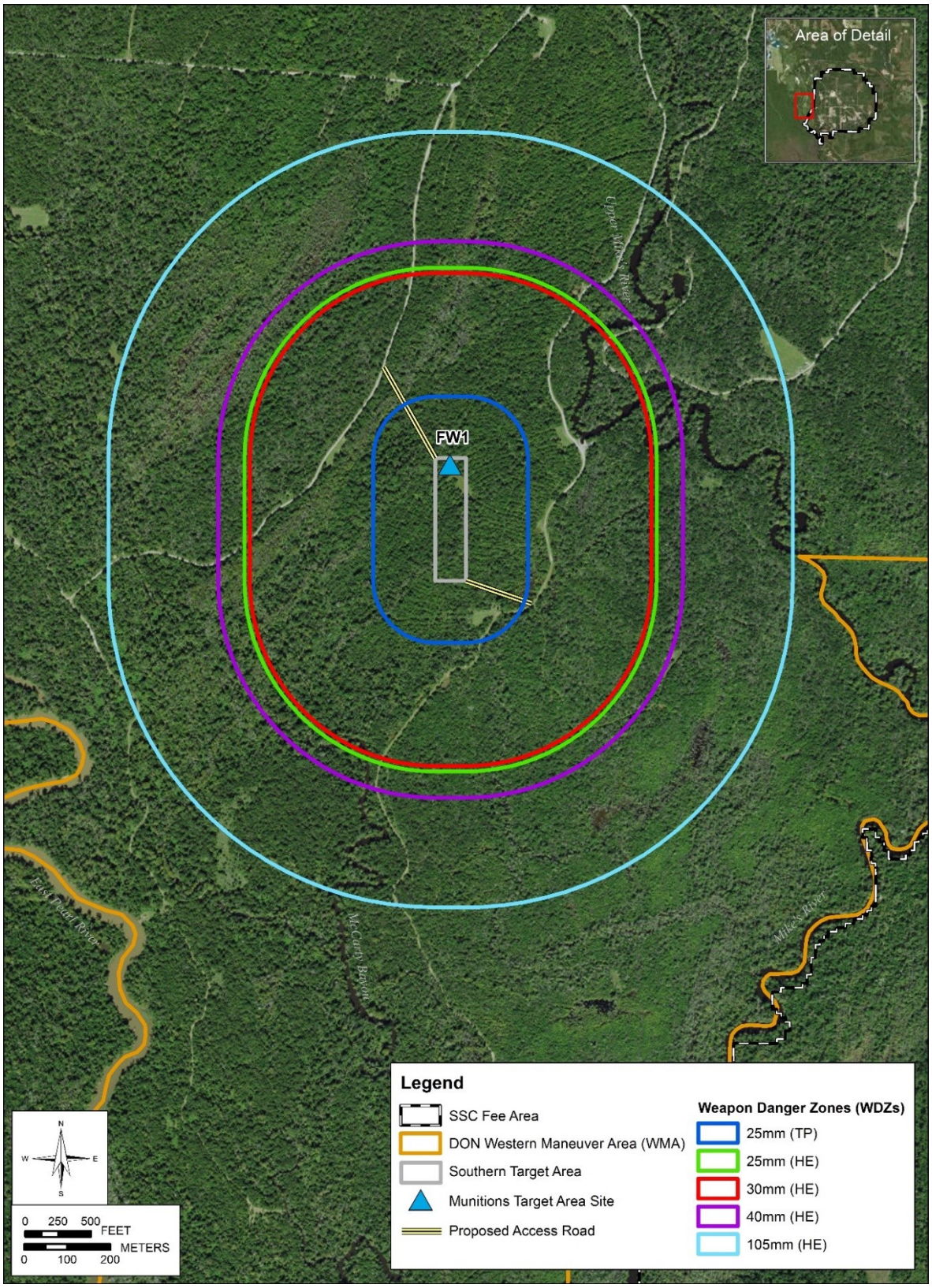

Figure ES-4. Southern Target Area (FW1) Detail

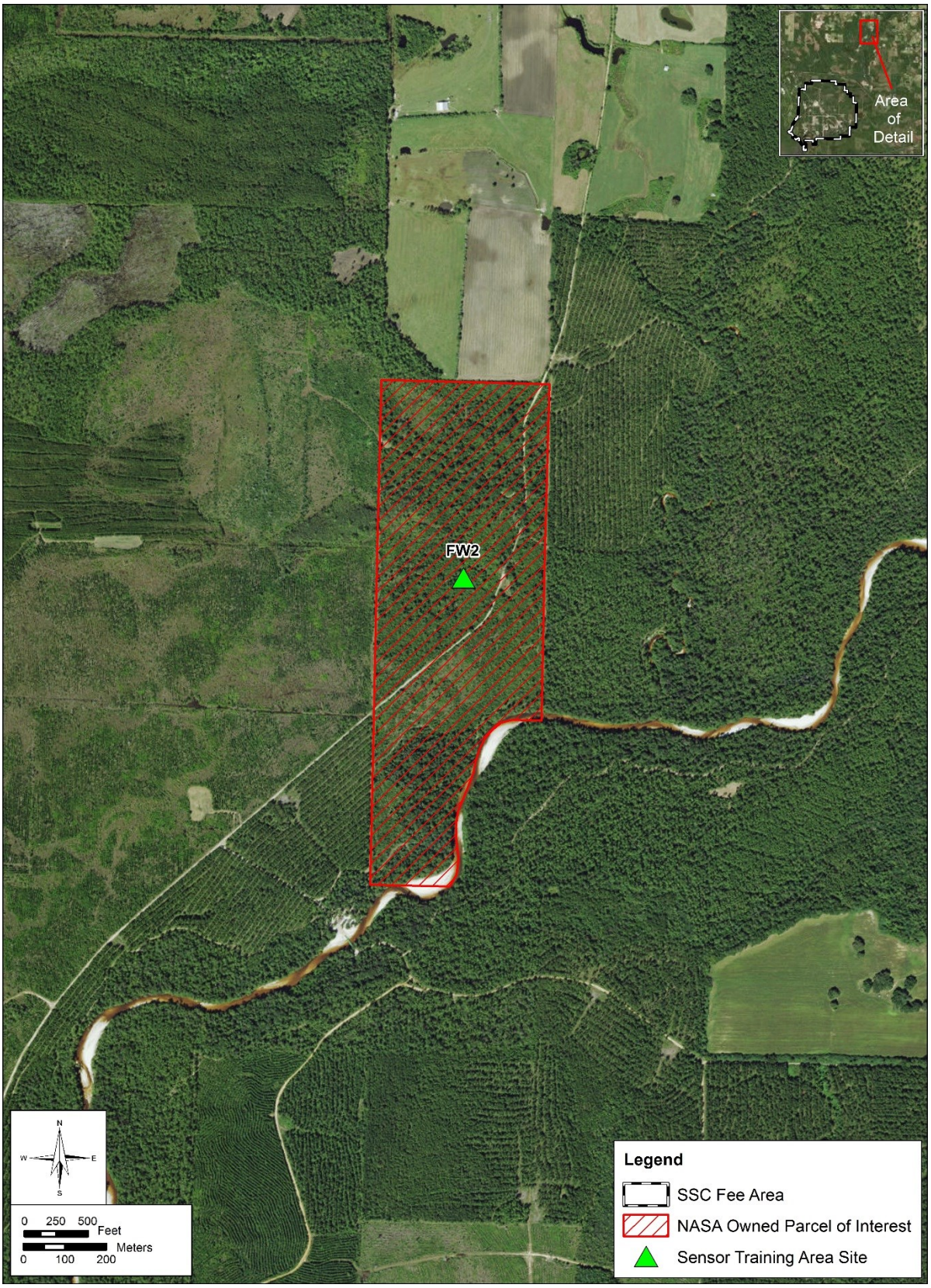

Figure ES-5. Sensor Training Area (FW2) Detail

The two target areas would accommodate both high explosive (HE) and target practice (TP) air-to-ground cannon rounds. (TP rounds are lacking explosive components, but may contain tracer material in the base for visual trajectory tracking.) Specifically, the following gunnery training and associated munitions would be authorized for delivery to both the northern target area (IMP-A) and the southern target area (FW1): 25 millimeter (mm) TP, 25mm HE, 30mm HE, 40mm HE, and 105mm HE.

ES.3.3 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

Same as Alternative 1, with one distinction – under Alternative 2, the southern target area (FW1) would be established to accommodate air-to-ground delivery of HE and TP munitions and the northern target area (IMP-A) would be established for development to accommodate delivery of TP-only munitions. This alternative provides a balance in lessening environmental and range management responsibilities associated with delivery of HE munitions to one munitions target area. Rounds authorized for delivery to the southern target area (FW1) would be the same as under Alternative 1 and only 25mm TP rounds would be authorized for delivery at the northern target area (IMP-A).

ES.3.4 Summary of Action Alternatives

Table ES-2 provides a summary of the action alternatives.

Table ES-2. Summary of Action Alternatives

	Alternative 1: Preferred Alternative	Alternative 2: Limit HE Delivery to a Single Munitions Target Area
Altitudes	R-4403A: Surface -- 12,000 ft MSL R-4403B: Surface – 6,000 ft MSL R-4403C: Surface – 10,000 ft MSL R-4403E: Surface – 10,000 ft MSL R-4403F: 4,000 – 10,000 ft MSL	Same as Alternative 1
Lateral Boundaries/ Extent	R-4403A: 2.5 NM radius; 26 square miles R-4403B: 100 square miles R-4403C: 70 square miles R-4403E: 30 square miles R-4403F: 13 square miles	Same as Alternative 1
Sensor Training Area	FW2 (on NASA-owned land in the Buffer Zone)	Same as Alternative 1
Air-to-Ground Target Area Locations	Southern Target Area (FW1) Northern Target Area (IMP-A)	Same as Alternative 1
Target Area Munitions Delivery Capability	2 HE and TP (IMP-A and FW1)	1 HE (FW1) 1 TP (IMP-A)

Notes: ft = foot/feet; MSL = Mean Sea Level; NM = Nautical Mile; HE = High Explosive; TP = Target Practice

ES.4 Environmental Consequences

A summary of environmental consequences for all alternatives analyzed in this Final EA is provided in Table ES-3. The table provides a summary of potential impacts related to the No Action Alternative (maintain status quo), Alternative 1 (establish new airspace and live-fire target areas), and Alternative 2 (establish new airspace but limit HE delivery to a single munitions target area). As discussed in Chapter 4, while there is potential for cumulative effects to some resources, the cumulative effects would be less than significant.

Table ES-3. Summary of Impacts for Resources Analyzed

Categories/Resources	Alternative 1 --Preferred Alternative	Alternative 2	No Action Alternative
Public Health and Safety	• Current NASA and DOD operational regulations and procedures would continue to mitigate ongoing safety risks and apply to new risks associated with new uses of the proposed airspace resulting in safety conditions similar to existing conditions. • R-4403A, B, C, E, and F would reduce risk of danger to participants and non-participants from current and evolving hazards associated with the increased airspace operations. • No impacts to safety of civilian operations at regional airports. • Increase in air operations would result in commensurate increase in bird/wildlife aircraft strike hazard (BASH) potential. • The delivery of HE ammunition to the proposed WMA munitions target areas would introduce a new ground hazard in the form of unexploded ordnance (UXO). To minimize associated risks, personnel and public safety DOD protocols for managing UXO would be implemented at regular intervals. • Laser use at the sensor training area and other locations would be tightly regulated to ensure that laser energy would be contained within R-4403A, B, C, E, and F and not threaten non-participating aircraft and/or personnel. • No disproportionate environmental health and safety risks to children.	• Similar to Alternative 1, except long-term impacts on safety/range management implications for UXO and ORC would be lessened since only the southern target area (FW1) would be used for delivery of HE munitions.	• Substantial risk to safety to airspace users from existing and evolving NASA and DOD mission requirements at SSC. • Existing airspace would continue to fail to accommodate and control the full dimensions of existing and evolving hazards.
Airspace and Air Operations	• Redesignation and expansion of the SUA would generate reliable airspace control and communication mechanisms that are currently only temporary in nature. • No significant impacts to Stennis International Airport or Picayune Municipal Airport operations or within the SUA are anticipated from the redesignation and expansion of R-4403A, B, C, E, and F. • Significant positive impacts to the availability of safe airspace within which NASA, DOD, and other tenant agencies can conduct existing and evolving mission requirements.	• Same as Alternative 1.	• Airspace use and management would remain unchanged from current conditions, and potential for conflicts associated with the joint military and civil use of the airspace in its current configuration would continue.
Noise	• Negligible overall risk of increased noise disturbance to human receptors as it is not anticipated that the noise associated with most aspects of Alternative 1 would travel beyond the established boundaries of the Buffer Zone. None of the annual average noise levels from proposed airspace operations, combined airborne weapon and HE delivery noise, or small arms noise were estimated to exceed DOD land use compatibility thresholds outside of the Buffer Zone. • The estimated noise contour for combined airborne weapon and HE delivery noise evaluated for a 1-month period during which operations would peak (e.g., during Emerald Warrior training exercises) would extend just beyond the Buffer Zone to an area with no noise sensitive receptors. • Negligible impacts to hearing exposure from implementation of the proposed rocket engine test events.	• Similar to Alternative 1 except delivery of TP rather than HE ordnance to the northern target area (IMP-A) would result in lower noise levels in the northern WMA and surrounding areas during Emerald Warrior exercise and year-round.	• Existing noise conditions continue.

Table ES-3. Summary of Impacts for Resources Analyzed

Categories/Resources	Alternative 1 --Preferred Alternative	Alternative 2	No Action Alternative
Land Use	• Consistent to the maximum extent practicable with the enforceable policies of the Federally-approved Mississippi Coastal Management Program and Louisiana Coastal Resources Program. • DON to work with local counties through the DON Range Air Installations Compatible Use Zones (RAICUZ) Program to encourage them to adopt and institute compatible land use zoning measures (such as retaining existing low-density land use in this area and avoiding certain land uses such as high density residential, schools, etc.). • The development of the proposed HE munitions target areas would represent a long-term dedication of land to military use. These munitions target areas would be managed under DOD range safety protocols and the DON Range Sustainability Environmental Program Assessments (RSEPA) process. This long-term land use commitment is generally consistent with the limitations on land use dictated by existing uses of the WMA and the Buffer Zone restricted easement.	• Similar to Alternative 1; however, the smaller WDZ footprint of the northern target area (IMP-A) would result in fewer land use controls for range deconfliction. • There would be greater potential for reuse of the northern target area (IMP-A) lands in the event the site is no longer used for military training at some point in the future as TP munitions delivery sites have fewer enduring land use control requirements than HE delivery sites.	• Existing land use conditions would continue.
Socioeconomics/ Environmental Justice	• Negligible socioeconomic impacts. • Would not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations.	• Same as Alternative 1.	• No changes to socioeconomic environmental justice conditions; existing conditions would continue.
Recreation	• Overall minor impacts to opportunity for recreational aviation as air-based recreation would be prohibited within the SUA when activated. Impacts would be intermittent and based on the frequency of airspace activation; recreation activity also may be displaced to the north of the proposed R-4403A, B, C, E, and F where airspace is available for recreational use. • Impacts to recreation experience within the Pearl River Wildlife Management Area would be similar to existing levels of impacts and consistent with the Buffer Zone. • No change in areas subject to exclusion of public recreation activities for safety during military operations.	• Similar to Alternative 1; however, the delivery of TP-only munitions to the northern target area (IMP-A) would have fewer associated impacts to the Pearl River Wildlife Management Area.	• Existing recreation conditions would continue.

Table ES-3. Summary of Impacts for Resources Analyzed

Categories/Resources	Alternative 1 --Preferred Alternative	Alternative 2	No Action Alternative
Cultural Resources	• No known impacts to architectural resources, archaeological resources, or Native American traditional cultural artifacts or properties. • No adverse impacts to National Register of Historic Places (NRHP)-listed or eligible resources. • The DON would ensure compliance with Section 106 of the National Historic Preservation Act (NHPA) by initiating any required cultural resources surveys at FW2 and IMP-A and taking any required action prior to commencing any ground-disturbing activities, and the DON and NASA would comply with inadvertent discovery standard operating procedures (SOPs) during the undertaking.	• Similar to Alternative 1; however, there would be a slight reduced risk to potential archaeological resources possibly located at the northern target area (IMP-A), due to a smaller WDZ associated with TP-only munitions.	• No impacts to historic or archaeological resources.
Hazardous Materials and Waste, Toxic Substances, and Contaminated Sites	• Negligible impacts to hazardous materials and waste management; all applicable protocols would continue as directed in applicable documents. • Munitions impact would potentially result in the release of small amounts of toxic substances as they explode or decompose; the unlikely potential for migration of munitions constituents would be monitored and managed under the DON's Range Environmental Program Assessments Program. • Should the target areas be closed, they may require response under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) prior to consideration of converting the land to other uses. • Negligible impact to Installation Restoration Program (IRP) known contaminated sites and ongoing remediation efforts located in proximity to proposed ground disturbing-activities.	• Similar to Alternative 1; however, military munitions management and range clearance requirements would be greater at the southern target area (FW1) and lesser at the northern target area (IMP-A) site as compared to Alternative 1 • Likewise, HE munitions constituents would not be delivered to IMP-A and thus a decreased risk of toxic substances in the environment would occur.	• Baseline conditions would continue.
Air Quality	• Minor impacts as small emission increases are anticipated for all criteria pollutants, but none of them approach the comparative threshold of 250 tons per year.	• Similar to Alternative 1.	• Baseline conditions would continue.

Table ES-3. Summary of Impacts for Resources Analyzed

Categories/Resources	Alternative 1 --Preferred Alternative	Alternative 2	No Action Alternative
Biological Resources	• Minor, primarily localized adverse impacts to vegetation associated with the establishment, use, and long-term maintenance of the munitions target areas (5 acres at IMP-A, 6 acres at FW1), sensor training area (2 acres), and untethered autonomous flight vehicle testing sites (up to 300 acres in the Fee Area). • Minor adverse impacts to wildlife (including special status species) expected from loss/conversion of an estimated 13 acres of habitat for the munitions and sensor training areas and up to 300 acres for the untethered autonomous flight vehicle sites, and slight increase over baseline disturbance to wildlife from ongoing rocket engine and untethered autonomous vehicle testing and DOD training (from noise, vibration, and human activity). • Although aquatic/wetlands habitats would be avoided to the extent possible, minor impacts to such habitats from air-to-ground SRTA training within Riverine Zones in areas already subject to SRTA impacts from ground and riverine based platforms and from development and use of munitions target areas and sensor training area • The DON and NASA have used the Draft EA to consult with the U.S. Fish and Wildlife Service (USFWS) on the following Endangered Species Act (ESA) Section 7 conclusions: may affect, but is not likely to adversely affect, the Louisiana black bear, ringed map turtle, gopher tortoise, dusky gopher frog, red-cockaded woodpecker, wood stork, Bachman's warbler, and Gulf sturgeon; and no destruction or adverse modification of designated critical habitat for the Gulf sturgeon. The USFWS concurred with the may affect but not likely to adversely affect determinations on April 10, 2015.	• Similar to Alternative 1, but the use of TP-only munitions at the northern target area (IMP-A) may reduce potential for overall impacts to habitat.	• Existing conditions for biological resources would continue.

Table ES-3. Summary of Impacts for Resources Analyzed

Categories/Resources	Alternative 1 --Preferred Alternative	Alternative 2	No Action Alternative
Geology and Soils	• At the proposed munitions target areas: short-term impacts associated with establishment of targeted arrays and associated roads; periodic, long-term disturbance of soils from range clearance and range maintenance activities, physical impacts of munitions with the earth, and exposure of soils to munitions constituents; best management practices (BMPs) (such as vegetation maintenance and maintenance of roads and trails) would minimize impacts. • At the proposed sensor training area: short-term disturbance associated with establishment of the Site, minimal long-term impacts; BMPs would minimize impacts. • Minimal impacts to soils at HLZs from increased operational tempo and addition of CV-22 operations.	• Similar to Alternative 1, but less impacts likely to occur at the northern target area (IMP-A) as the result of the use of TP-only munitions and a higher level of impacts would occur at the southern target area (FW1) with greater concentration of HE delivery to that site.	• Baseline conditions to geology and soils would continue.
Water Resources	• With the implementation of minimization measures, including preparation of Stormwater Pollution Prevention Plan (SWPPP) where 5 acres or more are impacted, impacts to water resources would be minor. • Anticipated impact to wetlands at the munitions target areas and associated WDZs from munitions impacts and munitions constituents and the access road to the southern target area (FW1); as planning progresses, impacts will be avoided to the maximum extent practicable and mitigated wherever not possible. • A Section 404 permit from the USACE and a Section 401 Water Quality Certification from the Mississippi Department of Environmental Quality would be obtained, as required. • No impacts to groundwater. • No practicable alternative to establishment of munitions target areas in floodplains; however, impacts would be minimal as conditions would not result in increased flood hazards.	• Similar to Alternative 1, but less impacts likely to occur at the northern target area (IMP-A) as the result of the use of TP-only munitions and a higher level of impacts would occur at the southern target area (FW1) with greater concentration of HE delivery to that site.	• Baseline conditions to water resources would continue.

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ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
µg/m^3	microgram per cubic meter
3-D	Three Dimensional
AARIN	Application for Air Range Information and Notification
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ADNL	A-Weighted Day-Night Average Sound Level
ADP	Area Development Plan
AEE	FAA Office of Environment and Energy
AFB	Air Force Base
AFSOC	Air Force Special Operations Command
AG&B	Air Gunnery and Blast
AGL	Above Ground Level
AQCR	Air Quality Control Region
ATC	Air Traffic Control
BASH	Bird/Wildlife Aircraft Strike Hazard
BGS	Basic Ground Skills
BMP	Best Management Practice
BRCC	Blue Ridge Research and Consulting
CAA	Clean Air Act
CAS	Close Air Support
CDC	Child Development Center
CDNL	C-Weighted Day-Nigh Average Sound Level
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	Conditionally Exempt Small Quantity Generator
CFA	Controlled Firing Area
CFC	chlorofluorocarbon
CFR	Code of Federal Regulations
CH_4	methane
CNRSE	Commander, Navy Region Southeast
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COA	Certificate of Authorization
CSSTC	Combat Shooting Skills Training Center
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	decibel
dBA	A-weighted
dBC	C-weighted
dBPk	Peak Sound Pressure Level
DERP	Defense Environmental Restoration Program
DNL	Day-Night Average Sound Level
DOD	Department of Defense
DON	Department of the Navy
DOT	Department of Transportation
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
EMTF	Energetic Materials Test Facility
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
ft	foot/feet
FONSI	Finding of No Significant Impact
FS	Feasibility Study
GHG	Greenhouse Gas
GSRC	Gulf South Research Corporation
HAP	Hazardous Air Pollutant
HE	High Explosive
HFC	hydrofluorocarbon
HLZ	Helicopter Landing Zone
HM	Hazardous Material
HMHWSW	Hazardous Material, Hazardous Waste, and Solid Waste

HMIS	Hazardous Materials Inventory System
HMMWV	high mobility multi-purpose wheeled vehicle
HRST	Helicopter Rope Suspension Training
HW	Hazardous Waste
HWMP	Hazardous Waste Management Plan
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ISR	Information, Surveillance, and Reconnaissance
KIAS	Knots-Indicated Air Speed
LADWF	Louisiana Department of Wildlife and Fisheries
LFZ	Laser Free Zone
L_{max}	Maximum Sound Level
LOX	Liquid Oxygen
LQG	Large Quantity Generator
LSDZ	Laser Surface Danger Zones
MDEQ	Mississippi Department of Environmental Quality
mm	millimeter
MMR	Military Munitions Rule
MMRP	Military Munitions Response Program
MOA	Military Operations Area
MSL	Mean Sea Level
MSU	Mississippi State University
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NASA	National Aeronautics and Space Administration
NAVFAC	Naval Facilities Engineering Command
NAVFAC SE	Naval Facilities Engineering Command Southeast
NAVSCIATTS	Naval Small Craft Instructional and Technical Training School
NCBC	Naval Construction Battalion Center
NCSHPO	National Conference of State Historic Preservation Officers
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	Nautical Mile
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOHD	Nominal Ocular Hazard Distance
NOTAM	Notice to Airmen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NSAv	Nonstandard Aviation
NSR	New Source Review
NSW	Naval Special Warfare
NWI	National Wetlands Inventory
OASPL	Overall Sound Pressure Level
OPNAVINST	Chief of Naval Operations Instruction
ORC	Operational Range Clearance
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PCB	polychlorinated biphenyl
PES	Preliminary Environmental Survey
PFC	perfluorocarbon
$PM_{2.5}$	particulate matter less than 2.5 microns
PM_{10}	particulate matter less than 10 microns
POL	petroleum, oil, and lubricant
PSD	Prevention of Significant Deterioration
RA	Restricted Area
RAICUZ	Range Air Installations Compatible Use Zones
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenetrinitramine
RI	Remedial Investigation
RLSO	Range Laser Safety Officer
ROI	Region of Influence

RSEPA	Range Sustainability Environmental Program Assessment
RZ	Riverine Zone
SARA	Superfund Amendments and Reauthorization Act
SARC	Small Arms Range Complex
SBT-22	Special Boat Team-TWENTY TWO
SDZ	Surface Danger Zone
SEAL	Sea, Air, Land (Navy)
SESAMS	Special Effects Small Arms Range Marking System
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SOCOM	Special Operations Command
SOF	Special Operations Forces
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Control and Countermeasures
SPR	Stennis Procedural Requirements
SQG	Small Quantity Generator
SRTA	Short Range Training Ammunition
SSC	Stennis Space Center
STUAS	Small Tactical Unmanned Aircraft System
SUA	Special Use Airspace
SWCC	Special Warfare Combatant-Craft Crewmen
SWPPP	Stormwater Pollution Prevention Plan
TF	Task Force
TFR	Temporary Flight Restriction
TMDL	Total Maximum Daily Load
TNT	Trinitrotoluene
TP	Target Practice
TSCA	Toxic Substances Control Act
UAS	Unmanned Aircraft System
UFC	Unified Facilities Criteria
ULT	Unit Level Training
U.S.	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UXO	Unexploded Ordnance
VFR	Visual Flight Rules
VOC	Volatile Organic Compound
WDZ	Weapon Danger Zone
WMA	Western Maneuver Area

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1.0 PURPOSE AND NEED

1.1 INTRODUCTION

This Environmental Assessment (EA) has been prepared to evaluate the potential environmental impacts of the proposed action to establish Special Use Airspace (SUA) to support Department of Defense (DOD) air-to-ground munitions training and National Aeronautics and Space Administration (NASA) rocket engine testing at, and in the vicinity of, Stennis Space Center (SSC), Mississippi. The proposed action consists of the following three key elements:

1. Removing existing Restricted Area (RA) R-4403 at SSC and replacing it with an expanded area that would be redesignated as R-4403A, B, C, E, and F. The new airspace would overlie a mix of Federal (NASA, DOD), State, and privately owned land;
2. Establishing two munitions target areas and a sensor training area for DOD air-to-ground training underlying R-4403C, E, and F; and
3. Using the new R-4403A, B, C, E, and F airspace areas to accommodate ongoing and evolving DOD and NASA testing and training requirements.

The DOD and NASA developed a joint proposal for the redesignation and expansion of R-4403 to include R-4403A, B, C, E, and F in consultation with the Federal Aviation Administration (FAA). The original joint proposal was submitted to FAA August 2013 by NASA SSC, Naval Special Warfare (NSW) Command, and Air Force Special Operations Command (AFSOC). In March 2014, the FAA Eastern Region completed an aeronautical study and submitted it to FAA Headquarters. The proposed configuration of the SUA analyzed in this EA was determined by the results of the joint proposal and FAA's aeronautical study process. In April 2015, minor revisions were made to the proposal (see Section 1.8). These minor revisions have been fully incorporated into this Final EA.

Environmental Assessment (EA): A concise public document that analyzes the potential environmental impacts of a proposed action and provides sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a FONSI.

Finding of No Significant Impact (FONSI): A decision document for an EA that concisely presents the reasons why a proposed action would not have a significant impact on the human environment and explains why the preparation of an EIS is not necessary.

Environmental Impact Statement (EIS): Similar to an EA, but provides a more in-depth analysis of the proposed action and reasonable alternatives, significant environmental impacts, and informs decision-makers and the public of the measures that would avoid or minimize adverse impacts or enhance the quality of the human environment.

1.2 REGION OF INFLUENCE

SSC is a NASA installation located in southern Mississippi about 57 miles northeast of New Orleans, Louisiana and 45 miles west of Gulfport, Mississippi (Figure 1.2-1). SSC, originally established in 1961 for the static testing of NASA rocket engines, has evolved into a multidisciplinary Federal city composed of more than 30 other resident Federal, State, academic, private organizations, and technology-based companies engaged in various space, environmental, and national defense programs. NSW Command is a major tenant at SSC and has trained within the adjacent jungle and riverine training environment for approximately 15 years.

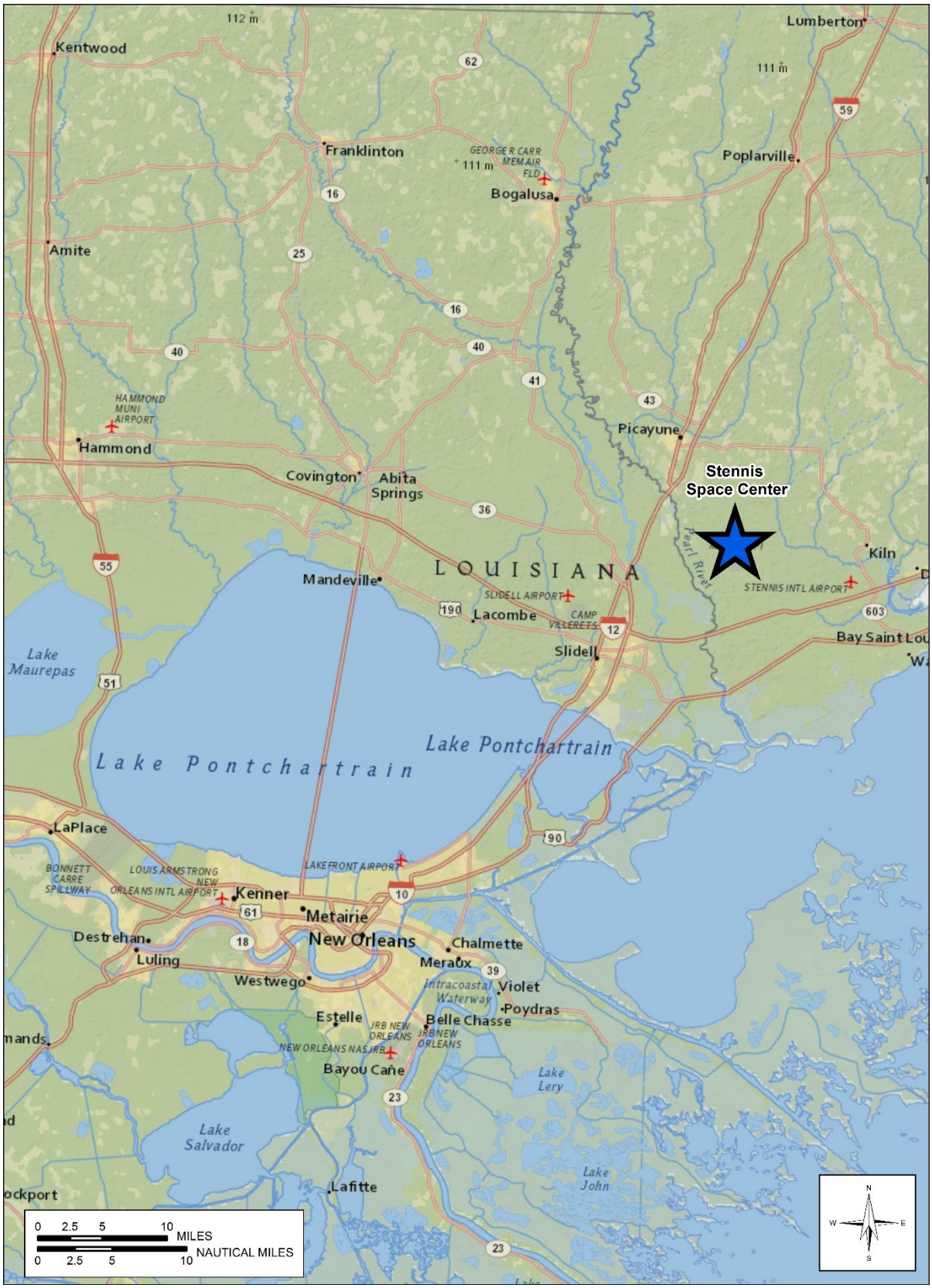


Figure 1.2-1. Stennis Space Center Vicinity Map

The Region of Influence (ROI) refers to the geographical area that could be affected by implementation of the proposed action. Department of the Navy (DON) and NASA defined the ROI for this EA based on the scope of the proposed action and the results of the scoping process.

The ROI is predominantly composed of the areas within the lateral extent of the proposed R-4403A, B, C, E, and F and extending from the ground to approximately 10,000 feet (ft) above Mean Sea Level (MSL). The ROI includes three unique and adjacent lands that support existing and evolving NASA and DOD airspace operations (Figure 1.2-2):

- SSC Fee Area (hereafter, Fee Area): This approximately 21.5 square mile (13,817 acre) area is owned "in fee simple" by NASA and contains the test facilities as well as other laboratory, office, and support building infrastructure for all tenants in the Federal city (the term "Federal city" is widely used by NASA and recognized locally to refer to the Fee Area.
- SSC Acoustic Buffer Zone (hereafter, Buffer Zone): Established concurrently with the Fee Area, this perpetual restrictive easement encompasses about 217 square miles (138,801 acres, including Fee Area; 124,984 acres not including Fee Area) radiating outward in all directions 9 miles from the center of the Fee Area over private and public lands. Since development of habitable buildings within Buffer Zone boundaries is prohibited, this area provides a formal encroachment barrier that separates human habitation and use from government testing and training activities. Only specific compatible uses (such as tree farming or other agribusiness, sand and gravel mining, designated wetlands mitigation banking areas, some recreation, and the Pearl River Wildlife Management Area) are permitted.
- The NSW Riverine Complex, Stennis: This DOD training resource consists of an amalgamation of a number of DON and NASA training assets, including the aforementioned Fee Area and Buffer Zone, as well as assets that are shared-use with the community. The text box on the page that follows provides a description of what the NSW Riverine Complex, Stennis is and what it includes.

The ROI also includes two additional areas that are an integral part of the proposed action (Figure 1.2-2): a NASA-owned parcel in the northern portion of the Fee Area and privately owned land outside of and to the north of the Buffer Zone boundary.

1.3 PROJECT BACKGROUND

1.3.1 Existing Airspace

Airspace is a finite resource that can be defined vertically, horizontally, and temporally when describing its use for aviation purposes. The FAA is charged with the safe and efficient use of the Nation's airspace and, therefore, has established certain criteria and limits for its use. In order to accomplish its task of ensuring safe and efficient use of the Nation's airspace (to include military and civil aviation), the FAA uses the National Airspace System, a common network of United States (U.S.) airspace, air navigation facilities, equipment, airports and landing areas, aeronautical charts, rules and procedures, technical information, and manpower. While the FAA has overall responsibility for managing the airspace system, it accomplishes this through close coordination with state aviation and airport planners, military

What is the NSW Riverine Complex, Stennis?

The NSW Riverine Complex, Stennis consists of a unique combination of DON and NASA training resources, as well as assets that are shared-use with the community. The NSW Riverine Complex, Stennis offers land, air, water, and communications battlespace in a varied environment (from riverine to coastal and from urban to heavily forested), and provides diverse, flexible, and challenging training opportunities. Elements contributing to training realism, and in turn training effectiveness, within the NSW Riverine Complex, Stennis include:

- sufficient (terrestrial) space to allow unrestricted tactical maneuver and weapons employment;
- the presence of realistic targets and training scenarios that mimic real world threats and challenge combat skills; and
- an environment that closely resembles other riverine environments worldwide.

What comprises the NSW Riverine Complex, Stennis?

- **Western Maneuver Area (WMA)**: The DON established the WMA in support of the NSW mission at SSC. DON began acquisition of WMA lands in 2004. The first phase of the land acquisition included approximately 3,200 acres. The remaining planned land acquisition would expand the WMA by approximately 2,000 acres to encompass approximately 5,200 total acres of contiguous land between the western boundary of the Fee Area and the East Pearl River (Naval Facilities Engineering Command Southeast [NAVFAC SE] 2013). The WMA includes live-fire small arms ranges, riverine and land maneuver live-fire training areas, and land maneuver training areas.

- **Fee Area**: NSW maintains a compound within the southwestern portion of the Fee Area and utilizes many areas within the Fee Area. The westernmost part of the Fee Area, the area located West of Trent Lott Parkway, is used in concert with the WMA. This area includes the Small Arms Range Complex (SARC) and accommodates portions of the safety zones associated with the SARC. Other portions of the Fee Area are used in support of NSW logistics and training needs to the extent that they do not threaten the integrity of the Fee Area as defined by NASA as the host. Such uses include munitions storage, driver training, military operations on urban terrain, aerial drops, and maneuver training.
- **Buffer Zone**: the WMA is located within the Buffer Zone and the remainder of the Buffer Zone acts as an encroachment buffer for NSW/Special Operations Command (SOCOM) range and training activities in the WMA and Fee Area.
- **Waterways**: the Mike's River and McCarty River within the WMA and a portion of the East Pearl River abutting the WMA are used for riverine training, including live-fire and river-to-land fire for Special Warfare Combatant-craft Crewmen (SWCC) training including insertion and extraction and interoperability training. This training is integrated with use of the adjoining waters for components of training exercises that do not include live-fire, such as the lower Pearl River, Lake Borgne, Pearl River Wildlife Management Area, St. Louis Bay, Jourdan River, the Mississippi Sound, and as far east as Mobile Bay.
- **Stennis International Airport**: this general aviation airport, owned and operated by the Hancock County Development Commission, supports NSW training and operations such as aircraft loading and equipment staging, military free fall and static line jumping, helicopter fast rope and rappelling, and drop zone and convoy training.

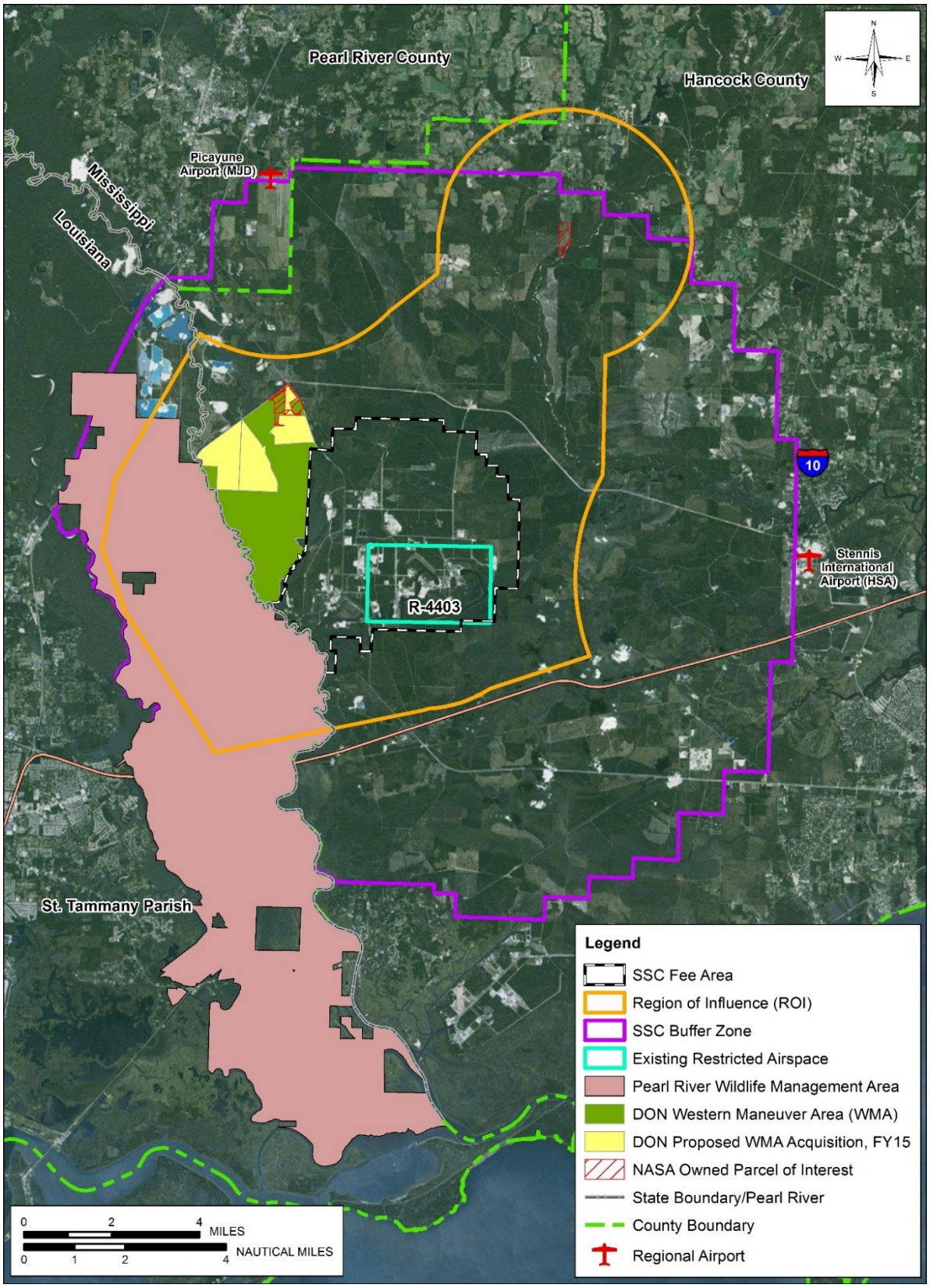


Figure 1.2-2. General Region of Influence for EA

airspace managers, and other entities. Through letters of agreement or other mechanisms with the FAA, many government installations are authorized to manage airspace used for training and testing purposes.

The existing R-4403, established in 1965, is rectangular (in plane view) measuring approximately 2.5 nautical miles (NM) diagonally, centered over the NASA test area and extending from the surface to 5,000 ft MSL. R-4403 is active on an intermittent basis, normally between the hours of 6 a.m. to 11 p.m. and outside those hours if a Notice to Airmen (NOTAM) is published 24 hours in advance.

1.3.2 SSC Mission and Current Use of R-4403

SSC continues to serve the national mandate of testing large liquid rocket engines as science, physics, and the space program evolve. The existing R-4403 configuration supported former missions at SSC, which included all first and second stages of the Apollo Saturn V "Moon Rocket," and later the Space Shuttle Main Engine. NASA's requirements for the proposed R-4403A and B were developed in alignment with the June 2010 National Space Policy of the United States of America (Office of the President of the United States 2010), which requires NASA to set far-reaching exploration milestones. By 2025, NASA is to begin crewed missions beyond the moon. By the 2030s, NASA is to send humans to orbit Mars and return them safely to Earth.

To meet agency long-term goals, NASA SSC has been charged with the development of the next-generation of launch systems. This includes new rocket engine technologies such as the J-2X, a liquid-oxygen/liquid-hydrogen fueled rocket engine that produces nearly 300,000 pounds of thrust in a vacuum.

NASA currently tests rocket engines approximately monthly at existing SSC test stands. Although the existing R-4403 airspace is available for activation 24 hours a day/7 days a week/365 days a year, NASA activates a Temporary Flight Restriction (TFR) in conjunction with test events to accommodate the full dimensions of testing hazards (see Section 1.3.3.1 for more detail).

Special Use Airspace (SUA): Special Use Airspace is designated where activities must be isolated because of their nature, or where limitations may be imposed upon aircraft operations that are not a part of or are otherwise not participating in those activities. The designation of SUA serves to alert nonparticipating aircraft to the possible presence of military activity or other unusual flight conditions and to provide segregation of participating and nonparticipating aircraft. Within the SUA designation, there are further sub-designations dependent on the activities that are driving the SUA (FAA 2013).

Restricted Area: An RA is a type of SUA established in areas where ongoing or intermittent activities occur that create unusual and often invisible hazards to aircraft, such as artillery firing, aerial gunnery, practice bomb dropping, and guided missile testing. Dimensions of the RA vary depending upon the needs of the activity and the risks to aircraft. RAs differ from prohibited areas in that most RAs have specific hours of operation, and entry during these hours requires specific permission from the Using Agency. In addition, there may be a separate scheduling agency who must also grant permission (FAA 2012). RA is established through a specific rulemaking process.

Rocket Engine Testing at the SSC A1 Test Stand Underlying R-4403

1.3.3 NSW Riverine Complex, Stennis Mission and Current Use

The NSW Riverine Complex, Stennis offers forested, urban-simulated, riverine, and coastal transition training opportunities. The natural and built environment of the complex provides diverse, flexible, and challenging training opportunities that are ideally suited to Special Operations Forces and specifically NSW units. The jungle and riverine training environment meets the core training requirements of NSW units, to include the proximity to the coastal maritime waters of the Gulf of Mexico. Elements contributing to training realism, and in turn training effectiveness, within the NSW Riverine Complex, Stennis include: sufficient space to allow unrestricted tactical maneuver and weapons employment, the presence of realistic targets and training scenarios that mimic real world threats and challenge combat skills, and an environment that closely resembles other riverine environments worldwide.

NSW live-fire SWCC and extraction training exercises in the WMA

NSW operations at the NSW Riverine Complex, Stennis are focused on training for Basic Ground Skills (BGS) and Unit Level Training (ULT) for Special Boat Team-TWENTY TWO (SBT-22), NSW GROUP 4 Detachment Stennis, SWCC, and the Naval Small Craft Instructional and Technical Training School (NAVSCIATTS). This training is conducted at the SARC, within the Western Maneuver Area (WMA), on the Pearl River system, at other training locations within the SSC Buffer Zone, and at nearby civilian airfields.

Aircraft currently used in support of these training missions include fixed-wing (AC-130), rotary-wing (MH-6, MH-60, and MH-47), tiltrotor (CV-22), and small types of Unmanned Aircraft Systems (UAS). Existing air operations generally support Intelligence, Surveillance, and Reconnaissance (ISR); Close Air Support (CAS) (without use of loaded weapons); Helicopter Landing Zone (HLZ) training; and some tactical airlift operations. The live-fire authorized and utilized at riverine and land maneuver training areas and the SARC is currently limited to surface fire. Currently, no air-to-ground live-fire operations have been authorized at NSW Riverine Complex, Stennis.

Although range training occurs at varying levels throughout the year, on average, the NSW operations at the NSW Riverine Complex, Stennis currently consist of some form of range training approximately 300 days per year. There are approximately 43,000 NSW man-days annually at NSW Riverine Complex, Stennis. The DON-owned portion of the WMA is managed by Commander, Navy Region Southeast

Hydrogen Flare (right) from Engine Testing (left)

(CNRSE) and is assigned to the Naval Construction Battalion Center (NCBC) Gulfport as a Special Area; however, the NSW Range Control operates, schedules, and otherwise manages all DOD training assets at NSW Riverine Complex, Stennis and is responsible to liaise with NASA in regards to the use, coordination, and deconfliction of training and testing events. Training resources within the NSW Riverine Complex, Stennis are potentially open to use by other interested parties, but NSW is afforded the first right of refusal, thus providing NSW scheduling priority amongst DOD components. Secondary users are other NSW groups and other SOCOM organizations, including AFSOC and the Army's 160th Special Operations Aviation Regiment (Task Force [TF]-160).

The NSW Riverine Complex, Stennis can concurrently accommodate large and multi-faceted training exercises on 33 different training sites and can support DOD interoperability training (i.e., training events that practice seamless integration of operations across airframes while additionally providing continuity between the air and ground forces). Chief among these is the annual 8- to 10-day "Emerald Warrior" event, which trains over 700 special operators and conventional active duty and Reserve forces from AFSOC, Marine Corps Special Operations Command, U.S. Army Special Operations Command, Air Combat Command, Air Mobility Command, and the Department of State. The existing NSW Riverine Complex, Stennis lacks the capability for some key elements of interoperability training for air-to-ground combat, which require RA; specifically, air-to-ground live-fire and sensor training areas (which use laser sensors rather than munitions delivery for air-to-ground combat training). Such training capability supports multi-dimensional, realistic training exercises needed for force readiness.

1.3.4 Requirements for Expanded RA

1.3.4.1 NASA Rocket Engine Testing

The proposed RA is needed to test rocket engine technology at the SSC test stands in order to meet the future space transportation system architectures necessary to execute the National Space Policy. The flaring of hydrogen at a high flow rate through adjacent flare stacks associated with the types of rocket engine testing needed (which may be similar to or of lesser magnitude than J-2X) exceeds the current vertical parameters of R-4403 by 240 percent. Figure 1.3-1 depicts the temperature and velocity created by flaring of hydrogen, which causes excessive turbulence conditions at altitude. The anticipated need for this type of rocket engine testing is approximately 20 to 40 times per year.

The current practice of utilizing a TFR for rocket engine testing is no longer sufficient for future testing. The FAA typically uses TFRs to protect "non-participating" aircraft from inconsistent and often unexpected activities such as firefighting, rescue, law enforcement, and for reasons of national security. They are, by definition, temporary and are issued via the NOTAM system (FAA 2004).

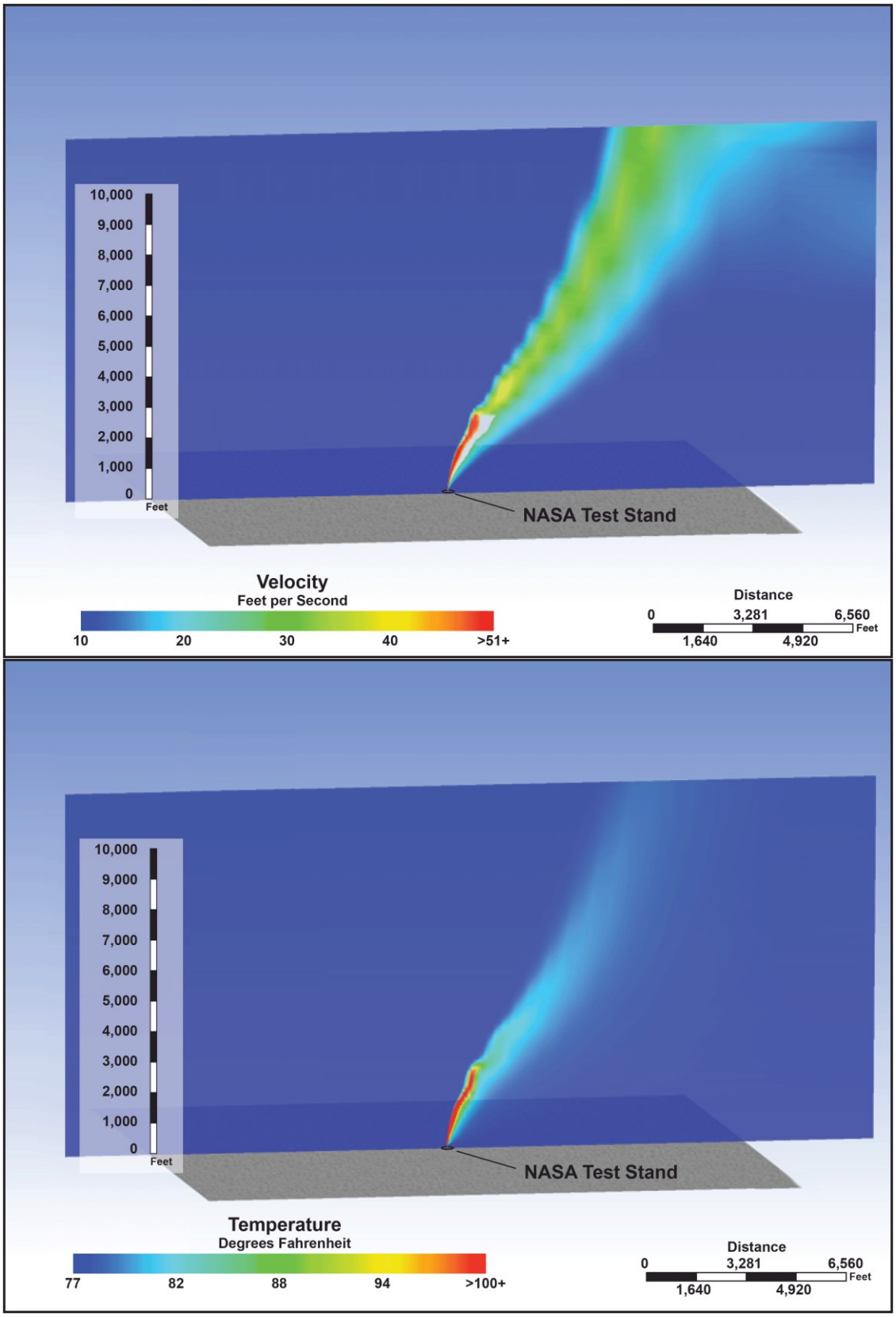


Figure 1.3-1. Rocket Engine Testing Hydrogen Flare Temperature and Velocity Diagrams

Given the frequency of proposed test events, the hazard would not be "temporary" and requires the proposed redesignation of RA. NASA would need to activate the RA, on average, 7 hours for each rocket engine test event. If technical difficulties or other conditions require, the RA may need to be activated for up to 12 hours. The inclusion of an appropriately sized RA on aeronautical charts is needed to increase the safety of the National Airspace System as compared to TFRs. Although pilots should be aware of TFRs through adherence to NOTAM system procedures, a pilot is more likely to be unaware of and violate a TFR than an RA. Given the nature and complexity of the rocket engine testing, immediate system shut-down is not possible to ameliorate hazards to non-participating aircraft that may potentially violate the TFR.

1.3.4.2 NSW/SOCOM 3-D Battlespace

The proposed RA is needed to provide for adequately sized and configured airspace for enhanced three-dimensional (3-D) training battlespace in support of fixed-wing, rotary-wing, and UAS integration with ground-based and riverine Special Operations Forces training. The existing R-4403 airspace is not used in support of DOD missions, and the use of existing Class G airspace and Certificates of Authorization (COAs) for UAS operations is not sufficient to accommodate current and evolving interoperability requirements. Currently, AFSOC-NSW interoperability training occurs during such joint training events at NSW Riverine Complex, Stennis, but is limited to ISR, CAS (without loaded weapons), and some tactical airlift operations. RA to support activities such as air-to-ground munitions delivery, evasive maneuver, and laser operations is needed to increase effectiveness and realism for units that use NSW Riverine Complex, Stennis.

AFSOC requires a varied training environment where Special Operations Squadrons can meet their CAS (including live-fire and evasive maneuvering), laser operation, and tactical airlift requirements. AFSOC units currently meet their training requirements at other locations, but SOCOM training is most effective when conducted in varied training environments, and the currently available training locations are lacking the types of operational and natural training environment present at the NSW Riverine Complex, Stennis. In addition, NSW requires the capability to support air-to-ground munitions delivery and laser operations in a riverine training environment. Additional units participating in interoperability events, such as TF-160 (an Army Special Air Warfare unit), also have training requirements for air-to-ground munitions delivery, laser operations, and tactical airlift.

1.3.4.3 NASA Untethered Autonomous Space Vehicle Testing

NASA has identified SSC as a potential location for the flight testing of untethered autonomous flight vehicles, such as the Morpheus Lander. These vehicles are utilized to explore planets and asteroids. Testing of these vehicles involves potential hazards since failure of the vehicle, its propulsion system, or propellant tanks can result in crash and/or explosion of the vehicle. The propensity for this to occur is greater with these vehicles than with a standard aircraft because of the extremely volatile nature of the propellants and the poor aerodynamic characteristics of the vehicle during earth-based operation.

The Morpheus Lander engine is representative of other systems that are likely to be developed to fit the NASA mission and potentially tested at SSC. Thus, the representative testing requirement for the

purposes of this EA is a 6,000-ft vertical trajectory over a 4-mile horizontal footprint. Requirements for other future untethered autonomous flight vehicles are assumed to be within this footprint.

1.4 Purpose of and Need for the Proposed Action

The purpose of the new R-4403A, B, C, E, and F airspace at SSC is to protect the public, including the general aviation community, while supporting NASA engine testing and DOD tenant missions at SSC. The existing R-4403 airspace is not sufficiently sized and sectored to accommodate current and emergent NASA and DOD mission requirements at SSC. The redesignation and expansion of R-4403A, B, C, E, and F is needed to segregate non-participating aircraft from potentially hazardous activities associated with current and emerging NASA and DOD airspace and ground uses, including the siting of associated locations for munitions impact and sensor training areas for DOD air-to-ground training. Safety hazards driving the need for the proposed RA are summarized in Table 1.4-1.

Table 1.4-1. Safety Hazards Driving Need for R-4403A, B, C, E, and F

Current/Ongoing Hazards	Evolving Hazards
• Excessive turbulence at altitude during NASA static testing of large, liquid-filled rocket engines • Mishap potential during interoperability training events due to congested and limited airspace to practice evasive maneuvering, ISR, CAS (without loaded weapons), and tactical airlift operations	• Risk of crash and/or explosion associated with testing untethered autonomous flight vehicles • Air-to-ground live-fire and laser sensor training from fixed-wing, tiltrotor, and rotary-wing platforms • Increased mishap potential with addition of more complex tactics for live-fire CAS, interoperability, and other training events

1.5 Environmental Review Process

The National Environmental Policy Act (NEPA) (42 U.S. Code [USC] §§ 4321–4370h) is a Federal statute requiring the identification and analysis of potential environmental impacts associated with proposed major Federal actions before those actions are taken. NEPA established the Council on Environmental Quality (CEQ), which was charged with the development of implementing regulations and ensuring Federal agency compliance with NEPA. The process for implementing NEPA is codified in Title 40 of the Code of Federal Regulations (CFR), §§ 1500–1508, Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (i.e., CEQ regulations). According to CEQ regulations, the requirements of NEPA must be integrated "with other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively" (40 CFR § 1500.2).

The DON implements NEPA through its established Procedures for Implementing NEPA (32 CFR § 775). NASA Procedures for Implementing NEPA are found at 14 CFR 1216, Subpart 1216.3. FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, provides FAA policy and procedures to ensure agency compliance with the requirements set forth in the CEQ regulations for implementing the provisions of NEPA, Department of Transportation (DOT) Order 5610.1C, Procedures for Considering Environmental Impacts, and other related statutes and directives (FAA 2015).

1.6 Inter-Agency Coordination

The DON, NSW, NASA, SOCOM, and AFSOC have all coordinated as partners in the creation and analysis of this proposed action and analysis to ensure that the shared airspace solution meets all mission obligations. The decision document associated with this EA is to be signed by DON and NASA SSC.

The FAA is a Cooperating Agency (per Order JO 7400.2J [FAA 2012]) and as such assumes responsibility to independently review the environmental documents prepared by the lead agency and to assess whether the environmental documents meet the standards for adequacy under NEPA. A Memorandum of Understanding between the FAA and the DOD (1998) establishes the requirement for cooperation between the two agencies. A Cooperating Agency Request Letter that fulfills the 1998 MOU specific to this proposed action (signed 22 November 2013) is included in this document as Appendix A.

The Cooperating Agency partnership is intended to eliminate duplication where parallel agency processes occur and to ensure that all NEPA requirements are integrated concurrently. The proposed removal of RA R-4403 and replacement with the expanded area that would be redesignated as R-4403A, B, C, E, and F is a SUA proposal. As such, it is subject to both NEPA and aeronautical processing requirements, including the FAA's obligations per the 14 CFR Part 73 rulemaking process. The FAA notice of public rulemaking for the proposed action was posted in the Federal Register on July 10, 2014 (79 Federal Register 39344) (Appendix B). Since the FAA is the approval authority for SUA actions, the agency cannot make a final decision on any particular SUA proposal prior to the completion of both the NEPA and the aeronautical review process. As a Cooperating Agency, the FAA assists the lead agency (i.e., DON, NASA) in preparing the proposed action. Typically, FAA does not prepare NEPA documentation for SUA actions but, as a Cooperating Agency, adopts DOD (in this case, DON)/NASA NEPA to support the SUA actions. FAA will not post its final rule on the proposed SUA until FAA has met its NEPA obligations (intended through the FAA's adoption of this NEPA document) and any proposed changes have cleared the FAA aeronautical review process.

1.7 PUBLIC INVOLVEMENT

In April 2014, the DON issued a scoping letter to potentially interested Federal, State, and Local agencies and Native American Tribes. Five written responses were received (Appendix C.1). Beginning on December 1, 2014, the public had 35 days to comment on the Draft EA as prepared by DON/NASA. The distribution list for the Draft EA is provided in Appendix C.2. In addition, notification of the availability of the Draft EA was provided in four local newspapers (*Picayune Item*, *Sun Herald*, *Sea Coast Echo*, and *Times Picayune*). The Draft EA was available in four local libraries (Bay St. Louis, Kiln, St. Tammany Parish, and Margaret Reed Crosby Memorial) and digitally on the following webpage:

http://www.ssc.nasa.gov/environmental/docforms/eas/eas.html

Six agencies commented on the EA (including U.S. Environmental Protection Agency, Region 4; USFWS, Jackson Mississippi Field Office; Mississippi Department of Marine Resources; Mississippi Department of Archives and History; The Choctaw Nation of Oklahoma; and the Jena Band of Choctaw Indians). No substantive changes were made to the Final EA in response to these comments. No individuals commented on the Draft EA. The comments received and a discussion of changes to the Final EA is provided in Appendix C.3

Notice of the Finding of No Significant Impact (FONSI) for this Final EA will be published in four local newspapers (*Picayune Item*, *Sun Herald*, *Sea Coast Echo*, and *Times Picayune*).

There also is a public involvement process associated with the FAA's rulemaking process for the charting of the airspace per 14 CFR Part 73, which is required for the proposed SUA. The FAA notice of proposed

rulemaking for the proposed action was posted in the Federal Register on July 10, 2014 (79 Federal Register 39344) (Appendix B) and included a 45-day public comment period that concluded on August 25, 2014. Compliance with NEPA is noted in the "Environmental Review" section of the notice of proposed rulemaking. Parties that commented on or expressed interest in the FAA proposed rulemaking process were sent a postcard noting the availability of the Draft EA and public comment period.

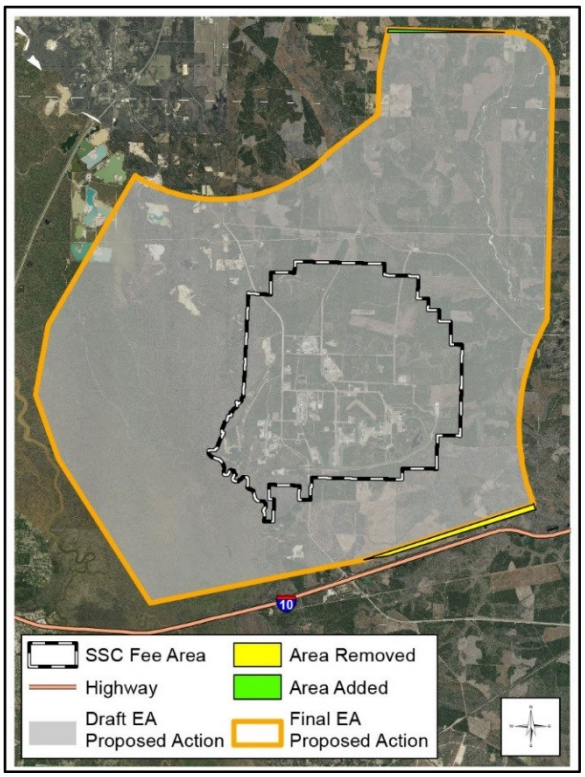
1.8 MAJOR DIFFERENCES BETWEEN THE DRAFT EA AND FINAL EA

Revisions to the EA text included minor clarifications and the inclusion of updated information. No major changes to the document content were warranted or made as a result of agency comment during the review period. Furthermore, none of the changes made to this Final EA are believed to have a profound effect on the findings and conclusions presented in the Draft EA. However, two important updates have been incorporated. First, the Final EA has been modified to correspond with the final Special Use Airspace Proposal (NASA et. al 2015). The final proposal, which was developed during the concurrent FAA rulemaking process described in Section 1.6 included the following slight modifications to the airspace configuration depicted in Figure 1.8-1:

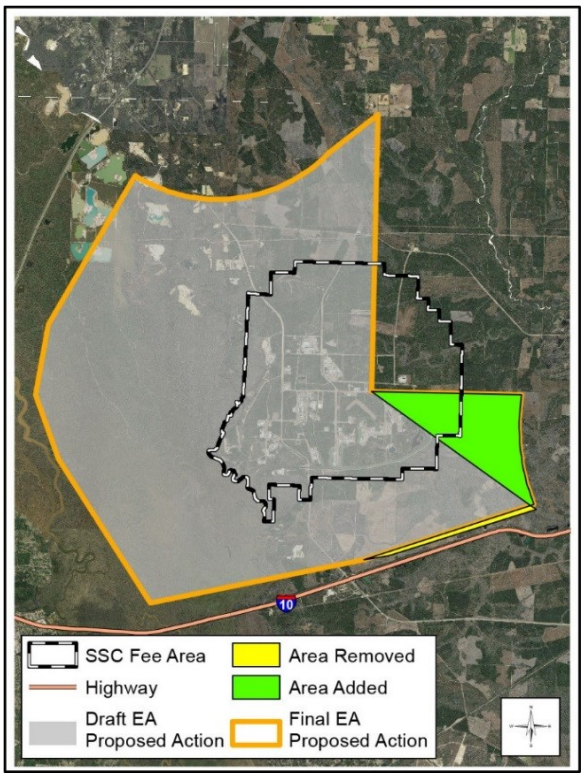
- Elimination of R-4403D as a separate sector of designated RA by merging of R-4403 C and D; increase of the ceiling at R-4403C from 6,000 to 10,000 ft MSL.
- Adjustments to the boundaries of R-4403B, C, E, and F to accommodate Stennis International Airport and provide a minimum 1,320-ft lateral buffer from Interstate-10.

Additionally, DOD and NASA revised and provided clarification regarding their estimates of operational use of the proposed airspace. These changes are summarized as follows:

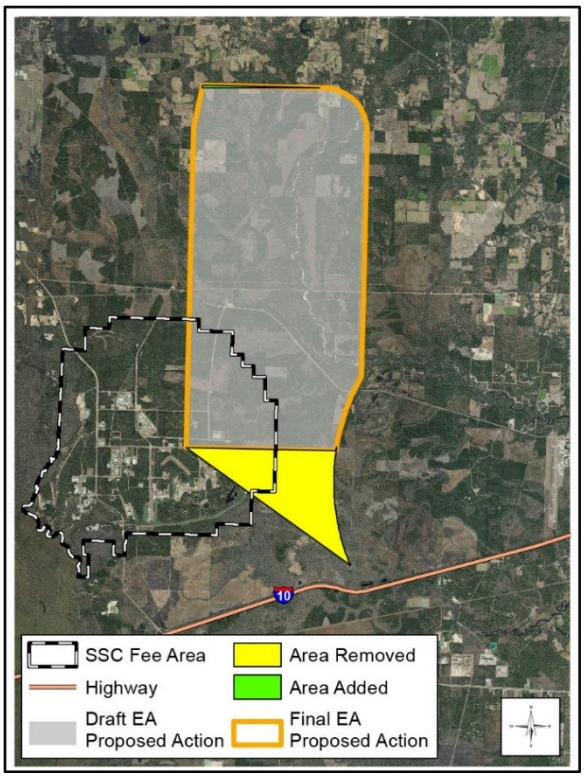
- NASA provided further specification on types of rocket engines that would be used in R-4403A to include the RS-25 and RS-68. Although these engines were not specifically identified in the Draft EA, they were analyzed in the "envelope" of rockets similar or lesser magnitude than the J2-X.
- One launch and two emergency landing sites for testing of untethered autonomous flight vehicles have been specifically designated within the Fee Area and a fourth location in the Fee Area is analyzed for flexibility/contingency.
- NASA's anticipated UAS operations within R-4403B were reduced to 30 annual events each for Category 1 and 2 UASs and 45 annual events for Category 3 UASs.
- DOD proposed durations for activation of R-4403C, (D), E, and F were reduced and clarified as follows:
    - The time block of 6 p.m. to 8 p.m. (1800 to 2000) limited to November 1 to March 1 and not to exceed 20 days per year.
    - The time block of 8 p.m. to 5 a.m. (2000 to 0500) limited to up to 120 days per year.
- The estimated DOD operations were refined, which resulted in an overall minor reduction in total estimated proposed DOD flight activity in activated airspace.



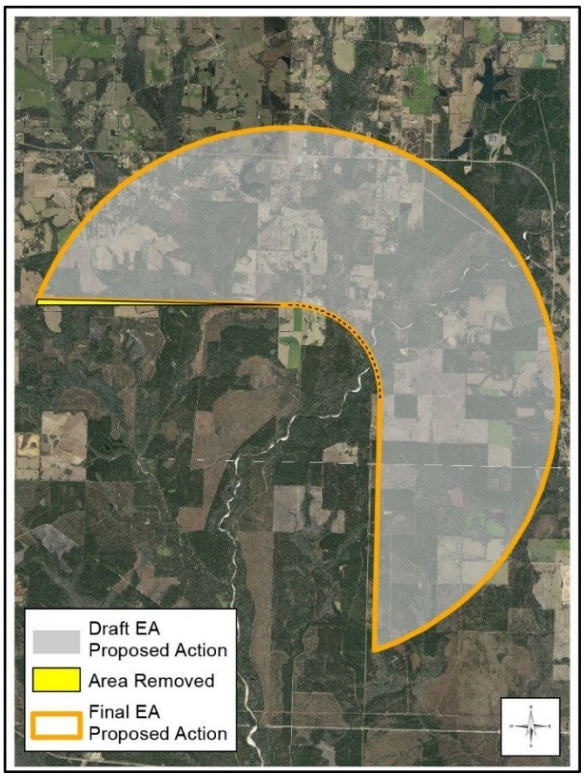
R-4403B



R-4403C



R-4403E



R-4403F

Figure 1.8-1: Revisions to R-4403 B, C, E, and F from Draft EA to Final EA

Overall, these revisions would result in an overall lower magnitude of environmental impacts as compared to that analyzed in the Draft EA, especially for airspace and air operations, noise, and air quality. This change in magnitude of impacts is analyzed qualitatively in the Final EA. Accordingly, the quantitative estimate of impacts associated with air emissions and noise modeling remains based on the operational estimates from the Draft EA, which are now presented as Appendix F. The quantitative estimate of associated air quality and noise impacts in the Final EA is conservative based on the reduction in estimated DOD operations in the proposed activated airspace.

1.9 ORGANIZATION OF THIS EA

This EA is organized with the goal to provide a reader-friendly document that presents an in-depth, accurate analysis of the proposed action; alternatives, including the no action alternative; and their potential environmental consequences. Organization of this EA is presented in Table 1.8-1. Appendices provide technical details as well as agency and public involvement.

Table 1.9-1. EA Organization

Executive Summary	Project Synopsis
Section 1	Purpose and Need for the Proposed Action
Section 2	Description of the Proposed Action and Alternatives
Section 3	Affected Environment and Environmental Consequences
Section 4	Cumulative Impacts and Other NEPA Considerations
Section 5	List of Preparers and Contributors
Section 6	References

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2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This section describes the proposed action to establish R-4403A, B, C, E, and F; provide associated air-to-ground munitions impact and sensor training areas within the RA; and to use these assets to meet current and evolving DOD and NASA requirements. It details the methodology used to arrive at the range of reasonable alternatives and the alternatives carried forward for analysis in this EA, including the No Action Alternative. This section also addresses alternatives considered but eliminated from further analysis.

2.1 PROPOSED ACTION

In order to protect the general aviation community while supporting NASA engine testing and DOD and other tenant missions at SSC, the existing R-4403 would be removed and replaced with an expanded R-4303A, B, C, and F. Whereas the existing R-4403 overlies 4.9 square miles of the Fee Area, the proposed R-4403A, B, C, E, and F would overlie 110.5 square miles of the Fee Area, Buffer Zone (including the WMA), and a relatively small area outside the Buffer Zone (approximately 8 square miles). The proposed action also includes the siting and use of two air-to-ground munitions target areas and a sensor training area underlying the new RA. The following subsections further detail the proposed action relating to the proposed airspace configuration, air-to-ground and sensor training areas, and the airspace operations.

2.1.1 Proposed Airspace R-4403A, B, C, E, and F Configuration

R-4403A, B, C, E, and F would be composed of five contiguous and integrated airspace units that are proposed to replace the existing R-4403 (Table 2.1-1).The proposed configurations and varied altitudes of new RA reflect each user's mission requirements (see Section 2.1.2), while promoting the efficient use of the National Airspace System.

Table 2.1-1. Existing R-4403 and Proposed R-4403A, B, C, E, and F Airspace Description

Airspace	Primary Purpose/Function	Altitudes (ft MSL)	Lateral Boundaries/ Footprint	Times of Use (Central U.S. Zone)
Existing				
R-4403	NASA rocket engine testing operations	Surface – 5,000	2.5 NM diagonal/ 4.9 square miles	Intermittent 0600 – 2300, and other times by NOTAM
Proposed				
R-4403A	NASA rocket engine testing operations	Surface – 12,000	2.5 NM radius/ 26 square miles	Intermittent, 1000 to 0300, activated by NOTAM at least 24 hours in advance
R-4403B		Surface – 6,000	100 square miles	
R-4403C	DOD inter-operability training	Surface – 10,000	70 square miles	2000 – 0500, activated by NOTAM at least 24 hours in advance, and 1800-2000 November 1 to March 1 (not to exceed 20 days per year)
R-4403E		Surface – 10,000	30 square miles	
R-4403F		4,000 – 10,000	13 square miles	

Notes: ft = foot/feet; MSL = Mean Sea Level; NM = Nautical Mile; NOTAM = Notice to Airmen

The airspace is designated "joint-use," and Houston Air Route Traffic Control Center is assigned as the airspace controlling agency. It is anticipated that the total projected activation and use of all proposed airspace sectors (A, B, C, E, and F) would be approximately 156 days per year. During periods when the airspace is not required by the using agencies (i.e., NASA or DOD) for its designated purpose, the airspace would be returned to the controlling agency for use by civil air traffic within the National Airspace System.

Figures 2.1-1 through 2.1-4 depict the proposed R-4403A, B, C, E, and F. Figure 2.1-1 is a two-dimensional representation. Figures 2.1-2 and 2.1-3 depict 3-D models of the proposed new airspace. Figure 2.1-4 is a cross-sectional view of the new proposed airspace.

2.1.2 Proposed Airspace Operations in R-4403A, B, C, E, and F

Table 2.1-2 summarizes the known requirements for aircraft and testing operations that would utilize the proposed RA once established. These operations, which will be analyzed quantitatively to the extent possible in this EA, are primarily those related to the proposed NASA rocket engine testing and autonomous untethered vehicle testing and DOD 3-D battlespace operations.

2.1.2.1 Proposed NASA Operations

Rocket Engine Testing Operations. Rocket engine testing of similar or lesser magnitude to J-2X testing could occur within proposed R-4403A at the existing NASA Test Stand Complex (Figure 2.1-5). R-4403A is configured to protect non-participating aircraft from the potential high altitude turbulence that would result from the flaring of hydrogen through the adjacent flare stacks in conjunction with the rocket engine testing events. Based on past tests, the potential effects would extend up to 12,000 ft MSL and 2.5 NM radius (see Figure 1.3-1). The rocket engine testing would occur 20 to no more than 40 times per year (Table 2.1-2). Testing events would last approximately 1,300 seconds (22 minutes); however, due to the complexity of the event, each test would require the activation of R-4403A for 7 to 12 hours.

> ***Hydrogen Flare Turbulence:*** Hydrogen flare is used to manage pressure levels of fuel delivery pipelines during test events. It creates nonstandard temperature and pressure, meaning that the standard rate at which temperature and pressure changes with increased altitude is altered, which results in air turbulence. For the type of rocket engine testing proposed, it is estimated that the temperature is in excess of 300 degrees Fahrenheit (°F) at 1,000 ft MSL during test events (FAA 2008).

Untethered Autonomous Flight Vehicle Test Operations. Autonomous robotic vehicles similar to the Morpheus Lander are expected to be tested at SSC facilities three times per year. Actual flight during testing events would last 8 to 10 minutes; however, due to the complexity of the event, each test would require the activation of the R-4403B restricted airspace for 7 to 12 hours (Table 2.1-2). Their flight profiles generally include launch, navigation within the restricted airspace, then touchdown either at the launch site or an alternative landing area within the restricted airspace.

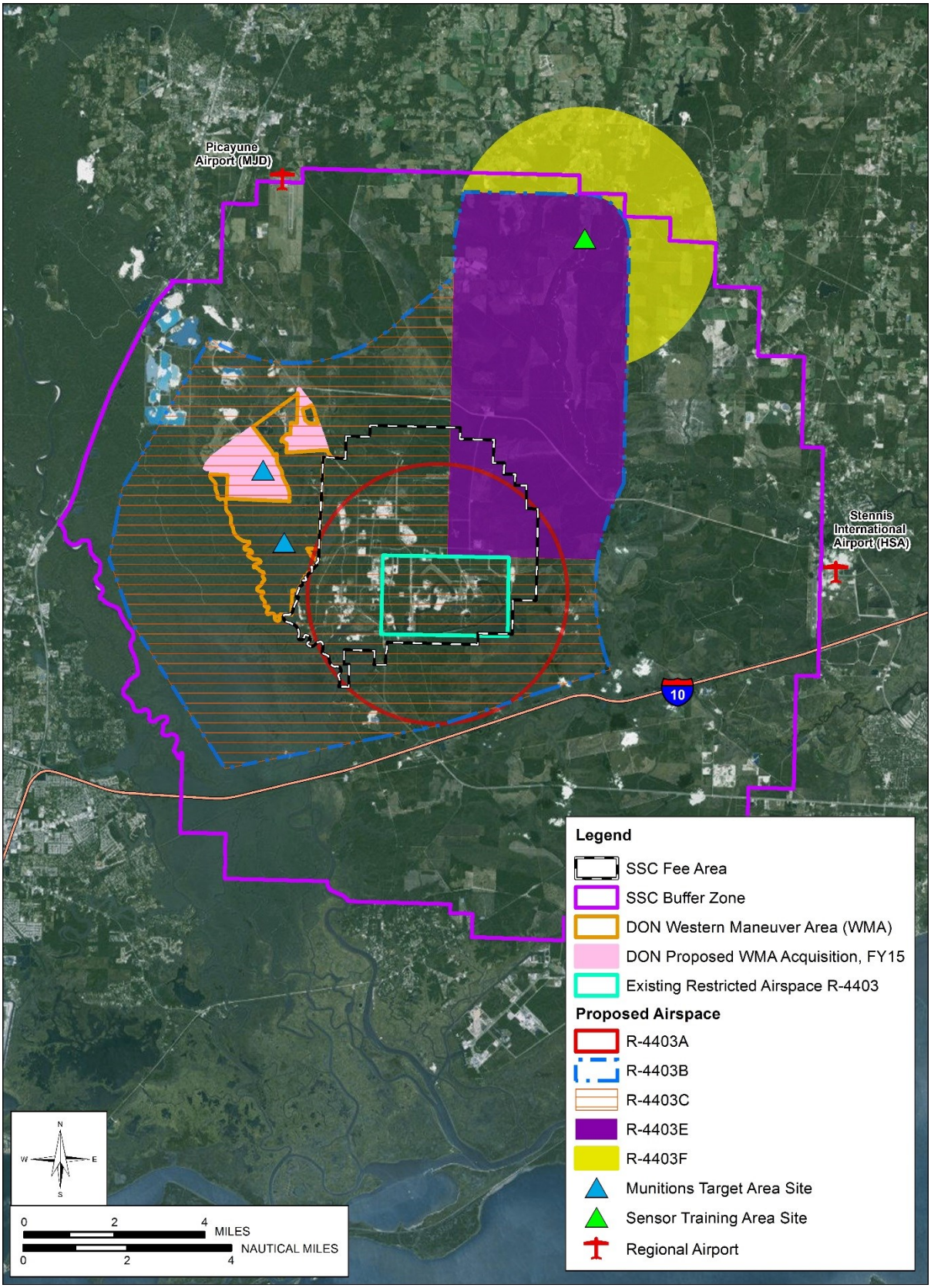


Figure 2.1-1. Proposed R-4403A, B, C, E, and F (Plane View)

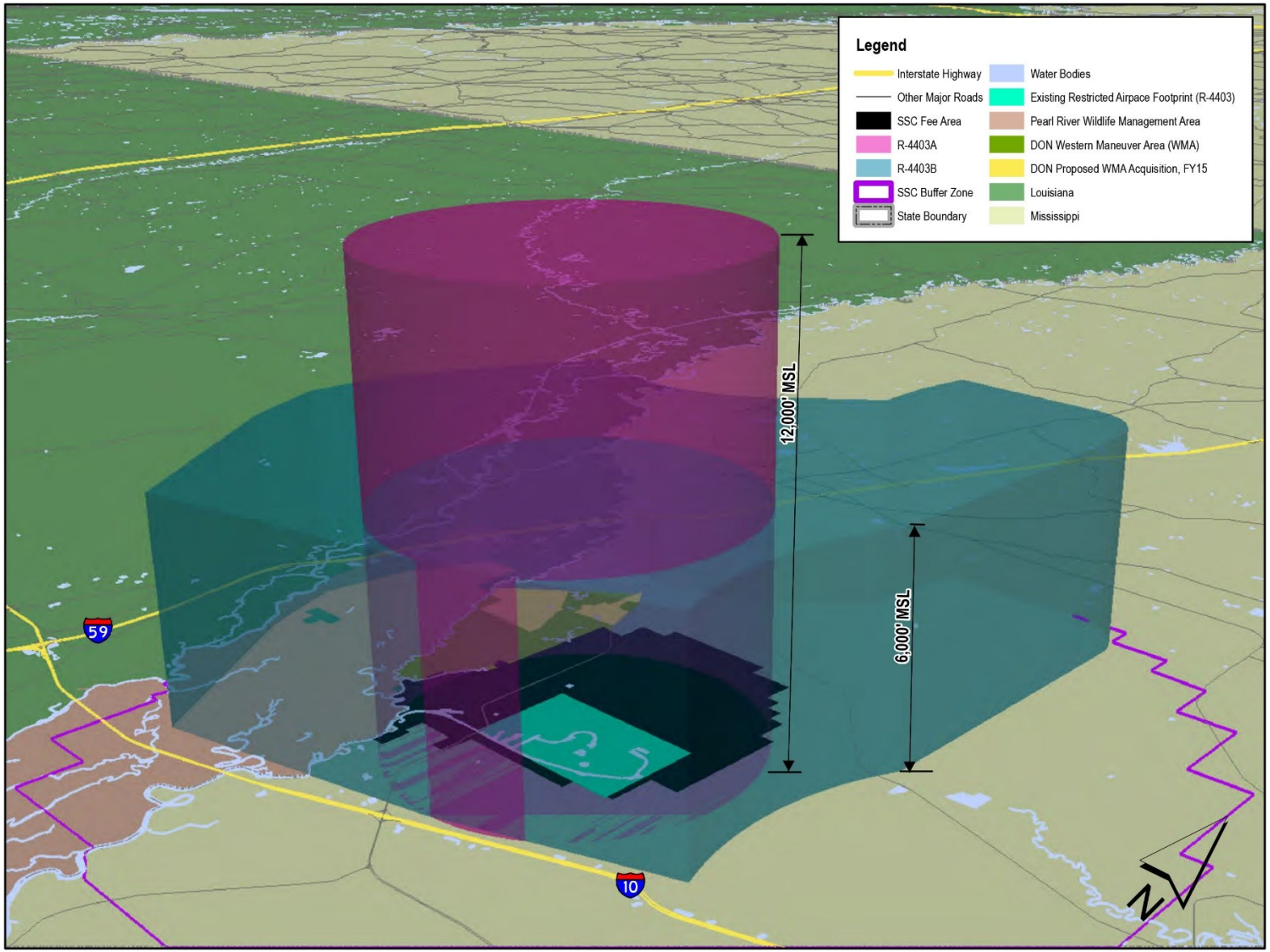


Figure 2.1-2. Proposed R-4403A and R-4403B (3D Model)

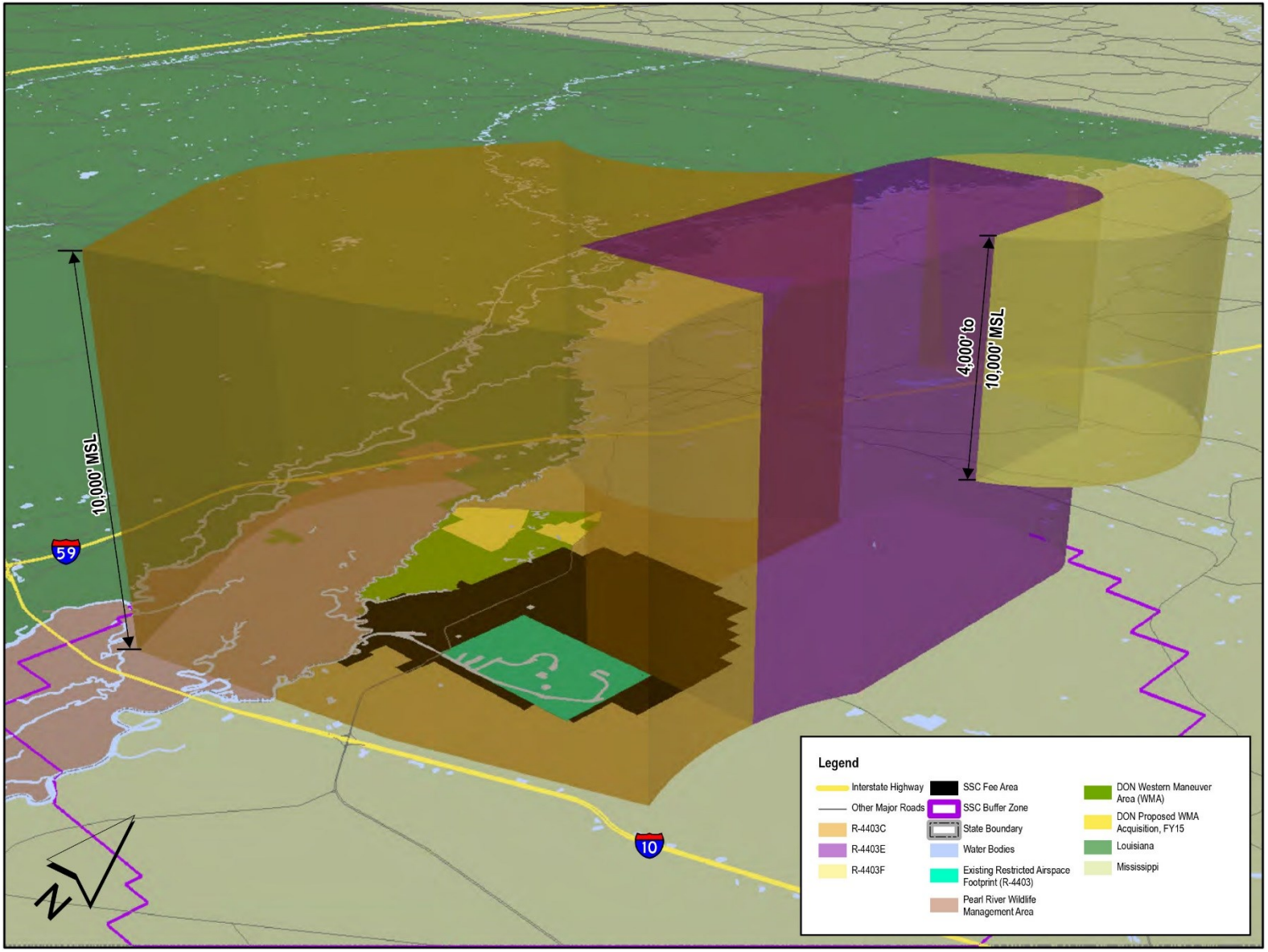


Figure 2.1-3. Proposed R-4403C, R-4403E, and R-4403F (3D Model)

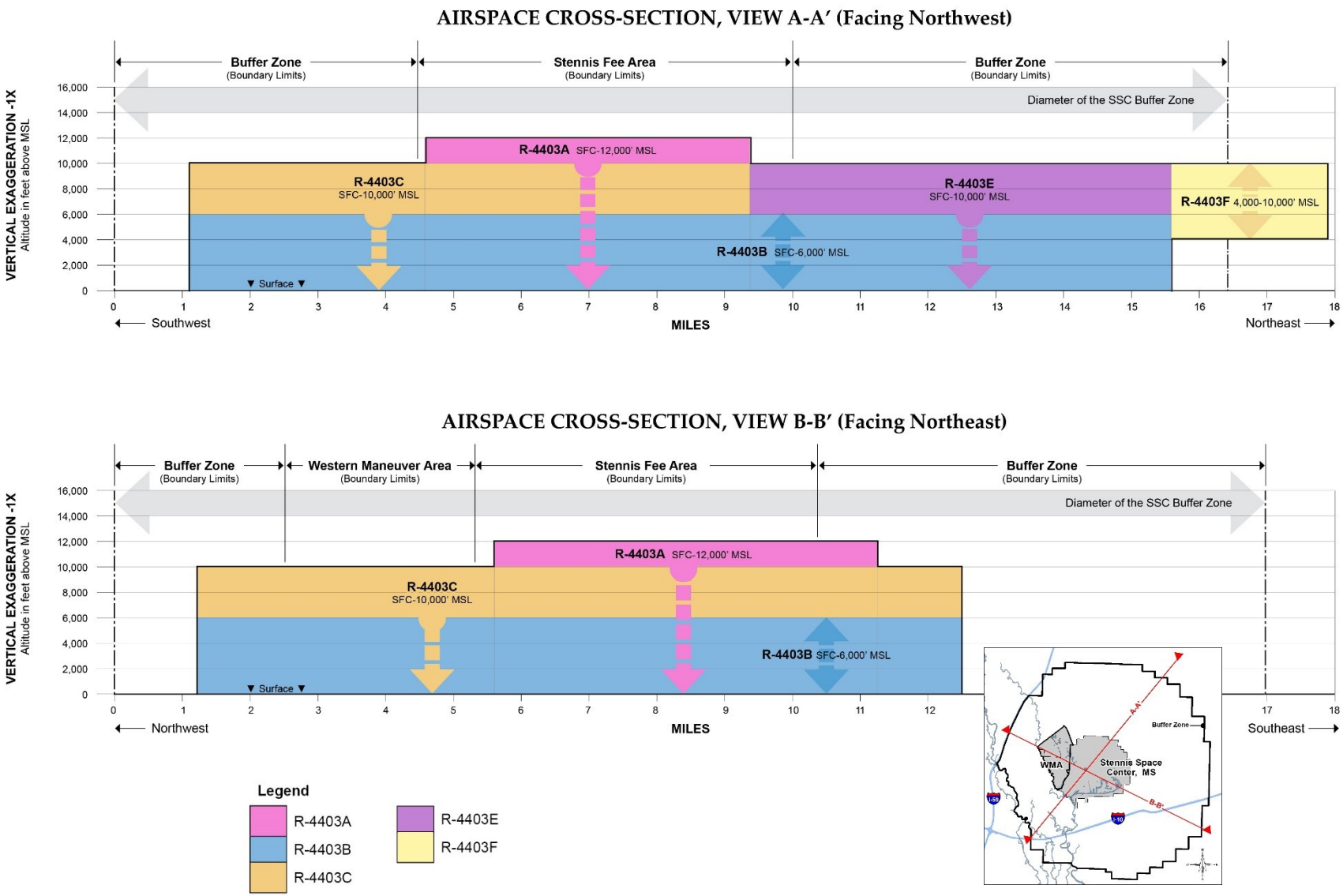


Figure 2.1-4. Schematic Cross Section of New Airspace

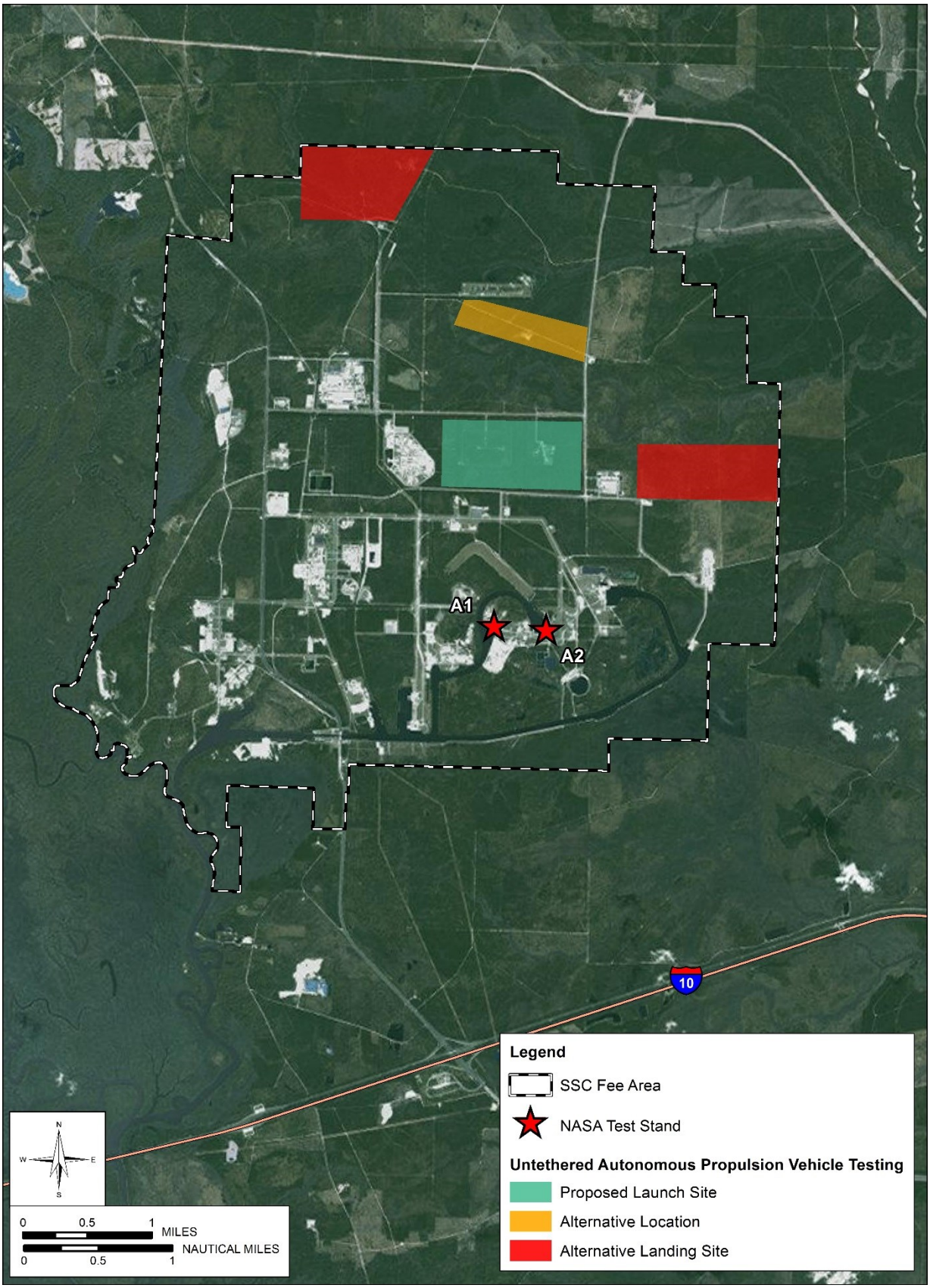


Figure 2.1-5. NASA Proposed Action Operations

Table 2.1-2. Existing and Proposed Annual Air Operations

Airspace	NASA				DOD			
	Activity	Total Annual Events	Typical Event Duration	Estimated Ratio of Day/Night Operations	Airframe: Activity	Total Annual Number of Events	Typical Event Duration	Estimated Ratio of Day/Night Operations
Existing								
R-4403	J-2X, RS-25, RS-68 testing	17	Test: 10-20 minutes RA Activation: 7-12 hours	95/5	Not applicable			
Class Ga	Sporadic overflight for capture of real property aerial imagery				AC-130: dry-fire	20	90 minutes	0/100
					CV-22: HLZ operations	20	55 minutes	0/100
					NSAv: ISR operations	20	30 minutes	0/100
					Helicopters (MH-60, MH-47, MH-6): HLZ, sling, ISR, Helicopter Rope Suspension Training (HRST) operations	100	120 minutes	50/50
					UAS (Category 1): ISR operations	300	60 minutes	75/25

Table 2.1-2. Existing and Proposed Annual Air Operations

Airspace	NASA				DOD			
	Activity	Total Annual Events	Typical Event Duration	Estimated Ratio of Day/Night Operations	Airframe: Activity	Total Annual Number of Events	Typical Event Duration	Estimated Ratio of Day/Night Operations
Proposed								
R-4403A[b,e]	J-2X, RS-25, RS-68 testing	20-40	Test: 10-20 minutes RA Activation: 7-12 hours	95/5	Not applicable			
R-4403B[b,e]	Untethered Autonomous Flight Vehicle Testing	3	Test: 8-10 minutes RA Activation: 7-12 hours	95/5				
	UAS (Category 1)[d] flight testing	30	30 minutes	95/5				
	UAS (Category 2)[d] flight testing	30	60 minutes	95/5				
	UAS (Category 3)[d] flight testing	45	120 minutes	95/5				
R-4403C[c,f]	Not applicable				AC-130: live-fire, laser firing, dry-fire	110	30-60 minutes	7/93
					CV-22: live-fire, HLZ	110	20-25 minutes	10/90
					MH-60: live-fire, HLZ, HRST operations	60	80 minutes	50/50
					MH-47: live-fire, HLZ, sling, HRST operations	60	80 minutes	50/50
					MH-6: live-fire, HLZ operations	20	80 minutes	50/50
					UAS (Category 1)[d]: ISR operations	120	30 minutes	75/25
					UAS (Category 2)[d]: ISR operations	120	60 minutes	73/27

Table 2.1-2. Existing and Proposed Annual Air Operations

Airspace	NASA				DOD			
	Activity	Total Annual Events	Typical Event Duration	Estimated Ratio of Day/Night Operations	Airframe: Activity	Total Annual Number of Events	Typical Event Duration	Estimated Ratio of Day/Night Operations
					UAS (Category 3)[d]: ISR operations	60	120 minutes	80/20
R-4403Ec,f	Not applicable				AC-130: laser firing	20	10-60 minutes	70/30
					NSAv: ISR operations	20	25 minutes	0/100
R-4403Fc,f	Not applicable				AC-130: laser firing	20	10-20 minutes	70/30
					NSAv: ISR operations	20	5-45 minutes	0/100

Notes: [a] Live-fire, laser firing, or other activities hazardous to civil aviation are not authorized in Class G uncontrolled airspace, so utilization of Class G airspace implies non-hazardous activities.

[b] For NASA rocket propulsion test operations and untethered autonomous flight vehicle testing, typical duration considers actual test time as well as RA activation time because explosive hazards are created upon transporting, filling, or charging of the propellant and/or oxidizer tanks. Hazards to civil aviation are not confined to the short duration test event itself.

[c] For DOD, only typical event duration is presented.

[d] For definition of Unmanned Aircraft Systems (UAS) categories, see Table 2.1-5.

[e.] Tests are not normally planned after 10 p.m., but an estimate of 5 percent is included because there is nothing to preclude night operations; night tests are possible, but not typical.

[f] It is common for AC-130s to accomplish live-fire, dry-fire, and laser ops in the same event. Therefore, for AC-130s, do not add E-F to C (i.e., C + (E/F) <> 100 gunship events). Additionally, AC-130s and NSAv platforms can occupy C and E/F simultaneously by maintaining 1,000-ft separation. AC-130s and NSAv platforms can also interfly with CV-22s accomplishing full mission profiles. Each event can consist of multiple activities (e.g., an AC-130 can live-fire, dry-fire, and perform laser ops all in a single event). Average CV-22 event will consist of multiple HLZ operations with one live-fire event. Live-fire and laser firing events would be almost exclusively at night, but aircraft would conduct dry-fire and Visual Flight Rules (VFR) flight during the day without activating the restricted airspace. Training that occurs in the daytime, which does not include the use of live-fire munitions and non-eyesafe lasers as described in this proposed action, are part of existing baseline activities.

The untethered autonomous flight vehicles would be tested within the Fee Area at the 365-acre proposed launch location depicted in Figure 2.1-5. Two emergency landing locations (323-acre northern site, 201-acre southern site), as well as a third 163-acre alternative location that may be needed for flexibility or contingency, are also analyzed as part of this proposed action. The launch and landing sites are located in previously disturbed, largely undeveloped areas that are designated for test operations (NASA 2011). Although the proposed action establishes the airspace to support the proposed test sites, detailed specifications for the design, construction, management, and maintenance of these areas have not been developed pending the evolution of untethered autonomous flight vehicle program requirements. Therefore, these areas may be subject to further site-specific planning and engineering actions as appropriate per the NASA safety and certification process.

In order to make an informed analysis of potential environmental impacts under NEPA with the best available data, conservative planning assumptions were applied to the proposed launch location, emergency landing locations, and potential alternative location. Specifically, it was assumed that some of the forested areas at the launch site would be converted into open grassy areas in order to provide adequate flight safety clearance. Clearing, grading, and compaction may be required for site preparation, and maintenance (such as pesticide application and mechanical treatments) may be necessary to keep the sites open and available. Potential vegetative removal would be consistent with the goals of NASA's forestry management program, which is implemented in support of the overriding NASA mission. The forestry management program calls for the removal of trees where needed to support testing operations and includes revenue production and management actions to maintain forest health, sustained yield, and biological diversity. The forestry plan schedules approximately 300 acres of timber harvest annually (beyond any removal required for the NASA mission). For analytical purposes, it was assumed that the total forestry clearance required to establish the launch site and provide infrastructure capable of supporting an untethered autonomous flight vehicle testing program would not exceed a combined 300 acres. Additionally, it was assumed that site preparation, including vegetative clearance, would not be required at the emergency landing sites. However, some disturbance at these sites may occur in the rare event that they are used for emergency landing, such as the physical impacts from the emergency landing and equipment and activity for recovery operations. Although wetlands are present within the proposed launch location, emergency landing locations, and potential alternative location, it was assumed that potential impacts to wetlands would be avoided.

2.1.2.2 Proposed DOD Operations

Airspace Operations. DOD flight operations for interoperability training are proposed to occur primarily within R-4403C, E, and F (Figure 2.1-6; Table 2.1-2). NSW, AFSOC, and other military Services, would utilize the proposed R-4403C, E, and F to support the addition of air-to-ground training at and to increase the frequency of existing training activities such as evasive maneuver, tactical airlift requirements, and laser operations. Aircraft employed by AFSOC include but are not limited to AC-130s, CV-22 tiltrotor aircraft, and other nonstandard aviation (NSAv) aircraft. Other platforms expected to utilize the proposed airspace include helicopters (MH-60, MH-47, and MH-6) and UAS. These aircraft may activate and occupy the airspace alone, but most commonly, a NSW Riverine Complex, Stennis training event will have one AC-130, up to two helicopters or tiltrotor aircraft, and up to two UAS (non-weaponized, Class 3). During the (no more than) 10-day annual Emerald Warrior training exercise, there may be up to 10 aircraft occupying the proposed airspace. In addition, the airspace would support the following DOD interoperability training:

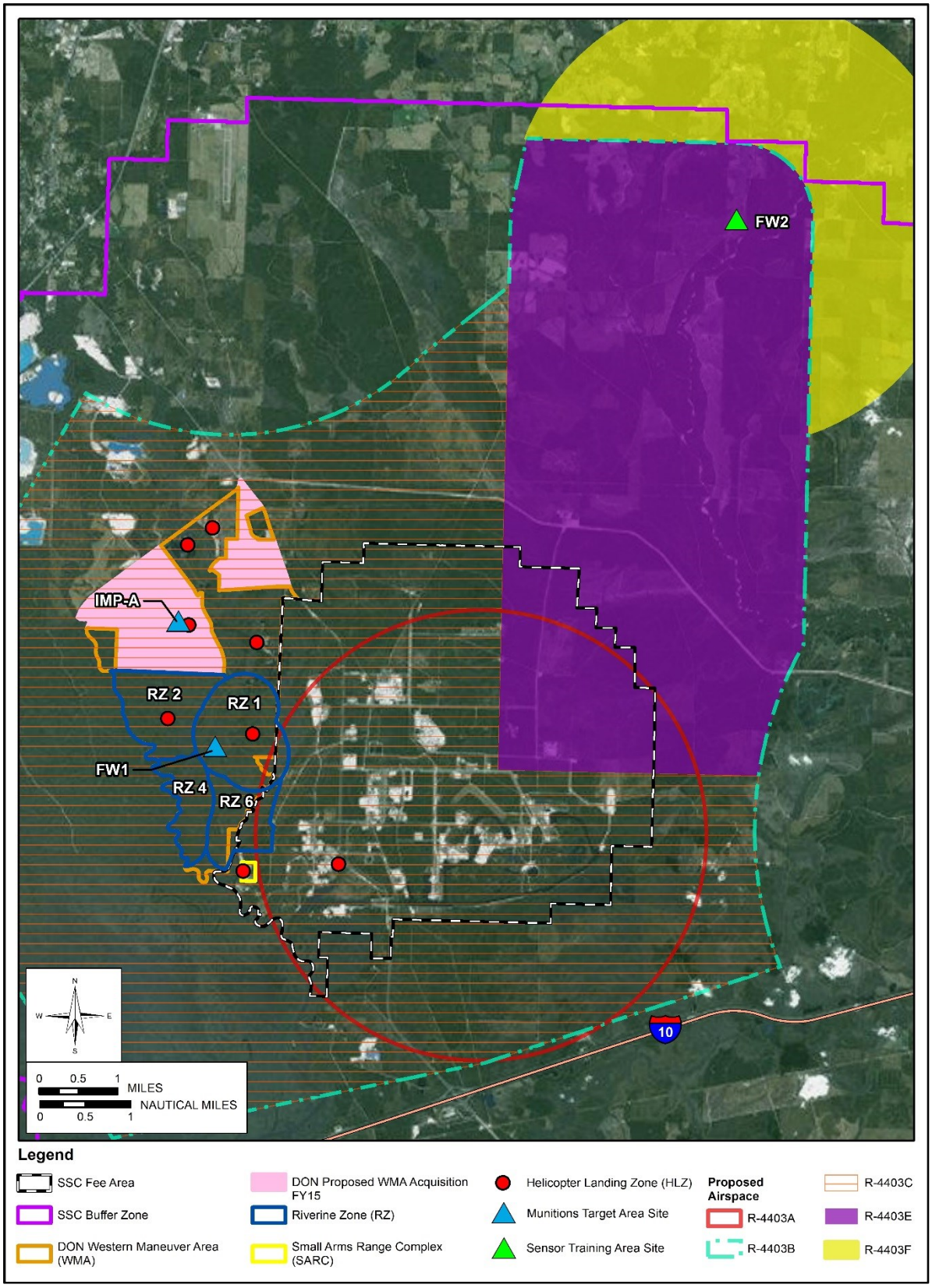


Figure 2.1-6. NSW Riverine Complex, Stennis Battlespace Operations

- low-level air-to-ground downrange firing of small arms from helicopters at the existing SARC;
- air-to-ground firing of Short Range Training Ammunition (SRTA) from low-level helicopters within the existing live-fire riverine training areas in the WMA;
- continued use of eight existing HLZs;
- use of flares from various aircraft; and
- ongoing and emerging UAS operations.

DOD units would request activation of the airspace sectors on an as-needed basis.

Munitions Target Areas and Sensor Training Area Siting. The siting of two munitions target areas and a sensor training area has been incorporated into the design for the proposed R-4403C, E, and F airspace. The siting of these areas is as follows:

- Southern target area (FW1): within WMA lands currently owned by the DON;
- Northern target area (IMP-A): within the proposed WMA area scheduled for DON acquisition; and
- Sensor training area (FW2): on NASA-owned 100-acre land parcel in the northern portion of the Buffer Zone surrounded by privately owned parcels.

The FW1, IMP-A, and FW2 nomenclature used in this analysis was developed at an early planning stage for the proposed action and is retained here for reference and consistency with the joint proposal for the redesignation and expansion of R-4403A, B, C, E, and F.

Although the proposed action establishes the airspace to support the proposed munitions target areas and sensor training area, detailed specifications for the design, construction, management, and maintenance of these areas has not been developed at this time. Therefore, these areas may be subject to further site-specific range planning and engineering actions as appropriate per the range certification process. In order to make an informed analysis of potential environmental impacts under NEPA with the best available data, planning assumptions were based on existing operational air-to-ground gunnery target areas and made to conservatively assess the development and operation of the munition target areas and sensor training area.

Munitions Target Areas Concepts and Assumptions. Based on guidance from military range planners regarding the size of a standard AC-130 gunnery target area, a conceptual 5-acre area of disturbance was assumed for each target area. For the purposes of the EA analysis, these areas were assumed to be filled and completely disturbed. Additionally, assumptions were made regarding the activities and impacts of the associated requirements and protocols for Operational Range Clearance (ORC) and range maintenance, as well as the planning-level Weapon Danger Zones (WDZs) associated with the conceptual 5-acre target areas. The development of the munitions target areas would include an array of individual targets up to the size of a tank. In order to provide the most realistic training scenario, initial tree clearing would be avoided to the greatest extent possible, but would occur incrementally as the area becomes impacted by munitions.

The proposed 5-acre munitions target areas were sited based on the latitude and longitude for the IMP-A and FW1 locations as used in the proposed configuration of R-4403C, E, and F, and the extent of the restricted airspace sectors were based on the orbit required by the AC-130 to train utilizing targets in the impact area. The airspace configuration supports air-to-ground munitions delivery at the munitions target area from all directions (i.e., in 360 degrees). The configurations of the proposed 5-acre munitions target areas were further refined for each site based on consideration of physical, natural resource, and operational conditions at the IMP-A and FW1 locations.

Hi-Resolution Imagery of the Northern Impact Area, March 2012

The conceptual configuration of the 5-acre northern target area (IMP-A) is analyzed as a rectangular area (215 ft by 1,015 ft) sited in a recently active gravel quarry. This area is already significantly disturbed due to quarry activity and no new access roads would be required. The target area is adjacent to but avoids the quarry pit where standing water collects approximately 10 to 30 ft deep, depending on rainfall amounts and season. Although historic data including National Wetland Inventory mapping identifies the area as wetland, the area may potentially be considered a non-wetland or upland area based on the conditions associated with quarry operations as evident in recent (March 2012) aerial photography.

The conceptual configuration of the 5-acre southern target area (FW1) is analyzed as a rectangular parcel 320 ft by 935 ft predominantly in a timber management area with thick vegetative cover. In addition, two new access roads totaling 1,325 ft would be required for the southern target area. The

access roads would require disturbance of an additional 1 acre, assuming a disturbance width of 33 ft (for the roadbed and shoulder combined). The access road from the northwest would disturb approximately 0.6 acre and the access road from the southeast would disturb approximately 0.4 acre. Some amount of fill would be required for the munitions target areas and access roads. For the purposes of this EA, the impacts related to anticipated fill requirements are analyzed qualitatively based on best available data.

The potential impacts related to the associated WDZs were also assessed based on the IMP-A and FW1 locations, as well as the proposed configuration of the munitions target areas (see inset text box). The WDZs expand beyond the 5-acre target areas and encompass a much larger area that would have the potential for impacts, but at a much lower level than the target area sites. Consistent with the proposed airspace configuration, the WDZs were based on weapons employment from a full 360 degrees around the targets.

The WDZs were developed for planning purposes only for both proposed munitions target areas and are analyzed qualitatively within this EA. The planning-level WDZs are specific to the projected use of each munitions target area, including specific combinations of aircraft and weapons delivery profiles. The planning assumptions fed into the WDZ Tool to create the footprints are described in detail in Appendix D. Because the WDZs would vary with each alternative, they are presented in Section 2.4 (they are also further discussed in Section 3.2, Safety, and Section 3.5, Land Use).

Weapon Danger Zone (WDZ): A WDZ is the area within which unprotected personnel are at risk from weapons effects; i.e., impact including ricochet, fragmentation, and blast from explosive rounds, for both properly and improperly functioning weapons. A WDZ is calculated specific for each weapon, delivery profile, target, and desired level of confidence of containment. Numerous WDZs can be combined to produce an overall, aggregate WDZ for the range, which is useful for facility planning purposes.

For analytical purposes for this EA, it was assumed that range clearance operations would cover the full extent of the 5-acre munitions target areas at least annually, but with increased frequency dependent upon levels of use. Clearance operations would consist of collection of munitions visible on the ground surface and rendering not fully detonated High Explosive (HE) rounds safe (i.e., igniting such rounds so that explosives detonate). Subsurface detection and removal is completed when a range is being permanently closed or if rounds land off the target area and pose a threat to troops or vehicle traffic. Those HE munitions recorded as impacting a location within the WDZ, but outside of the intended 5-acre munitions target area, would be logged. If the logged location is in an area that is used by ground units other than Explosive Ordnance Disposal (EOD) and range maintenance personnel, appropriate clearance measures would be taken on a case-by-case basis. Range clearance would also occur prior to and in the area of range maintenance ground activities (such as road, target maintenance/replacement, debris removal, grading, and stabilization of soils). Such range maintenance would occur on an as needed basis and consist of periodic blocks of 2 to 4 weeks. Generally, major range maintenance events typically occur every 75 usage days. Support for clearance of partially exploded munitions would be provided by an existing range clearance team, likely based out of Hurlburt Field.

Sensor Training Area Concepts and Assumptions. The sensor training area (FW2) site is undeveloped and not currently used for any specific test or training purpose. South Benville Road (gravel) extends from the southwestern to the northeastern corners of the 100-acre parcel (Figure 2.1-7). South Benville Road connects with Lott McCarty Road, a paved local road to the north, and other unpaved local roads to the south. The conceptual design of the proposed sensor training area (FW2) is based on a typical sensor training area configuration, to include the development of a semi-improved mobile vehicle target track, mobile sensor target with trailer, and perimeter fencing and security upgrades. The existing road may require upgrades and improvements, and a perimeter road may be established in conjunction with the perimeter fencing. The total disturbance for the proposed sensor training area (FW2) would be approximately 2 acres. The mobile laser sensor target would be mounted to a small vehicle/quad track and driven along the track within the 100-acre NASA-owned property where the sensor training area is sited. While AFSOC operations would potentially utilize this capability year-round, most NSW and Army helicopter operations at the sensor training area (FW2) would occur as part of the joint training events such as Emerald Warrior. Proposed laser use at the sensor training area (FW2) would include use of both eyesafe and non-eyesafe laser systems. Regulations for laser use at the sensor training area would include altitude restrictions for eyesafe lasers (with small Nominal Ocular Hazard Distance [NOHD]), ensuring that non-participating aircraft are protected. Non-eyesafe laser energy designator modes (with large NOHD) would be limited to use from the proposed R-4403E, ensuring that laser energy remains safely inside the proposed RA.

Other Laser Operations. SOCOM interoperability training includes force-on-force laser operations training that can be air-to-ground, ground-to-ground, ground-to-air, or air-to-air. AFSOC operations at the munition target areas would include use of air-to-ground lasers for training to standards of target identification, illumination, location, and designation. The use of lasers would be limited so that all non-eyesafe laser energy would be contained within the proposed RA (ensuring that there is no hazard to non-participating aircraft), and would be in accordance with all applicable safety regulations and procedures.

Expendable and Munitions Delivery Estimates. The primary munitions fired into the munitions target areas would be 25 millimeter (mm), 30mm, 40mm, and 105mm HE and 25mm target practice (TP) rounds delivered from the AC-130 airframe (Table 2.1-3). In addition, NSW, Army, and AFSOC units would conduct low-level air-to-ground SRTA firing (.50-caliber, 7.62mm, and 5.56mm) at the proposed munitions target areas from MH-60, MH-47, and MH-6 rotary-winged and CV-22 tiltrotor aircraft. MH-60 helicopters at the existing SARC would hover near the current SARC tower and fire small arms munitions downrange. The following weapons, all certified within the existing SARC Surface Danger Zone (SDZ), would be authorized for helicopter SARC downrange firing: 7.62mm and 5.56mm ball and SRTA ammunition and .50-caliber SRTA, as well as .50-caliber ball ammunition for the elite class of NSW certified snipers (see Figure 2.1-6). Air-to-ground SRTA would be employed at previously certified (surface only) live-fire riverine training areas in the WMA (specifically, at Riverine Zones [RZs] 1, 2, 4, and 6). All capable platforms would utilize countermeasure/decoy flares (such as but not necessarily limited to M-206 and MJU-64 flares); chaff will not be expended as part of proposed airspace operations (Table 2.1-3).

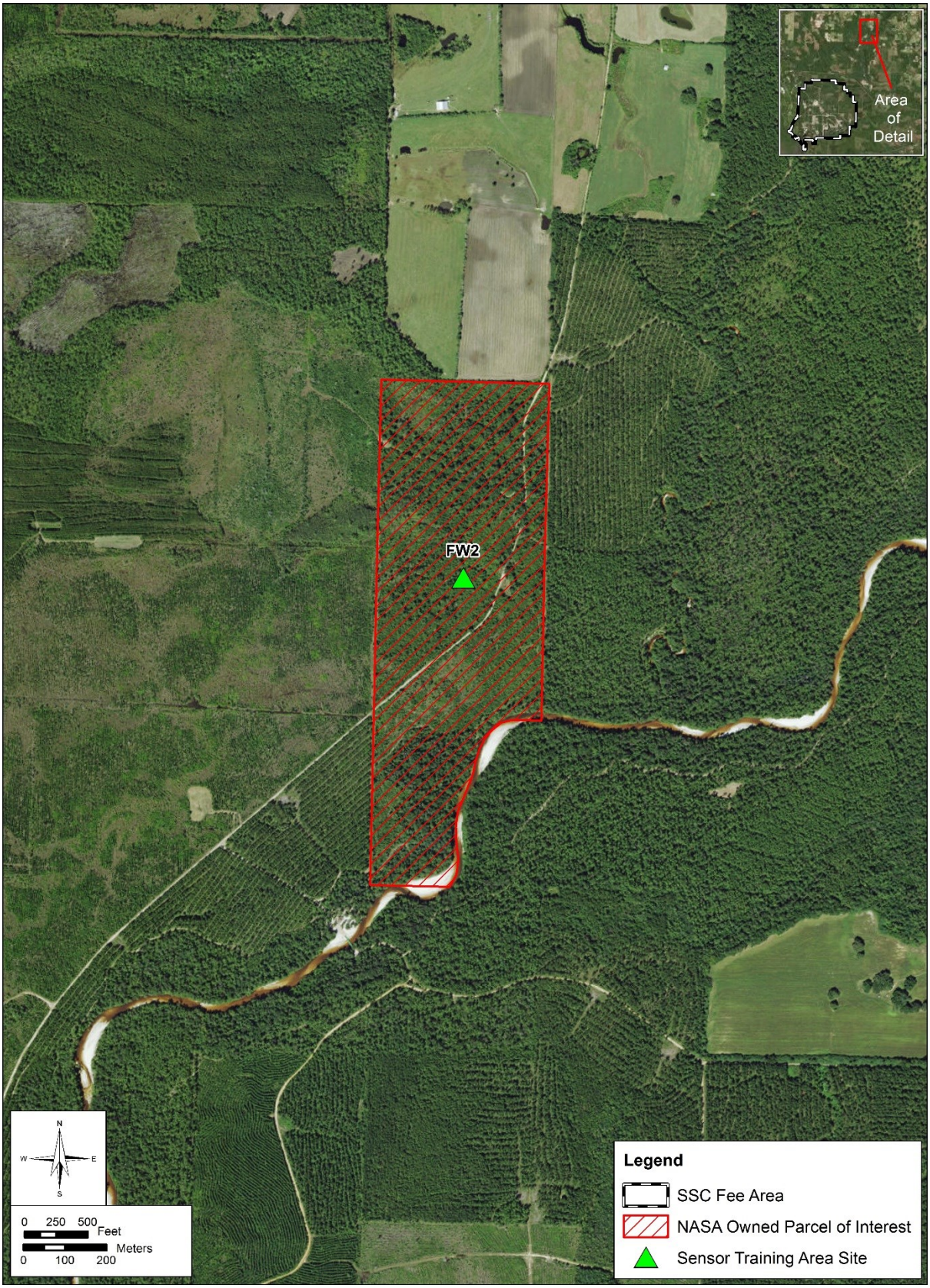


Figure 2.1-7. Sensor Training Area (FW2) Area Detail

Table 2.1-3. Total Annual Proposed Expendables and Air-to-Ground Munitions Delivery in R-4403C[a,b]

Expendable/Munitions Types[c]	Aircraft Type: AC-130 (Emerald Warrior/Other) [rounds per year]	Aircraft Type: Helicopters MH-60, 47, 6 & CV-22 (Emerald Warrior/Other) [rounds per year]	Target Delivery Locations
Expendables			
Decoy Flares	9,600/38,496	3,200/7,296	NA
Munitions			
25mm HE and TP	10,000/40,000	NA	Munitions target areas, varies by alternative – see Tables 2.4-1 and 2.4-2 for more detail
30mm or 40mm	1,280/5,120	NA	
105mm HE	600/2,400	NA	
SRTA: 7.62mm	NA	500,000/1,440,000	Munitions target areas and RZs 1, 2, 4, and 6
SRTA: 5.56mm	NA	0/120,000	Munitions target areas and RZs 1, 2, 4, and 6
SRTA: .50-caliber	NA	0/240,000	Munitions target areas and RZs 1, 2, 4, and 6
Ball ammo: 7.62mm	NA	0/480,000	Sniper Tower at SARC
Ball ammo: 5.56mm	NA	0/40,000	Sniper Tower at SARC
Ball ammo: .50-caliber	NA	10,000/80,000	Sniper Tower at SARC

Notes: a. There are currently no live-fire operations occurring from aerial platforms; likewise, no flares are currently being expended as part of existing operations.

b. Munitions Types: HE = High Explosive; TP = Target Practice; SRTA = Short Range Training Ammunition; Ball ammo = standard small arms service ammunition without explosive fill of various sizes (7.62 mm, 5.56 mm, and .50-caliber)

2.1.2.3 UAS Operations

UAS operation requirements are evolving, and additional UAS requirements could be tangentially supported by the proposed RA. Small class UAS operations are currently conducted at NSW Riverine Complex, Stennis under COAs issued by FAA for UAS operations conducted outside of RA as outlined in the 2007 DOD-FAA UAS Memorandum of Agreement. The advantages that RA would offer in terms of greater flexibility, diversity, and control advantages as compared to COAs would allow DOD to meet current and emerging requirements for UAS. In addition to current Group 1 UAS platforms that operate at NSW Riverine Complex, Stennis, additional UAS operations up to the Group 3 UAS Category of Small Tactical Unmanned Aircraft Systems (STUASs) (Table 2.1-4) could be accommodated. (The existing and projected UAS operations for both DOD and NASA are included in Table 2.1-2.)

Table 2.1-4. UAS Categories

UAS Category	Maximum Gross Takeoff Weight (lbs.)	Normal Operating Altitude	Speed (KIAS)	Example Aircraft
Group 1	0-20	<1,200 ft AGL	<100	Puma, Wasp, RQ-11 Raven
Group 2	21-55	<3,500 ft AGL	<250	RQ-21A Scan Eagle
Group 3	<1,320	<18,000 ft MSL	<250	STUAS, RQ-7 Shadow, MQ-5 Hunter

Notes: KIAS = Knots-Indicated Air Speed; ft = foot/feet; AGL = Above Ground Level; MSL = Mean Sea Level

Overall, an increased tempo of DOD UAS operations is expected as the use of these systems would increase during periods of DOD interoperability training. Existing operations of Group 1 Category UAS are currently about 300 sorties annually. As detailed in Tables 2.1-2, 2.1-3, and 2.1-5, these Group 1 Category UAS operations are estimated to decrease to 120 sorties annually. Additionally, sorties would be added for Group 2 and Group 3 UAS Categories, at 120 and 60 annual sorties, respectively. All UAS would continue to launch from the river, SARC, HLZs, and roads within the WMA and be controlled from the launch point.

NASA and SSC tenants also have emerging mission requirements that may be tangentially supported by the proposed RA. Foreseeable UAS programs for NASA and SSC tenants include:

- Buffer Zone Monitoring – SSC must monitor the 125,000-acre easement to ensure compliance with regulations and safety standards. In the future, a UAS program may be used to meet this requirement.
- Science Missions – NASA and other SSC tenants may be called upon to support missions such as remote sensing data collection from an airborne platform.

2.2 Alternatives Development Process and Selection Criteria

This section summarizes the methodology and criteria used to identify potential alternatives, to screen out alternatives that would not reasonably fulfill the purpose and need for the action, and to develop the range of reasonable action alternatives that are carried forward in the EA impact analyses. The methodology for determining the reasonable range of alternatives considered two major factors: (1) the specific operational requirements associated with the RA described in Section 1.4, and (2) the physical limits and feasibility of accommodating the lateral and horizontal airspace configuration as well as the munitions target area sites and sensor training area within the study area. This analysis was primarily conducted in support of the FAA rulemaking process.

The information identified in Table 2.2-1 demonstrates the complexity of NASA and DOD operational requirements for the proposed R-4403A, B, C, E, and F. In addition to the needs outlined in Section 1.4, non-RA-dependent uses (i.e., small UAS) were considered to capture the full spectrum of potential airspace use and acknowledge potential conflicts if necessary. (This is consistent with the proposed airspace operations discussed in Section 2.1.2.)

Table 2.2-1. Operational Needs Considered in Configuration of Proposed R-4403A, B, C, E, and F

User Requirement	Activity	Max Altitude (ft MSL)	Max Horizontal Distance (NM Radius)	Threats to User Safety	Potential Airspace for Operations
NASA	Propulsion Test (J-2X type)	12,000	2.5	Turbulence at altitude; noise; explosive potential	A
	Other Untethered Autonomous Flight Test (Morpheus Lander-type)	12,000	6.9	Explosive potential	B
	UAS Research and Development	6,000	7.5	Precision guidance system - crash potential	B
DOD	Fixed-Wing ISR/UAS	16,000	6	Laser system – Visual Flight Rules (VFR) interference	C, E, F
	Fixed-Wing- Live-Fire	10,000	3	Air-to-ground munitions delivery	C, E, F
	Fixed-Wing-Maneuver	16,000	10	Evasive maneuvering - crash potential	C, E, F
	Rotary or Tilt-Wing	6,000	5	Air-to-ground munitions delivery	C, E
	Low Level UAS	3,000	1 NM Buffer from river's edge	Precision guidance system - crash potential	C
	Small Arms Range	7,000	2.2	Air-to-ground munitions delivery	C
	Target areas	10,000	3	Air-to-ground munitions delivery	C, E
	Sensor Training Area	10,000	3	Laser system	F

All alternatives must support the four basic functions of productive testing and training airspace, which are to:

- provide adequate airspace for the required testing and training activities;
- ensure the safety of non-participating air traffic and surface users;
- ensure the safety of the participating air and surface operators; and
- prevent non-participants from interrupting testing and training activities.

In addition, all alternatives must meet the following configuration and operational criteria:

- be charted as RA due to the types of hazards associated with proposed uses (see Table 1.4-1);
- overlie the SSC test stand complex and the WMA;
- ensure that any established RA that extends to the ground and that any proposed hazardous activities that may become surface hazards overlie lands that are owned, leased, or by

agreement, controlled by the Using Agency (including lands within the Buffer Zone restrictive easement);

- minimize conflicts with existing civil air traffic (including that associated with Picayune Regional and Stennis, Gulfport-Biloxi, and New Orleans International Airports) to the extent practicable to meet operational requirements;
- provide for multiple air-to-ground munitions target areas and sensor training area to allow options for deconflicting range and airspace operations as needed;
- accommodate at least one munitions target area within the WMA;
- provide multiple opportunities for valuable training (i.e., tied to a DOD training requirement) within the RA to ensure that flight/airspace activation time can be utilized effectively and actively for mission purposes); and
- ensure that the WMA maintains interoperability capability and ability to concurrently train three NSW units, while also providing additional training capacity to other SOCOM users (Naval Facilities Engineering Command Southeast [NAVFAC SE] 2013).

Alternatives that would not meet the above criteria would not meet the purpose and need for the proposed action and, therefore, are not considered reasonable. Alternatives that do meet the above criteria are carried forward for detailed analysis in this EA.

2.3 ALTERNATIVES ELIMINATED FROM FURTHER ANALYSIS

The alternatives listed below were developed during the planning process, but were dismissed from further detailed review because they failed to meet one or more of the screening criteria, and, therefore, the purpose and need for the proposed action. They are presented here to reflect the full spectrum of alternatives analyzed during the course of the project's development.

NASA Moves Liquid Propulsion Engine Testing to Alternate Space Center. The SSC is the only location capable of large-scale integrated propulsion system (such as the J-2X) testing in the Nation as it offers ample land for construction and operation of large NASA rocket engine static test facilities. These test facilities include water access via a series of canals and locks for shipping rocket engine stages and barge loads of propellants.

The SSC facilities are also equipped with specially constructed pipelines and their associated flare stacks for the pumping and pressure maintenance of liquid oxygen (LOX), liquid hydrogen, nitrogen, and other fuel delivered to the stands during test events. This infrastructure has taken decades to engineer specifically for static rocket engine testing purposes, is expensive, and is not found

Test Stands A3 and A2 and SSC Pipe and Canal Support Infrastructure (taken from Test Stand A-1)

elsewhere at NASA locations, other government, or private sites. Likewise, the Buffer Zone surrounds the Fee Area and provides an acoustic buffer and a barrier to community encroachment that is not found at any other location. The assets found at SSC are unique as SSC was initially developed in 1961 specifically for spacecraft engine development and testing.

SSC's role is to perform rocket engine propulsion test for components, systems, stages, and vehicles providing access to space from surface to low-earth orbit. This role is governed and clarified by NASA strategic planning guidance and capability specification by the NASA Rocket Engine Propulsion Test Program and an Inter-Agency agreement through the National Rocket Engine Propulsion Test Alliance (made up primarily of NASA and DOD test facilities). The necessary facilities, infrastructure, and technical capabilities at SSC are specialized to this SSC role, and therefore provide a unique set of services that are not otherwise available within the public and private sectors of the U.S. economy.

NASA cannot move the test stand complex, change its mission, or bear the extreme cost of redeveloping elsewhere the unique infrastructure required for liquid propulsion rocket engine testing already present at SSC; thus, moving liquid propulsion engine testing to another NASA facility is not a feasible option.

Other Airspace Configurations. Through the FAA cooperating agency and parallel NEPA process, the proposed arrangement of R-4403A, B, C, E, and F, including its distribution, shape, and vertical extent, has been modified by FAA to fit National Airspace rules and requirements and to avoid/minimize impacts to existing airspace traffic flows. Other airspace configuration alternatives have already been considered, developed, analyzed, and eliminated by FAA and other project proponents (NASA *et al.* 2013, 2015). These alternative airspace configurations included use of other types of SUA, including military operations areas (MOAs), TFRs, and controlled firing areas (CFAs).

Specifically, a MOA was evaluated as a potential for configuration of the SUA, but eliminated primarily because: 1) MOAs are specific to military activity and the proposed airspace is needed for both DOD and NASA, and 2) the DOD need for air-to-ground munitions delivery could not be accommodated with a MOA. MOAs are intended to segregate air combat tactics, air intercepts, aerobatics, formation training, and low-altitude tactics and do not provide for the same level of safe segregation of non-participation aircraft as compared to RA (particularly with respect to Visual Flight Rules (VFR) traffic and vertical hazards such as munitions delivery). Additionally, CFAs were examined as a potential alternative for meeting NASA's engine testing requirements. CFAs contain activities that, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft. The distinguishing feature of the CFA, as compared to other SUA, is that its activities are suspended immediately when spotter aircraft, radar, or ground lookout positions indicate an aircraft might be approaching the area. There is no need to chart CFAs since they do not cause a nonparticipating aircraft to change its flight path. Given the nature and complexity of NASA static engine testing, immediate system shutdown is not possible. Use of a CFA restriction would be inappropriate for rocket engine testing because the hazardous activity cannot be stopped to allow a non-participating aircraft to pass through the designated airspace. Additionally, CFAs are not depicted on aeronautical charts, thus increasing the risk of conflict with civilian aircraft. Neither the MOA or CFA designation would fit the screening criteria to provide adequate airspace for the required testing and training activities, ensure the safety of non-participating air traffic and surface users, ensure the safety of the participating air and surface operators, and prevent non-

participants from interrupting testing and training activities. Therefore, both MOA and CFA designations would be inappropriate and incompatible with NASA's and DOD's mission requirements. Therefore, such other SUA designations would not meet the purpose and need for the proposed action.

DOD Conducts Emergent Training Missions at Alternate Installations. The WMA provides an extensive triple-canopy jungle and riverine training experience unique within DOD. Current range facilities and training capabilities within the WMA include live-fire day and night training environments, nearly 7 miles of riverine live-fire shooting (SRTA), and more than 800 acres of live-fire maneuver and convoy training (NSWG-4 2009). As documented in the *Final EIS for Purchase of Land in Hancock County, MS for a Naval Special Operations Forces Training Range* (DON 2004), three other training locations were evaluated to potentially support NSW training needs being sought at the WMA: Fort Knox, Kentucky; Eglin Air Force Base (AFB); and Camp Lejeune, North Carolina. None of these areas can offer the mix of factors needed for the DOD interoperability training being proposed: riverine, jungle environmental setting; personnel quality of life; and range priority of use. Thus, alternative training ranges could not satisfy the purpose and need; only RA supporting NSW Riverine Complex, Stennis were considered.

Simulated Training for DOD Activities. The use of simulators to accomplish DOD/SOCOM training, especially on the scale required to support the Emerald Warrior or other interoperability training scenarios, is both prohibitively expensive and technically infeasible. Although the use of simulators is efficient and beneficial for primary mission instruction, the use of simulators for the type of advanced training offered at NSW Riverine Complex, Stennis would not adequately respond to the evolving mission to "train like we fight" and would not effectively prepare military personnel for the hazards encountered on the battlefield.

Airspace Configurations That Address Solely DOD or Solely NASA Requirements. NASA has been established at SSC since 1961, and DOD has been an active tenant since 1971. The beginnings of the NSW Riverine Complex, Stennis date to 2000, and DON is now in the process of obtaining ownership of the contiguous 5,200 acre WMA. The need for RA to support both NASA and DOD activities has been previously demonstrated in Chapter 1. Furthermore, this evaluation has established that placing either DOD or NASA at locations other than Stennis would not be possible or reasonable. Therefore, providing RA for one or the other would not represent a viable alternative.

2.4 ALTERNATIVES CARRIED FORWARD FOR FURTHER ANALYSIS

The airspace configuration and use elements described in Section 2.1 are common to all action alternatives. Two viable action alternatives emerged during the planning process. They pertain to the type of munitions that would be authorized for delivery at the munitions target areas. Target areas can be established for HE munitions, TP munitions, or a combination of the two. There are specific safety, range certification, range maintenance, and environmental management requirements associated with munitions target areas when they are authorized for delivery of HE munitions and when they are authorized for delivery of TP and inert service ammunition only. The alternatives in this EA evaluate these differences at the northern target area (IMP-A).

2.4.1 Alternative 1: Preferred Alternative

Alternative 1 includes the full implementation of all elements of the proposed action as outlined in detail in Section 2.1. Alternative 1 consists of the following components:

- R-4403A: 2.5 NM radius/26 square miles; Surface – 12,000 ft MSL
- R-4403B: 100 square miles ; Surface – 6,000 ft MSL
- R-4403C: 70 square miles; Surface – 10,000 ft MSL
- R-4403E: 30 square miles; Surface – 10,000 ft MSL
- R-4403F: 13 square miles; 4,000 – 10,000 ft MSL
- Siting and use of a sensor training area at FW2 (on NASA-owned land in the Buffer Zone)
- rocket engine testing operations (J-2X-type)
- autonomous untethered flight vehicle test operations (Morpheus Lander-type)
- 3-D battlespace operations
- DOD UAS operations
- Other proposed and evolving RA operations
- Siting and use of two air-to-ground munitions target areas within WMA, the southern target area (FW1) and the northern target area (IMP-A) for gunnery training with both HE and TP cannon rounds (TP rounds are lacking explosive components, but may contain tracer material in the base for visual trajectory tracking)

This alternative is the preferred alternative because it best meets the purpose and need for the proposed action as outlined in Section 1.4. It includes the delivery of HE munitions to both the northern and southern target areas. The delivery of HE munitions in air-to-ground training at a location such as the NSW Riverine Complex, Stennis provides a distinct training value advantage as compared to delivery of TP munitions. Specifically, whereas the signature of the HE rounds' impact with the target area can be detected on monitors that are in the cockpit and may be recorded for post-flight review, TP rounds are often undetected and do not provide the critical training value feedback that is intended in the training requirement. Figure 2.4-1 depicts the target areas and associated WDZs under Alternative 1. Figure 2.4-2 provides a detailed view of the northern target area (IMP-A) and Figure 2.4-3 provides a detailed view of the southern target area (FW1). The munitions expenditure estimates associated with Alternative 1 are provided in Table 2.4-1. Under Alternative 1, these munitions would be delivered to both munitions target areas in roughly equal quantities as the two target areas provide varied target environments for diversity in training and provide flexibility for deconfliction of use of other training areas in the WMA.

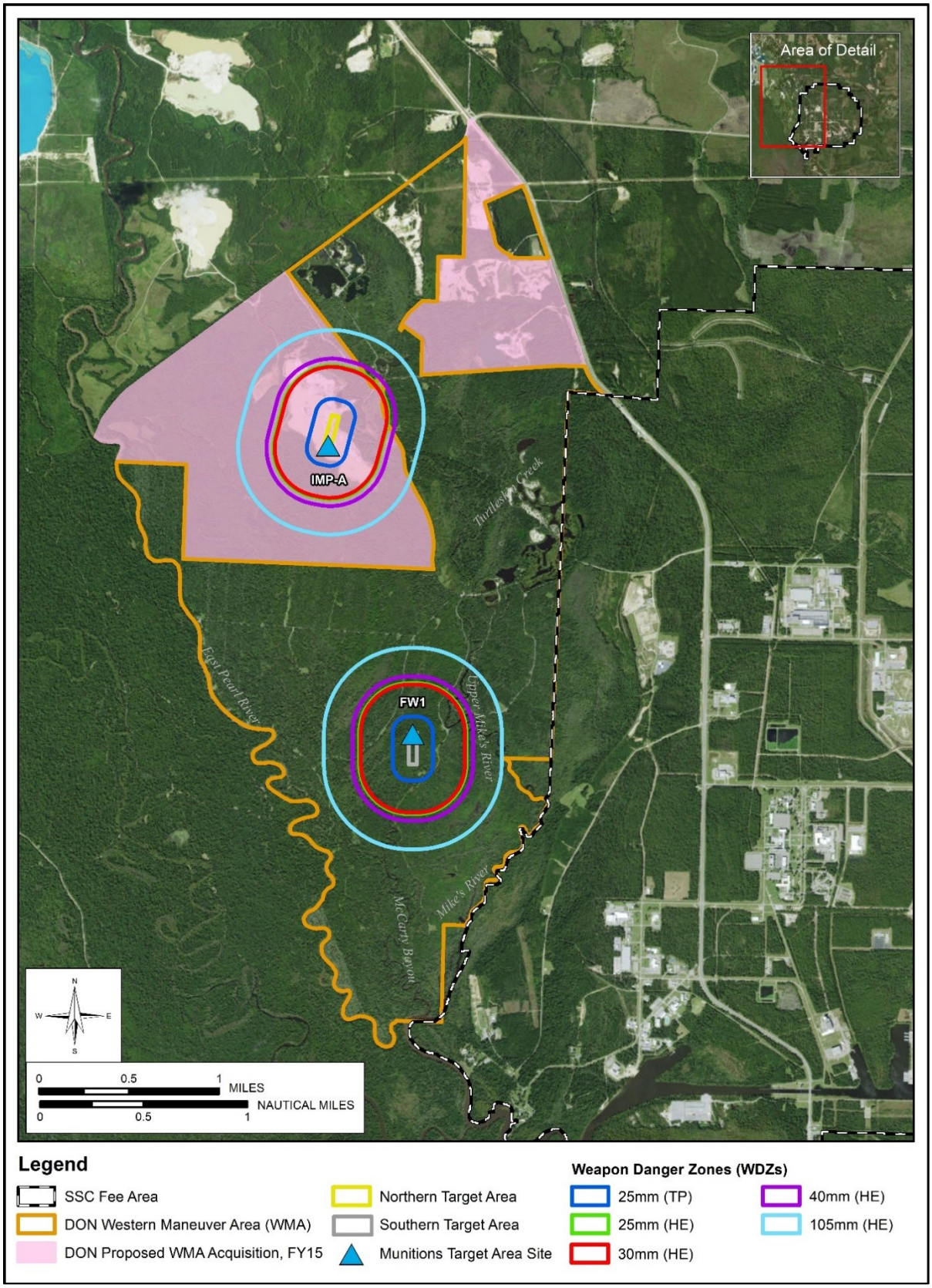


Figure 2.4-1. Alternative 1 (Preferred Alternative) Munitions Target Areas and WDZs

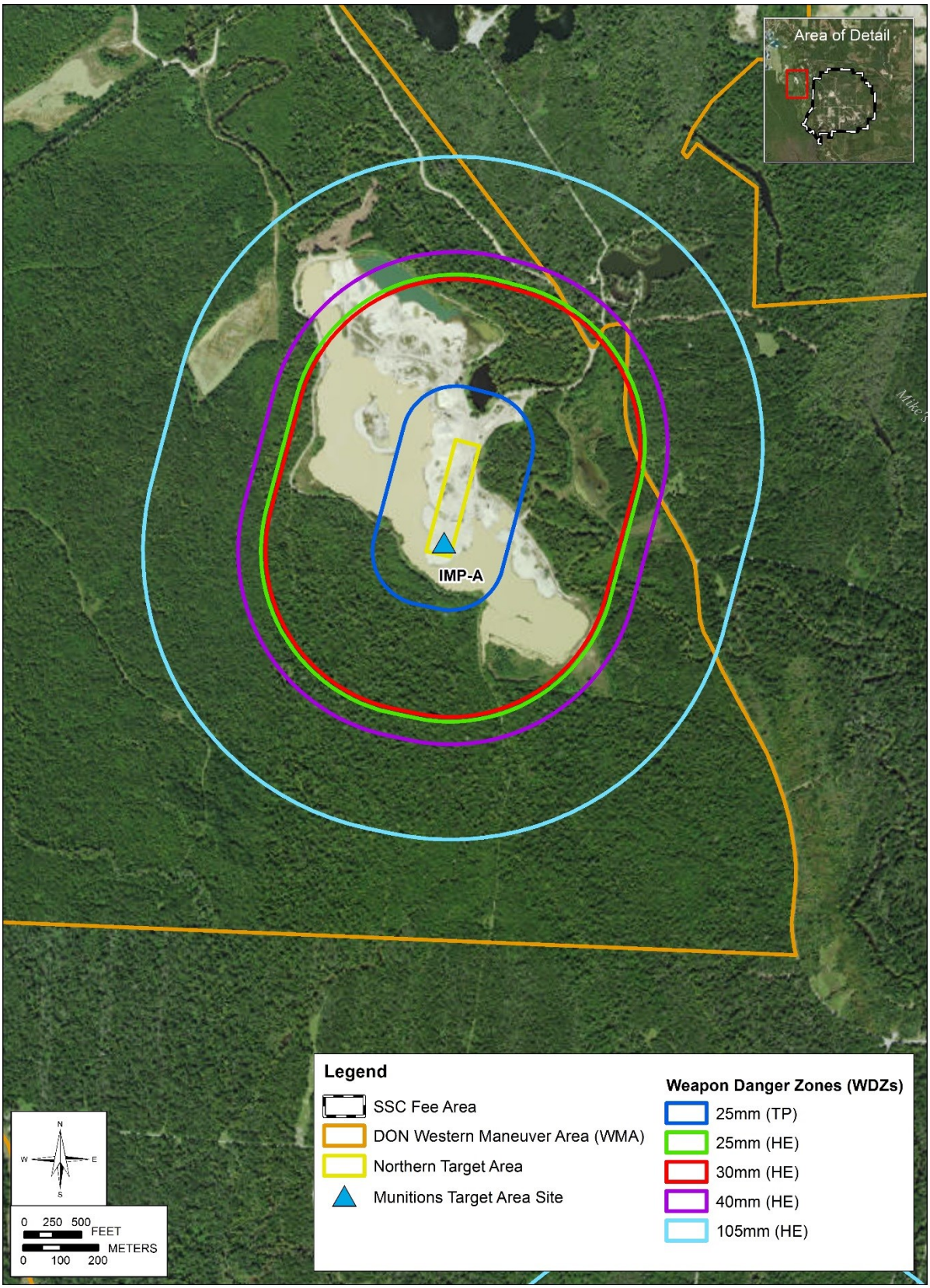


Figure 2.4-2. Northern Target Area (IMP-A) Detail

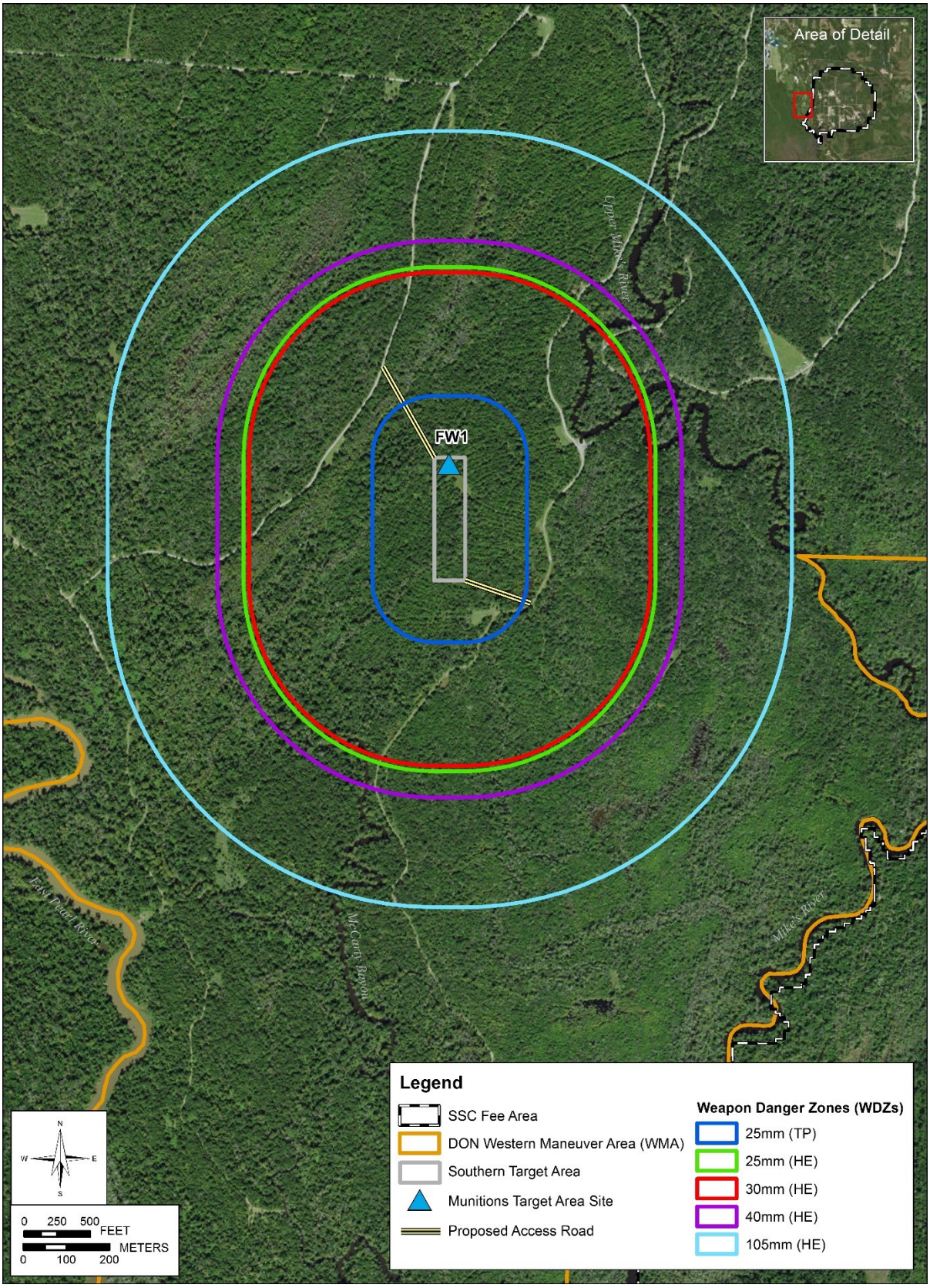


Figure 2.4-3. Southern Target Area (FW1) Detail

Table 2.4-1. Total Annual Proposed Munitions Delivery Under Alternative 1				
Expendable/Munitions Types	Munitions Target Area	Annual Rounds Fired from AC-130 Aircraft		Total
		Emerald Warrior	Other	
25mm HE and TP	Both	10,000	40,000	50,000
30mm or 40mm HE	Both	1,280	5,120	6,400
105mm HE	Both	600	2,400	3,000

2.4.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

Alternative 2 includes almost all of the same elements as Alternative 1. Alternative 2 consists of the following components:

- R-4403A: 2.5 NM radius/26 square miles; Surface -- 12,000 ft MSL (same as Alternative 1)
- R-4403B: 100 square miles; Surface – 6,000 ft MSL (same as Alternative 1)
- R-4403C: 70 square miles; Surface – 10,000 ft MSL)
- R-4403E: 30 square miles; Surface – 10,000 ft MSL (same as Alternative 1)
- R-4403F: 13 square miles; 4,000 – 10,000 ft MSL (same as Alternative 1)
- Siting a sensor training area at FW2 (on NASA-owned land in the Buffer Zone)(same as Alternative 1)
- rocket engine testing operations – J2-X-type (same as Alternative 1)
- autonomous untethered flight vehicle test operations – Morpheus Lander-type (same as Alternative 1)
- 3-D battlespace operations (same as Alternative 1)
- DOD UAS operations (same as Alternative 1)
- Other proposed and evolving RA operations (same as Alternative 1)
- Siting and use of the southern target area (FW1) as an air-to-ground HE and TP munitions target area and siting and future use of the northern target area (IMP-A) as a TP only munitions target area (different from Alternative 1)

Under Alternative 2, air-to-ground delivery of HE munitions would be limited to a single munitions target area: the southern target area (FW1). The IMP-A site would be established for delivery of TP-only munitions. The following munitions would be authorized for delivery to FW1: 25mm TP, 25mm HE, 30mm HE, 40mm HE, and 105mm HE rounds and only 25mm TP rounds would be authorized for delivery at IMP-A. The annual estimated munitions expenditures at each of the munitions target areas under Alternative 2 are detailed in Table 2.4-2.

Table 2.4-2. Total Annual Proposed Munitions Delivery Under Alternative 2				
Expendable/Munitions Types	Munitions Target Area	Annual Rounds Fired from AC-130 Aircraft		Total
		Emerald Warrior	Other	
25mm HE	Southern	6,666	26,666	33,333
30mm or 40mm HE	Southern	1,280	5,120	6,400
105mm HE	Southern	600	2,400	3,000
25mm TP	Northern	3,333	13,333	16,666

This alternative would meet the purpose and need as described in Section 1.4 and provides a balance in lessening environmental and range management responsibilities associated with concentrating delivery of HE munitions to one munitions target area. However, as compared to Alternative 1, there would be less training value as the delivery of HE rounds can be detected and aim refined aboard the firing aircraft as well as recorded for post-flight review. TP rounds are often undetected and do not provide the critical training value feedback that is afforded with delivery of HE rounds. Figure 2.4-4 depicts the planning-level WDZs under Alternative 2. For a detailed look at the target areas, refer back to Figures 2.4-2 and 2.4-3, noting that under Alternative 2, the only WDZ that would apply at the northern target area is the 25mm TP WDZ.

2.4.3 No Action Alternative

CEQ regulations that implement NEPA require a clear basis for choice among options provided to the decision-maker and the public, and a no action alternative must be included and analyzed (40 CFR 1502.14[d]). The No Action Alternative for this proposed action would consist of maintaining the existing R-4403 configuration, not establishing new air-to-ground munitions target areas, and restricting NASA and DOD missions to those that are established or those that could operate within the confines of existing R-4403. Although the implementation of the No Action Alternative would not meet the purpose and need of the proposed action, the No Action Alternative was carried forward in the analysis to provide a benchmark to evaluate the potential environmental effects of the proposed action alternatives.

NASA would continue to use TFR designation to protect incoming aircraft from episodic rocket engine test hazards. At times, the TFRs could be in place at a high level of frequency that would be contrary to the intended “temporary” purpose of TFRs. The No Action Alternative would require the additional actions of increased coordination with the FAA to ensure appropriate issuance of TFR NOTAMs and diligent monitoring of the airspace to support the increased tempo of testing operations. The autonomous untethered flight vehicle testing of the Morpheus Lander-type system would be limited, if not prohibited, as there is not sufficient open space within R-4403 to accommodate untethered tests that would not have a high risk of affecting existing static test infrastructure.

Current DOD ground and air-based riverine/jungle warfare training and testing would continue without additional restricted airspace. The current configuration and tempo of systems/platforms and training operations would continue. DOD interoperability training within the NSW Riverine Complex, Stennis would continue with current limitations. AFSOC would not be able to utilize the varied training environment at NSW Riverine Complex, Stennis to meet training requirements. The use and development of UAS would continue through the use of COAs and their associated limitations.

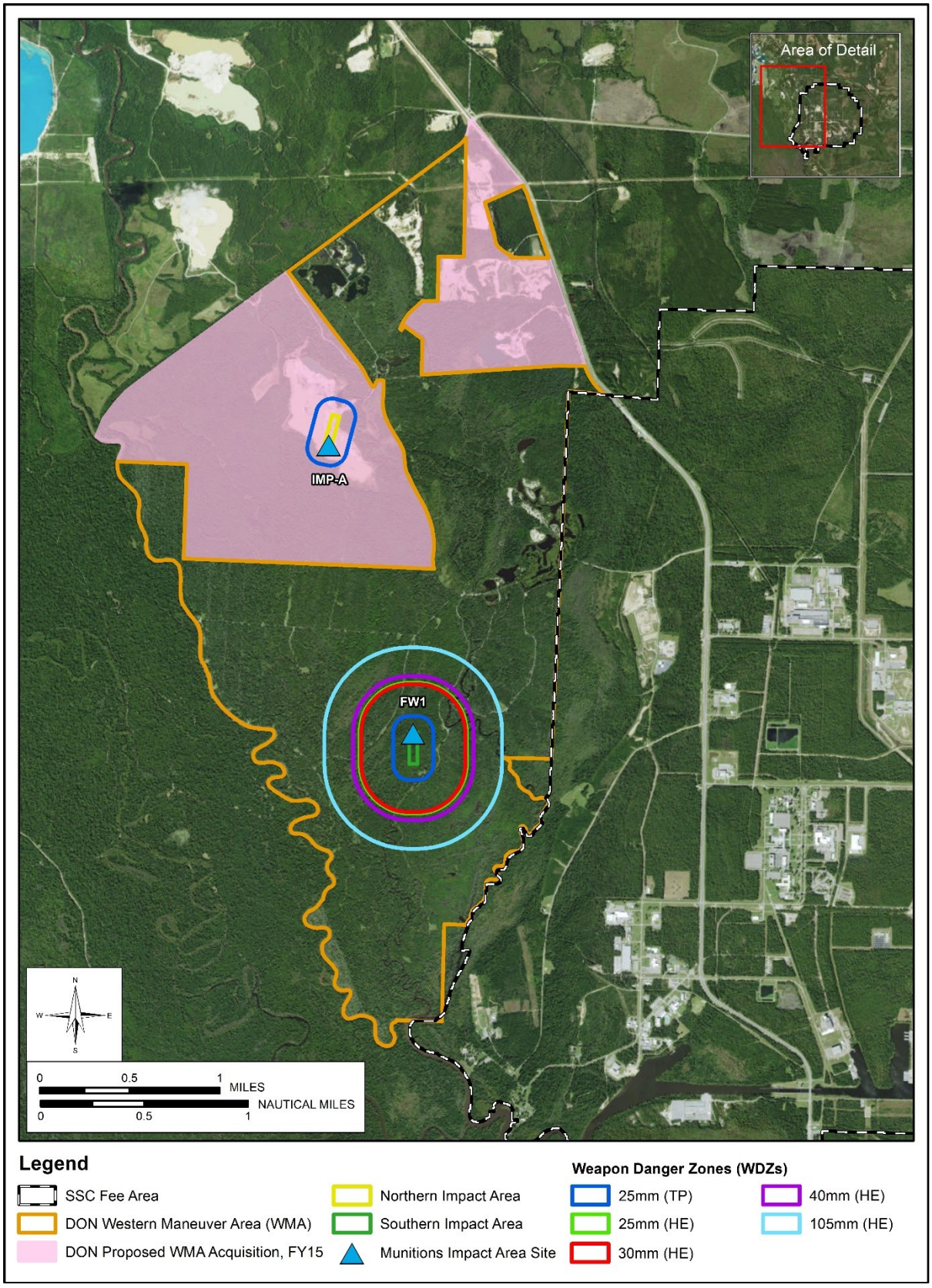


Figure 2.4-4. Alternative 2 Munitions Target Areas and WDZs

2.5 COMPARISON OF ALTERNATIVES

Table 2.5-1 provides a summary comparison of the key elements of each action alternative. Table 2.5-2 summarizes and presents the potential environmental effects of the alternatives in a comparative form. The levels of intensity of potential impacts are described as negligible, minor, moderate, or significant (see Section 3.3.1 for full description of terminology used in measuring environmental impacts in the EA).

Table 2.5-1. Summary of Action Alternatives

	Alternative 1: Preferred Alternative	Alternative 2: Limit HE Delivery to a Single Munitions Target Area
Altitudes	R-4403A: Surface -- 12,000 ft MSL R-4403B: Surface – 6,000 ft MSL R-4403C: Surface – 10,000 ft MSL R-4403E: Surface – 10,000 ft MSL R-4403F: 4,000 – 10,000 ft MSL	Same as Alternative 1
Lateral Boundaries/ Extent	R-4403A: 2.5 NM radius; 26 square miles R-4403B: 100 square miles R-4403C: 70 square miles R-4403E: 30 square miles R-4403F: 13 square miles	Same as Alternative 1
Sensor Training Area	FW2 (on NASA-owned land in the Buffer Zone)	Same as Alternative 1
Air-to-Ground Target Area Locations	FW1 (within WMA) IMP-A (within WMA)	Same as Alternative 1
Target Area Munitions Delivery Capability	2 HE and TP (IMP-A and FW1)	1 HE and TP (FW1) 1 TP-only (IMP-A)

Table 2.5-2. Summary of Impacts for Resources Analyzed			
Categories/Resources	**Alternative 1 --Preferred Alternative**	**Alternative 2**	**No Action Alternative**
Public Health and Safety	• Current NASA and DOD operational regulations and procedures would continue to mitigate ongoing safety risks and apply to new risks associated with new uses of the proposed airspace resulting in safety conditions similar to existing conditions. • R-4403A, B, C, E, and F would reduce risk of danger to participants and non-participants from current and evolving hazards associated with the increased airspace operations. • No impacts to safety of civilian operations at regional airports. • Increase in air operations would result in commensurate increase in bird/wildlife aircraft strike hazard (BASH) potential. • The delivery of HE ammunition to the proposed WMA munitions target areas would introduce a new ground hazard in the form of unexploded ordnance (UXO). To minimize associated risks, personnel and public safety DOD protocols for managing UXO would be implemented at regular intervals. • Laser use at the sensor training area and other locations would be tightly regulated to ensure that laser energy would be contained within R-4403A, B, C, E, and F and not threaten non-participating aircraft and/or personnel. • No disproportionate environmental health and safety risks to children.	• Similar to Alternative 1, except long-term impacts on safety/range management implications for UXO and ORC would be lessened since only the southern target area (FW1) would be used for delivery of HE munitions.	• Substantial risk to safety to airspace users from existing and evolving NASA and DOD mission requirements at SSC. • Existing airspace would continue to fail to accommodate and control the full dimensions of existing and evolving hazards.
Airspace and Air Operations	• Redesignation and expansion of the SUA would generate reliable airspace control and communication mechanisms that are currently only temporary in nature. • No significant impacts to Stennis International Airport or Picayune Municipal Airport operations or within the SUA are anticipated from the redesignation and expansion of R-4403A, B, C, E, and F. • Significant positive impacts to the availability of safe airspace within which NASA, DOD, and other tenant agencies can conduct existing and evolving mission requirements.	• Same as Alternative 1.	• Airspace use and management would remain unchanged from current conditions, and potential for conflicts associated with the joint military and civil use of the airspace in its current configuration would continue.
Noise	• Negligible overall risk of increased noise disturbance to human receptors as it is not anticipated that the noise associated with most aspects of Alternative 1 would travel beyond the established boundaries of the Buffer Zone. None of the annual average noise levels from proposed airspace operations, combined airborne weapon and HE delivery noise, or small arms noise were estimated to exceed DOD land use compatibility thresholds outside of the Buffer Zone. • The estimated noise contour for combined airborne weapon and HE delivery noise evaluated for a 1-month period during which operations would peak (e.g., during Emerald Warrior training exercises) would extend just beyond the Buffer Zone to an area with no noise sensitive receptors. • Negligible impacts to hearing exposure from implementation of the proposed	• Similar to Alternative 1 except delivery of TP rather than HE ordnance to the northern target area (IMP-A) would result in lower noise levels in the northern WMA and surrounding areas during Emerald Warrior exercise and year-round.	• Existing noise conditions continue.

Table 2.5-2. Summary of Impacts for Resources Analyzed

Categories/Resources	Alternative 1 --Preferred Alternative	Alternative 2	No Action Alternative
	rocket engine test events.		
Land Use	• Consistent to the maximum extent practicable with the enforceable policies of the Federally-approved Mississippi Coastal Management Program and Louisiana Coastal Resources Program. • DON to work with local counties through the DON Range Air Installations Compatible Use Zones (RAICUZ) Program to encourage them to adopt and institute compatible land use zoning measures (such as retaining existing low-density land use in this area and avoiding certain land uses such as high density residential, schools, etc.). • The development of the proposed HE munitions target areas would represent a long-term dedication of land to military use. These munitions target areas would be managed under DOD range safety protocols and the DON Range Sustainability Environmental Program Assessments (RSEPA) process. This long-term land use commitment is generally consistent with the limitations on land use dictated by existing uses of the WMA and the Buffer Zone restricted easement.	• Similar to Alternative 1; however, the smaller WDZ footprint of the northern target area (IMP-A) would result in fewer land use controls for range deconfliction. • There would be greater potential for reuse of the northern target area (IMP-A) lands in the event the site is no longer used for military training at some point in the future as TP munitions delivery sites have fewer enduring land use control requirements than HE delivery sites.	• Existing land use conditions would continue.
Socioeconomics/ Environmental Justice	• Negligible socioeconomic impacts. • Would not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations.	• Same as Alternative 1.	• No changes to socioeconomic environmental justice conditions; existing conditions would continue.
Recreation	• Overall minor impacts to opportunity for recreational aviation as air-based recreation would be prohibited within the SUA when activated. Impacts would be intermittent and based on the frequency of airspace activation; recreation activity also may be displaced to the north of the proposed R-4403A, B, C, E, and F where airspace is available for recreational use. • Impacts to recreation experience within the Pearl River Wildlife Management Area would be similar to existing levels of impacts and consistent with the Buffer Zone. • No change in areas subject to exclusion of public recreation activities for safety during military operations.	• Similar to Alternative 1; however, the delivery of TP-only munitions to the northern target area (IMP-A) would have fewer associated impacts to the Pearl River Wildlife Management Area.	• Existing recreation conditions would continue.
Cultural Resources	• No known impacts to architectural resources, archaeological resources, or Native American traditional cultural artifacts or properties. • No adverse impacts to National Register of Historic Places (NRHP)-listed or eligible resources.	• Similar to Alternative 1; however, there would be a slight reduced risk to potential archaeological resources	• No impacts to historic or archaeological resources.

Table 2.5-2. Summary of Impacts for Resources Analyzed			
Categories/Resources	**Alternative 1 --Preferred Alternative**	**Alternative 2**	**No Action Alternative**
	• The DON would ensure compliance with Section 106 of the National Historic Preservation Act (NHPA) by initiating any required cultural resources surveys at FW2 and IMP-A and taking any required action prior to commencing any ground-disturbing activities, and the DON and NASA would comply with inadvertent discovery standard operating procedures (SOPs) during the undertaking.	possibly located at the northern target area (IMP-A), due to a smaller WDZ associated with TP-only munitions.	
Hazardous Materials and Waste, Toxic Substances, and Contaminated Sites	• Negligible impacts to hazardous materials and waste management; all applicable protocols would continue as directed in applicable documents. • Munitions impact would potentially result in the release of small amounts of toxic substances as they explode or decompose; the unlikely potential for migration of munitions constituents would be monitored and managed under the DON's Range Environmental Program Assessments Program. • Should the target areas be closed, they may require response under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) prior to consideration of converting the land to other uses. • Negligible impact to Installation Restoration Program (IRP) known contaminated sites and ongoing remediation efforts located in proximity to proposed ground disturbing-activities.	• Similar to Alternative 1; however, military munitions management and range clearance requirements would be greater at the southern target area (FW1) and lesser at the northern target area (IMP-A) site as compared to Alternative 1 • Likewise, HE munitions constituents would not be delivered to IMP-A and thus a decreased risk of toxic substances in the environment would occur.	• Baseline conditions would continue.
Air Quality	• Minor impacts as small emission increases are anticipated for all criteria pollutants, but none of them approach the comparative threshold of 250 tons per year.	• Similar to Alternative 1.	• Baseline conditions would continue.

Table 2.5-2. Summary of Impacts for Resources Analyzed

Categories/Resources	Alternative 1 --Preferred Alternative	Alternative 2	No Action Alternative
Biological Resources	• Minor, primarily localized adverse impacts to vegetation associated with the establishment, use, and long-term maintenance of the munitions target areas (5 acres at IMP-A, 6 acres at FW1), sensor training area (2 acres), and untethered autonomous flight vehicle testing sites (up to 300 acres in the Fee Area). • Minor adverse impacts to wildlife (including special status species) expected from loss/conversion of an estimated 13 acres of habitat for the munitions and sensor training areas and up to 300 acres for the untethered autonomous flight vehicle sites, and slight increase over baseline disturbance to wildlife from ongoing rocket engine and untethered autonomous vehicle testing and DOD training (from noise, vibration, and human activity). • Although aquatic/wetlands habitats would be avoided to the extent possible, minor impacts to such habitats from air-to-ground SRTA training within Riverine Zones in areas already subject to SRTA impacts from ground and riverine based platforms and from development and use of munitions target areas and sensor training area • The DON and NASA have used the Draft EA to consult with the U.S. Fish and Wildlife Service (USFWS) on the following Endangered Species Act (ESA) Section 7 conclusions: may affect, but is not likely to adversely affect, the Louisiana black bear, ringed map turtle, gopher tortoise, dusky gopher frog, red-cockaded woodpecker, wood stork, Bachman's warbler, and Gulf sturgeon; and no destruction or adverse modification of designated critical habitat for the Gulf sturgeon. The USFWS concurred with the may affect but not likely to adversely affect determinations on April 10, 2015.	• Similar to Alternative 1, but the use of TP-only munitions at the northern target area (IMP-A) may reduce potential for overall impacts to habitat.	• Existing conditions for biological resources would continue.
Geology and Soils	• At the proposed munitions target areas: short-term impacts associated with establishment of targeted arrays and associated roads; periodic, long-term disturbance of soils from range clearance and range maintenance activities, physical impacts of munitions with the earth, and exposure of soils to munitions constituents; best management practices (BMPs) (such as vegetation maintenance and maintenance of roads and trails) would minimize impacts. • At the proposed sensor training area: short-term disturbance associated with establishment of the Site, minimal long-term impacts; BMPs would minimize impacts. • Minimal impacts to soils at HLZs from increased operational tempo and addition of CV-22 operations.	• Similar to Alternative 1, but less impacts likely to occur at the northern target area (IMP-A) as the result of the use of TP-only munitions and a higher level of impacts would occur at the southern target area (FW1) with greater concentration of HE delivery to that site.	• Baseline conditions to geology and soils would continue.

Table 2.5-2. Summary of Impacts for Resources Analyzed

Categories/Resources	Alternative 1 --Preferred Alternative	Alternative 2	No Action Alternative
Water Resources	• With the implementation of minimization measures, including preparation of Stormwater Pollution Prevention Plan (SWPPP) where 5 acres or more are impacted, impacts to water resources would be minor. • Anticipated impact to wetlands at the munitions target areas and associated WDZs from munitions impacts and munitions constituents and the access road to the southern target area (FW1); as planning progresses, impacts will be avoided to the maximum extent practicable and mitigated wherever not possible. • A Section 404 permit from the USACE and a Section 401 Water Quality Certification from the Mississippi Department of Environmental Quality would be obtained, as required. • No impacts to groundwater. • No practicable alternative to establishment of munitions target areas in floodplains; however, impacts would be minimal as conditions would not result in increased flood hazards.	• Similar to Alternative 1, but less impacts likely to occur at the northern target area (IMP-A) as the result of the use of TP-only munitions and a higher level of impacts would occur at the southern target area (FW1) with greater concentration of HE delivery to that site.	• Baseline conditions to water resources would continue.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ANALYTICAL APPROACH

This section describes the existing environmental conditions in the ROI (see Section 1.2) for resources potentially affected by the proposed action (see Section 2.1) and alternatives (see Section 2.4). Analysis of the affected environment provides a framework for understanding the direct, indirect, and cumulative effects of the proposed action and alternatives.

NEPA requires focused analysis of the areas and resources potentially affected by an action or alternative, and an EA should consider, but is not required to analyze in detail, those areas or resources not potentially affected by the proposal. Therefore, an EA should not be encyclopedic; rather, it should be succinct and to the point. Both description and analysis in an EA should provide sufficient detail and depth to ensure that the agency took a hard look at the proposal and the potential impacts it might have on the human and natural environment. An EA is a concise public NEPA document that provides sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a FONSI, aids in the DON's decision-making when no EIS is necessary, or facilitates preparation of an EIS when one is necessary.

The affected environment (or ROI) is the same for each alternative and is delineated as the airspace and the area underlying R-4403A, B, C, E, and F, including a small area north and outside of the Buffer Zone boundary (see Figure 1.2-2).

3.1.1 Resource Areas Analyzed in this EA

This section focuses on the potential direct and indirect impacts to the environmental resource areas analyzed in this document; potential cumulative impacts are discussed in Section 4.0. Table 3.1-1 presents the resources considered for analysis in this EA. A total of 15 resource categories were evaluated for their potential to be impacted by the proposed action: 1) public health and safety, including protection of children; 2) airspace and air operations; 3) noise; 4) land use; 5) socioeconomics and environmental justice; 6) recreation; 7) cultural resources; 8) hazardous and toxic materials and waste; 9) transportation and traffic; 10) visual resources and aesthetics; 11) public services and utilities, including solid waste; 12) air quality; 13) biological resources (including vegetation, wildlife, aquatic/wetland habitats, and sensitive species); 14) geology and soils; and 15) water resources (including surface and stormwater, wetlands, groundwater, and floodplains). Consideration was then given to each resource and it was noted whether the resource would be potentially impacted by implementing the proposed action or alternatives. If the analysis summarized in Table 3.1-1 found that implementation of the proposed action would result in negligible or no impact on a resource area, then this resource area was not carried forward for further for analysis; justification for not carrying it forward for further analysis is discussed in Section 3.1.2.

> ***Direct Impacts*** are those caused specifically by the Proposed Action and that occur at the same time and place.
>
> ***Indirect Impacts*** are also caused by the Proposed Action, but occur at a different time or place.
>
> ***Cumulative Impacts*** result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes such other actions.

Table 3.1-1. Resources Analyzed to Determine Need for Further Evaluation

Categories/Resources	*Elements of Proposed Action and Need for Further Evaluation*	
	Potentially Affected by Change in Airspace and Air Operations	**Potentially Affected by Establishment of Air-to-Ground Target Areas and Laser Sensor Training Area**
Human Use Considerations		
Public Health and Safety , including Protection of Children	Yes	Yes
Airspace and Air Operations	Yes	Yes
Noise	Yes	Yes
Land Use	Yes	Yes
Socioeconomics/Environmental Justice	No	Yes
Recreation	Yes	Yes
Cultural Resources	No	Yes
Hazardous Materials and Waste, Toxic Substances, and Contaminated Sites	Yes	Yes
Ground Transportation and Traffic	No	No
Visual Resources and Aesthetics	No	No
Public Services and Utilities, including Solid Waste	No	No
Ecological Considerations		
Air Quality	Yes	Yes
Biological Resources		
Vegetation	No	Yes
Wildlife	Yes	Yes
Aquatic/Wetland Habitats	No	Yes
Sensitive Species	Yes	Yes
Geology and Soils	Yes	Yes
Water Resources		
Surface and Storm Water	No	Yes
Wetlands	No	Yes
Groundwater	No	Yes
Floodplains	No	Yes

3.1.2 Resources Eliminated From Further Analysis

Resources determined to not be affected by implementation of the proposed action or alternatives, and thus not carried forward for further analysis include: 1) ground transportation and traffic; 2) visual resources and aesthetics; and 3) public services and utilities, including solid waste.

3.1.2.1 Public Ground Transportation and Traffic

Ground transportation and traffic resources refer to the public road network, infrastructure, and equipment required for the movement of people, manufactured goods, and raw materials. The ROI for transportation includes gates, access points, and roads both on and off the installation designated primarily for civilian (non-military) use. Direct access to and through SSC from Interstate 10 and Interstate 59 is provided by Mississippi Highway 607. The highway is closed to the general public within the Fee Area and checkpoints exist at both entrances to SSC. Highway 607 connects with U.S. 90 approximately 9 miles southeast of SSC (NASA 2013). There also is direct access to the WMA via Old Highway 11.

The only local transportation route that could potentially be affected by the proposed action is the local unimproved road that bisects the proposed sensor training area (FW2) NASA-owned property. The highly local access that the road provides for the vicinity of the NASA-owned property would be used in support of the proposed action, including potential road improvements and upgrades. As perimeter fencing is established, a road along the site perimeter may also be established. Local traffic that utilizes the existing road would be shifted to other local roads or it is possible that the roads that may be established near the perimeter of the property could also be used for local traffic. No traffic data are available for this roadway.

Although activation of the proposed RA would not add personnel or vehicle trips in the ROI, the establishment and maintenance of the two munitions target areas in the WMA may have additional negligible impacts depending on the source and amount of fill material that may be required to construct the target areas. As related to the construction of the munitions target areas, these trips would be temporary in nature and routed and timed to avoid public transportation to the greatest extent possible. Ongoing target area maintenance activities would originate from within the WMA and would not utilize public transportation infrastructure. Such impacts can only be assessed qualitatively at this time since engineering analysis to determine fill requirements is not yet available. At a qualitative level, however, any transportation impacts would be highly localized, primarily within the WMA, and potentially on local access roads en route to/from the WMA. The highest magnitude impacts would be expected to occur on a temporary basis during the construction phase for establishment of the target areas. Therefore, because local transportation and traffic patterns would not be expected to change, activating R-4403A, B, C, E, and F would have no impact on ground transportation, and local roads may be only negligibly affected by increased truck traffic during temporary construction and periodic range maintenance events, it was determined that no further analysis of ground transportation resources is required.

3.1.2.2 Visual Resources and Aesthetics

Visual resources include the natural and man-made physical features that give a particular landscape its aesthetic character and value. Viewer perceptions are formed through the impression of scenic quality in elements such as landform, vegetation, water, color, adjacent scenery, scarcity, and man-made (cultural) modifications. Visibility and visual sensitivity evaluations are based on public viewing opportunities and concern for the potential for changes to the landscape.

The activation of the proposed RA would result in no impact to visual resources. Although the establishment of the two munition target areas would impact up to 5 and 6 acres at each proposed location in the WMA, public access to most areas potentially affected by the establishment of the munition target areas is generally restricted, areas are remote from public visibility, and viewer sensitivity is generally low and within the context of the military mission and activities that occur at and near SSC. The proposed sensor training area at FW2 is also remote and not visually sensitive, and the equipment proposed for use in this area would be low to the ground (i.e., not visually apparent in the horizon) with some elements being transitory. Therefore, this resource was not carried forward for further analysis.

3.1.2.3 Public Services and Utilities, including Solid Waste

Public services and utilities include natural gas, potable water, sewage, solid waste, and communications. SSC complies with Mississippi Department of Environmental Quality (MDEQ) requirements for waste minimization and maintains on-going recycling programs for paper, plastic, cardboard, metals, batteries, toner cartridges, etc. Off-site contractors handle the recycling of many wastes generated at SSC (NASA 2013). Solid wastes generated at SSC (that are not segregated for recycling) are collected in mechanically lifted-type containers located at buildings throughout the Fee Area. The contents of the containers are transported to the on-site sanitary landfill for disposal. No large volume of solid waste is expected to be generated from any activities associated with the proposed action; therefore, potential solid waste impacts were not carried forward for further analysis.

Two new waste streams would be associated with the proposed action: 1) the remnants of air-to-ground targets as target arrays are rebuilt/replaced at the proposed munitions target areas, and 2) munitions casings and remnants that are removed through periodic range maintenance activities. In accordance with standard protocols, these items would be recycled and/or added to the general solid waste stream once they have been cleared of unexploded ordnance (UXO). In context of the volume of the existing solid waste and recycling programs, this impact is expected to be negligible and is therefore not carried forward for further analysis.

Potable water is supplied to the NASA support and Test Areas by two deep wells and two elevated storage tanks. A third elevated tank in the test area is backed up with a booster pump to increase water pressure to the Test Area. Water supplied by this system is used for drinking, sanitation, and fire protection. The industrial park sector of SSC, known as Area 9, has two wells and one elevated tank that supplies water to the Area 9 tenants. SSC maintains an on-site sanitary sewer system. No additional demand for water would result from the proposed action, so potable water requires no further analysis.

Several telecommunication systems exist at SSC including: telephone, trunked radio, emergency notification, public address, and an operational intercom. Electricity is supplied to SSC by the Mississippi Power Company, with an alternate power source available from the Louisiana Power and Light Company. Natural gas is purchased from the Sage Company and used as fuel for emergency back-up generators; Heating, Ventilation, and Air Conditioning boilers; water heaters; some aspects of testing; and for some laboratories (NASA 2013). None of these utility resources would be altered, nor would demand measurably increase as a result of the proposed action. Thus, they were not carried forward for further analysis.

3.2 PUBLIC HEALTH AND SAFETY

The public health and safety analysis addresses flight, ground, and munitions safety that relate to the activities tied to the proposed action. Flight safety considers the potential risks to the public, SSC and tenant personnel, military personnel, contractors, and civilians from potentially hazardous operations in the airspace. Ground safety considers potential hazards associated with operations and maintenance activities such as fueling, occupational hazards, facility security, and incident response. Munitions safety refers to hazard areas, which is the composite area of all SDZs and WDZs for all authorized weapon delivery events against targets approved for actual expenditures of munitions.

Safety is the responsibility of all NASA, DOD, SSC tenant personnel, and range and airspace users while conducting operations at SSC and the NSW Riverine Complex, Stennis. This requires a concerted effort by all personnel to operate in a manner that would minimize the risks inherent in performing rocket engine testing, aircraft maneuver, live-fire, UAS, and other operations associated with the proposed action.

This assessment also includes an analysis of compliance with Executive Order (EO) 13045, *Protection of Children from Environmental Health Risks and Safety Risks,* which was signed by President Clinton in April 1997. The EO was issued out of concern that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because: children's neurological, immunological, digestive, and other bodily systems are still developing; children eat more food, drink more fluids, and breathe more air in proportion to their body weight than adults; children's size and weight may diminish their protection from standard safety features; and children's behavior patterns may make them more susceptible to accidents because they are less able to protect themselves. This EO requires Federal agencies to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that agency policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

3.2.1 Affected Environment

Day-to-day operational activities, such as test and range events, have established safety protocols. For NASA test events, these are primarily Stennis Procedural Requirements (SPR) 8715.1 Revision C, *SSC Safety and Health Program Requirements* (NASA 2010), and SPR 8715.2, *SSC Operational Readiness Program Procedural Requirements* (NASA 2013a). For DOD range operations, these are primarily the range operating instruction, NSWG-4 Instruction 3591.1C, (DON 2011a) and Department of the Army Pamphlet 385–63, *Range Safety* (Army 2014). These protocols are outlined herein because they represent the existing condition whereby potential risks to health and safety are minimized.

3.2.1.1 NASA Safety Protocols

Flight Safety. The goal of mission safety, and particularly those dangers inherent with flight operations, is to protect the public, range participants, and property from the danger created by conducting potentially hazardous aerial operations at SSC and to prevent such mishaps from occurring. Although these risks can never be completely eliminated, the airspace is purposely organized and flight operations are carefully planned to minimize the risks involved while executing NASA and DOD mission objectives.

NASA acts as the airspace scheduling authority and is responsible for managing and communicating the SUA activation schedule to the controlling agency (local FAA/Houston Air Traffic Control [ATC]). This process is currently used for TFR activation in relation to test stand operations. In addition, in order to effectively track and communicate other flight operations through the airspace, NASA operates the Application for Air Range Information and Notification (AARIN) system. The AARIN is a web-based airspace request system that allows NASA to deconflict air operations and static rocket engine testing activities within the operations area of the Fee Area. The AARIN system was developed to allow pilots on-site and off-site of SSC the opportunity to request access to SSC airspace.

Existing SSC policy incorporates a 1,000-ft vertical and lateral avoidance zone around the NASA test stands within the Fee Area (personal communication, Douglas 2014). Likewise, NASA has identified areas within the Fee Area where NSW training is not authorized, including all ground training activities and overflight by rotary-wing (to include some tilt-wing), fixed-wing, and UAS aircraft (Figure 3.2-1) (DON 2011a). These precautions help prevent otherwise authorized aircraft within the Fee Area from colliding with the test stands or infringing on NASA activities.

The existing R-4403, TFR activation, avoidance, and NSW No-Fly Zones are currently insufficient to contain the risk of turbulence to non-participating aircraft at altitude in the vicinity of the Test Stand flare stacks during static engine testing events (See Section 2.3.4.1, Rocket Engine Testing).

Ground Safety. To protect persons on the ground during test events, NASA restricts access and clears all authorized and unauthorized personnel from all areas surrounding the test complex. Operational Readiness Assessments are required for new construction, operations, and equipment in support of high risk programs within the Fee Area, and are performed to identify and eliminate or control all hazards to ensure safe operations relative to personnel and property (SPR 8715.1, *Operational Readiness Program Procedural Requirements*) (NASA 2013a). Each NASA engine testing project requires a detailed Safety Mission Assurance Plan in accordance with the SSC Range Safety Program, SPR 8715.7 (NASA 2011). Additionally, an Operational/Industrial Safety Plan is in place to ensure adherence to safety principles and compliance with safety requirements and checklists (NASA 2013b). This Plan includes risk management, a safety procedure review to identify potential hazards, and appropriate personnel safety training specific to the current task.

NASA SSC maintains an Occupational Health Clinic for its employees. The clinic is staffed with licensed health care professionals that are available to assess employee health status for prevention, early recognition, and treatment of illness and injury. Emergency procedures and services, including provisions for ambulances, emergency medical technicians, emergency clinics, or hospital emergency rooms, are communicated to employees on all shifts (NASA 2010).

Fire protection and mishap response at SSC are provided on a 24-hour-per-day, year-round basis for all areas and activities in the Fee Area. Other safety services include fire prevention inspections, stand-by duty for LOX and liquid hydrogen transfers, explosive and engine tests, basic and refresher fire-fighting training for full-time firefighters and officers, and assistance to the contractor in establishing fire-fighting training programs to qualify their personnel in the use of fire-fighting equipment (NASA 2013c).

In addition, SSC has mutual aid agreements with landowner corporations in the Buffer Zone and in several nearby municipalities (see list below) whereby the fire-fighting organizations of each agree to lend equipment and personnel to one another if the need for assistance arises (NASA 2013c).

- Diamondhead, Mississippi
- St. Tammany Parish, Louisiana
- Bay St. Louis, Mississippi
- Gulfport, Mississippi
- Pass Christian, Mississippi
- Picayune, Mississippi
- Waveland, Mississippi
- International Paper

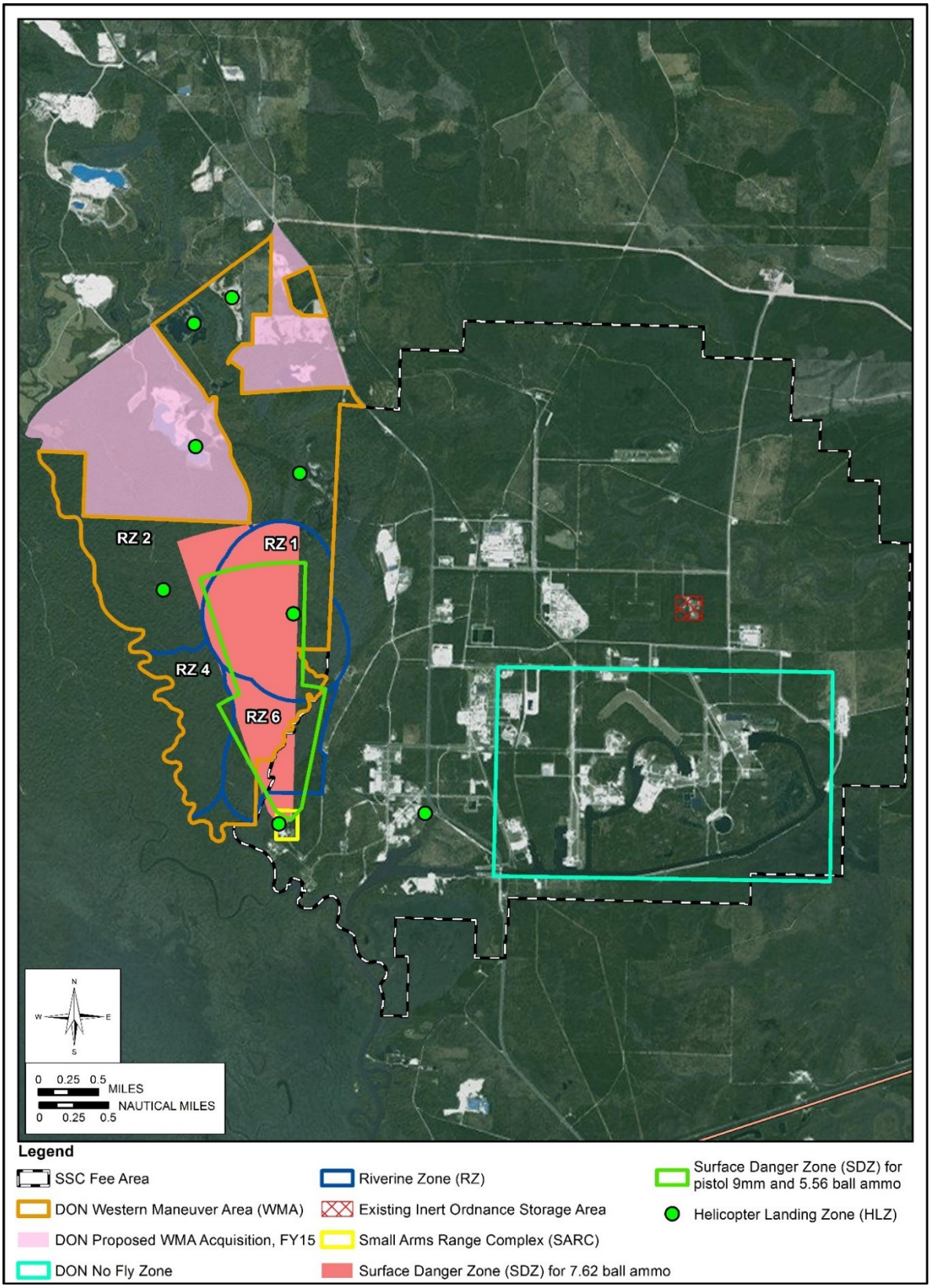


Figure 3.2-1. Existing Composite NSW Safety Zones at the NSW Riverine Complex, Stennis

3.2.1.2 DOD Safety Protocols for Existing DOD Operations

Airspace and Range Scheduling. Commander NSWG-4 Instruction 3591.C provides the current guidance and an explanation of regulations, procedures, and responsibilities pertaining to all live-fire operations in the WMA (DON 2011a). Range Control's overarching day-to-day responsibility is the management of all training assets, and to liaise with NASA in regards to the use of those training assets within the NSW Riverine Complex, Stennis. To deconflict training activities and prevent scheduling overlap of training areas, NSWG-4 Range Control operates a coordinated scheduling center, which is responsible for all training areas within the NSW training complex (including the WMA, the SARC, and other training sites within the Buffer Zone and the DOD operations that occur at Stennis International Airport). The NSWG-4 Range Managers utilize a zone compatibility matrix to ensure any simultaneous live-fire training activities can occur safely. The NSWG-4 Range Control coordinates training assets through a combination of radio coordination and hands-on oversight by range and target technicians in the field. The NSW Range Control Officer also schedules all NSW training operations at the Stennis International Airport (DON 2011a).

Comprehensive operating procedures and safety precautions are employed at the NSW Riverine Complex, Stennis to reduce the potential for mishaps to occur during operations and training events. These procedures include holding routine briefings for pilots, who are required to remain within approved flight routes and maneuvering areas. Likewise, range operations personnel also review established safety practices and conduct ground inspections prior to all live-fire training events. The evolution and training checklist requires the NSW Range Control Officer to file a medical evacuation plan on the scheduled day of live-fire training (DON 2011a).

Flight Safety. NSW Command Range Control responsibilities include the coordination of airspace use with NASA SSC via AARIN. Currently, there is no specialized airspace (i.e., SUA) separating the existing 460 annual training sorties, DOD activities, and non-participants within the NSW Riverine Complex, Stennis (see Section 1.3.2, SSC Mission and Current Use of R-4403 and Section 1.3.3, NSW Riverine Complex, Stennis Mission and Current Use for further discussion of existing NSW and SOCOM activities performed within the ROI). The NSW Range Control Officer must ensure that SDZ areas are cleared of low-flying aircraft prior to live-fire events at the WMA and SARC.

HLZ operations are conducted at eight existing HLZ sites that consist of unimproved, relatively flat areas located throughout the NSW Riverine Complex, Stennis (see Figure 3.4-1). Consistent with Unified Facilities Criteria (UFC) 3-260-01, *Airfield and Heliport Planning and Design* (DOD 2008), these sites are minimally-sized based on the types of aircraft authorized to utilize them and have unencumbered approach and departure (360 degree lateral 1:8 slope) as depicted in example HLZ configuration, Figure 3.2-2.

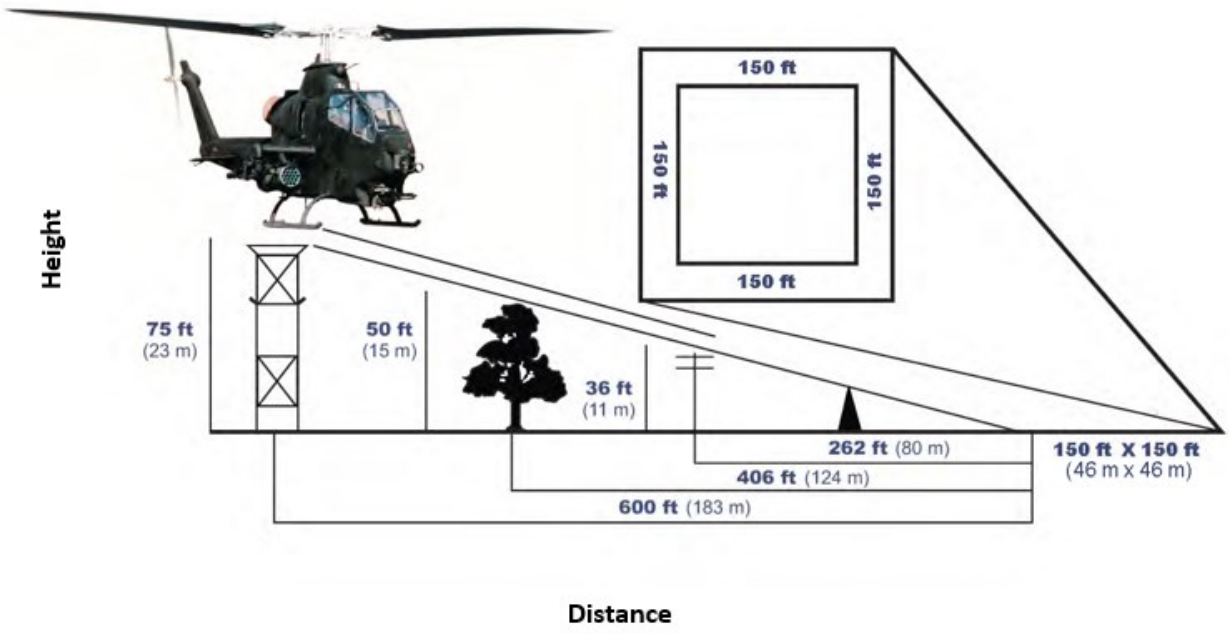


Figure 3.2-2. Representative Approach/Departure Clear Zones for HLZs

All current UAS operations within the NSW Riverine Complex, Stennis are flown in strict accordance with Range Control Operating Procedures and are operated by an external pilot via a data-link ground control station at the location of take-off and landing. Operating procedures focus on (but are not limited to) ensuring UAS launches, loiter positions, and recoveries remain within restricted airspace and inside the approved training area and selecting a UAS frequency that does not conflict with known sources of electromagnetic emission. Within the WMA, a UAS observer must maintain positive visual contact with the UAS aircraft at all times. If contact is lost, the aircraft would proceed directly to the Return Launch Point/Recovery Point and maintain 2,000 ft MSL or above until positive visual contact is re-acquired. Commander NSWG-4 Instruction 3591.C cautions that UAS operators should make every effort to remain clear of manned aircraft. UAS operators should not assume that the manned aircraft can avoid UASs (DON 2011a).

Both FAA and DOD have established Bird/Wildlife Aircraft Strike Hazard (BASH) programs to minimize flight safety risks by addressing specific aviation safety hazards associated with wildlife near airfields (FAA 2007, DON2011b). These hazards are identified and coordinated among all entities supporting the aviation mission. All DOD aircraft utilizing SSC SUA follow applicable BASH instructions from their home stations (DON 2011b).

Ground/Munitions Safety. Commander NSWG-4 Instruction 3591.C outlines specific uses and rules pertaining to existing range operations at the NSW Riverine Complex, Stennis. The SDZs associated with ground and riverine live-fire activities drive the configuration of the existing DOD range operations at SSC. The use of live-fire on existing ranges is governed by existing range standard operating procedures (SOPs) applicable to all units that use the ranges (DON 2011a). NSW maintains a combination of SOPs, physical barriers, signage, and/or perimeter patrols to prevent encroachment into the SDZs.

SDZs are generated by a combination of authorized munitions and munitions firing points or zones. There are a number of SDZs that are generated with the following authorized live-fire training operations at the existing rifle and pistol ranges within the SARC: 12-gauge shotgun; 9mm, 5.56mm, 7.62mm, and .40-caliber ball; as well as .50-caliber ball by certified NSW snipers only. Figure 3.2-1 depicts the composite SDZ for the rifle and pistol ranges at the SARC. In addition to traditional ball ammunition at the SARC, SRTA is authorized at the SARC and other live-fire training areas within the WMA (no ball ammunition is authorized outside of the SARC). SRTA SDZs vary by caliber. The following SRTA-only ammunitions are authorized at specific live-fire training areas within the WMA: shotgun, 5.56mm, 7.62mm, 9mm, and .50-caliber with a maximum range of 700 meters or less. Range Training Zones have been established to contain SDZs and enable scheduling units to train side-by-side with the assurance that each training activity is compatible with neighboring zones. Existing RZs within the DON-owned portion of the WMA are 1, 2, 4, and 6 (see Figure 3.2-1). These RZs support riverine shooting of SRTA from water to land.

Blank-fire refers to the use of weapons ammunition that contains gunpowder but no projectile leaves the weapon. Blanks contain no bullet or shot.

Live-fire The firing of any kind of munition out of any kind of weapon. There are various types of live-fire munitions:

HE: Live munitions with explosive properties have the potential to fail to explode when armed.

Inert/TP: Munitions that are lacking explosive components, but may contain tracer material in the base for visual trajectory tracking.

Short range training ammunition (SRTA) is a plastic bullet with limited flight potential that reduces the safety area requirement by approximately 90 percent from that of a lead projectile. SRTA provides a realistic range training alternative to traditional service rounds, and it is ideal for training ranges with limited geographic extent or environmental restrictions

'Simunition' Training, also called ***Special Effects Small Arms Range Marking System (SESAMS)*** is non-lethal, paintball-like marker ammunition.

The East Pearl, Mike's, and McCarthy Rivers provide multiple access points for civilians to enter the WMA and thus existing RZs and SDZs. Civilians are not restricted from being in the WMA waterways, so their presence is problematic to operations, security, and public safety. During RZ use, the area is first cleared of all unauthorized personnel (i.e., non-participants are asked to leave the area) and security/patrol boats are posted within the rivers to maintain cleared status and warn any non-participating entities for the duration of the exercise. Likewise, watchmen are deployed at the SARC. If civilians on foot or in recreational boats pass through the areas during use, a cease-fire is called. In addition, "No Fire" sectors are established at various points within the WMA to provide a safe location

in the event that a transient boater or other participating user is accidentally present during a live-fire exercise.

NSW currently stores inert munitions in magazines located in a portion of the Fee Area that was formerly part of the Mississippi Army Ammunition Plant (former tenant of Fee Area). The use of blanks and non-lethal ammunition such as 9mm Special Effects Small Arms Range Marking System (SESAMS) is authorized at various training sites within the NSW Riverine Complex, Stennis. Specific safety protocols for training with blanks and SESAMS are established and adhered to at all authorized locations. Such safety protocols include, but are not limited to establishing a 150-meter safety distance and proper storage.

Range Air Installations Compatible Use Zones (RAICUZ) Study Program. The DON is in the process of developing a RAICUZ Study to address existing and potential expansion of range operations at the NSW Riverine Complex, Stennis. The Range Safety Study is aligned with the goals of Chief of Naval Operations Instruction (OPNAVINST) 3550.1A, Range Air Installations Compatible Use Zones (RAICUZ) Program. The RAICUZ program is designed to protect public health, safety, and welfare, and to prevent encroachment from degrading the operational capabilities of air-to-ground ranges. The program presents compatible land use guidelines for areas in the range environs subject to noise and safety impacts generated from training activities, and primarily focuses on projected use. Range compatibility zones are defined based on a level of protection to public health, safety, and welfare and compatible land uses consistent with range operations and management are recommended.

Laser Safety. The purpose of range laser safety is to prevent exposure of both military personnel and the general public to laser radiation and to ensure that only intended target areas are engaged by the laser without placing unnecessary restrictions on laser system use. Different control measures are required depending on the class of the laser, the operational environment, and the level of personnel training. Most control measures fall into the category of common sense practices aimed at limiting the laser exposure. To that end, Laser Surface Danger Zones (LSDZs) are designated horizontal and vertical regions where laser radiation levels may exceed maximum permissible exposure levels or hazards. Unauthorized personnel are not permitted in LSDZs, and laser eye protection is required for personnel who may potentially engage in intrabeam viewing within this area.

DOD handbook MIL-HDBK-828B, *Range Laser Safety* (DOD 2011) provides uniform guidance for the safe use of military lasers and laser systems on DOD ranges, and directs each military service to establish a range laser safety program as part of their overall range safety program. Accordingly, DON instruction OPNAVINST 5100.27B, *Navy Laser Hazards Control Program* (DON 2008), prescribes the DON and Marine Corps policy and guidance in the identification and control of laser radiation hazards. This instruction includes, but is not limited to: controls over laser design and operation; protection of personnel and equipment, including training requirements; and specific information on various laser safety subjects. NSWG-4 Instruction 3591.C addresses the use of military operators utilizing certain classes of DOD approved hand-held lasers and force-on-force lasers, and requires range safety personnel with laser safety certification be present during all laser operations, all personnel using lasers to be property trained, and personnel participating in or observing laser training to receive a laser range

briefing by the Range Laser Safety Officer (RLSO) prior to commencing laser training operations. Laser signs are posted during training events where laser use is authorized (DON 2011a).

3.2.1.3 Standard Safety Protocols for Proposed DOD Operations

Flares. Currently, aircraft do not dispense flares in the existing airspace at SSC, but defensive countermeasures training is part of the proposed action. Flares released from aircraft provide high-temperature heat sources that mislead heat-sensitive or heat-seeking surface-to-air and air-to-air missile systems. Typical defensive flares are made of magnesium or other metals that, when ignited, burn for a short period (less than 5 seconds) at approximately 2,000 degrees Fahrenheit (°F). The burn temperature is hotter than the aircraft's exhaust, so the flare attracts and decoys heat-seeking weapons and sensors targeted on the aircraft. For these flares, approximately 500 vertical ft is generally required before they are completely burned. However, regulations (see below) require dispersal at altitudes that provide more than sufficient time to ensure complete combustion before contacting the ground.

Effective use of flares in combat requires frequent training by aircrews to master the timing of deployment and by ground crews to ensure safe and efficient handling. Flare training is governed by a series of regulations based on safety, environmental considerations, and limitations of the flare itself (e.g., U.S. Air Force [USAF] Instruction 13-212, *Range Planning and Operations* [2007]; Department of the Army Regulation 385-63/Marine Corps Order 3570.1C, CH 11 *Aviation Range Safety* [2012]; and Marine Corps Order 3550.9 *Range Certification* [2004]). These regulations establish procedures governing the use of flares over ranges, other Government-owned and -controlled lands, and non-Government-owned or -controlled areas. Local range regulations/SOPs typically designate specific flare SOPs and are established in accordance with these regulations, FAA requirements, aircraft technical manuals, and local airspace and terrain conditions; thus, flares are used only in approved airspace at appropriate altitudes designated for the airspace. For pyrotechnic flares, altitude restrictions in SUA are often established by local range operations to ensure burnout before a flare reaches the ground, thus decreasing potential risk of ground fire or contact with ground personnel.

Weapons Danger Zones. As air-to-ground weapons delivery is not currently authorized at the NSW Riverine Complex, Stennis, no WDZs are currently in place. As detailed in Section 2.4, the proposed action includes establishment of WDZs associated with the proposed munitions delivery profiles for the northern and southern target areas. The specific type of aircraft, its speed, angle, and the specific type of munitions expended under those conditions are used to calculate WDZ footprints using the Multi-Service WDZ Tool (see Section 2.1.3.5; Appendix D). WDZs represent the minimum safety requirements designed for aviation weapons training on DOD ranges.

Laser Safety. The proposed action includes the establishment of a sensor training area for air-to-ground training where laser systems are used without live munitions delivery. At the sensor training area, airborne lasers would potentially be used for marking, range-finding, designating, and illuminating targets, and targets would be equipped to sense and record receipt of laser energy. In addition, air-to-ground laser use would occur in concert with munitions delivery operations at the proposed munitions target areas. All of these proposed activities would be conducted in accordance with the orders and directives outlined in Section 3.2.1.2. In particular, altitudes and locations of aircraft flying in the new R-4403F while employing lasers into the sensor training area would be tightly regulated to ensure that

any hazardous laser energy would be contained in RA so as not to be a threat to non-participating aircraft and personnel.

3.2.1.4 Protection of Children

The identification and assessment of environmental health risks and safety risks that may disproportionately affect children for EO 13045 includes identification of the population of children that may be affected. The following analysis was conducted to identify the population of children within the ROI.

- *Fee Area/Buffer Zone portions of the ROI*. Due to the restrictive easement governing the acoustic Buffer Zone, residences are prohibited and, thus, children are generally not present in this predominant portion of the ROI. There are no schools located within this area. However, there is NASA-owned, DON-operated Federal Child Development Center (CDC) within the Fee Area. The Stennis CDC is accessible only for dependents of eligible members of the SSC Federal city. The Stennis CDC is licensed to provide care for 105 children ages 6 weeks to 5 years. Additionally, the NASA SSC Visitor's Center is a family attraction and occasionally the site of school field trips.
- *Underlying the Proposed R-4403F that Extends North of the Buffer Zone*. An analysis of 2010 census data was conducted in order to estimate the under-18 population in this area. There are five census block groups partially underlying this portion of R-4403F. Due to the nature of block groups, the area represented in these five block groups covers a slightly larger area than the portion of R-4403F evaluated. The population under age 18 within the total extent of the five block groups is 2,415 or about 25.8 percent of the total population (9,355). This population is generally consistent with the under 18 population of the counties in the ROI (which is at 23.9 percent for Hancock County, 24.6 percent for Pearl River County, and 25.7 percent for St. Tammany Parish). There are no schools or known childcare centers underlying this portion of proposed R-4403F; however, West Hancock Elementary School is located approximately 0.6 mile northeast of the proposed airspace. Therefore, there is no concentration of children within this area (U.S. Census Bureau [USCB] 2010).

In summary, there is a low distribution of children within the ROI overall, due in large part to the Buffer Zone restrictive easement and an average distribution of resident children within that portion of the ROI that is not within the Buffer Zone restrictive easement.

3.2.2 Environmental Consequences

Factors considered in the analysis of potential safety impacts in the ROI include potential for substantial hazard to personnel or the general public. This includes identification and assessment of environmental health risks and safety risks that may disproportionately affect children and addressing such disproportionate risks, if identified.

3.2.2.1 Alternative 1: Preferred Alternative

Flight Safety. Under Alternative 1, NASA would continue to act as the airspace scheduling authority for, and thus coordinate all activations of R-4403A, B, C, E, and F through AARIN (e.g., as needed by using

agencies NASA, DOD, and other tenants). The airspace would be open for civilian traffic and returned to the controlling agency, i.e., the local FAA (Houston Air Route Traffic Control Center), when not needed for operations at SSC. This level of controlled oversight would assist in deconfliction of operations and thus increase safety within the proposed new airspace.

The proposed action is intended to bring substantial positive impacts to the existing safety conditions associated with congested airspace in the ROI, as well as safety conditions anticipated with the DOD and NASA evolving uses of the proposed airspace. Under the proposed action, and summarized in Table 2.1-2, there would be an increase in annual airspace operations in the ROI, including a maximum of 40 static engine tests, 440 fixed- and rotary-wing events, and an estimated 405 UAS (DOD and NASA) sorties (Section 2.1.3, Air Operations and 3.3, Air Operations). The redesignation and expansion of R-4403A, B, C, E, and F would segregate hazardous flight activities and reduce risk of danger to participants, civilians, and civilian aircraft from current hazards and those associated with evolving operations, including excessive turbulence during static engine testing events, excessive airspace congestion, explosive potential from static rocket and untethered vehicle test engines, and live-fire munitions and laser sensor training (see Table 1.4-1).

During development of the preferred alternative, DOD, NASA, and FAA considered existing and future civilian operations at Picayune Municipal and Stennis International Airports and deconfliction of potential operational interference from hazardous activities during times when the R-4403A, B, C, E, and F is activated. The 3-NM buffer between the restricted airspace and the Picayune Municipal and Stennis International Airports was specifically incorporated by FAA into the proposed action to provide for safe distance separation of civilian aircraft activity. (For context, there is a relatively low level of operations at Picayune International Airport, see Section 3.3, Operations). Therefore, the Preferred Alternative would not have impacts to the safety of civilian operations at Picayune Municipal or Stennis International Airports.

A negligible increased risk to safety may occur over the proposed restricted airspace, above 10,000 ft MSL, when the airspace is activated during interoperability training. On occasion, NSAv operations associated with interoperability training maneuver up to 16,000 ft MSL, which is above the proposed 10,000 ft MSL ceiling overlying the WMA and/or the sensor training area (FW2) within R-4403C, E, and F. Although NSAv operations at this altitude currently occur in the ROI with the aircraft operating under VFR, the increased tempo of NSAv operations under Alternative 1 would not be ameliorated by the proposed RA altitude. Therefore, existing associated risks to non-participant aircraft safety would continue and could potentially increase with increased NSAv operations in the ROI. During VFR flight, pilots must be able to consistently maintain visual separation from clouds (and thus have positive control of incoming hazards). The magnitude of this impact would be minor given the low volume of civilian aircraft activity in this area.

All current NASA and DOD operational regulations and procedures would continue to mitigate safety risks from engine testing, aircraft and range operations, UAS activities, use of HLZs, and the use of laser sensor targets. Pilots would continue to adhere to existing training policies and follow OPNAVINST 5100.27B, *Navy Laser Hazards Control Program* (DON 2008). Additionally, since the use of air-to-ground laser sensors would be a new activity at the NSW Riverine Complex, Stennis, local emergency and

mishap response plans would be updated to include procedures and response actions necessary to address any mishap involving lasers. The proposed sensor training area (FW2) and associated airspace are not within the Laser Free Zone (LFZ) for Picayune Municipal Airport or Stennis International Airport.

Existing air safety policies would be met or exceeded by all parties operating within the RA (DON 2011a). Stringent arming and munitions delivery restrictions would continue to be applied to aircraft munitions delivery operations to ensure munitions are contained within the designated release corridor and munitions target areas. Pilots would be required to have visual surveillance of targets, and ground controllers (safety officers) are required for all air-to-ground weapons training to ensure the area is clear of unauthorized personnel and non-participating aircraft. All firings from helicopters would be in accordance with NSWG-4 Instruction 3591.lC, which requires a negative (below horizontal) muzzle angle and careful control of firing location and direction (DON 2011a).

The use of flares would be considered a new activity in the ROI, and as such would require the establishment of release protocol, including appropriate locations, minimum altitudes, and wildfire reduction best management practices (BMPs). Under the proposed action, and particularly during the Emerald Warrior exercise, the use of flare countermeasures are estimated to total approximately 58,600 flares per year expended from various aircraft (AC-130s, CV-22s, and helicopters) (see Table 2.1-4). Of these annual flare expenditures, 22 percent would be concentrated in the 8 to 10 days of Emerald Warrior training. However, the majority (slightly more than 82 percent) of flares would be deployed from AC-130s.

Based on projected training profiles, all AC-130 events would operate above 1,000 ft above ground level (AGL); thus, flares would be released with ample altitude to ensure complete consumption within the airspace. Helicopters and CV-22 generally operate lower than AC-130s, but the establishment of minimum release altitudes would mitigate the risk of ground fire from flare deployment. Standard minimum-release altitudes for flares over Government-owned and -controlled lands recommend the allowance of enough altitude for flares to burn out completely at least 100 ft above the ground. Additionally, more restrictive altitude limitations could be established in response to local considerations, including seasonal wildfire threat levels or existing infrastructure in the ROI. However, the land under the proposed RA is generally swampy, verdant, and not highly combustible. Furthermore, there is an active controlled-burn program in effect on Government-controlled lands underlying the proposed RA, one purpose of which is to reduce fuel build up in the forest understory. The Flare Release Protocol that would be developed by the Range Control at NSW Riverine Complex, Stennis would be specific to the proposed operations, as well as the humid environmental conditions and ongoing vegetation management at SSC. Finally, SSC has eight mutual aid agreements with local fire departments and agencies that would cooperate in response to flare-related fires. Thus, with implementation of the burn control program, flare release protocol, and fire response planning in place, the increased wildfire risk associated with proposed flare use under Alternative 1 would be mitigated and thus negligible.

The proposed increase in air operations would result in a commensurate increase in the BASH potential. This potential increase in BASH occurrence would be mitigated by continued adherence to the procedures currently used by aircraft operators as prescribed by their home basing authority to minimize incidences of bird/wildlife-aircraft strikes.

Ground/Munitions Safety. Under Alternative 1, operations and activities would continue to be conducted in accordance with current procedures to ensure protection of human health and safety. Air-to-ground munitions expenditure during training events would be limited to the ranges and target areas designated, operated, and managed specifically for that purpose (e.g., FW1; IMP-A; RZs 1, 2, 4, 6; and the SARC). Air-to-ground targets would be located only on DON-owned lands that are clearly posted as closed to the public (Section 3.5, Land Use). As with current range operation protocol, munitions delivery activities would be suspended immediately if trespassers are observed at or near designated safety exclusion zones. Specific weapon safety footprints are calculated for each target area to ensure that munitions could be safely expended from aerial platforms within the ROI (see Figures 2.1-7 and 3.2-1). Existing inert munitions handling and storage procedures and protocols would continue to be implemented.

NASA Test Stands and Proposed Untethered Autonomous Flight Vehicle Areas. As is the procedure for all new equipment and operations at NASA SSC, introduction of a new rocket engine or any autonomous untethered flight system would require Operational Readiness Assessments and Systems Safety Plans prior to system initiation (NASA 2013a, 2013b). With the completion of these Assessments and Plans, and with the implementation of any resulting recommendations, NASA ground safety conditions would be similar to existing conditions and no additional impacts are anticipated.

At the proposed untethered autonomous flight vehicle sites, further analysis of the site preparation requirements for both the launch and the two emergency alternative landing areas would be required before the locations could be used for that purpose (NASA 2013a, 2013b). The untethered autonomous flight vehicles' flight profiles generally include launch, navigation within the restricted airspace, then touchdown at either the launch site or an alternative landing area within the restricted airspace. Due to the volatile nature of propellants used in these vehicles, these vehicles carry an inherent Net Explosive Weight and an Explosive Safety Quantity Distance (ESQD) that varies with the amount of propellant on-board. The boundaries of R-4403B are driven largely from an uncontrolled launch of an untethered autonomous flight vehicle from the launch site, combined with the vertical and horizontal ESQD cast by the amount of propellant onboard the vehicle. In order to mitigate safety concerns, NASA would use two controls for containment of untethered autonomous flight vehicle testing: 1) limiting propellant loads so vehicles simply lack the fuel to break containment, and 2) on-board flight control and termination systems activated by range safety officers in the event vehicles approach 1.0-NM and 0.5-NM from the border of R-4403B. Thus, after Operational Readiness Assessments and Systems Safety Plans are complete, no additional impacts to safety from the testing of untethered autonomous flight vehicles are anticipated.

Southern Target Area (FW1) and Northern Target Area (IMP-A). Documentation and communication of target area/range protocol and management plans would be required as part of the establishment of the two new target areas at FW1 and IMP-A. Target areas have been proposed for both locations in accordance with Department of the Army Regulation 385-63/Marine Corps Order 3570.1C (2012). Both of these proposed target areas would encompass approximately 5 acres, and would contain all the authorized targets and aim points for the authorized weapons systems using the IMP-A and FW-1 target areas. The recommended configuration of the northern target area (IMP-A) avoids water features to the

greatest extent possible to further minimize safety/ricochet factors for HE munitions delivery and to allow for ease of target construction and maintenance. WDZs corresponding to the use of the northern target area (IMP-A) and southern target area (FW1) air-to-ground live-fire munitions delivery have been developed using the Multi-Service WDZ Tool (see Section 2.1.3.5; Figure 2.1-7; Appendix D). The WDZ calculations were performed for all possible aim points in the defined target areas. The combination of designated WDZs and safety procedures will ensure all projectiles, fragments, debris, and components resulting from the firing, launching, and detonation of aviation-delivered ordnance come to rest on Government-controlled property underlying R-4403C. As with existing ranges, the risk of ground personnel casualties from air-to-ground munitions delivery would be minimized by the tight controls placed on aircraft weapons use, range scheduling, and range entry procedures by ground personnel. No degradation of public safety is expected from release or detonation of live or inert munitions by fixed-wing or rotary-wing aircraft at either proposed impact site; thus, impacts to safety from the establishment of the southern target area (FW1) and northern target area (IMP-A) would be mitigated to a negligible level.

The proposed delivery of HE ammunition to these areas would introduce a new ground hazard for potential UXO at the NSW Riverine Complex, Stennis as all munitions currently authorized outside of the SARC are inert. DOD protocols for managing UXO and conducting ORC would be implemented annually and prior to any range or infrastructure maintenance in the area to minimize associated risks to personnel and public safety. As noted in Section 2.1.2.2, the need for UXO management and ORC is dependent upon use and could be more frequent with a higher training rate or a weaker target (such as a wooden or plastic soft target as opposed to a metal or harder target). Munitions that make impact off of the 5-acre target area will be logged and marked for clearance. Clearance operations will be conducted as required, i.e., if the round is suspected to be live, is within a ground training area, or is otherwise an immediate threat to safety, and the appropriate range clearance actions will be taken. Although the associated safety impacts would be manageable and DOD protocols for safety are proven effective in protection of personnel and the public, the introduction of UXO would increase risk to personnel and property and range management/cleanup responsibilities in the long-term.

Laser use would occur as a component of some operations at the southern target area (FW1) and northern target area (IMP-A). Such laser use would occur within the 5-acre parcels. It is anticipated that lasers used in air-to-ground munitions delivery operations at the southern and northern target areas could be operated from any altitude or location within the proposed R-4403C-D airspace configuration. Final laser use certification may include restrictions that would be developed in the Range SOP. The northern target area (IMP-A) is an upland area within a gravel mining operation that is surrounded on three sides by water that has filled the gravel pits. There are safety issues associated with the use of laser systems over water as reflections cannot be controlled or predicted and are a hazard to pilots, as well as other nearby receptors. The recommended configuration of the northern target area (IMP-A) at this location avoids water features to the greatest extent possible to further minimize safety hazards associated with sensor training in this area. Likewise, minimal risk to safety of other pilots in the area would occur as all sorties and activities would be deconflicted by Range Control.

Riverine Zones. The RZs in the WMA (see Figure 2.1-6, Battlespace Ops) have been previously designated as SDZs for boat-platform and terrestrial live SRTA fire delivery, but existing range protocol at the RZs (DON 2011a) and the RZ management plan would need to be updated to include SRTA from aerial platforms. The use of SRTA at live-fire training areas in the WMA is ideal due to the close proximity of the training areas and the insufficient land area to absorb the SDZ for standard ball cartridges. Current range signage and patrol of training areas (i.e., flank guards) to exclude non-participating entities prior to commencement of live-fire activities in the RZs would continue to be enforced. The live-fire range officer would ensure that the RZ is clear of boaters, low flying aircraft, and unauthorized personnel and that all safety procedures have been followed prior to initiating training activities. Thus, impacts to safety from the use of existing RZs for the delivery of SRTA from airborne, low-level rotary-wing aircraft would continue to be mitigated to a negligible level.

Small Arms Range Complex. As part of Alternative 1, helicopters (MH-60s, MH-47s, or A/MH-6s) would hover at a location near to the Sniper Tower at the existing SARC and shoot downrange. Although it does not currently occur, NSW has analyzed and certified air-to-ground munitions delivery from helicopters hovering at the SARC Sniper Tower location and determined that munitions fired from hovering helicopters would be contained within the existing 7.62mm ball ammo SDZ for the SARC (see Figure 3.2-1) (DON 2011a). Due to the highly skilled sniper training and certification process, .50-caliber ball ammo sniper fire is contained within the 7.62mm ball ammo SDZ. Firing from helicopters in forward flight (i.e., not hovering) at the SARC has not been certified by the DON and is not part of the proposed action. Current use of live-fire 7.62mm ball ammo at the SARC from the sniper tower, and thus use of 7.62mm ball ammo from aerial platforms, requires the suspension of most other activity in the WMA as all RZs and several HLZs are impacted by the 7.62mm ball ammo SDZ (see Figure 3.2-1). Thus, impacts to safety from the use of the SARC from rotary-wing platforms at a low-level hover would be negligible. Additionally, there would be a benefit to safety in that the vertical hazard associated with the SARC would be contained within the proposed RA, and the RA could be activated to exclude non-participating aircraft from the airspace when the SARC is in use. The current practice of ensuring that the SDZ is free of low-flying aircraft does not place restrictions on non-participating aircraft and has greater potential for error in the event that the range control officer fails to identify a low-flying aircraft when the SARC is in use and an errant round is dispersed or ricochets vertically.

Sensor Training Area (FW2). Under Alternative 1, the use of air-to-ground laser sensor systems would be a new activity at SSC. As noted in Section 2.1.2, the LSDZ at the proposed sensor training area (FW2) would be fully contained within the 100-acre NASA-owned property. Range operating instructions would be revised to incorporate additional safety measures for air-to-ground laser safety in accordance with standard laser safety procedures (DON 2008, NASA 2011) to ensure that the laser operations occur in a manner that is safe for participating personnel, civil aviators, and the general public.

The proposed sensor training area (FW2) would be located in the northeast corner of R-4403E, and aircraft maneuvering around that simulated target area would use both the R-4403E and R-4403F airspace. Since the bottom boundary of the R-4403F airspace would not go all the way to the surface, there would be restrictions on aircraft altitudes and laser modes to ensure that hazardous laser energy would be contained within the RA without being a threat to non-participating aircraft and personnel

below the R-4403F. At approximately 6 and 8 NM from the Picayune Municipal Airport and Stennis International Airport, respectively, laser operations at the FW2 site would be outside the LFZ surrounding both airports and would not cause visual distraction or disruption to airport operations. The redesignation of R-4403E/F, with its inherent prohibitions against intrusion by unauthorized aircraft, would help prevent laser mishaps to civil and commercial pilots. Thus, it is not likely that laser operations at FW2 would interfere with local flight operations at either airport.

Similarly, the projected total annual rocket engine test events by NASA within R-4403A/B are a maximum of 43 per year, or an average of less than four per month. This paucity of proposed engine testing operations, coupled with the coordinated scheduling of NASA testing events with the use of NSW training areas, would limit potential conflicts between laser sensors and NASA equipment and operations. Thus, negligible impacts to safety from the use of FW2 for air-to-ground laser sensor training are expected.

Protection of Children. As noted in Section 3.2.1.4, there is a low distribution of children throughout most of the ROI. Therefore, the assessment of environmental health risks and safety risks that may disproportionately affect children focused on the area underlying that portion of the proposed R-4403F airspace outside the Buffer Zone, where there is an average distribution of children (and an estimated residential population of less than 2,500 under age 18). None of the proposed activities within the R-4403F would result in environmental health risks or safety risks to this population. DOD compatible land use policies do recognize any land area underlying RA as possessing a minimum level of safety hazard concern for compatible land use. Under the DON's compatible land use program, the DON would work with Hancock County and Pearl River County to discourage siting a school, childcare facility, or other land use that would potentially increase the proportion of children within this area (see Section 3.5, Land Use). Therefore, implementation of the proposed action would not result in environmental health risks and safety risks that may disproportionately affect children.

3.2.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

Impacts for Alternative 2 are the same as for Alternative 1 except that HE would not be used at IMP-A target. This alternative is evaluated to provide a balance in lessening environmental and range management responsibilities associated with delivery of HE munitions to one munitions target area. The long-term impacts on safety/associated range management implications for UXO and range clearance and disposal operations associated with delivery of HE munitions would be lessened as compared to Alternative 1 since only one site, FW1, would be authorized for delivery of HE munitions.

No further degradation of safety is expected from release of inert-only munitions by AC-130s or rotary-wing aircraft at IMP-A, and anticipated impacts to safety associated with Alternative 2 are similar to those described for Alternative 1.

3.2.2.3 No Action Alternative

Under the No Action Alternative, existing airspace would continue to fail to accommodate and control the full dimensions of existing and emergent hazards, and the potential for excessive turbulence at altitude during NASA static rocket engine testing and mishap potential during interoperability training events due to limited airspace would continue to exist. There would not be increased flexibility for UAS

operations; hazards associated with Category 1 UAS would continue to be managed through the COAs. Although the ground, flight, and weapons safety considerations associated with current operations would remain in place, NASA and DOD would likely not be able to meet expanded mission requirements at SSC and NSW Riverine Complex, Stennis, safely.

3.3 AIRSPACE AND AIR OPERATIONS

Airspace is a finite resource that can be defined vertically, horizontally, and temporally when describing its use for aviation purposes. The FAA generally regulates the Nation's airspace, and all users (commercial, military, civilian, recreational) are required to comply with rules, procedures, charts, and other measures that distribute its use and ensure users' safety above and on the ground. Airspace of defined dimensions is controlled based on proximity to congested areas or airports (Class A through E) within which air traffic control service is provided (Figure 3.3-1; FAA 2013). Class E airspace extends upward from either the surface or a designated altitude to the overlying Class A airspace. Class G airspace is uncontrolled. Classes A, E, and G primarily relate to en route flight and are defined in terms of altitude and the nature of flight operations that commonly occur at those altitudes.

As many of the elements of airspace and air operations are defined in Chapters 1 and 2, the following discussion is intended to provide a general summary of current and proposed airspace use in the ROI. This discussion tiers from, and for expanded detail refers to, the FAA Aeronautical Study pertaining to the proposed R-4403A, B, C, E, and F.

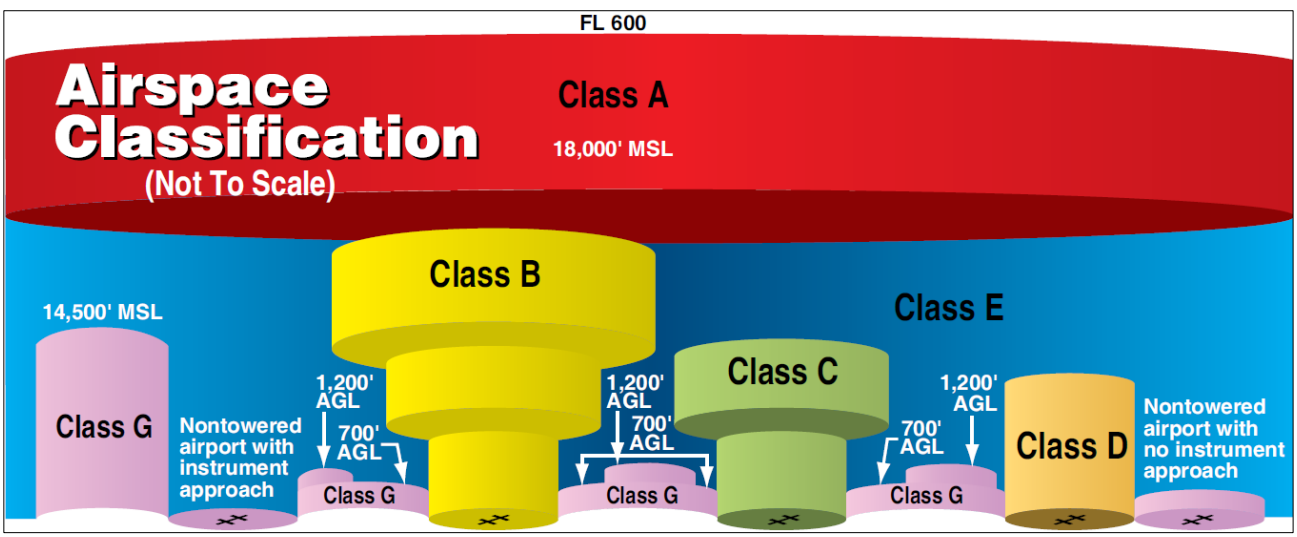


Figure 3.3-1. National Airspace Classification System (FAA 2013)

3.3.1 Affected Environment

Airspace Control. The airspace at SSC is controlled by the local Houston FAA ATC and organized by NASA as the local scheduling authority (Section 3.4.1, Safety). NASA uses AARIN to track, deconflict, and communicate flight operations. The airspace associated with NSW training assets is scheduled by NSWG-4 Range Control via the AARIN system.

Airspace Use. Under the existing condition, the annual amount of airspace use consists of 477 operations in the ROI (NASA and DOD combined), requiring 204 hours of RA activation for NASA engine testing events (with the exception of COAs for UAS, DOD operations do not currently utilize SUA at SSC) (Table 3.3-1).

Table 3.3-1. Hours per Year of Projected Airspace User Activation

Airspace Unit	NASA Testing events	Joint Training Events (Emerald Warrior) All aircraft *11 hours per day, for 8-10 day exercise, once a year*	Non-Emerald Warrior NSW Use Helicopters, UAS *Airspace scheduled in 3-hour blocks per event*	Non-Emerald Warrior AFSOC Use AC-130, CV-22, PC-12 or similar *Airspace scheduled in 3-hour blocks per event*
R-4403A[1]	140-480	NA	NA	NA
R-4403B[2]	21-36 autonomous vehicle propulsion testing; 315 UAS	NA	NA	NA
R-4403C	NA	88-110	1320	660
R-4403E	NA	88-110	NA	240
R-4403F	NA	88-110	NA	240

Notes: [1.] Data range reflects minimum expected tests (20 at 7 hours of airspace activation, each) to maximum number of expected tests (40 at 12 hours of activation, each).

[2.] Data range reflects minimum (3 tests at 7 hours of airspace activation, each) to a maximum number of expected tests (3 at 12 hours of activation, each). UAS does not require, but could potentially utilize, airspace activation surrounding an estimated 3-hour block.

Local, Civilian Airports. There are two civilian airports located within proximity to the ROI, Picayune Municipal and Stennis International (see Figure 1.2-2). Picayune has no control tower with ATC services and is only in operation from 0800–1700; the airport beacon operates from sunset to sunrise (AirNav 2014a). For the 12-month period ending June 6, 2013, Picayune averaged approximately 50 aircraft operations per day (AirNav 2014a), the majority of which could be assumed to be during daylight hours based on airport personnel attendance hours. Stennis International Airport operations averaged 175 aircraft operations per day for a 12-month period ending January 31, 2012, with 44 recorded as local general aviation, 113 as transient general aviation, and 18 as military (AirNav 2014b).

Figure 3.3-2 provides a representative look at existing air traffic in the vicinity of the existing R-4403 SUA. This snapshot of radar tracks of flight, taken on May 25, 2013, from 5 p.m. to 9 p.m. depicts the relative congestion of the Gulfport-Biloxi airspace as compared to the airspace in the ROI.

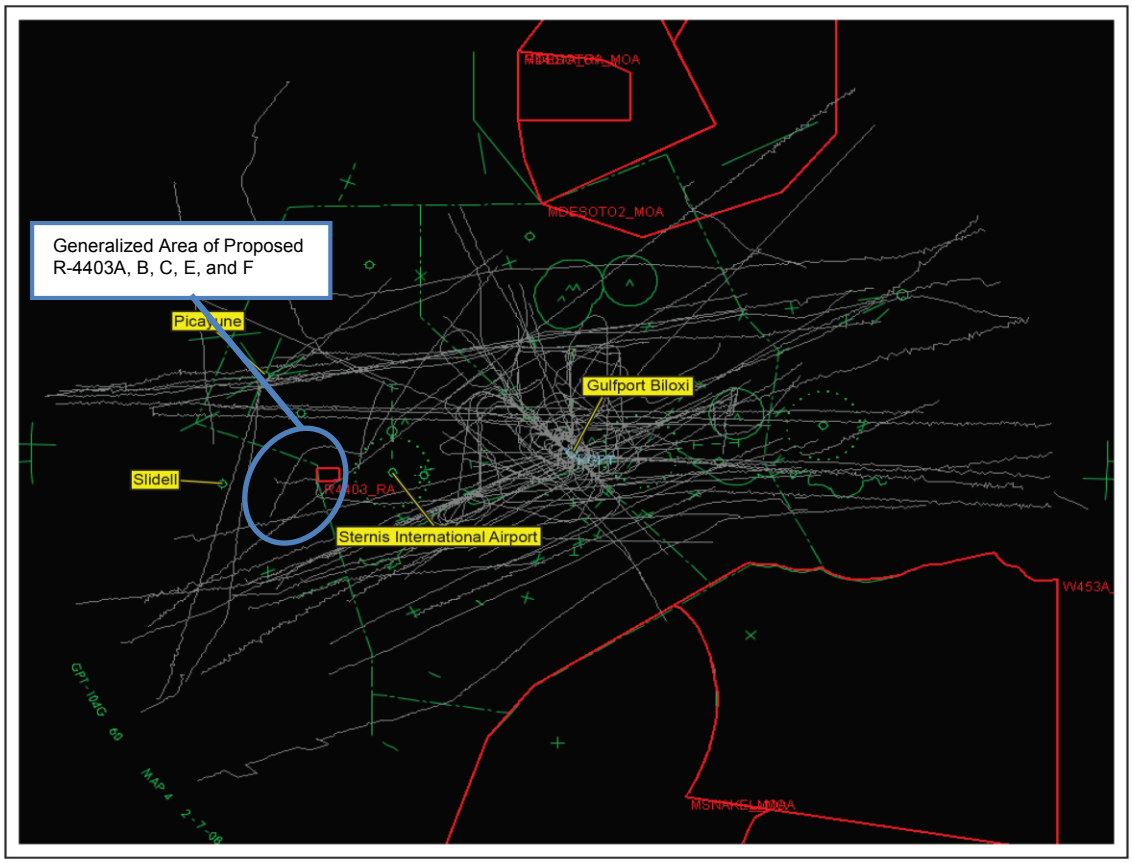


Figure 3.3-2. Representative Snapshot of Existing Air Traffic in the ROI from Radar Tracks on May 25, 2013, 5 p.m. to 9 p.m.

3.3.2 Environmental Consequences

The redesignation and expansion of R-4403A, B, C, E, and F (see Figure 2.1-1) would provide safety and separation for the conduct of static rocket engine and untethered autonomous flight vehicle testing, fixed- and rotary-wing flight operations, and UAS operations proposed by NASA, DOD, and other tenant agencies at SSC.

3.3.2.1 Alternative 1: Preferred Alternative

The air operations anticipated to occur within the proposed R-4403A, B, C, E, and F as part of Alternative 1 are summarized in Table 2.1-2. Activation of R-4403A-B would occur in 7 to 12 hour blocks associated with rocket engine testing and untethered autonomous flight vehicle testing. Activation of R-4403C, E, and F is projected to be 11 hours per day during the annual 8- to 10-day Emerald Warrior exercise, and for 3 hours per event for other DOD training operations (Table 3.3-1). This proposed airspace would be designated joint-use and, when not needed for testing or training purposes, would be returned to Houston FAA ATC for use by commercial and general air traffic.

Redesignation of R-4403A, B, C, E, and F would generate reliable, consistent airspace control and communication mechanisms over those that are currently temporary in nature (e.g., TFRs, COAs). Additionally, SUA redesignation would require civil pilots to be more vigilant in pre-flight mission

planning to acknowledge and accommodate the status of the SSC airspace, as well as in-flight with regard to increased see-and-avoid responsibilities. The redesignation of R-4403A, B, C, E, and F presents a more reliable method for separating non-participating aircraft from intrusion into hazardous activities within SSC airspace and would ensure a safer environment for all entities (see Section 3.2, Safety and Section 3.7.2, Recreation).

The existing configuration of the proposed R-4403A, B, C, E, and F airspace accounts for the required 3 NM and 1,500 ft AGL airport exclusion zones to accommodate Picayune Municipal Airport and Stennis International Airport operations (FAA 2012). Exclusion zones separate commercial and civil aviation from military training aircraft without requiring see-and-avoid procedures, and they eliminate the potential for civilian aviation to transit the RA while on approach to airport runways. These exclusion zones are charted on aviation maps and are mutually beneficial to deconflict operations and preserve operational momentum for both the airports and Federal stakeholders at SSC. Thus, no significant impacts to Picayune or Stennis International Airport operations or within the SUA are anticipated from the redesignation and expansion of R-4403A, B, C, E, and F.

Redesignating and expanding RA over SSC would accommodate increased and evolving missions of SSC tenant agencies. Although operations within the SSC airspace would increase (see Table 2.1-2), R-4403A, B, C, E, and F have been purposefully configured to accommodate the proposed action, and it is not expected that mission requirements would exceed the proposed capacity (Table 3.3-2). Additionally, coordination between the FAA, NASA, and NSWG-4 via AARIN would continue to deconflict airspace use, and excessive, additional demands on the regional ATC system would not be expected. The implementation of Alternative 1 would bring substantial positive impacts to the availability of safe airspace within which NASA, DOD, and other tenant agencies can conduct existing and evolving mission requirements.

Table 3.3-2. R-4403A,B, C, E, and F Airspace Volume

Airspace	Lateral Boundaries (sq. mi)	Altitudes (ft MSL)	Cubic Miles
Existing R-4403	4.9	Surface – 5,000	4.6
R-4403A	26	Surface – 12,000	59.1
R-4403B	100	Surface – 6,000	113.6
R-4403C	70	Surface – 10,000	132.6
R-4403E	30	Surface – 10,000	56.8
R-4403F	13	4,000 – 10,000	14.8

3.3.2.2 Alternative 2: Limit HE Delivery to Single Munitions Target Area

Although IMP-A would be used for inert munitions only, the exclusion of HE munitions delivery would not impact the total number of operations expected to occur in the proposed airspace; thus, anticipated impacts associated with airspace for Alternative 2 are similar to those described for Alternative 1.

3.3.2.3 No Action Alternative

Under the No Action Alternative, the training inefficiencies and risks resulting from the lack of restricted or segregated airspace at SSC would continue. Civil pilots would need to continue to employ increased vigilance in both pre-flight and in-flight responsibilities to avoid conflicts with NASA and DOD training

aircraft and UAS operations. Airspace use and management would remain unchanged from current conditions, and the potential for conflicts associated with the joint military and civil use of the airspace in its current configuration would continue.

3.4 NOISE

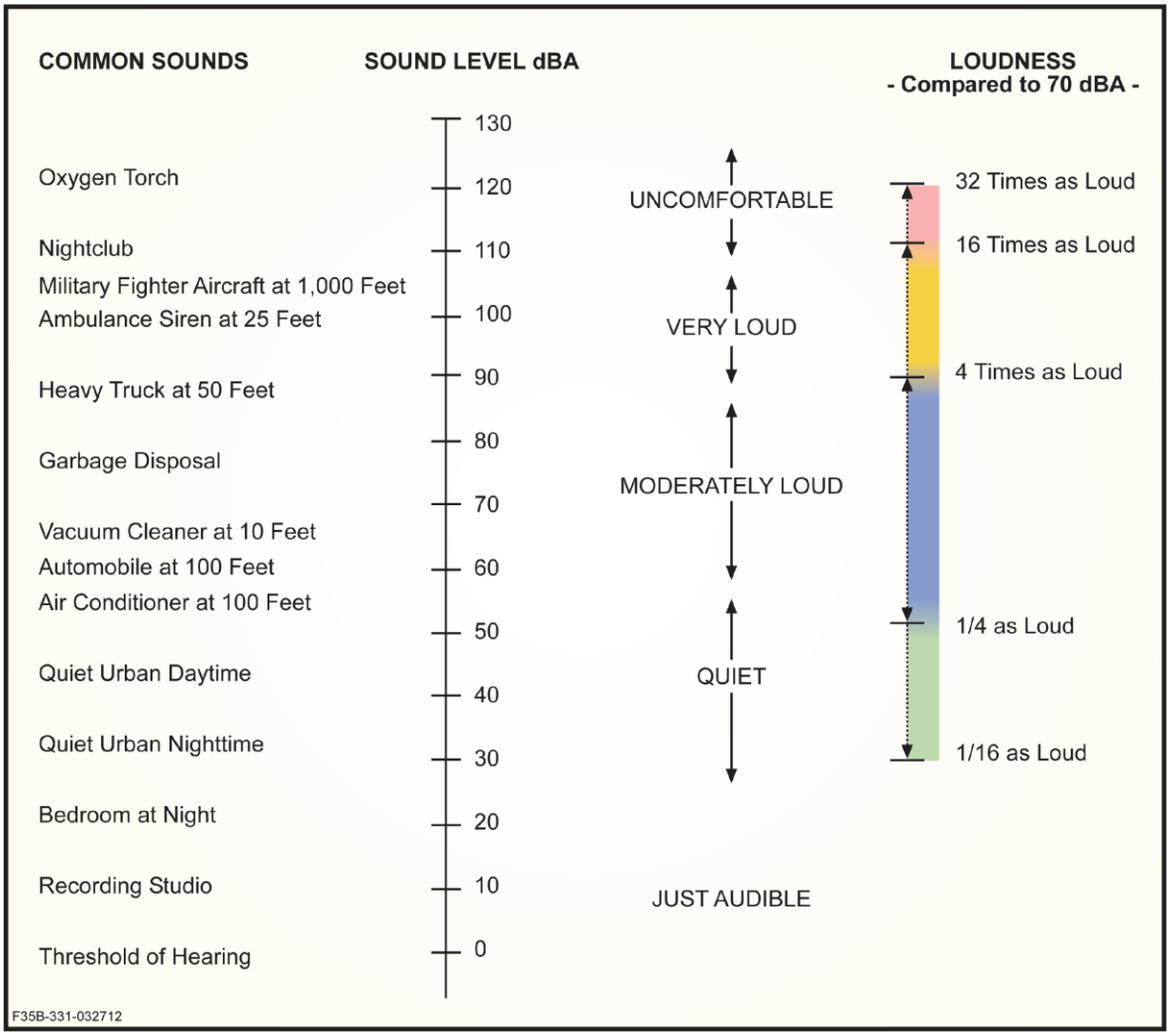
Noise is unwanted or annoying sound that interferes with or disrupts normal human activities. Although exposure to very high noise levels can cause hearing loss, the principal human response to noise is annoyance. The response of different individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise, its appropriateness in the setting, time of day, type of activity during which the noise occurs, and sensitivity of the individual. Sound is a physical phenomenon consisting of minute vibrations that travel through the air and are sensed by the human ear. Noise and sound are expressed in decibels (dB), which are a logarithmic unit. Table 3.4-1 provides a comparison of how the human ear perceives changes in loudness on the logarithmic scale.

Table 3.4-1. Subjective Responses to Changes in A-Weighted Decibels (dBA)

Change	Change in Perceived Loudness
3 dBA	Barely perceptible
5 dBA	Quite noticeable
10 dBA	Dramatic – twice or half as loud
20 dBA	Striking – fourfold change

A sound level of 0 A-weighted decibel (dBA) is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dBA. Sound levels above 120 dBA begin to be felt inside the human ear as discomfort, and those between 130 to 140 dBA are felt as pain (Berglund and Lindvall 1995). Figure 3.4-1 presents typical noise sources and representative sound levels.

Some noise sources, such as air conditioners and vacuums, are continuous and maintain a constant (or nearly constant) sound level over time. Sources such as airplanes, automobiles, and trucks produce noise levels that change as the source approaches and departs the receptor. Fireworks, weapons, and munitions generate impulsive sound.



Source: Derived from Harris 1979 and Federal Interagency Committee on Aviation Noise 1997.

Figure 3.4-1. Typical Sounds

All sounds have a spectral content, meaning their magnitude or level changes with frequency. To mimic the human ear's sensitivity and perception of different sound frequencies, the spectral content is weighted. For example, environmental noise measurements are usually on an "A-weighted" (or dBA) scale that filters out very low and very high frequencies to replicate human sensitivity. It is common to add the "A" to identify that the unit measurement was done using this filtering process. Typically applied to low frequency, impulsive sounds, "C-weighted" decibels (dBC), are applied to noise sources such as HE from large-caliber weapons, munitions detonations, and aircraft-generated sonic booms.

Metrics are a system for measuring or quantifying a particular characteristic of a subject. Because noise is a complex physical phenomenon, different noise metrics help to quantify the noise environment. The noise environment at military ranges, such as at the NSW Riverine Complex, Stennis, includes a range of noise sources that can either be classified as continuous or impulsive noise. Continuous noise, in this analysis, applies to aircraft operations and takes into account the gradual onset of noise (i.e., the noise source coming towards and away from a receptor) and not necessarily occurring at all times. In contrast,

impulsive noise refers to sudden events, including weapons firing or the detonation of explosives. Not all of these noise sources are directly associated with military training, such as civilian vehicular traffic or building air conditioning system noise. However, the noise environment associated with military training is typically dominated by the military training operations being conducted in the area. The following are the noise metrics and modeling used in the analysis.

Noise Metrics

Day-Night Average Sound Level. The Day-Night Average Sound Level (DNL) is the Federally (and FAA) recommended noise measure used for assessing cumulative sound levels that account for the exposure of all noise events within a 24-hour period (FAA 2015). The DNL (which is sometimes denoted by L_{dn}) is an average sound level, expressed in dBs, commonly used to assess aircraft noise exposures in communities near airfields and training airspace. The DNL values are related to compatible/incompatible land uses and do not directly relate to any singular sound event a person may hear, but rather depict an averaged level of perceived sound. In addition, a 10-dB penalty for nighttime noise events is applied to account for the generally lower background sound levels and greater sensitivity to noise during nighttime hours. For this analysis, environmental daytime hours are from 7 a.m. to 10 p.m., and nighttime hours are from 10 p.m. to 7 a.m.

Peak Sound Pressure Level. The Peak Sound Pressure Level (dBPk) is the highest instantaneous, un-weighted sound level over any given period. It is used to quantify impulsive, short duration events such as a large-caliber weapon firing or an explosive detonation, which can generate complaints from people in the local community. Peak sound levels can differ significantly due to varying weather conditions. Therefore, computer models used to predict peak levels account for this variation by using the $Peak_{15}$ (or $dBPk_{15}$) metric. $Peak_{15}$ is the peak sound level, factoring in the statistical variations caused by weather, that is likely to be exceeded only 15 percent of the time (i.e., 85 percent probability that the sound will be within this range).

Overall Sound Pressure Level. For rocket engine noise, the impacts on humans and surrounding structures are assessed using the A-weighted and un-weighted maximum Overall Sound Pressure Level (OASPL), respectively. The OASPL provides a measure of the sound level at any given time, while the maximum OASPL indicates the maximum OASPL achieved over the duration of the event.

3.4.1 Affected Environment

The affected environment for this resource is the area exposed to noise generated from rocket engines and fixed- and rotary-wing aircraft operations within the Buffer Zone and overlying airspace. With respect to noise generated by rocket engines, the baseline noise levels associated with the noise analysis for this EA result from tests that occur for 22 minutes at a time up to 17 times a year at existing SSC test stands. Baseline noise from DOD activity analyzed in this EA is generated by 60 total annual sorties of AC-130, CV-22, and NSAv aircraft; 100 sorties annually by helicopters; and up to 300 sorties by UAS. Noise levels associated with these baseline operational activities are dispersed over a large area, are not noticed by receptors outside of the Buffer Zone, and are similar to background noises typically found in a rural environment (i.e., 40 to 50 dBA). This is estimated from the baseline level of operations,

the frequency at which they are conducted, the relatively few operations that occur over the year, and the distance between the noise sources to any receptors outside the Buffer Zone.

The land area required for the Fee Area and the Buffer Zone was established based upon acoustic environment calculations made for the NOVA first stage rocket engine (NASA 2013). NASA determined that it was necessary to purchase all land within a 125-dB acoustical boundary and to prohibit human habitation within a 110-dB acoustical boundary. There are no environmental Federal, State, or local regulations limiting noise in the vicinity of SSC.

Background noise levels within the Fee Area are normally low and occur typically from construction sites and traffic (NASA 2013). Other occasional noise occurs at the NASA High Pressure Industrial Water Facility with the operation of generators and pumps for power and deluge water during rocket engine testing activities, at the Rolls Royce commercial facility that tests jet engines, at the E-Test Stand Complex for rocket engine component testing, and noise generated from military activities at NSW Riverine Complex, Stennis. The noise from these facilities is not noticeable at most locations at SSC and has no impact on the local community. Due to the soil conditions at SSC, the facility and surrounding areas are susceptible to acoustic-seismic effects (vibrations). However, years of testing the Saturn V rocket engine motor showed that the effect from rocket engine test firings is limited to the falling of objects in occupied buildings due to the slight swaying induced by seismic vibrations (NASA 2013).

3.4.2 Environmental Consequences

Noise Criteria. In this analysis, noise was assessed using various DOD and FAA approved noise metrics (Army 2007, FAA 2015). Noise generated by aircraft in the airspace was assessed using the A-weighted Day-Night Average Sound Level (ADNL or L_{dn}). Noise associated with small arms fire was assessed using ADNL as well as $Peak_{15}$. Operations using SRTA do not occur in well-defined locations, so a buffer area is defined based on the computed $Peak_{15}$ for those weapons. Operations where HE rounds and airborne weapons were used are assessed using $Peak_{15}$ as well as C-weighted Day-Night Average Sound Level (CDNL or L_{cdn}). Rocket engine noise was assessed using the A-weighted OASPL of 115 dBA and un-weighted OASPL of 111 dB and 120 dB.

Table 3.4-2 provides the noise level limits associated with land use planning (Occupational Safety and Health Administration [OSHA] Standard 1910.95). In general, most land uses are compatible within Noise Zone 1. For Noise Zone 2, some land uses are incompatible with the noise, and most land uses are incompatible with Noise Zone 3.

Table 3.4-2. Compatible Land Use Planning Zone Definitions

Noise Zone	Noise Criteria		
	Aviation ADNL	Impulsive CDNL	Small Arms (dBPk)
1	<65	<62	<87
2	65 to 75	62 to 70	87 to 104
3	>75	>70	>104

Table 3.4-3 shows the risk of noise complaints with increasing levels of impulsive noise from large weapons and UXO detonations (Army 2007). As such, Table 3.4-3 is applicable to buffer distances related to the risk of noise complaints at various $dBPk_{15}$ levels, inherently a function of noise level versus

distance. Noise criteria for rocket engines were developed to protect the public health and welfare of the surrounding communities. The following noise criteria address two primary concerns with rocket engine launch noise: hearing conservation and structural damage. For this analysis, single-events were assessed in terms of hearing conservation and a maximum noise level of 115 dBA was applied (the OSHA maximum exposure for a steady-state event) as an initial conservative threshold to identify potential locations where hearing protection should be considered for rocket engine testing. Noise from rocket engine testing also has the potential to cause damage to buildings and other structures in the vicinity of the test site. Generally, the most sensitive components of a structure to rocket engine noise are windows, and infrequently, plastered walls and ceilings. A NASA technical memo written by Guest and Sloan (1972) found a relationship between structural damage claims and overall sound pressure level from rocket engine firings. The 1972 study estimated that one damage claim in 1,000 households exposed is expected at an average continuous level of 111 dB, and one in 100 households at 120 dB.

Table 3.4-3. Risk of Noise Complaints from Blast Noise (PK15[met])

Risk of Noise Complaints	Noise Limits (dB)
Low	< 115
Medium	115 – 130
High	130 – 140
Risk of physiological damage to unprotected human ears and structural damage claims	> 140

Source: Army 2007.

Noise Modeling. To characterize noise and its impacts, the analysis employed several source-specific models discussed below. Each of these models represents a product of actual noise measurements and sophisticated acoustical physics. Note that FAA determines that for SUA proposals, the FAA Office of Environment and Energy (AEE) approves specific DOD noise computer models as equivalent methodologies, including: MR NMAP (airspace, MOA's Ranges), NOISEMAP (airfield noise), BOOMAP (sonic boom), BNOISE (blast noise and ground-dropped munitions or weapons), and SARNAM (small arms range) (FAA 2015).

- Airspace Aircraft Operations. Noise generated by aircraft operations within the defined airspace is assessed using the DOD model MR NMAP (Ikelheimer and Downing 2013), which has been approved by the FAA (FAA 2015). This model assumes that aircraft operate within the entire airspace equally and spreads the noise uniformly throughout the airspace. The noise metric produced by MR NMAP is ADNL.
- Airborne Weapons. The Air Gunnery Noise computer model addresses the generation and propagation of noise from air-weaponry operations (Downing et al. 2007, Carlson 1978, Ikelheimer et al. 2007). This model was developed with funding from the DOD Strategic Environmental Research and Development Program to address the lack of an appropriate noise model to handle these complex and unique noise sources. The model has been used to compute noise from airborne weaponry in many DOD projects and is currently the DOD preferred method of measurement for these operations.

- Small Arms Firing. Noise generated by small arms firing was assessed using the standard DOD model SARNAM2. This model computes a number of noise metrics including Peak15 and ADNL based on the range description (geographic coordinates, size of the range, number of targets, and direction of fire), weapons and ammunition used (weapon type and number of acoustical day/nighttime rounds fired), and atmospheric conditions. AEE has approved the use of this model (Blue Ridge Research and Consulting [BRRC] 2014a).
- High Explosives. Noise generated by HE was assessed using the DOD model BNoise2 (Army 2009). Primary inputs to BNoise2 are the range firing and target point coordinates, munitions type (large-caliber gun or explosive munitions), and number of acoustical daytime and nighttime rounds or operations. The AEE has approved the use of this model (BRRC 2014a).
- Rocket Engine Noise. The majority of the noise generated by a rocket engine is created by the rocket engine plume, or jet exhaust, interacting with the atmosphere along the entire plume and the combustion noise of the propellants. The noise levels generated from rocket engine testing were assessed by the Launch Vehicle Acoustic Simulation Model (RUMBLE). The AEE has approved the use of this model (BRRC 2014b).

Operational Input to Models. The operations estimates input into the noise model can be referenced in Appendix F. As noted in Section 1.8, following the release of the Draft EA, the proposed airspace was reconfigured slightly as a result of the aeronautical study efforts that occurred parallel with the EA process. Specifically, R-4403D was eliminated/combined with R-4403C, and the estimates for operational use of airspace were reduced. As the airspace configuration would not warrant a change in noise modeling parameters and the reduced operational estimates would correspond with a reduction in overall noise exposure, DON and NASA have determined that these changes do not warrant revision of the noise modeling analysis as conducted in the Draft EA. Consequently, the noise analysis provides a conservative estimate of potential noise exposure given the reduction in proposed operations analyzed in the Final EA (see Table 2.1-2).

Three major classes of operations are proposed within the ROI:

- Static testing of rocket engines, similar to or lesser in magnitude than the J-2X engine, and potential testing of a untethered autonomous flight vehicle;
- Emerald Warrior interoperability military training exercise occurring 8-10 days each year and utilizing both the airspace and ranges extensively; and
- Normal military training operations occurring throughout the year. Military training and exercise operations include aircraft flying in the airspace, large- and small-caliber weapons firing, and HE detonations.

An added level of detail was included into this analysis to take into consideration aircraft landings during some operations, namely those done by the CV-22 and helicopters at HLZs within the WMA. This detail is modeled by adding additional airspaces designed with an “upside-down wedding cake” altitude arrangement around each of the designated landing zones (Figure 3.4-2). To account for HLZ use within the R-4403C airspace, operational data on HLZ use (i.e., number of sorties and HLZ locations) were

modeled as occurring at or below 500 ft into these new airspaces. The result is a slight reduction in the total noise within the R-4403C airspace, with local increases in the noise around the HLZs. All other aircraft operations are assumed to distribute their operations throughout the available airspace.

For these HLZ operations, the assumption was that the aircraft would land equally at each of the HLZs. The modeled airspace was designed so that aircraft operations between 0 ft AGL and 100 ft AGL were confined to a circle 2,000 ft in diameter centered on the landing zone. Aircraft operations between 100 ft AGL and 200 ft AGL were confined to a circle 4,000 ft in diameter. Aircraft operations between 200 ft AGL and 300 ft AGL were confined to a circle 8,000 ft in diameter, and operation between 300 ft AGL and 500 ft AGL were confined to a circle 12,000 ft in diameter. Operations were distributed evenly across all eight HLZs.

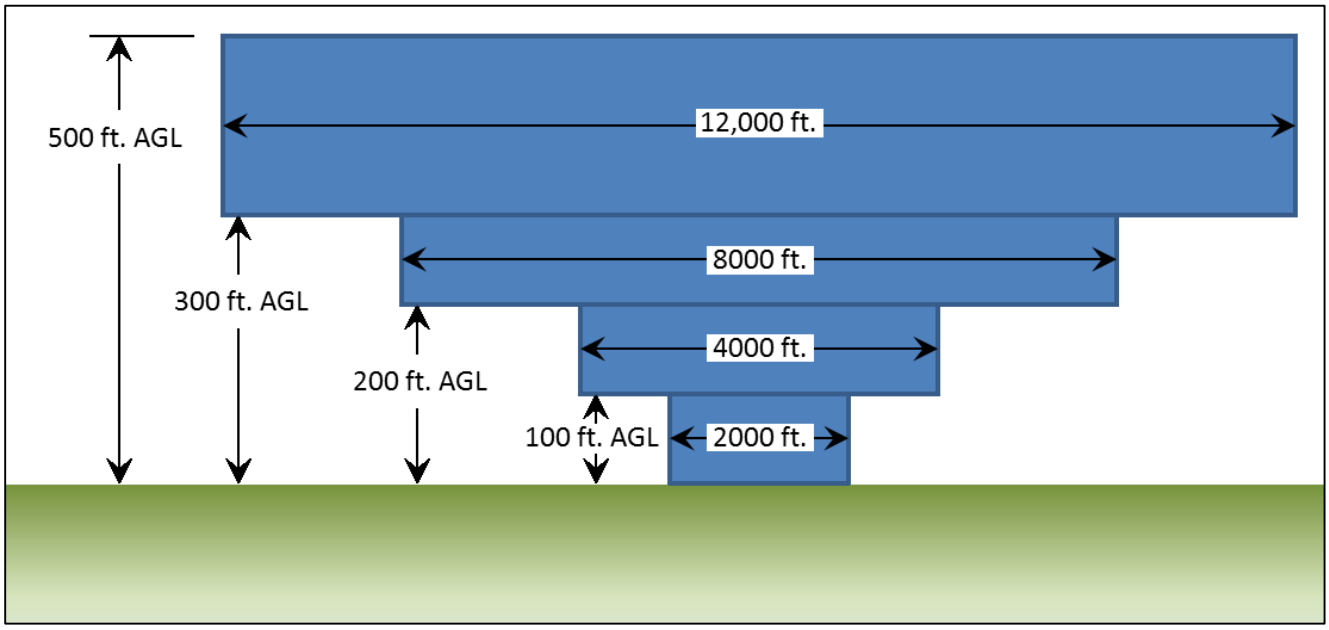


Figure 3.4-2. Diameter and Altitude Distribution of Landing Zone Airspaces

3.4.2.1 Alternative 1: Preferred Alternative

Rocket Engine Noise (R-4403A-B). Noise generated from rocket engine testing, as represented by the J-2X engine modeled, is described using A-weighted and un-weighted maximum OASPL. OSHA has set an upper noise level of 115 dBA as a guideline to protect human hearing from long-term continuous daily exposures to high noise levels and to aid in the prevention of noise-induced hearing loss. To identify potential locations affected by noise levels greater than 115 dBA, the A-weighted maximum OASPL was predicted for J-2X rocket engine tests. Based on the analysis of best available data on untethered autonomous flight vehicle tests operations, it was apparent that Morpheus-type operations had a significantly smaller noise footprint than that produced by the J-2X-type operations. Therefore, for the purposes of this EA it was assumed that the potential noise impacts associated with untethered autonomous flight vehicle tests activities would be adequately covered in the envelope of analysis of rocket engine noise.

Figure 3.4-3 displays the maximum sound level (L_{max}) 115 dBA contour generated by a single J-2X rocket engine test. Figure 3.4-4 displays the OASPL 111 dB and 120 dB contours generated by a single J-2X rocket engine test. As shown, the predicted rocket engine noise contours do not extend beyond the Buffer Zone. Note that the distinct "butterfly" shape of the noise contours is a result of the source directivity of the rocket engine. Although the noise produced by J-2X-type rocket engine testing events is known to be up into the "uncomfortable" range for human exposure (refer to Figures 3.4-1 and 3.4-8), all personnel are moved to a safe distance from test stand operations during testing events and are required to wear hearing protection where necessary (Section 3.4.1, Safety). Therefore, there would be negligible exposure and impacts to hearing exposure from implementation of Alternative 1.

Airspace Noise (R-4403C-F). The projected operational tempo at the NSW Riverine Complex, Stennis would increase over existing baseline conditions during the Emerald Warrior exercise as well as overall operations proposed throughout the rest of the year. Therefore, to demonstrate the variation in noise levels from the testing and training operations, noise was computed on an annual average as well as for the "busy" month of the Emerald Warrior exercises.

Airspace noise comprises all aircraft activities that take place within the proposed R-4403A, B, C, E, and F airspace. As the operations would occur throughout the airspace, graphical representation of these operations tends to mimic the boundary of the airspace itself. Therefore, it is also useful to describe the maximum noise level expected within the airspace. (The analysis results, shown in Table 3.4-4, were completed without the use of HLZs.)

Table 3.4-4. Projected Noise Levels in Proposed Airspace

Airspace	Busy Month (ADNL)	Annual Average (ADNL)
R-4403C (D)	61 (39)	57 (35)
R-4403E	61	51
R-4403F	45	37

To include more of the operational detail at SSC, the upside-down "wedding cake" airspace for the HLZs also was modeled, and resulting noise contours are shown in Figure 3.4-5 for the busy month (similar to what would be found during Emerald Warrior exercises). Figure 3.4-6 illustrates noise levels that would occur on average over the rest of the year. By using these additional constraints on the airspace, the overall noise level within the airspace units tends to go down, while the noise around the HLZs increases. The results are shown in Table 3.4-5. As illustrated, none of the airspace operations create noise at levels above 65 ADNL that would extends outside of the Buffer Zone.

Table 3.4-5. Projected Noise Levels in Proposed Airspace with Landing Zones

Airspace	Busy Month (ADNL)	Annual Average (ADNL)
R-4403C (D)	61 (39)	57 (35)
R-4403E	61	51
R-4403F	45	37

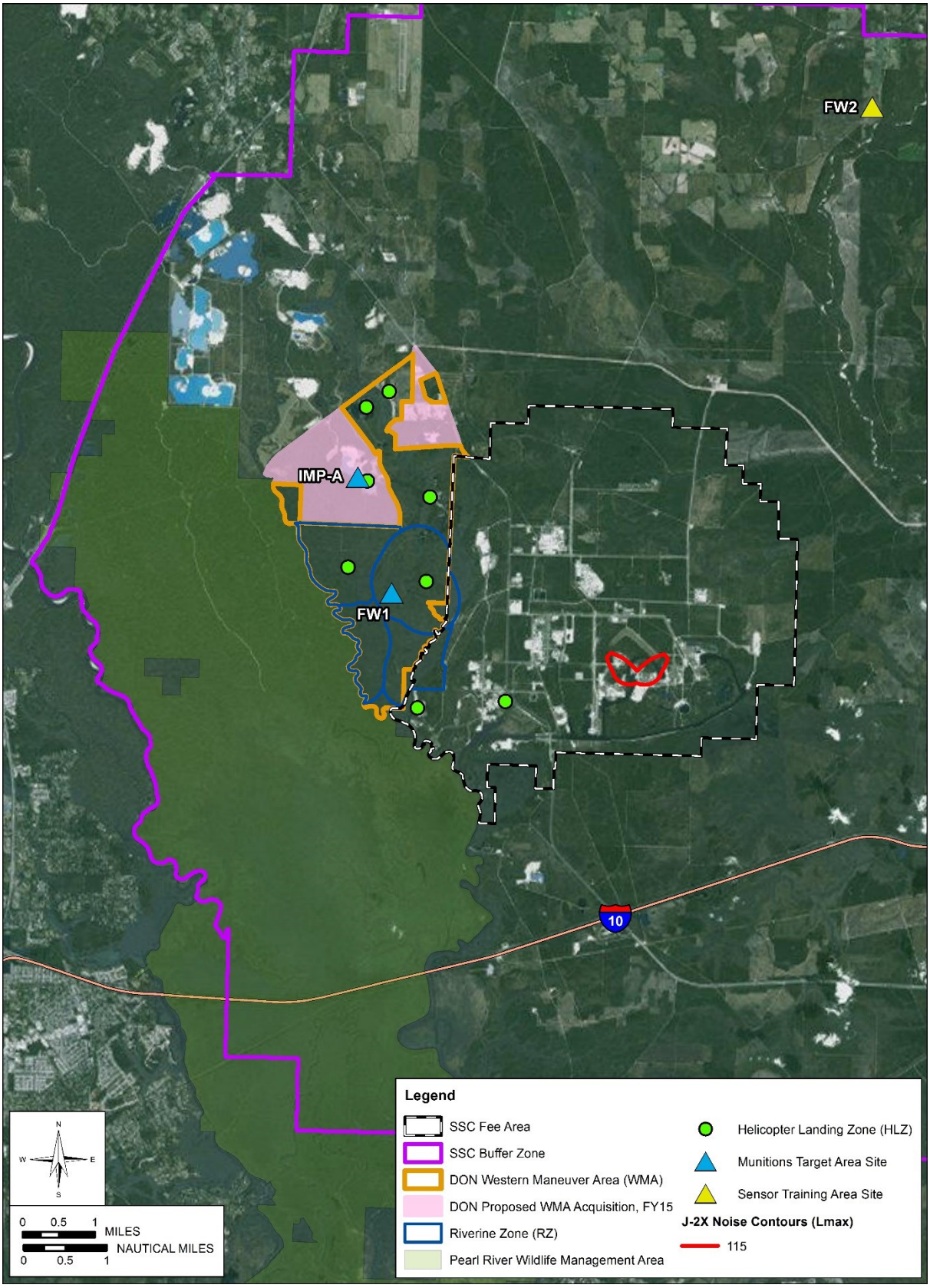


Figure 3.4-3. Rocket Engine Testing Maximum Projected Noise Contours at NASA Test Stand A1

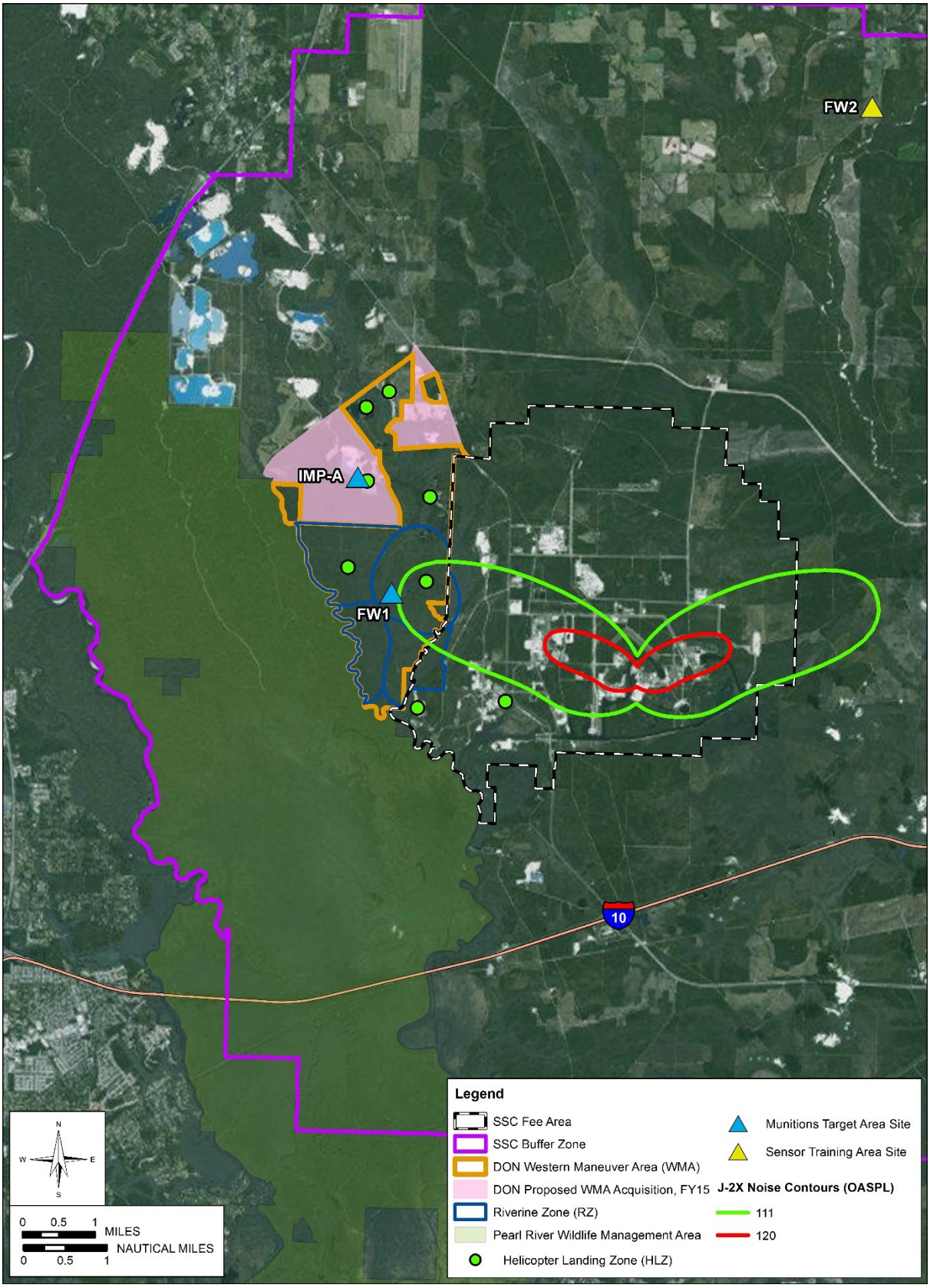


Figure 3.4-4. Rocket Engine Testing OASPL Projected Noise Contours at NASA Test Stand A1

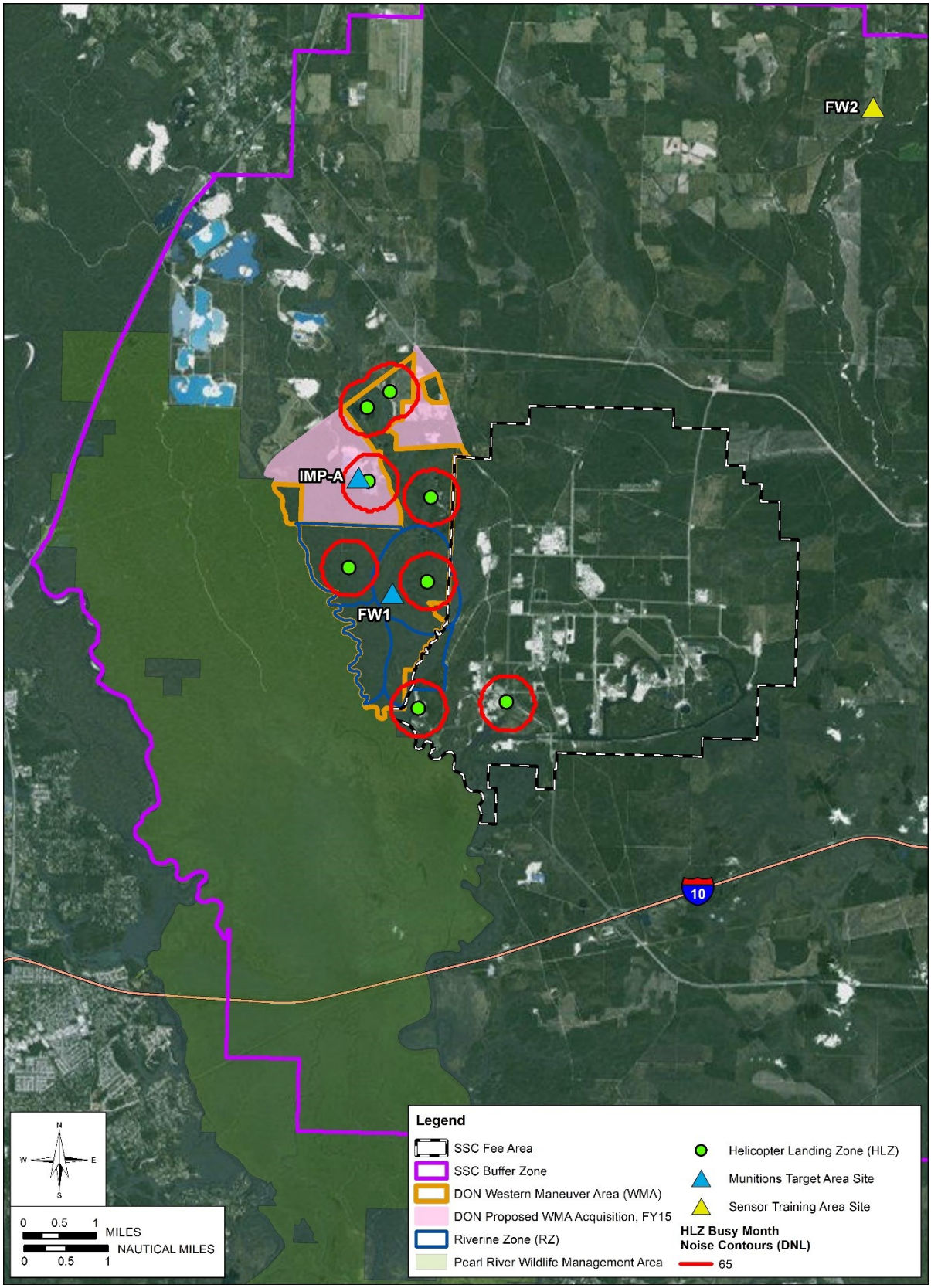


Figure 3.4-5. Landing Zone Busy Month Projected Noise Contours

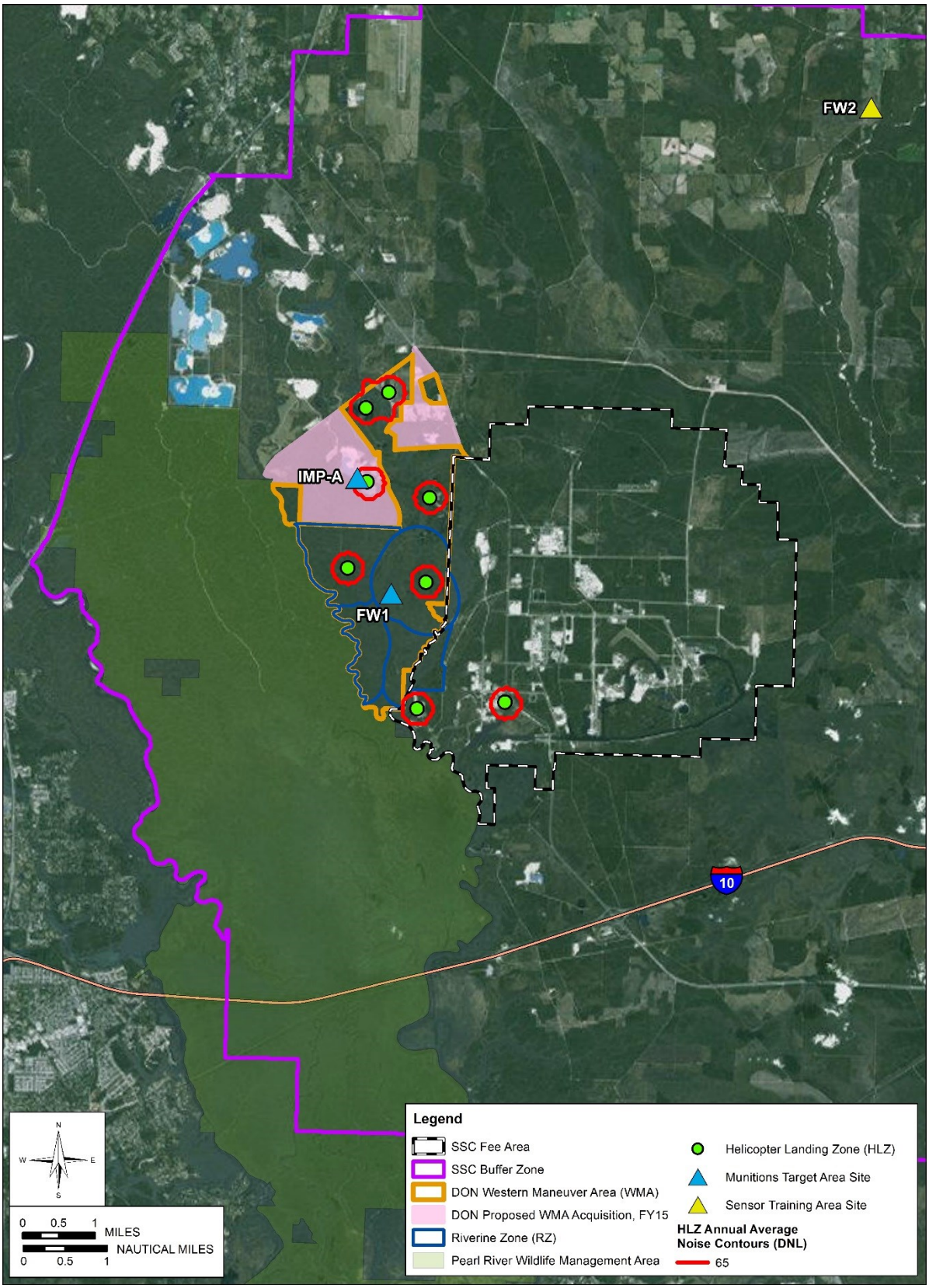


Figure 3.4-6. Landing Zone Annual Average Projected Noise Contours

Airborne Weapon Noise and High Explosives Noise. The noise generated by the AC-130 firing weapons (air gunnery) was combined with the noise generated by the HE rounds (blast) to form a composite noise footprint (air gunnery and blast [AG&B]); $Peak_{15}$ and the CDNL were the metrics used. Alternative 1 would produce $Peak_{15}$ noise levels (Figure 3.4-7) that would not extend beyond the boundaries of the Buffer Zone. In terms of cumulative impacts, the CDNL was also broken out into the annual average level (Figure 3.4-8) and the peak month (i.e., busy month) during which the Emerald Warrior exercises are taking place (Figure 3.4-9). The estimated annual average levels would not extend beyond the boundaries of the Buffer Zone. However, in the month when the Emerald Warrior exercises would be conducted, the estimated 62 dB CDNL noise contour would extend through the Pearl River Wildlife Management Area to just beyond the Buffer Zone. Noise at this time is expected to extend approximately 1,100 ft beyond the Buffer Zone in the west/northwest location and 550 ft beyond the Buffer Zone in two locations to the west/southwest. From aerial photography interpretation, neither of these locations appear to be inhabited. Impacts would be considered not significant because the average busiest month represents a short-term impact and there are no noise sensitive receptors within the estimated 62 dB CDNL threshold.

Small Arms Noise. A range of small arms weapons use is planned within the WMA RZs. These include 5.56mm and 7.62mm SRTA, and 5.56mm, 7.62mm, and 0.50-caliber ball and SRTA at the SARC. The existing RZs were used to define the possible firing zone. The peak level contours were compared to the Buffer Zone boundaries around these riverine areas. Using SARNAM2 and with Army Public Health Center guidance, it was determined that the distance from the edge of the RZs to the 87 dBPk level is 1,300 meters, with 325 meters to the 104 dBPk level. These results, shown graphically in Figure 3.4-3, indicate that estimated noise contours would not extend beyond the Buffer Zone.

In summary, with implementation of Alternative 1, there would be a minor increase to noise experienced to the west of the WMA during the peak busy week of Emerald Warrior training each year (Figure 3.4-9). However, there is negligible overall risk of increased noise disturbance to human receptors, as it is not anticipated that the noise associated with any other aspect of Alternative 1 would travel beyond the established boundaries of the Buffer Zone.

3.4.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

The potential noise effects of implementation of Alternative 2 would be similar to those analyzed for Alternative 1. The delivery of inert rather than HE munitions to the IMP-A site would result in lower noise levels in the northern WMA and surrounding areas during Emerald Warrior and year-round. The differences were not modeled, but qualitatively this lower level would be negligible to noise receptors outside of the Buffer Zone.

3.4.2.3 No Action Alternative

Under the No Action Alternative, baseline noise conditions in the ROI would continue.

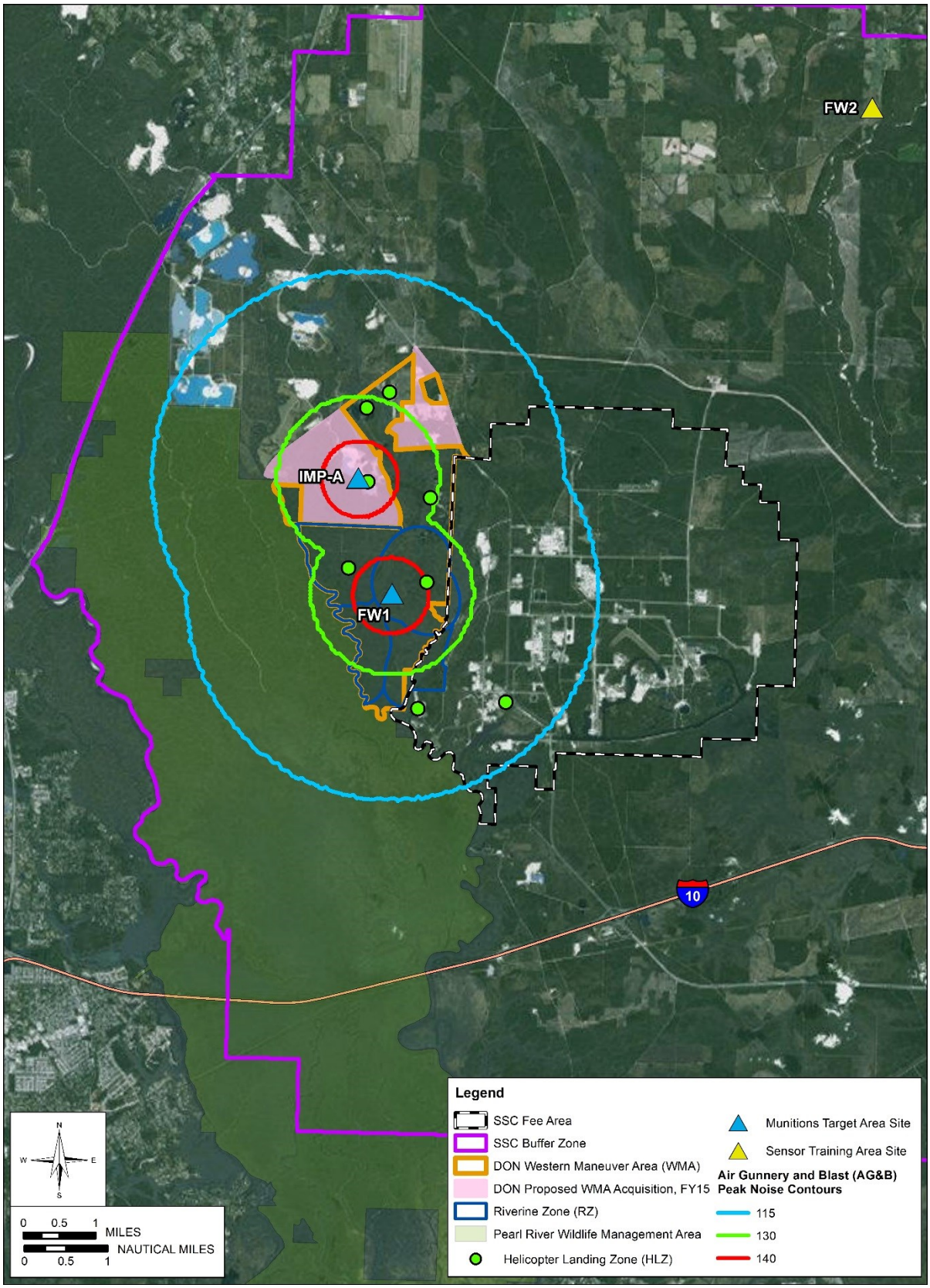


Figure 3.4-7. Airborne Weapons and HE Peak Projected Noise Contours

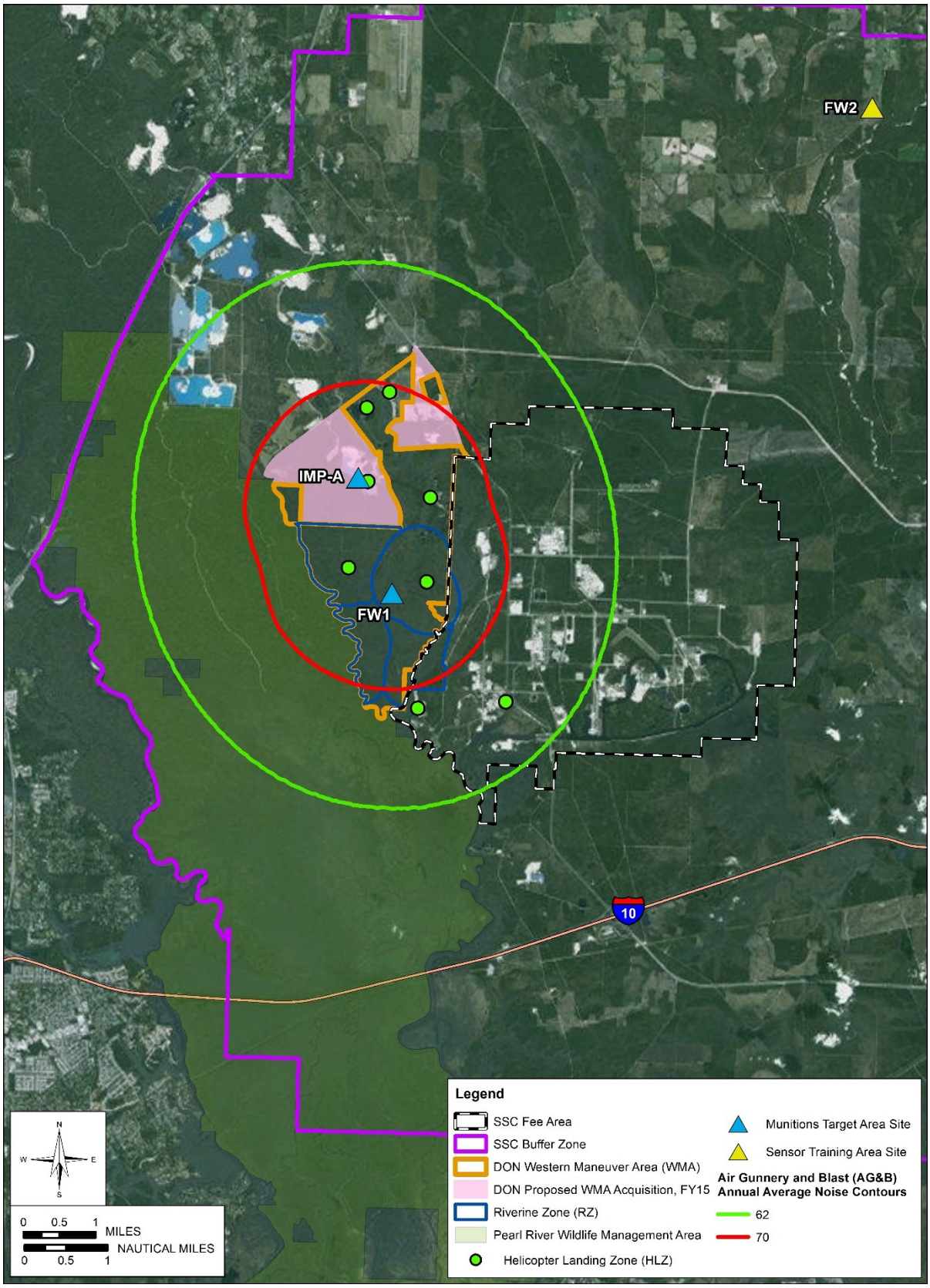


Figure 3.4-8. Airborne Weapons and HE (AG&B) Annual Average Projected Noise Contours

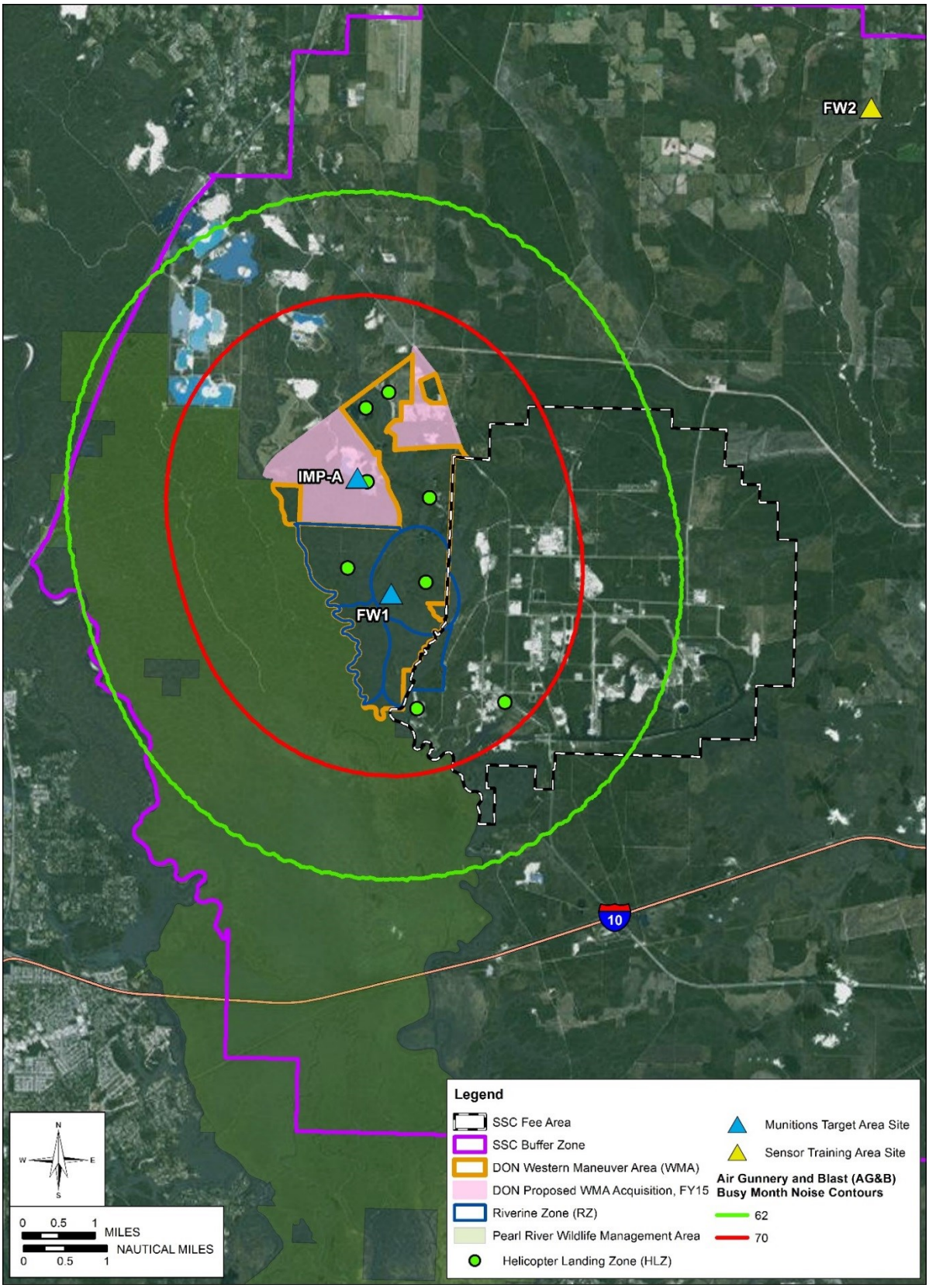


Figure 3.4-9. Airborne Weapons and HE (AG&B) Busy Month Projected Noise Contours

3.5 LAND USE

Land use describes how land is developed and used, typically in categories that identify the types of human activities occurring in a given area. Land use categories may include residential, commercial, manufacturing, transportation/communication/utilities, recreation, institutional, industrial, public, mixed-use, undeveloped/unimproved, etc. On Federal installations, land use in developed areas tend to be categorized as either operational or support functions. Installation noise, safety, and security zones often affect land use patterns within the installation boundaries. If installation noise and safety zones extend beyond installation boundaries, they are used to assist local elected officials, planners, and citizens in supporting compatible uses adjacent to military installations. Land use plans, land use regulations, and recognized compatibility standards are typically used to define appropriate land uses within noise and safety zones.

3.5.1 Affected Environment

The affected environment for land use does not differ from the general ROI as defined in Section 1.2. The proposed R-4403A, B, C, E, and F overlies 58,650 acres of Hancock County, Mississippi; 13,941 acres of St. Tammany Parish, Louisiana; and 146 acres of Pearl River County, Mississippi. A portion of the proposed R-4403F, with a proposed floor of 4,000 ft MSL, would extend to the north of the Buffer Zone within an approximately 5,018-acre area (of which 4,871 acres are in Hancock County and 146 acres are in Pearl River County). A more focused analysis of land use is provided for this 5,018-acre area, as there are additional/more complex land use issues outside of the Buffer Zone restrictive easement.

Coastal Zone Management. In accordance with Section 307 of the Coastal Zone Management Act (CZMA) and 15 CFR 930 subpart C, Federal agency activities affecting a land or water use or natural resource of a state's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the state's coastal management program. Consequently, DON and NASA are required to determine if a proposed action is reasonably likely to directly or indirectly (cumulatively or secondarily) affect any land or water use or natural resources within the coastal zone. The potential effects of the proposed action on Mississippi's coastal zone could result from changes in airspace and air operations and the establishment of air-to-ground target areas and laser sensor training area. The potential effects of the proposed action on Louisiana's coastal zone could result from changes in airspace and air operations.

Implementation of the Mississippi Coastal Program is the primary responsibility of the Office of Coastal Zone Management. The Mississippi Coastal Program was legislatively mandated in Section 57-15-6 of the Mississippi Code of 1972 and approved by the National Oceanic and Atmospheric Administration under the provisions of the CZMA of 1972. Per Section 57-15-6 of Mississippi Code, the coastal area of Mississippi is composed of Hancock, Harrison, and Jackson counties.

The Louisiana Department of Natural Resources, Office of Coastal Management is responsible for implementing the Louisiana Coastal Resources Program under the authority of the Louisiana State and Local Coastal Resources Management Act of 1978, as amended (Act 361, La. R.S. 49:214.21 *et seq*.). The Louisiana Coastal Resources Program was approved by the National Oceanic and Atmospheric Administration in September 1980. The inland boundary for the Louisiana coastal zone contains all or part of 20 parishes, including St. Tammany Parish.

Appendix E includes an analysis of how the proposed action would be undertaken, to the maximum extent practicable, in a manner consistent with the enforceable policies of both the Mississippi Coastal Program

(Mississippi Department of Marine Resources 2014) and the Louisiana Coastal Resources Program (Louisiana Department of Natural Resources 2014).

Local Land Use Plans, Programs, and Controls. Municipal management plans and zoning regulations determine the type and extent of allowable land use in specific areas to limit conflicting land uses and protect specially designated or environmentally sensitive areas.

Zoning and land use for Hancock County are outlined in the Hancock County Comprehensive Plan, which was adopted by the County Board of Supervisors in 2010. The plan includes a Future Land Use map developed by the County to guide future growth. The document notes that the majority of the County is undeveloped, with nearly 45 percent of the area limited for development by wetlands (the majority of developed land is residential) (Hancock County 2010).

Land use in Pearl River County is outlined in the Pearl River Comprehensive Plan, which was adopted by the County Board of Supervisors in 2010. Unlike Hancock, Pearl River does not have county-wide zoning; zoning ordinances are used only within city limits. Picayune City is the closest city within Pearl River County to SSC, but is outside the Buffer Zone, and there are no expected effects to the City. Land use in Pearl River County within the Buffer Zone is composed of a variety of land uses, including commercial/industrial, low density residential, and forested (Pearl River County 2010).

St. Tammany Parish does not have a zoning ordinance or comprehensive plan. A Future Land Use Map, adopted in 2003, is intended to guide development; however, the map lacks the legal backing of a zoning ordinance or some other form of land use control. Land use in the Parish within the Buffer Zone is largely dedicated to the Pearl River Wildlife Management Area; the two primary land uses are open space and low-density residential, with much of the land falling within the 100-year floodplain (St. Tammany Parish 2003).

In 2011, NASA completed the John C. Stennis Space Center Master Plan to affect orderly growth and physical development of the Fee Area within the scope of its designated mission and related responsibilities (NASA 2011). NSW is in the process of developing an Area Development Plan for the NSW compound within the Fee Area as well as the NSW Riverine Complex, Stennis. This planning effort addresses optimization of land use and facilities assets and planning for growth/increased range throughput, and it is being prepared to be consistent with the SSC Master Plan.

Outside the Buffer Zone. In lieu of land use or zoning data, which exists in varied formats for each county, Figure 3.5-1 depicts general U.S. Geological Survey (USGS) land cover mapping for the ROI (USGS 2011). (For the purposes of the land use analysis, wetlands data from the USGS land cover analysis are generalized here, see Section 3.13 for additional analysis of wetlands.) Hancock County land use designations surrounding the Buffer Zone include undeveloped/water, residential, mobile home, and resource production/extraction. Pearl River County land uses adjacent to the Buffer Zone include forest, agriculture, and low-density residential (Pearl River County 2010). West of the WMA, St. Tammany Parish lands surrounding the Buffer Zone are dominated by the Pearl River Wildlife Management Area. The primary land use of the Wildlife Management Area is conservation, but fishing and hunting are allowed in compliance with the regulations of the Louisiana Department of Wildlife and Fisheries (LADWF) (LADWF 2014). Two regional airports, Picayune Municipal Airport and Stennis International Airport, are located adjacent to the Buffer Zone (see Section 3.3, Airspace and Air Operations).

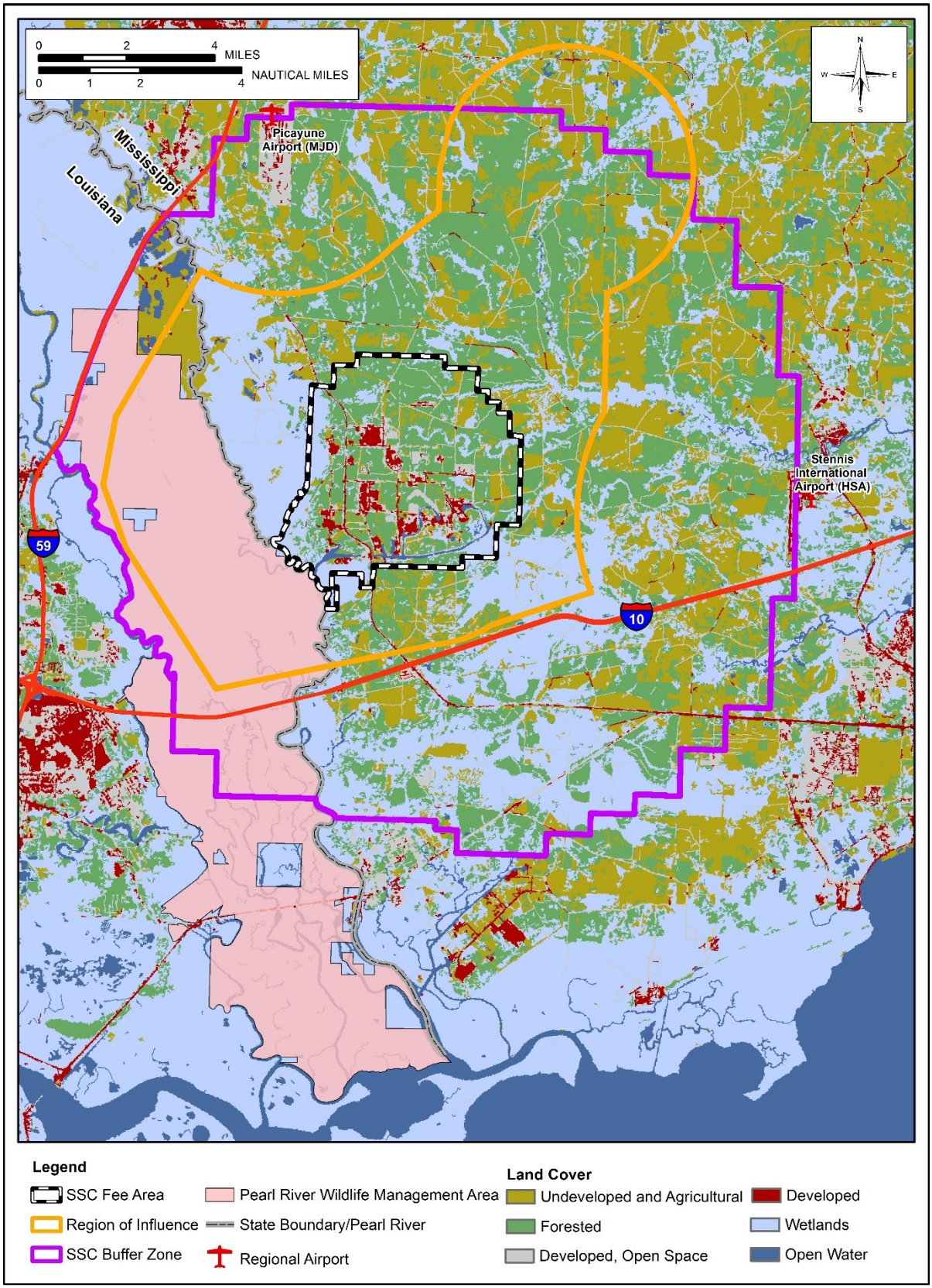


Figure 3.5-1. Land Cover within the ROI

The Hancock County Comprehensive Plan identifies existing land use in the area within the 4,871-acre area of Hancock County that would underlie the proposed R-4403F outside the Buffer Zone as open space interspersed with residential use, retail trade, and resource production/extraction. Per the County's Future Land Use Plan, this area is planned for increased development primarily for residential use (Hancock County 2010). Pearl River County existing land use for the 146-acre area of Pearl River County that would underlie the proposed R-4403F outside the Buffer Zone is primarily forested with a mix of agricultural and low-density residential (Pearl River County 2010).

Buffer Zone. The majority of the Buffer Zone is located in Hancock County, although portions extend into Pearl River County and St. Tammany Parish. Land ownership in the Buffer Zone is mixed and includes U.S. Government, State of Mississippi, corporations, and individuals. While there are more than 500 different land parcels within the Buffer Zone, there are approximately 25 property owners.

Human habitation in the Buffer Zone is prohibited by restrictive easement provisions that prohibit the maintenance or construction of dwellings and other buildings suitable for human habitation. Farming (including livestock), pulpwood and timber operations, and mining are allowed under the easements. Timberland, primarily consisting of pine trees, is the largest land use in the Buffer Zone. Other land uses within the Buffer Zone include sand and gravel mining, agriculture, the Pearl River Wildlife Management Area, and recreational pursuits such as hunting and fishing (NASA 2007).

NSW WMA. Current land uses within the DON-owned portions of the WMA are confined to uses associated with range operations and associated safety zones. The WMA contains very little developed area and is composed primarily of hardwood forests. The forests have been heavily disturbed by past timber harvest practices (which occurred prior to DON's acquisition of the land) and by Hurricane Katrina in 2005. As a result, very little merchantable timber is present (DON 2011).

Stennis Fee Area. The *Stennis Space Center Master Plan* governs the development of the Fee Area. The NSW compound (which primarily includes administrative, training, and support uses) is physically located in the southern end of the Fee Area designated for U.S. Marine Corps Operations, and the NSW SARC is in the southwest corner of the Fee Area, west of Maintenance and Logistical Use areas. The central and southern portions of the Fee Area are restricted to primarily support NASA use, including rocket engine test operations at the test stands (NASA 2011).

3.5.2 Environmental Consequences

The analysis of potential consequences for land use focuses on an evaluation of compatibility of the proposed action with existing and planned future land use in the ROI. Factors considered in this land use compatibility analysis pertain to the noise and safety zones associated with the proposed activities within the RA. Specifically:

- Where the RA floor is proposed to extend to the ground surface (proposed R-4403A-E), the using agency must own, lease, or by agreement, control the underlying surface to prevent possible disruption of that agency's activities (FAA Order JO 7400.2J, Section 3-1-4).
- Lands underlying RA (proposed R-4403A, B, C, E, and F) would be subject to the requirements of OPNAVINST 3550.1A, *Range Air Installations Compatible Use Zones*. All of

the proposed RA would be expected to become a range safety zone with a minimum level of safety concern to recognize airspace that is restricted for safety of flight. Recommended use compatibility within these zones is detailed in OPNAVINST 3550.1A. Typically, compatible land use activities would include industrial, mining, hunting/fishing, and other recreation activities and all other land uses are conditionally compatible.

- Land use compatibility within noise zones is analyzed in accordance with guidelines used by FAA, DOD, and other Federal agencies. Land use compatibility is analyzed in terms of DNL exposure levels (see Section 3.4, Noise, specifically Table 3.4-2).

3.5.2.1 Alternative 1: Preferred Alternative

Coastal Zone Management. The actions proposed under Alternative 1 were reviewed for consistency with the enforceable policies of the Federally approved CZMA programs for the Mississippi Coastal Program (Mississippi Department of Marine Resources 1983) and the Louisiana Coastal Resources Program (Louisiana Department of Natural Resources 2014). Based on best available data, DON and NASA determined that the actions proposed would be consistent to the maximum extent practicable with the enforceable policies of the Mississippi Coastal Program and the Louisiana Coastal Resources Program. The Coastal Consistency Determinations are provided in Appendix E. During the Draft EA review period, DON and NASA submitted the Coastal Consistency Determinations to the Mississippi Department of Marine Resources and Louisiana Department of Natural Resources for concurrence (see Appendix C.2). The Mississippi Department of Marine Resources concurred with the determination on March 10, 2015. A response to the submitted Coastal Consistency Determination was not received by the Louisiana Department of Natural Resources within the 60-day timeframe specified in 15 CFR Section 930.41. Therefore, in accordance with 15 CFR Section 930.41, concurrence by the Louisiana Department of Natural Resources is presumed (see Appendix C.3).

Outside the Buffer Zone. Based on interpretation of aerial imagery, the residential density in the portion of R-4403F that extends north of the Buffer Zone into unincorporated Hancock County and Pearl River County is estimated at 0.06 units per acre (see Section 3.6, Socioeconomics). Residential land use is generally compatible with RA at densities of one to two dwelling units per acre; thus, land use in this area is currently considered compatible with the establishment of RA. There are no other land uses that are considered incompatible in the area (i.e., multi-family residential, transient lodging, schools, libraries, churches, hospitals, nursing homes, auditoriums, or concert halls). As noted above, the lands underlying the R-4403A, B, C, E, and F airspace would be subject to further evaluation under the RAICUZ program. Per OPNAVINST 3550.1A, in implementation of the RAICUZ program, DON would work with the community towards achieving compatible land use utilizing available strategies such as land use controls and compatible zoning.

The Pearl River County future land use plan for 2030 indicates that the area underlying the proposed R-4403F outside the Buffer Zone would remain primarily forested and agricultural (Pearl River County 2010), which are considered compatible land uses underlying RA. Hancock County's long-range future land use plan for this area, however, indicates conversion of existing open space/undeveloped land use to residential use by 2030. The plan reflects population growth projections from the Gulf Regional Planning Commission, which reports a projected 82.2 percent population growth rate from 2005 to 2030

(Hancock County 2010). By comparison, the USCB projected growth rate for the State of Mississippi for the same period is 6.2 percent (USCB 2005). The Hancock County future land use plan was developed based on a hybrid plan for growth that considered corridors and centers (which established two regional commercial centers and three mixed use centers and new growth near the town centers located north of Interstate 10 and inland growth (which assumes the population of coastal Hancock County will move north) (Hancock County 2010).

The conversion in land use underlying R-4403F from less open space/undeveloped land use to residential as planned for in Hancock County's future land use map could result in incompatible land use underlying RA. Specifically, if residential density in this area becomes higher than the one to two dwelling units per acre, it would be considered generally incompatible. Therefore, if no action is taken by Hancock County to establish a compatible land use control program in this area and incompatible land use occurs, there could be an adverse impact in terms of land use compatibility. The magnitude of this potential impact would be ameliorated if the counties institute a compatible land use control program for this area. Under the RAICUZ program, DON would work with Hancock County and Pearl River County to encourage the counties adopt and institute compatible land controls for the area underlying R-4403F.

Buffer Zone. The establishment of the sensor training area (FW2) in the northeastern part of the Buffer Zone would be compatible with existing and adjacent land uses at the 100-acre site, and would transition the currently undeveloped NASA-owned parcel into an active sensor training site with an associated LSDZ. Likewise, due to the restrictions placed on aircraft altitudes and laser modes, hazardous laser energy would be contained within the RA without being a threat to non-participating aircraft and personnel below the R-4403F (see Section 3.2.2.1, Safety). Due to the existing Buffer Zone restrictive easement, aircraft noise and land use designations within the Buffer Zone at the location of the sensor training area (FW2) are determined to be compatible.

NSW WMA. The development of the munitions target areas would represent a long-term dedication of 5 acres to each target area and WDZs as areas where errant munitions possibly occur. The existing land use, a gravel mining pit at northern target area (IMP-A) and forested lands at the southern target area (FW1), would change to an active target area. The proposed introduction of HE munitions delivery represents an increased level of controls as compared to the types of day-to-day range control and long-term operational range management currently in place at NSW Riverine Complex, Stennis. This change in land use status and associated controls would result in a long-term commitment/dedication of these land areas as range areas. The ranges would be managed under range safety protocols for UXO and ORC and the DON Range Sustainability Environmental Program Assessments (RSEPA) Process for environmental concerns (Section 3.9, Hazardous Materials and Hazardous Waste). If the range was to cease its live-fire activity and close (via Secretarial decision), it would be assessed under the Military Munitions Response Program (MMRP). The MMRP dictates DON responsibilities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and addresses the long-term land use controls that would be required to safely manage access and use in the future to minimize risk to the public from exposure to UXO. The magnitude of the impact of the land use change

is lessened in that the affected area is within the Buffer Zone, where long-term land use controls of the restrictive easement already limit future land use possibilities.

WMA range operations would be impacted with the addition of the WDZs from the Northern and southern target areas to the existing and planned mix of ranges and their associated SDZs. The range certification process would establish necessary adjustments to range control procedures to ensure that operations are deconflicted (i.e., surface maneuver or range areas within WDZs are closed for range training purposes when the air-to-ground munitions delivery operations are occurring/scheduled to occur). Under Alternative 1, the WDZs at the southern target area (FW1) would extend over all four of the existing live-fire RZs, resulting in the need for range controls to deconflict air-to-ground munitions delivery and riverine training. However, the northern target area (IMP-A) WDZs would be almost entirely within land that is not currently dedicated to range use (it is part of the planned WMA acquisition, see Figure 2.4-2). Although the eastern portion of the 105mm WDZ fouls a road that is used for access to various training sites within the WMA, there would be little potential for conflict with existing range operations at the northern target area site. Training planned to occur in the northern part of the WMA that DON has not yet acquired would be compatible with the establishment of the munition target area at this location, but the planned uses would not be available for training when the northern target area was active. This could, in turn, result in increased training intensity in the portions of the WMA and the larger NSW Riverine Complex, Stennis not fouled by use of the proposed munitions target area, but such an impact would not be expected to result in a change to training land use categorizations.

Fee Area. All other aspects of Alternative 1 would be consistent with land use plans, programs and controls associated with the Buffer Zone restrictive easement and NASA and NSW master plans. The elements of Alternative 1 that affect land use within the Fee Area include the proposed rocket engine testing and untethered autonomous flight vehicle testing operations. These proposals would be consistent with NASA's master plan.

3.5.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

Overall, anticipated land use impacts associated with Alternative 2 would be similar to those described for Alternative 1. However, by comparison under Alternative 2:

- The conversion of land use at the northern target area (IMP-A) would be to an active military target area certified for inert service and TP munitions delivery only (see Figure 2.4-4).
- There would be comparatively less range land areas within the northern target area (IMP-A) WDZ and, therefore, fewer range scheduling deconfliction requirements with respect to operational ground ranges, convoy routes, and riverine training areas.
- Over the long-term, there would be greater potential for reuse of the northern target area (IMP-A) lands as inert service and TP munitions delivery sites have fewer enduring land use control requirements than HE delivery sites.
- There would be less potential for reuse of the southern target area (FW1) lands due to the increased HE use at the southern target area (FW1). Concentrating all HE operations at one

location would result in greater intensity of use and a faster degradation of the land, making it less suitable for reuse.

3.5.2.3 No Action Alternative

Under the No Action Alternative, baseline land use conditions would persist and no additional impacts are anticipated.

3.6 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.6.1 Affected Environment

3.6.1.1 Population

The SSC Federal city is an important employment center in the ROI; the daytime population of the Federal city includes approximately 5,400 employees and 100 children at the CDC (NASA 2012). Due to the nature of the Fee Area and Buffer Zone restrictive easement, there is no permanent residential population within the Fee Area or Buffer Zone. The nearest communities to SSC are Picayune, Mississippi (population 10,878) to the north; Kiln, Mississippi (population 2,238) to the east; Slidell, Louisiana (population 27,068) to the south; and Pearl River, Louisiana (population 3,601) to the west (USCB 2010a, 2010b). All four of these communities are unincorporated.

The only permanent/residential population that underlies the proposed airspace is that portion of R-4403F that would overlie an approximately 5,010-acre area to the north of the Buffer Zone. This area covers four census block groups in Hancock County, Mississippi, and one in Pearl River County, Mississippi (St. Tammany Parish, Louisiana, does not underlie R-4403-F). These four census blocks represented a total population of 8,111 in 2010 (USCB 2010c). The residential population of the area underlying the proposed RA was estimated using a standard approach that has been utilized in many similar NEPA evaluations. To validate U.S. census block group data, a subject matter expert with cadastral expertise conducted aerial imagery analysis and recorded likely residential structures within this area. Approximately 280 to 310 residences are estimated to occur under the proposed R-4403F portion not contained in the Buffer Zone, of which the majority were located in Hancock County (approximately 50 were located in Pearl River County). These counts were then correlated with the USCB average household size for census block group that they were located in to develop an estimate of the residential population at approximately 775-830.

3.6.1.2 Population Density

Population density in the ROI is lower in the three counties in the ROI as compared to the states of Mississippi and Louisiana. Population densities recorded during the 2010 census in Hancock and Pearl River counties were 92.7 and 68.9 persons per square mile, respectively, as compared to the state of Mississippi, which had approximately 63.2 persons per square mile. St. Tammany Parish had a population density of 276.4 persons per square mile, compared to 104.9 persons per square mile in the state of Louisiana. The majority of the population for these counties is in the incorporated areas that are not within the ROI. For example, the population density in Bay St. Louis (Hancock County) is 630.3 persons per square mile, Picayune (Pearl River County) is 839.6 persons per square mile, and Slidell (St. Tammany Parish) is 1,823.5 persons per square mile (USCB 2014a). In the unincorporated areas within

the ROI and outside the Buffer Zone, population density is quite low – estimated at approximately 100 persons per square mile based on interpretation of aerial photography and census block group data.

3.6.1.3 Population Trends

Population data for Hancock County, Pearl River County, and St. Tammany Parish from the 1990, 2000, and 2010 decennial census are provided in Table 3.6-1 (to see locations of the Counties/Parish, see Figure 3.5-4). From 1990 to 2010, Hancock County population increased by 12,169, an increase of approximately 38 percent; Pearl River County population increased by 17,120, an increase of approximately 44 percent; and St. Tammany Parish population increased 89,232, an increase of approximately 62 percent (USCB 1990, 2000a, 2000b, 2010a, 2010b). Population growth over the last 20 years in all three counties/parishes has exceeded the national growth (24 percent), although at varying rates. With the exception of Kiln, population growth in the communities nearest SSC has been at a similar pace over the same 20-year period – a 1 percent increase in Picayune, an 84 percent increase in Kiln, a 48 percent increase in Slidell, and a 44 percent increase in Pearl River (USCB 1990, 2000a, 2000b, 2010a, 2010b). During this time period, strong population growth could to be attributed to factors such as a strong regional economic climate, increased growth in nearby metropolitan areas such as New Orleans, and increased employment opportunities.

Table 3.6-1. Population Growth within Counties/Parish in the Region of Influence

Geographic Area	1990 Census	2000 Census	2010 Census
Hancock County, Mississippi	31,760	42,967	43,929
Pearl River County, Mississippi	38,714	48,621	55,834
St. Tammany Parish, Louisiana	144,508	191,268	233,740

Sources: USCB 1990, 2000a, 2000b, 2010a, 2010b.

In coastal Hancock County, the 20-year growth rate nearly all occurred in 1990-2000, when the population growth rate was at 35 percent; between 2000 and 2010, that rate dropped to 2 percent. Pearl River County and St. Tammany Parish also experienced more moderate population growth from 2000 to 2010 as compared to 1990-2000. One major factor affecting growth between 2000 and 2010 was Hurricane Katrina, which impacted the area in 2005. Hurricane Katrina displaced more than 11,000 residents in Hancock County alone (Hancock County 2010). The economic recession that occurred in the U.S. later in the decade could have also resulted in decreased population growth in these areas. Population estimates from 2010 to 2013 show Hancock County's population is increasing at a rate of approximately 2 percent annually, while the population of Pearl River County has remained the same or decreased by less than 1 percent annually during the same time period (USCB 2013a, 2013b). Growth rates decreased by about half from 2000-2005 to 2006-1010, and when combined with a noticeable decrease in building permits in 2007, could indicate St. Tammany Parish was less affected by Hurricane Katrina and more so by the economic environment than surrounding areas (Adelson 2011, USCB 2013c).

3.6.1.4 Employment

Based on 2008 to 2012 American Community Survey (ACS) 5-year estimates, there were 20,584 persons in the labor force (able to work) and 18,314 employed within Hancock County, resulting in an unemployment rate of approximately 6.2 percent (USCB 2012a). ACS estimates for Pearl River County include 24,157 persons in the work force and 21,558 unemployed, resulting in an unemployment rate of

approximately 5.8 percent (USCB 2012a). The labor force in St. Tammany Parish was estimated to be 115,960 persons of whom 107,009 were employed, resulting in an approximate 4.5 percent unemployment rate (USCB 2012b).

SSC, including DOD and other tenants, provides a significant source of employment for surrounding counties, which was estimated at 5,400 persons as of 2011 (Table 3.6-2). Approximately 3,767 persons, or 70 percent of the workforce employed by SSC, are residents of Hancock County, Pearl River County, or St. Tammany Parish. SSC provides strong economic stimulus to surrounding counties and parishes within 50 miles, estimated in 2011 to be approximately $682 million (NASA 2012).

Table 3.6-2. Stennis Space Center Workforce

Agency	Workforce*
NASA and Contractors	2,125
DOD and Contractors	2,069
Department of Commerce and Contractors	232
Other Resident Agencies	932
Total	5,358

Source: NASA 2012.
* As of Sept. 30, 2011

With respect to the area underlying that portion of proposed R-4403F that extends north of the Buffer Zone, limited data are available to quantify businesses or other economic activity in this area. Hancock County land use data includes some dispersed retail use and resource production/extraction. Future land use planning indicates that the area is planned for increased residential land use. No currently planned business expansion needs or proposals have been identified in future land use planning documents for this area (Hancock County 2010, Pearl River County 2010) and in discussions with local planning and zoning staff (O'Neal 2014).

3.6.1.5 Environmental Justice

The potential for high and adverse human health or environmental effect to disproportionately affect minority or low-income populations was evaluated, as required under EO 12898. The evaluation included detailed analysis of USCB data from the block groups that occurred within the ROI, but were outside of the Buffer Zone. Since there are no permanent residents in the Buffer Zone, the focus of this analysis was limited to that portion of R-4403F that would overlie an approximately 5,010-acre area to the north of the Buffer Zone. Census data detailing these populations at a county and State level were used as an area or community of comparison (Table 3.6-3).

USCB data are based on self-identification in accordance with guidelines provided by the U.S. Office of Management and Budget. A minority population is defined by USCB as a group of people and/or a community experiencing common conditions of exposure or impact that identify as White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, and Other Race. Also included are those persons of two or more races (USCB 2010d).

Table 3.6-3. Minority and Low-Income Populations

Geographic Area	Total Population[1]	Minority Population	Percent Minority	Low-Income Population[2]	Percent Low-Income[2]
Communities of Comparison					
Hancock County	44,044	5,244	11.9	8,677	19.7
Pearl River County	55,886	8,650	15.5	12,183	21.8
State of Mississippi	2,967,297	1,212,613	40.9	661,707	22.3
Area Underlying Portion of Proposed R-4403F Outside the Buffer Zone					
Hancock County Block Groups	742	32	4.3	21	0.8
Pearl River County Block Groups	49	4	7.3	3	0.3
Total Affected Area	791	36	4.5	24	0.7

Sources: USCB 2010a, 2010e, 2012a, 2012c, 2012d.

Notes:

1. The total population within this table represents the total population that reported on race/ethnicity and income status; therefore, it does not match with the total population presented in Table 3.6-1.
2. The percentage of low-income persons is calculated as a percentage of all persons for whom the Bureau of the Census determines poverty status, which is generally a lower number than the total population because it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years old.

Low-income populations were defined as the sum of those individuals living below the calculated poverty level. USCB adheres to the standards specified by the U.S. Office of Management and Budget in Statistical Policy Directive 14 and uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. Money income before taxes is used and does not include capital gains or noncash benefits (such as public housing, Medicaid, and food stamps) (USCB 2014b).

Approximately 12 percent of the population of Hancock County and 16 percent of Pearl River County is composed of minorities (i.e., an ethnic or racial group with a distinctive presence in a community), compared to approximately 41 percent for the state of Mississippi. The percentage of population living below the poverty level for the state of Mississippi (approximately 22 percent) is slightly higher than Hancock County (approximately 20 percent) and equal to Pearl River County (approximately 22 percent).

The percentage of minority and low-income populations underlying the proposed portion of R-4403F that extends north of the Buffer Zone are significantly lower than the percentages of these groups within the county populations. In affected Hancock groups, 4.3 percent of the affected population would be minorities, compared to the county population, which consist of approximately 12 percent minorities. In the affected Pearl River County block group, 7.3 percent of the affected population would be minorities, compared to the county population, which consist of approximately 16 percent minorities. Minority populations make up an even greater percentage of the state of Mississippi's population, approximately 41 percent.

Affected Hancock County block group low-income populations would equal approximately 0.8 percent of the affected population, compared to the county population that consists of approximately 20 percent of individuals living below the poverty line. The affected Pearl River County block group low-income population would equal approximately 0.8 percent of the affected population, compared to approximately 22 percent of the county population that consists of individuals living below the poverty

level. Individuals living below the poverty level in the state of Mississippi make up approximately 20 percent of the total population.

3.6.2 Environmental Consequences

Economic impacts are defined to include direct effects, such as changes to employment and expenditures that affect the flow of dollars into the local economy, and indirect effects, which result from the "ripple effect" of spending and re-spending in response to the direct effects. Factors typically considered in the analysis of socioeconomic impacts include redistribution, influx, or loss of population within the study area; impacts to employment and income; changes to the tax base; and availability of housing. Socioeconomic impacts are often mixed: beneficial in terms of gains in jobs, expenditures, tax revenues, etc., and adverse in terms of growth management issues such as demands for housing and community services.

The analysis in this EA identifies potential environmental justice issues in accordance with the requirements of EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.* Impacts to environmental justice populations are identified where high and adverse human health or environmental effects may disproportionately affect minority or low-income populations.

3.6.2.1 Alternative 1: Preferred Alternative

The implementation of Alternative 1 would support the mission needs of SSC and DON, and support to the overall mission of these agencies is generally aligned with the continued economic contribution of SSC and DON to the region. That said, there are few elements of Alternative 1 that would be expected to have a discernible economic impact within the region. The redesignation and expansion of the proposed airspace would support NASA uses for which jobs and expenditures would represent continuations of existing programs, and the military users would primarily be tied to jobs and spending at the home base locations. When the proposed range infrastructure is constructed, there would be minor and temporary expenditures that would not necessarily all be localized to the region. There would also be a long-term increase in range management work, though this would be expected to be minor in context.

Within the area that would underlie that portion of R-4403F that would extend north of the Buffer Zone, there would be no discernible economic impact from implementation of Alternative 1. The proposed restricted airspace establishment in this area would be at an altitude at 4,000 ft MSL. There is the potential that the future land use controls that the county may adopt in this area for compatible land use may restrict certain types of economic opportunities such as multi-family residential, transient lodging, schools, libraries, churches, hospitals, nursing homes, or auditoriums/concert halls (see Section 3.5, Land Use). However, the future land use planning for Hancock County indicates that planned use in this area for residential would likely be at a density that would be compatible with the proposed overlying airspace. Therefore, no economic impact from compatible land use controls is foreseen at this time and, thus, the associated potential for economic impact is discounted. In conclusion, the economic impact of implementation of Alternative 1 would be negligible.

With respect to environmental justice, the proportion of the total affected population underlying R-4403F outside the Buffer Zone, that consists of minorities and/or individuals living below the poverty

line, is much lower in the affected area than in the county and state as a whole. Whereas the affected area has a 4.5 percent minority population, the minority population in the state of Mississippi is 40.9 percent, and whereas the affected area has a 0.7 percent low income population, the state of Mississippi has a 22.3 percent low income population (see Table 3.6-3). Based on the analysis in this EA, the DON concludes that Alternative 1 would not result in disproportionately high and adverse human health or environmental effects on minority populations and low-income populations in the ROI.

3.6.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

The potential socioeconomic and environmental justice impacts of Alternative 2 would be the same as described for Alternative 1.

3.6.2.3 No Action Alternative

Under the No Action Alternative, there would be no changes to conditions relative to socioeconomics and environmental justice; baseline conditions would continue.

3.7 RECREATION

Recreation, for this analysis, refers to the use of natural resources in an outdoor setting for human enjoyment. Recreational resources consider outdoor activities that take place away from the residences of participants. They can include natural resource areas and man-made facilities that are designated or available for public or private use.

3.7.1 Affected Environment

Airspace Recreation. Air-based recreation includes aviation hobbyists, such as student, sport, recreational, and private pilots flying airplanes, rotorcraft, gliders, lighter-than-air (e.g., balloons), powered-lift, powered parachute, and weight-shift control (e.g., ultralight) craft (FAA 2005). Air-based resources include the airspace over Stennis, especially when the airspace is not in use by NASA and DOD activities. Since 2011, the airspace has been restricted from 119 to 202 hours a year (14 to 25 days per year) (see Section 3.3, Airspace). While it is known that air-based recreation does occur over SSC, specific recreational use of the airspace is hard to track as it falls under the general aviation category of users that also includes charter business flights, sight-seers, and those who are not considered commercial or military (see Section 3.3.1 for use data). Recreational users do not typically file flight plans, but instead use VFR and do not communicate with ATC. Additionally, recreational pilots generally occupy Class G (below 1,200 ft AGL) and Class E (uncontrolled) airspace (see Figure 3.3-1); whereas, large or turbine powered airplanes are required to maintain above 1,500 ft AGL until they descend to a receiving airport.

Terrestrial Recreation. The affected environment for land/water-based recreational resources in the ROI primarily consists of the River systems in the WMA and Buffer Zone; forested ecosystems in the WMA and Buffer Zone; and the Pearl River Wildlife Management Area (see Figure 1.2-2). Based on available land use data and aerial imagery interpretation, no public recreation resources are known within the area outside of the Buffer Zone underlying the proposed R-4403F.

The NASA Integrated Natural Resources Management Plan (INRMP) calls for providing outdoor recreation to demonstrate integration of ecosystem management and the development of self-guided nature trails for conservation and education of the public and SSC personnel (Mississippi State University [MSU] 2010). While it addresses both the Fee Area and the Buffer Zone, it focuses on the Buffer Zone since public recreation is restricted within the Fee Area due to the industrial and potentially hazardous nature of NASA testing missions. Likewise, NSW manages WMA natural resources through a separate INRMP, and one of the goals of the WMA Plan is the continued provision of recreational opportunities within the WMA (DON 2011). Although the DON does not currently plan specific actions to directly support outdoor recreation management objectives, several measures, including timber stand improvement, nuisance wildlife management, and land/fire management, could ultimately enhance recreational opportunities and facilitate future development of plans to specifically address these opportunities.

River Systems. The East Pearl, Jourdan, and Mike's Rivers (including Turtleskin Creek) and McCarty Bayou are all used for public recreation within the Buffer Zone and WMA (see Figure 2.4-1). The East Pearl River bisects the study area, serving as the Mississippi/Louisiana State line in the ROI. These rivers and their tributaries are frequently used for boating, recreational fishing, canoeing, kayaking, etc. (DON 2011, NASA 2013). The East Pearl River adjacent to the WMA and the Mike's River and the McCarty Bayou navigable upstream from the East Pearl River within the WMA provide opportunities for recreational boating, fishing, and swimming. However, during RZ use, the area is first cleared of all unauthorized personnel (i.e., non-participants are asked to leave the area) and security/patrol boats are posted within the rivers to maintain cleared status and warn any non-participating entities for the duration of the exercise (DON 2011). Thus, there is a higher intensity of recreational use of the East Pearl River south of the Interstate 10 Bridge (see Figure 1.2-2).

Forested Ecosystems. As there is no development or habitation permitted within the Buffer Zone boundaries, there are generally contiguous and intact forested wetlands, open water, old pasture, and upland forest habitats that provide quality dispersed daytime recreational opportunities (but no overnight camping). The slash pine forests found in the Buffer Zone provide habitat for a variety of game and nongame wildlife species, and are a popular hunting and viewing resource for recreational users (MSU 2010).

The biotic environment of the WMA is typical of a marginal floodplain, with areas of hardwood forest, extensive invasive species infestation (primarily Chinese tallow tree [*Triadica schifera*]), open water in the form of streams and rivers, as well as ponds left over from abandoned surface mines, and some open agricultural fields (DON 2011). Land-based recreation in the WMA (and thus at the RZs, SARC, and proposed locations for the southern target area [FW1], and the northern target area [IMP-A]) is currently restricted during training events, which constitutes the majority of the year.

Pearl River Wildlife Management Area. This area, located just west of the NSW Riverine Complex, Stennis WMA and adjacent to the town of Pearl River, Louisiana, comprises approximately 35,000 acres and is owned and managed by the LADWF (see Figure 1.2-2). The Wildlife Management Area provides hunting, fishing, bird watching, hiking, camping, crawfishing, canoeing, and motor boating opportunities for the general public. The Honey Island Shooting Range is also located within the Wildlife Management

Area, but operated independently by Southeast Louisiana Firearms Safety, Inc. The LADWF coordinates with NASA SSC and NSWG-4 to provide maps outlining SSC danger zones as well as announcements for restrictions on recreational uses associated with current DOD activities (LADWF 2014).

3.7.2 Environmental Consequences

Factors considered in the analysis of potential impacts to recreation resources included potential for reduced recreational availability through development or repurposing of the land, from increased access restrictions due to safety concerns, or indirectly from noise or introduction of other incompatible activities to the area. The analysis focuses on a qualitative analysis of potential effects to types, quality, or access to recreation opportunities.

3.7.2.1 Alternative 1: Preferred Alternative

As with current use, air-based recreation would be prohibited within SUA when activated. However, under Alternative 1, the R-4403A, B, C, E, and F covers a much larger area/volume of airspace than the current SUA (see Table 3.3-2) and the area that could be activated would increase substantially. With implementation of Alternative 1, the proposed R-4403A, B, C, E, and F may be activated up to 156 days a year, including 9 hours per day during the 8- to 10-day Emerald Warrior exercise, and in 3-hour blocks throughout the rest of the year (NASA *et al.* 2015). However, the majority of the projected operations would occur at night, when airspace recreationalists (largely VFR flight) are unlikely to be flying (i.e., the proposed operations would not likely occur during or affect the majority of times that typical air-based recreation takes place).

The designation of RA would continue to deter general aviation enthusiasts from flying in the area for recreational purposes. In relation to the landscape of airspace available for recreation in the area, and due to the likely low numbers of enthusiasts currently flying within the ROI overall, the change in the RA extent and increase in use would not likely substantially affect recreational aviation. The impacts would be potentially less use of recreational airspace within the ROI limited by the extent that intermittent activation of the airspace would conflict with recreational use. Recreational aviation activity could be displaced to other, less constrained airspace in the region (e.g., the ample Class G and E open airspace to the north of the ROI). Therefore, the potential effects to the opportunity for recreational aviation would fluctuate with the frequency of airspace activation, but since other nearby areas could accommodate displaced use, the impact would be minor overall.

Under the DON's RAICUZ program, the new R-4403A, B, C, E, and F area would be anticipated to be designated as a minimum level of safety hazard concern where dense development and sensitive land uses would be potentially incompatible (see Section 3.5, Land Use). For recreation, sensitive land uses would include recreation experiences that are designated and managed for wilderness characteristics, such as outstanding opportunities for solitude and quiet. Existing and all known proposed recreation would be compatible with the land use compatibility parameters that would be associated with the RA designation. The recreational experience within areas affected by the visual and noise effects associated with aircraft overflight and the additional noise from air-to-ground munitions delivery would be altered, particularly in the Pearl River Wildlife Management Area. Hiking and ATV trails are the recreational resources most likely to be exposed to additional noise as they are located on the northeast boundary of

the Pearl River Wildlife Management Area, within the 115 (AG&B) peak noise contour and 62 and 70 dB AG&B annual average CDNL and 62 and 70 dB busy month DNL noise contours associated with proposed HE munitions delivery sites (see Figures 3.4-5, 3.4-6, 3.4-7). The ongoing coordination between NASA SSC and NSWG-4 and the LADWF to ensure danger zone maps and posted restrictions at the Pearl River Wildlife Management Area are updated, accurate, and widely communicated would be continued. Additional information regarding aviation training within the proposed R-4403A, B, C, E, and F airspace and associated noise would be included in these coordination efforts.

The use of the new R-4403A, B, C, E, and F area would not be expected to result in lessened opportunity for terrestrial recreation. Existing ongoing exclusion of public recreation activities from the Fee Area and the WMA due to incompatibility with NASA and military activities would continue and would not change through the implementation of Alternative 1 (including the proposed siting of the munitions target areas and SUA operations within the WMA). The target areas were specifically sited and defined so that their associated WDZs did not extend over the boundary of the WMA (see Section 2.4; Figure 2.4-1). Therefore, activating airspace for the provision of live-fire munitions training at the two proposed target areas would not restrict recreation outside of the WMA.

The temporary exclusions of recreational boaters and fishermen from the East Pearl River and its tributaries for safety purposes during live-fire events in the RZs would continue at levels similar to the baseline as the majority of the proposed new military activity is for interoperability with existing/ongoing ground-based training events in the existing RZs east of the East Pearl River (see Section 3.2.1.2; Figure 2.4-1). However, there is the potential that these exclusions could increase slightly with the overall increased diversity in operations and with possible training events that interrelate with the redesignation and expansion of the proposed RA. Impacts to recreation activity in the Buffer Zone associated with siting of the proposed FW2 sensor training area would not be anticipated as no recreation is currently known to exist in this area.

Although DOD is exempted, the DOT Section 4(f) legislation was considered in this recreation resources analysis because FAA, a cooperating agency on this EA, is subject to Section 4(f) requirements. DOT Section 4(f) consultations are required when the public land will be used for a potential transportation program or project. (Public lands include publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance or land from an historic site of national, State, or local significance.) Given that publicly owned recreational resources would still be made available for their intended use, Alternative 1 would be compliant with Section 4(f) requirements.

3.7.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

Anticipated impacts associated with Alternative 2 would be expected to be generally the same as those described for Alternative 1 except for the noise impacts on recreation. The delivery of TP only rather than HE munitions within the northern target area (IMP-A) may decrease associated impacts to the Pearl River Wildlife Management Area as compared to Alternative 1 (see Section 3.4, Noise).

3.7.2.3 No Action Alternative

Under the No Action Alternative, baseline conditions would persist and no additional impacts are anticipated.

3.8 CULTURAL RESOURCES

Cultural resources are defined as prehistoric or historic sites, buildings, structures, objects, districts, or other physical evidence of human activity that are considered important to a culture or community for scientific, traditional, religious, or other purposes.

Federal agencies are required to review their projects in accordance with Sections 106 and 110 of the National Historic Preservation Act (NHPA) of 1966, as amended, and as implemented by 36 CFR Part 800. Section 106 requires Federal agencies to consider the effects of their actions on historic properties before undertaking a project and affording the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. A historic property is defined as any cultural resource that is included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). The NRHP, administered by the National Park Service (NPS), is the official inventory of cultural resources that are significant in American history, prehistory, architecture, archaeology, engineering, and culture. The NRHP also includes National Historic Landmarks. In consideration of 36 CFR Part 800, Federal agencies are required to initiate consultation with the State Historic Preservation Officer (SHPO) to inform them of the planned action and to request their submittal of any comments or concerns.

The SHPO has a principal consultative role in the Section 106 process in reflecting the interests of the State and its citizens in the preservation of their cultural heritage. In accordance with Section 101(b)(3) of the Act, the SHPO advises and assists Federal agencies in carrying out their Section 106 responsibilities and cooperates with such agencies, local Governments, and organizations and individuals to ensure that historic properties are taken into consideration at all levels of planning and development. The ACHP generally delegates its review authority to the SHPO and reserves the right to consult on undertakings that may incur adverse effects on historic properties, or affect Native American interests, or complicated procedural processes (ACHP 2014).

The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) requires Federal agencies to consult with Federally recognized Native American Tribes who demonstrate affinity to the geographic region or who have expressed interest in a specific action in regard to the potential discovery of “cultural items” which include human remains, funerary objects, objects of cultural patrimony, and sacred objects. The NAGPRA was amended in 1992 to require that a Federal agency’s procedure for compliance with Section 106 of the NHPA provide for the disposition of Native American cultural items from Federal or Tribal land in a manner consistent with Section 3(c) of the NAGPRA.

There are no known traditional cultural properties within the action area. As part of the scoping and agency notification process for this EA, interested Federally recognized Native American tribes were contacted (Appendix C). The Choctaw Nation of Oklahoma has requested participation as a consulting party in the Section 106 consultation process due to concerns regarding potential ground disturbance.

3.8.1 Affected Environment

Section 100(a)(2) of the NHPA requires Federal agencies to establish a historic preservation program for the identification and protection of historic properties under their jurisdiction, and ensure that such properties are managed and maintained in a way that considers their historic and cultural values. NASA has developed an updated Integrated Cultural Resources Management Plan (ICRMP). The ICRMP serves

to guide the management of historic properties with recommendations on how to best uphold historic preservation requirements in the face of projects that could incur effects on significant cultural resources. NASA's historic properties compliance status at SSC is fully discussed in the SSC ICRMP, is reviewed annually and updated every 5 years. The SSC ICRMP ensures that NASA is fulfilling its responsibilities for the effective management and protection of the significant cultural resources located within the Fee Area and Buffer Zone pursuant to the provisions of the NHPA, NAGPRA, and other relevant laws and supporting regulations. All SSC tenants are required to comply with the SSC ICRMP (NASA 2013). Other landowners within the Buffer Zone, including DON, are required to meet their cultural resource obligations under Federal, State, and local statutes. The DON is currently conducting cultural resource survey work within the WMA pursuant to Section 110 of the NHPA.

The affected environment analysis for this EA, or what is referred to as the area of potential effects for the undertaking pursuant to Section 106 of the NHPA, focuses on the analysis of potential impacts to significant cultural resources from noise impacts of the proposed action and analysis of the ground disturbing activities associated with the establishment of air-to-ground impact and sensor target areas, increased mission tempo at established HLZs and RZs and with the testing of untethered autonomous flight vehicles. Increased operations tempo at the SARC is not analyzed as cultural resources impacts were considered as part of the range establishment process and expansions and operations were analyzed in a recent EA (DON 2013).

Fee Area. Within the Fee Area, there are three test stands designated as National Historic Landmarks that appear on the NRHP. These include the A-1 Rocket Propulsion Test Complex (Building 4120), the A-2 Rocket Propulsion Test Complex (Building 4122), and the B-1/B-2 Rocket Propulsion Test Complex (Building 4220). These Test Stands and associated control centers have been designated as National Historic Landmarks because of their importance in the testing of Saturn rockets and the importance of the Saturn rocket in landing men on the moon. Typically, such properties would have restrictions concerning modification of original structures. However, since the Test Complex was nominated because of its contributions to the Man-in-Space era, and since that function is still in effect today, certain exceptions were granted. These exceptions were outlined in a Programmatic Agreement (PA) signed by NASA, the National Conference of State Historic Preservation Officers (NCSHPO), and ACHP on September 20, 1989. Activities to the Testing Complex including demolition, dismantling, relocation, or removal of significant elements that contribute to the National Landmark status require primary consultation with the NPS pursuant to 36 CFR 800.10 and follow-on consultation with the Mississippi SHPO. Activities that do not affect the characteristics of the Test Complex such as replacing historic hardware, modifications to the original facilities, or new construction compatible with the purpose of the facility are to be mitigated as outlined in the PA (NASA 2013).

In prior consultations with NASA, the Mississippi Historic Preservation Division has identified three potential archaeological sites within the Fee Area (22 HA 530, 22 HA 531, and 22 HA 580). Appropriate survey and archaeological reconnaissance investigations were completed for all three sites, and no archaeological resources were found (NASA 2013). In addition to these archaeological surveys, a reconnaissance of the remainder of the Fee Area was conducted to determine if archaeological resources were present or could reasonably be predicted. Results of the effort determined that only

those areas bordering the Pearl River floodplain had the potential for the presence of archaeological resources and a pedestrian survey of that area was conducted. However, no evidence of prehistoric or historic sites was found in any of the areas examined. Therefore, within the Fee Area, only the town site of Gainesville would require archaeological considerations if land-disturbing activities were proposed for that area (NASA 2013).

NASA conducted an archival search and ground survey of the town site of Gainesville in 1994. Gainesville, the former Hancock County seat, was incorporated in 1846. Based on the results of this effort, the site was nominated to the NRHP in 1997. The site is located in the southwest corner of the Fee Area near the SARC and WMA, bounded on the west by the Pearl River (NASA 2013).

Buffer Zone. In 1989, the U.S. Army Corps of Engineers (USACE) conducted two built-historic properties investigations for NASA that included 39 areas within the Buffer Zone. The investigation focused on historical house sites, churches, schools, and cemeteries. A few areas adjacent to the Pearl and Jourdan Rivers with potential for prehistoric archaeological resources were also sampled. One previously recorded archaeological site, 22 HA 579, could not be relocated during these investigations. No significant archaeological sites or historic structures were identified as a result of these surveys (NASA 2013).

When SSC and the Buffer Zone were established in 1961, four logging towns existed, including the towns of Napoleon, Santa Rosa, Logtown, and Westonia. Most of the buildings in these towns were removed when NASA acquired the Fee Area and easement in the Buffer Zone (NASA 2013). In 1998, a survey of three parcels within the Logtown town tract was conducted, which covered small areas of the town site west of the community cemetery. No significant archaeological resources were encountered during the study. Although it was determined that the studied portions of the tract contained no resources eligible for the NRHP, the Mississippi SHPO recognized that unrecorded cultural resources may be encountered during land disturbing activities (NASA 2013).

In 2009, the USACE conducted additional field investigation on the towns of Napoleon and the area along Bayou LaCroix for NASA. Napoleon was the first European settlement in Hancock County. In addition, the area along Bayou LaCroix was known to have been occupied by the Southern Band of the Choctaw Nation. Land disturbances to Napoleon and Bayou LaCroix would require surveys (NASA 2013).

The NASA-owned parcel where the sensor training area (FW2) is proposed has not yet been surveyed, but archaeological analysis has identified the northern portion of this area as having a high potential for archaeological resources (NASA 2013). DOD would conduct proper survey of the site and take appropriate action in compliance with cultural resource SOPs and BMPs prior to commencing any ground disturbing activity.

Western Maneuver Area. Limited archaeological investigations for the WMA were conducted prior to DON's acquisition of a portion of the WMA in 2004. The DON is currently conducting cultural resource surveys within the WMA; the majority of the WMA has not been previously surveyed, including the northern target area (IMP-A) and sensor training area (FW2). Cultural surveys have been completed in and around the southern target area (FW1), and no cultural resources were noted directly within the area (Winter 2014). Two isolated archaeological finds were located to the east and west of the southern

target area boundaries (FW1), but are not considered to be of archaeological or historic significance. Although NRHP-eligible locations have been located in the WMA, none are within the target area WDZs or in proximity to any activities associated with this proposed action.

Areas Surrounding the Buffer Zone. The limits of the RA fall within the Buffer Zone, except R-4403F, which extends north and east in a semi-circular configuration over lands in Hancock and Pearl River counties. There are 18 sites listed on the NRHP in Hancock County, but none of the sites fall within the ROI boundaries. Pearl River County contains one NRHP-listed site, which lies outside of the R-4403F footprint (Mississippi Department of Archives and History 2014).

3.8.2 Environmental Consequences

Criteria set forth in 36 CFR Section 800.5 are used to evaluate the effects of an undertaking on historic properties. The regulation defines an effect as an alteration to the characteristics of a significant cultural resource that qualify it for inclusion in the NRHP. Analysis of potential impacts to significant cultural resources considers both direct and indirect impacts. Direct impacts may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment that contribute to the importance of the resource, introducing visual, atmospheric, or audible elements that are out of character for the period the resource represents (thereby altering the setting), or neglecting the resource to the extent that it deteriorates or is destroyed.

With respect to the three National Historic Landmark-listed test stands (A-1 Rocket Propulsion Test Complex [Building 4120], the A-2 Rocket Propulsion Test Complex [Building 4122], and the B-1/B-2 Rocket Propulsion Test Complex, [Building 4220]), an impact would be considered significant if the action could not meet the stipulations detailed in the PA.

3.8.2.1 Alternative 1: Preferred Alternative

Fee Area. Within the Fee Area, all of the areas with high potential for archaeological resources have been examined and no cultural resources have been located. Likewise, no traditional cultural properties have been defined within the area of potential effects; therefore, implementation of Alternative 1 would have no potential to incur effects on archaeological or traditional cultural properties in the Fee Area.

Implementation of Alternative 1 (including rocket engine testing and establishment of the untethered autonomous flight vehicle testing site) would not affect the town site of Gainesville (nominated to the NRHP) or other NASA National Historic Landmarks that appear on the NRHP. Any required construction or renovation relating to new testing missions at the Test Stands would be coordinated through the NASA Historic Preservation Office. Specifically, a Preliminary Environmental Survey (PES) Form SSC-696M would be filed to ensure the actions are consistent with the PA between NASA, NCSHPO, and ACHP. This coordination, in conjunction with compliance outlined by the NASA ICRMP, would ensure no adverse impacts to the integrity of the Rocket Propulsion Test Complex. Therefore, implementation of Alternative 1 would not adversely impact NRHP-listed or eligible resources that are or may be located in the Fee Area.

Buffer Zone. Although no cultural resources are expected at the sensor training area (FW2), the installation and maintenance of sensor training facilities would disturb ground areas and thus have the potential to incur effects on archaeological resources. Given that the area of potential disturbance estimated for the development of the sensor training area is 2 acres and the NASA-owned parcel is 100 acres, it was assumed for the purposes of this EA that any impacts to cultural resources could and would be avoided. The requirements of the Section 12.4.2 of the NASA Environmental Resource Document would apply. This includes completing a PES Form SSC-696M and submitting it to the NASA Environmental Management prior to any construction or operational activities (NASA 2013). This process ensures that the appropriate level of coordination with the Mississippi SHPO occurs and any required actions to mitigate significant impacts to archaeological resources at the sensor training area site are implemented. Further, in the event of inadvertent archaeological discovery, all activities at the discovery site will cease and the action proponent will contact the NASA Historic Preservation Office for guidance. The NASA Historic Preservation Office will consult with the NAVFAC SE Historic Preservation Office, Mississippi SHPO, and other consulting parties as warranted to determine further actions at that location (DON 2013). Therefore, implementation of Alternative 1 would not adversely impact archaeological resources in the Buffer Zone.

No architectural resources are located within the Buffer Zone, so such resources would not be affected.

No known Native American cultural items (including human remains, funerary objects, objects of cultural patrimony, and sacred objects) or traditional cultural properties have been recognized within the area of potential effects. If any traditional Native American cultural resources were discovered, operations would stop and discovery would be immediately reported to NASA's Historic Preservation Office for further consultation and guidance. Therefore, implementation of Alternative 1 would have no adverse impact on Native American traditional cultural artifacts or properties in the Buffer Zone.

Western Maneuver Area. No known cultural resources would be directly affected by the redesignation and expansion of the new R-4403A, B, C, E, and F airspace and the construction, use, or maintenance of the southern target area (FW1) (Winter 2014). Although no cultural surveys are available for the northern target area (IMP-A), impacts to cultural resources are not anticipated as the location is already extremely disturbed due to decades of mining activities in the area. The DON would ensure compliance with Section 106 of the NHPA by initiating any required cultural resources surveys at IMP-A prior to commencing any ground-disturbing activities. Therefore, implementation of Alternative 1 would have no adverse impact on archaeological resources in the WMA.

No architectural resources are located within the WMA; therefore, no effect to architectural resources is expected with the implementation of Alternative 1 within the WMA.

No known Native American cultural items or traditional properties have been identified within the area of potential effects. If any Native American cultural resources were discovered, operations would stop and discovery would be immediately reported to the NCBC cultural resource manager and NASA's Historic Preservation Office for further consultation and coordination. Therefore, implementation of Alternative 1 would have no adverse impact on Native American cultural items or traditional properties in the WMA.

Areas Surrounding the Buffer Zone. As there is no ground-based activity proposed outside of the Buffer Zone, no impacts are expected to occur to significant cultural resources beneath the R-4403F airspace.

3.8.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

Anticipated impacts associated with implementation of Alternative 2 would be similar to those described for Alternative 1.

With respect to ground disturbing activities associated with the use and maintenance of munitions target areas, a slightly reduced risk would apply to potential archaeological resources that may be in the northern target area. The smaller impact footprint associated with TP munitions as compared to HE munitions would account for this reduced potential for impacts. This potential would be further evaluated during NHPA Section 106 review prior to the commencement of construction activities at this location.

3.8.2.3 No Action Alternative

Under the No Action Alternative, no impacts to significant cultural resources would occur. The SSC ICRMP would continue to ensure the effective management and protection of NASA's obligations with respect to cultural resources located within the Fee Area and Buffer Zone for NASA and all its tenants, and the DON would continue to meet cultural resource obligations for DON activities and the DON-owned WMA.

3.9 HAZARDOUS MATERIALS AND WASTE, TOXIC SUBSTANCES, AND CONTAMINATED SITES

Hazardous Materials. Hazardous materials (HMs) are chemical substances that pose a substantial hazard to human health or the environment. They are regulated under several Federal programs administered by the U.S. Environmental Protection Agency (USEPA), including CERCLA (42 USC Section 9601 *et seq.*), Emergency Planning and Community Right-to-Know Act (42 USC Section 11001 *et seq.*), Toxic Substances Control Act (TSCA) (15 USC Section 2601, *et seq.*), and the Resource Conservation and Recovery Act (RCRA) (42 USC Section 6901, *et seq.*) among others. Federal installations are required to comply with these laws along with other applicable Federal, State, and DOD regulations, as well as with relevant EOs including EO 13148, *Greening the Government Through Leadership in Environmental Management*.

Hazardous Waste. Hazardous wastes (HWs) are those wastes meeting the definition of solid waste (40 CFR 261.2) and meeting the criteria of 40 CFR 261.10. HWs may take the form of solid, liquid, contained gaseous, semi-solid (e.g., sludges), or any combination of wastes that pose a substantial present or potential hazard to human health or the environment and have been discarded or abandoned.

Military Munitions. Military munitions used for their intended purposes on ranges or collected for further evaluation and recycling, including UXO and flares, are not considered waste per the USEPA Military Munitions Rule (MMR) (40 CFR Section 266.202). The MMR implements portions of RCRA (40 CFR Parts 260 through 270) and defines when conventional and chemical military munitions become solid waste.

Toxic Substances. The promulgation of TSCA (40 CFR Parts 700 through 766) represented an effort by the Federal Government to address those chemical substances and mixtures for which it was recognized

that the manufacture, processing, distribution, use, or disposal may present unreasonable risk of personal injury or health of the environment and to effectively regulate these substances and mixtures in interstate commerce. The TSCA Chemical Substances Inventory lists information on more than 62,000 chemicals and substances, including lead (and other heavy metals), asbestos, chlorofluorocarbons (CFCs), polychlorinated biphenyls (PCBs), and mercury.

Contaminated Sites. Potentially contaminated areas are regulated and investigated under CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA). Section 120 of CERCLA as amended by SARA mandated that the USEPA establish a list of Federal facilities where HW has been generated, stored, treated, or disposed of in the past. SSC is not a CERCLA facility, but NASA has voluntarily investigated SSC to determine if any historical operations or releases may have caused any potential environmental contamination.

Defense Environmental Restoration Program. Section 211 of SARA also authorizes the Defense Environmental Restoration Program (DERP). The DOD developed the DERP to identify, investigate, and remediate potentially HM disposal sites on DOD property prior to 1984. As part of DERP, the DOD has created the Environmental Restoration Program (ERP) and the MMRP. Under the MMRP, closed historic ranges and munitions disposal sites are required to have discarded military munitions, UXO, and their chemical residues disposed and site cleaned up. The MMRP addresses the unique explosive safety hazards associated with munitions and explosives and human health risks posed by munitions constituents at locations not designated as operational ranges. There are no historic closed ranges within the NSW Riverine Complex, Stennis.

Active ranges are not managed under the DERP and are instead subject to specific range safety protocols for UXO and range clearance and the DON RSEPA Process for environmental concerns. RSEPA ensures DON operational ranges are sustainable and compliant with applicable environmental regulations, and RSEPA helps range managers identify and assesses potential for off-range migration of munitions constituents at land-based ranges. If a range ceases its live-fire activity and closes, it is assessed under CERCLA.

3.9.1 Affected Environment

Hazardous Material/Hazardous Waste. The NASA Hazardous Material, Hazardous Waste, and Solid Waste (HMHWSW) Plan governs the proper handling and disposal of HM, HW, universal waste, and non-hazardous solid waste at SSC. The HMHWSW Plan is applicable to all organizations operating at SSC (including NASA, DOD, resident/tenant agencies, and contractors). NSWG-4 has also prepared a Hazardous Waste Management Plan (HWMP) to further control hazardous substances directly applicable to their operations (Naval Facilities Engineering Command [NAVFAC] 2014a). The NASA HMHWSW Plan identifies and standardizes BMPs for effective lifecycle management of these materials (including purchase and inventory, storage, segregation, accumulation, handling and disposal), and for effective minimization of these materials through ongoing programs such as substitution, reduction, process improvement, redistribution, and recycling. The NSWG-4 HWMP and the NSWG-4 Pollution Prevention Plan (NAVFAC 2014b) outline good HM inventory practices and HW recycling opportunities. Common hazardous substances used by DOD operations include petroleum, oil, and lubricant (POL)

products such as motor oils, hydraulic fluids, diesel fuel, and motor gasoline; paints; sealants; solvents; antifreeze; and batteries. Common hazardous substances used by NASA include solvents, reagents, acids, bases, reaction product and test sample wastes, paints, POL, dyes, photographic waste, and trichloroethylene. NASA SSC has a rigorous Hazardous Materials Inventory System (HMIS) that includes an inventory updated annually by all organizations (NASA 2013a). NASA SSC maintains a large quantity HW generator (LQG) status under RCRA Subtitle C. NSW is required by NASA to have a separate USEPA Generator ID number, and all NSW units, including the Ranges, within SSC operate as a small quantity generator (SQG) under the same ID#, as issued by the MDEQ on January 27, 2014. Previously, NSW operated under two separate USEPA Generator ID numbers. SBT-22 operated as a SQG, and NAVSCIATTS operated under a Conditionally Exempt Small Quantity Generator (CESQG) ID number.

The SSC Environmental Integrated Contingency Plan and Spill Prevention, Control and Countermeasures (SPCC) Plan (NASA 2012), and the NSWG-4 Oil and Hazardous Substance Spill Contingency Plan and Red Plan (NAVFAC 2013) establish procedures, methods, equipment, and other criteria to prevent and respond to unintentional releases of hazardous substances from SSC and WMA facilities and activities, respectively. The Plans address storage locations and proper handling procedures of all HM to minimize potential spills and releases at the point of use. The Plans further outline activities to be undertaken to minimize the adverse effects in the incidence of a spill, including notification, containment, decontamination, and cleanup of spilled materials.

Toxic Substances. At SSC, TSCA's primary applicability relates to the decontamination and disposal of PCB-contaminated electrical equipment and the removal and disposal of asbestos-containing insulating materials and CFCs (NASA 2011, NASA 2013b). With respect to DOD activity at the NSW Riverine Complex, Stennis, the primary concern is the potential for components of munitions projectiles such as lead, chromium, antimony, copper, and zinc at the SARC. The DON ensures proper range construction, certification, and sustainable range management procedures ensure metals are not released into the environment, including containment, treatment, and removal/recycling.

Contaminated Sites. NASA has had an active program for identification and cleanup of contaminated sites at SSC since 1990. The cleanup activities at one site (Area H) are discussed in additional detail here because it is located approximately 200 ft from an alternative contingency field evaluated for untethered autonomous flight vehicle test operations. Area H is the former site of the Energetic Materials Test Facility (EMTF), used by the U.S. Army from the 1940s through 1991 as a strafing and bombing range, inert rocket impact area, and explosives test activity range. A Remedial Investigation (RI) and Feasibility Study (FS) were completed in 2003, which detected metals/inorganic compounds, cyanide, volatile organic compounds (VOCs), semi-volatile organic compounds, explosives, pesticides, and petroleum hydrocarbons in surface and ground water and/or sediment samples. The site does not pose any elevated risk to human health or other ecological receptors from exposure to surface and subsurface soils, sediment, surface water, and groundwater. Although remediation has not yet occurred, the preferred method for site cleanup is to pump and treat groundwater prior to discharging it into the SSC wastewater treatment system (NASA 2004).

3.9.2 Environmental Consequences

The magnitude of potential impacts associated with hazardous substances depends on their toxicity, transportation, storage, and disposal. Factors included in the analysis were potential for substantial increases in the human health risk or environmental exposure through storage, use, transportation, or disposal of HM, HW, or toxic substances. An increase in the quantity or toxicity of HM and/or HW handled by a facility may also result in a potentially adverse effect, especially if the facility was not equipped to handle a new waste stream. For contaminated sites, factors considered included potential for disturbance of a contaminated site and potential changes in remediation status of existing sites/addition of new sites.

3.9.2.1 Alternative 1: Preferred Alternative

The types of HM used and HW streams that would be generated to support the evolving missions at SSC are similar to existing conditions that support current missions; however, the number, duration, and produced power of NASA static rocket engine testing events and the NSW/SOCOM training opportunities and tempo associated with Alternative 1 would be expected to increase over existing baseline operations. The two new HE target areas would create new MMRP requirements for the NSW Riverine Complex, Stennis.

Hazardous Materials. Established procedures for HM management through the NASA HMIS system would continue to be followed by all tenant and resident agencies at SSC (NASA 2013a), or through BMPs specific to the NSW operations in the WMA (NAVFAC 2014a, 2014b). No new HMs would be required to support DOD activities associated with the proposed action. For NASA in particular, rocket engine testing requires substantial amounts of highly combustible LOX and liquid hydrogen fuels, and the untethered autonomous flight vehicle engines use LOX and methane. LOX may explode if improperly mixed with combustible materials such as liquid hydrogen, and the gaseous oxygen evaporating from a liquid spill would intensify any existing fire. However, long-term environmental impacts have not been reported due to spills of LOX or liquid hydrogen. In addition, all the fuels considered under the proposed action are currently used for rocket engine testing events, and these materials would continue to be managed within existing infrastructure and under existing NASA fuel delivery protocols (see Section 3.2, Safety). The continued elimination and reduction of hazardous substances through pollution prevention strategies across SSC would reduce the overall amount of HM used, thus minimizing overall potential impacts to human health or the environment. Therefore, there would be negligible impacts to HM management from implementation of Alternative 1.

Hazardous Waste. A small increase of HW generation at SSC would be expected due to increased flight and munitions operations as part of the proposed action. Although AC-130s would not be landing or serviced at SSC, increased capacity for interoperability training maneuvers, including helicopter training, would increase the use of POL, weapons, and related support equipment in use within the NSW Riverine Complex, Stennis. Existing procedures for the management of HW would continue to be followed at NSW locations (NAVFAC 2014a), and it is not likely that HW generated would exceed the existing SQG permit. Likewise, it is not expected that the evolving NASA mission would translate to substantially increased HW generation as the current focus of NASA operations is likely to just shift from other,

similar systems testing to testing of rocket engines similar or lesser in magnitude to the J-2X. All HW handling protocol at NASA work locations would continue as directed in applicable documents (NASA 2013a, 2012), and it is unlikely that the NASA LQG permit conditions would be exceeded. Therefore, there would be negligible impacts to HW management from implementation of Alternative 1.

Toxic Substances. There would be no discernible impacts to toxic substances with the implementation of the proposed airspace redesignation and expansion and establishment of munitions impact area and sensor training areas under Alternative 1. However, the use and maintenance of the two HE munitions impact areas would include munitions delivery and expending of flares that would have potential impacts. Such expended training material can potentially release contaminants to the environment upon use or leach small amounts of toxic substances as they explode and decompose. The hazardous constituents that may be released upon use are generally referred to as energetic chemicals and are most commonly found in the explosive, propellant, and pyrotechnic elements of munitions or flares. These constituents also may leak from munitions that do not detonate on impact or flares that do not combust as intended (i.e., duded). The chemicals listed in Table 3.9-1 were studied by the U.S. Army Engineer Research and Development Center and are considered primary indicator munitions constituents due to their chemical stability in the environment. For the munitions proposed for use at the impact areas, the explosive compounds are either trinitrotoluene (TNT) or cyclotrimethylenetrinitramine (RDX), or a combination of the two.

Table 3.9-1. Munitions Elements and Respective Hazardous Constituents

Munitions Element	Energetic Chemicals
Explosives	Trinitrotoluene (TNT) and/or Cyclotrimethylenetrinitramine (RDX)
Propellants	Nitrocellulose (NC), Nitroglycerine (NG), Nitroguanidine (NQ), 2, 4 Dinitroluene (2, 4-DNT), perchlorate

Source: U.S. Army Engineer Research and Development Center 2007.

The HE munitions proposed for use at the HE target areas all contain a propellant that expels the round from the gun and an explosive charge within the round itself that explodes at the target. As such, propellant residues would typically be found near the firing point and explosive residues found at the target areas. Because the weapons would be aircraft-based and airborne while firing, the propellant residues would disperse with little opportunity for the residues to concentrate in a single area as would be the case for a fixed firing point (such as on a ground-based range). Explosives would be found downrange at or near the targets. Explosive residues would result from a munitions delivery operation when a round is a dud round that does not detonate or only partially detonates. The expected failure rate of U.S. military munitions ranges from 1 to 5 percent of the total rounds expended. When a subsequent live round explodes near a dud round, the explosion can cause a dud round to detonate or, most likely, partially detonate. These partially detonated rounds would be the most probable source for munitions constituents released to the soil (USEPA 2012). SRTA rounds are made out of non-toxic plastic material and do not contain any heavy metals. SRTA rounds would not introduce hazardous or toxic materials to the ranges and since the rounds travel shorter distances, the area in which the rounds would collect would be considerably less than for HE or TP munitions. No leaching of heavy metals into the environment would occur using SRTA rounds.

Proposed flare use is discussed in Section 3.2.1.3 and 3.2.2.1 and detailed in Table 2.1-4. Specific flares to be used in the WMA, potentially including visible and other decoy flares, are undetermined at this time. When flares are deployed, the aluminum casings are generally retained in the aircraft but some flare debris may be deposited on the ground, including small amounts of plastic, nylon, copper, and steel from internal flare components (USAF Pacific Air Forces Command 2008). Constituents vary depending on the flare type, but may include magnesium, Teflon, white phosphorous and other materials of varying toxicity that produce varying heat signatures when ignited. Most flare constituents will burn completely in the air; the DOD requires greater than 99 percent flare ignition reliability, thus the less than 1 percent of flares that dud and do reach the ground would not contribute a significant amount of toxic materials to the environment (USAF 1997).

As described in Section 2.1.2.2, EOD personnel would conduct periodic range clean-up and maintenance, including a search throughout the target area for UXO including dud and partially detonated munitions and flares. For TP munitions, procedures for collection and inspection of ejected munitions casings and other range debris, demilitarization of these materials (if necessary), certification of the materials as inert, and recycling would be employed.

Although periodic range clearances would remove UXO, munition constituents would be deposited on the soil in the target areas. This residue includes RDX, TNT, and metals. Of these, TNT and metals tend to be generally insoluble and immobile in soils. RDX can migrate and enter in the water substrate (USEPA 2012). The terrain at both target areas is virtually flat with no slope at the southern target area (FW1) and a 3 ft slope draining to the south-southwest at the northern target area (IMP-A). Migration of munition constituents at detectable levels into water supplies would be unlikely because the amount of munition constituents available to be deposited would be minimized by the fact that most explode upon impact and the remainder are collected or destroyed by EOD personnel. This, coupled with the low slope of the terrain in the areas of the HE target, means that what little contaminants remain would stay very close to where the HE round landed. The volume of proposed annual munitions expenditures would be relatively low in comparison to other active DOD air-to-ground ranges where potential releases to the environment are successfully managed under the RSEPA program. The RSEPA initiative is aimed at sustaining operational readiness while assessing the potential risk to human health and the environment posed by DON ranges. The purpose of RSEPA is to support the sustainment of DON ranges by assessing and managing the present environmental condition of each land-based operational range under DON control where munitions were used, are used, and will continue to be used. The DON RSEPA process is a phased approach that provides a framework for informed decisions about when and how to proceed with a comprehensive assessment and protective measures, if necessary. The DON RSEPA process consists of range condition assessments, comprehensive range evaluations, and sustainable range oversight. Therefore, given the magnitude of the proposed action and DON management of operational ranges under the RESPA program, contamination from munition constituents under Alternative 1 would be less than significant.

Contaminated Sites. The alternative location for the untethered autonomous flight vehicle testing site is in proximity to Area H. Although the RI/FS determined that there was soil/sediment contamination at the site, it is unlikely that untethered autonomous flight vehicle testing would disturb onsite

soils/sediments or preferred remediation system and thus it is not likely that testing would increase the risk of contamination exposure or environmental transport (NASA 2004). Therefore, there is negligible risk to contaminated sites expected from implementation of Alternative 1.

3.9.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

Anticipated impacts for HM, HW, toxic substances, and contaminated sites would be primarily the same with Alternative 2 as those described for Alternative 1. However, as compared to Alternative 1, there would be a greater amount of military munitions management and range clearance requirements at the southern target area (FW1) as a greater volume of HE munitions would be delivered to this site and a lesser amount of these requirements at the northern target area (IMP-A) as requirements would relate to TP munitions only. Likewise, HE munitions constituents would not be delivered to IMP-A and thus a decreased risk of the presence and mobility of toxic substances in the environment would occur as compared to Alternative 1. As with Alternative 1, construction, certification, and sustainable range management procedures for the northern target area (IMP-A) would be established prior to commencing TP munitions delivery at this proposed target area under Alternative 2.

3.9.2.3 No Action Alternative

Under the No Action Alternative, all regulations and plans that pertain to HM, HW, toxic substances, and contaminated sites would continue to be followed. Thus, baseline conditions would persist under the No Action Alternative and no additional impacts are anticipated.

3.10 AIR QUALITY

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. A region's air quality is influenced by many factors including the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The significance of the pollutant concentration is determined by comparing it to the Federal and State ambient air quality standards. The Clean Air Act (CAA) and its subsequent amendments established the National Ambient Air Quality Standards (NAAQS) for what are commonly referred to as "criteria" pollutants. Criteria pollutants include:

- ozone,
- carbon monoxide (CO),
- nitrogen dioxide (NO_2),
- sulfur dioxide (SO_2),
- particulate matter less than 10 microns (PM_{10}),
- particulate matter less than 2.5 microns ($PM_{2.5}$), and
- lead

NAAQS represent the maximum allowable atmospheric concentrations that may occur while ensuring protection of public health and welfare, with a reasonable margin of safety. Short-term standards (1-, 8-, and 24-hour periods) are established for pollutants contributing to acute health effects. Long-term standards (quarterly and annual averages) are established for pollutants contributing to chronic health effects.

Areas that comply with NAAQS are designated as attainment areas. Areas that exceed ambient air quality standards are designated as non-attainment areas. Areas that have improved air quality from non-attainment to attainment are designated as attainment/maintenance areas. Areas that lack monitoring data to demonstrate attainment or non-attainment status are designated as unclassified and are treated as attainment areas for regulatory purposes.

3.10.1 Affected Environment

The affected environment for the air quality analysis for the proposed action is identified as the Mobile (Alabama) - Pensacola-Panama City (Florida) - Southern Mississippi Interstate Air Quality Control Region (AQCR) defined in 40 CFR § 81.68. This AQCR is classified as attainment/unclassifiable for all criteria pollutants (40 CFR 81.325). Because the entire AQCR is and has been in attainment for the criteria pollutants, General Conformity Rule requirements do not apply.

Hazardous Air Pollutants. In addition to the ambient air quality standards for criteria pollutants, national standards exist for hazardous air pollutants (HAPs), which are regulated under Section 112(b) of the 1990 CAA Amendments. The National Emission Standards for Hazardous Air Pollutants regulate HAP emissions from stationary sources (40 CFR Parts 61 & 63). Unlike the criteria pollutants, there are no NAAQS for HAPs. The primary control methodologies for these pollutants for mobile sources involves reducing their content in fuel and altering the engine operating characteristics to reduce the volume of pollutants generated during combustion. Because of the low levels of aircraft, rocket engine, expendable, and munition emissions of these pollutants in the ambient air below the mixing height (3,000 ft AGL), HAPs are not further evaluated in this EA.

> **Mixing height** is defined as the vertical region of the atmosphere where pollutant mixing occurs. Above this height, pollutants that are released generally do not mix with ground level emissions and do not have an effect on ground level concentrations in the project area. The default mixing height value for the United States is 3,000 ft AGL (USEPA 1992).

Regulatory Requirements – New Source Review and Prevention of Significant Deterioration. As part of the 1977 amendments to the CAA, Congress established the New Source Review (NSR) program. This program is designed to ensure that air quality is not significantly degraded from the addition of new and modified factories, industrial boilers, and power plants. In areas with unhealthy air, NSR assures that new emissions do not slow progress toward cleaner air. In areas with clean air, especially pristine areas like designated Class I areas (e.g., national parks), NSR assures that new emissions do not significantly deteriorate existing air quality.

Emissions associated with rocket engine test activities at SSC exceed the thresholds established for criteria pollutants in Title V of the CAA. Therefore, the facility is classified as a major source subject to Title V Operating Permit requirements. In addition, any modification to the facility must be evaluated to determine applicability of Prevention of Significant Deterioration (PSD) permitting regulations. In the event the increase in emissions is greater than or equal to the established significance levels or if the source is located within 100 kilometers of a Class I area and the impact would be greater than 1 microgram per cubic meter ($\mu g/m^3$) (24-hour average) in the Class I area, further evaluation is required. The nearest PSD Class I area is the Breton National Wildlife Area in Louisiana, which is located

approximately 49.7 miles from the test stand areas. SSC currently operates under Air Pollution Control Title V Permit to Operate Number 1000-00005 issued by MDEQ on December 5, 2012, and the Air Pollution Control Permit and PSD issued by MDEQ on August 6, 2007. All air pollution sources associated with rocket engine test activities are listed in the Title V Operating Permit. Total emissions from these sources are calculated on an annual basis for submission to the MDEQ. A spreadsheet is used to compile data required for calculation of air emissions from rocket engine test activities.

3.10.2 Environmental Consequences

The operations estimates input into the air emissions calculations can be referenced in Appendix F. As noted in Section 1.8, following the release of the Draft EA, the proposed airspace was reconfigured slightly as a result of the aeronautical study efforts that occurred parallel with the EA process. Specifically, R-4403D was eliminated/combined with R-4403C, and the estimates for operational use of airspace were reduced. As the airspace configuration would not warrant a change in air emissions parameters and the reduced operational estimates would correspond with a reduction in overall air emissions, DON and NASA have determined that these changes do not warrant revision of the air quality calculations as conducted in the Draft EA. Consequently, the air analysis provides a conservative estimate of potential effects to air quality given the reduction in proposed operations analyzed in the Final EA (see Table 2.1-2).

The primary air quality issue associated with the proposed action is mobile source emissions associated with aircraft operations. Other components of the proposed action include rocket engine testing and the use of munitions in the restricted airspace. UAS emissions are not included in the air quality analysis because the UAS types are primarily battery-powered and because the level of operations would not be expected to differ from appreciably from the baseline in terms of air quality emissions. Baseline (2013) SSC airspace operations consist of approximately 160 sorties conducted annually by DOD aircraft (non-UAS) using the existing airspace (see Table 2.1-2), including operations within the mixing height. In addition to aircraft operations, the baseline conditions analysis includes 17 rocket engine tests for the J-2X as a representative rocket engine type.

Although there would be emissions from construction equipment to establish the northern target area, southern target area, and sensor training area, these emissions would be minimal and temporary in nature, and thus are not further considered in this analysis.

The smoke produced by flares is too small to create a concern with respect to NAAQS compliance. Some flares are ejected by pyrotechnic devices or contain first fire mixtures or initiation devices that contain chromium and/or lead compounds. Both chromium and lead are listed as hazardous air pollutants under the CAA. The results of health screening assessments for flare use determined that up to 67,000 flares can be released in a peak hour, and, for a typical target area of 10,000 acres, 220,000 flares could be released annually without significantly increasing short- or long-term health risks from hexavalent chromium or lead (Air Force 1997). Given the comparatively small number of flares anticipated to be released annually under the proposed action (58,600; see Table 2.1-4), emissions from the proposed release of flares was not quantified.

Air quality impacts were reviewed for significance in light of Federal air pollution standards and regulations. Potential air quality impacts include increases of ambient air pollution concentrations above the NAAQS or 250 tons per year for any criteria pollutant. Because the proposed action would occur in an area that is in attainment for all criteria pollutants, the "major stationary source" definition (250 tons per year or more of any air pollutant subject to regulations under the CAA) from the PSD program was selected as a comparative measure. The PSD threshold is used to assess mobile source emissions in locations that are in attainment and determine the potential significance of air quality impacts. The 250 tons per year threshold is solely for the purpose of informing the public and decision-makers about the relative air quality impacts from the proposed action as compared to the baseline condition under NEPA requirements.

3.10.2.1 Alternative 1: Preferred Alternative

In order to analyze the potential impacts to air quality from implementation of Alternative 1, the following estimates of emissions within the proposed airspace were quantified:

- estimated aircraft operations that would occur below the mixing height for a portion of the sortie duration;
- air-to-ground delivery of HE and inert munitions (conservatively estimated by applying the largest emission factors among these proposed munitions to all munition types); and
- testing of the J-2X rocket engine as a representative rocket engine type.

Table 3.10-1 presents the estimated emissions that would occur with implementation of Alternative 1 as compared to baseline operations emissions (as applicable).

Table 3.10-1. Comparison of Estimated Baseline and Alternative 1 Air Emissions (tons/yr)

Baseline	**VOCs**	**CO**	**NO_x**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
J-2X Static Engine Tests	0.00	0.00	4.00	0.00	0.00	0.00
Rotary-wing Aircraft	0.19	0.89	1.11	0.35	0.50	0.50
Fixed-wing Aircraft	0.00	0.02	0.14	0.03	0.04	0.04
Total	*0.20*	*0.90*	*5.25*	*0.38*	*0.54*	*0.54*
Proposed	**VOCs**	**CO**	**NOx**	**SO2**	**PM10**	**PM2.5**
J-2X Static Engine Tests	0.00	0.00	4.00	0.00	0.00	0.00
Rotary-wing Aircraft	0.39	1.76	2.25	0.71	1.00	1.00
Fixed-wing Aircraft	0.01	0.17	3.28	0.52	0.42	0.42
Munitions	[1]ND	12.33	0.25	[1]ND	0.87	0.46
Total	*0.39*	*14.26*	*9.78*	*1.23*	*2.29*	*1.89*
Net Change	**0.20**	**13.36**	**4.53**	**0.85**	**1.75**	**1.35**
Comparative Threshold	250	250	250	250	250	250
Exceedance?	No	No	No	No	No	No

Notes: VOC = volatile organic compound; CO = carbon dioxide; NO_x = nitrogen oxides; SO_2 = sulfur dioxide; PM_{10} = particulate matter less than 10 microns; $PM_{2.5}$ = particulate matter less than 2.5 microns
[1]Not determined
Sources: USEPA 2008, 2009.

In addition to the quantified emissions, emissions from the detonation of munitions, in particular the HE munitions (25mm to 105mm HE rounds) could generate additional particulate matter suspended in the air. Much of the dust generated from the detonation event and physical impact would be expected to settle within relative proximity of the detonation site. However, depending on the specific climate conditions (wind, humidity) at the time of detonation, some fugitive dust could migrate beyond the target areas. It is impossible to quantify the amount of fine fugitive dust that could migrate during any period of detonation. The total quantity of HE rounds estimated for use per year is just under 60,000. The vast majority (50,000) of these expenditures would involve the smaller 25mm HE round, which would generate the least amount of particulate matter suspension upon impact. Thus, the limited number of sizeable rounds and the overall restricted number of HE rounds is unlikely to have a significant impact as a result of any fugitive dust plume migration to populated areas that would primarily be south and east of the target areas.

The results of the analysis indicate that while there are small emission increases anticipated for all criteria pollutants, none of them approach the comparative threshold of 250 tons per year and, therefore, are considered to be a minor impact.

3.10.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

The anticipated impacts to air quality associated with Alternative 2 would be similar to those described for Alternative 1. Because munitions were conservatively estimated using the highest emission factors, there is no quantitative analysis of the difference in emissions as compared to Alternative 1.

3.10.2.3 No Action Alternative

Under the No Action Alternative, baseline air quality conditions would continue. Air emissions from aircraft and rocket engine testing would be expected to remain at similar levels and no additional impacts to air quality beyond those that currently exist would be anticipated.

3.11 BIOLOGICAL RESOURCES

Biological resources include native or naturalized plants and animals and the habitats in which they occur. Biological resources discussed in this EA include vegetation, wildlife, aquatic/wetland habitats, and sensitive species (i.e., Federally- and State-listed threatened or endangered species and their critical habitat). Biological resources are managed according to the *John C. Stennis Space Center Environmental Resources Document* (2013); *Naval Construction Battalion Center Gulfport Stennis Western Maneuver Stennis Space Center, Mississippi, Integrated Natural Resources Management Plan* (2011); and the *Integrated Natural Resources Management Plan for NASA John C. Stennis Space Center, Mississippi* (2010), as discussed under the appropriate subheadings below.

3.11.1 Affected Environment

The affected environment for biological resources is defined by the limits of proposed airspace and its terrestrial footprint. Specifically, the affected environment focuses on potential impacts to biological resources located: in or around the site of proposed rocket engine testing (Test Stand A1) and the untethered autonomous flight vehicle testing sites in the Fee Area, proposed munitions target areas in the WMA (i.e., FW1 and IMP-A), areas within the WMA of existing training operations where additional

operations would occur (RZs 1, 2, 4, and 6 and the HLZs), and the proposed sensor training area (FW2) located in the northeastern portion of the Buffer Zone. Although the proposed action would also increase mission tempo at the existing SARC Sniper Tower, existing operations in these areas have already been analyzed for their potential effects to biological resources and thus are not further analyzed in this document (DOD and DON 2014).

Vegetation. The affected environment is dominated by temperate flooded and swamp and freshwater aquatic vegetation communities. Other typical vegetation communities found within the affected environment include herbaceous agricultural vegetation (pasture/hay), freshwater aquatic vegetation (Eastern North American freshwater aquatic vegetation), warm temperate forest (South Eastern North American ruderal [first to colonize disturbed lands] forest and plantation), temperate flooded and swamp (Southern floodplain hardwood forest), recently disturbed or modified (harvested forest – grass/forb [wildflower] regeneration), and open water (USGS National Gap Analysis Program 2011, Gulf South Research Corporation [GSRC] 2012).

The temperate flooded and swamp community in the affected environment consists primarily of pine flatwood savannah and pitcher plant (*Sarracenia* sp.) bogs. Pine flatwoods contain slash pine (*Pinus elliottii*), baldcypress (*Taxodium distichum*), loblolly pine (*Pinus taeda*), swamp tupelo (*Nyssa biflora*), red maple (*Acer rubrum)*, and sweet gum (*Liquidambar styraciflua*), with some species of oak (*Quercus* spp.) found in areas of higher elevation and better drainage. The understory is dominated by holly (*Ilex opaca*), yaupon (*Ilex vomitoria*), wax myrtle (*Myrica cerifera*), grasses, and cane (*Arundinaria gigantea*). Pitcher plant bogs are unique to the southeastern United States and are characterized by a limited number of mature trees, typically cypress or longleaf pine (*P. palustris*). The longleaf pine and grasses depend on frequent fires that prevent establishment of other vegetation types. Orchids (*Orchideaceae*), sundews (*Drosera* sp.), pitcher plants, pipeworts (*Eriocaulon* sp.*)*, and yellow-eyed grass (*Xyris* sp.) are supported in this environment. Not as prevalent, but still found within the temperate flooded and swamp community are bottomland hardwoods and grasslands. Bottomland hardwood areas tend to have standing water and are dominated by black gum (*Nyssa sylvatica*), swamp tupelo, and pond cypress (*Taxodium ascedeus*) with the following understory species: green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), red maple, poison ivy (*Toxicodendron radicans*), and honeysuckle (*Lonicera japonica*) with few grass or forb species. Like the bogs, grasslands also occur where there are frequent fires, or where there has been disturbance. Common grassland species include panic grass (*Panicum virgatum*), cane, rushes (*Juncus* spp.), pipeworts, and sedges (*Carex* spp.) (MSU 2010).

The freshwater aquatic vegetation community found in southwestern Mississippi supports a large diversity of plants, dominated by maidencane (*Panicum hemitomon*), sawgrass (*Cladium jamaicense*), bulltongue arrowhead (*Sagittaria lancifolia*), duck potato (*Sagittaria latifolia*), pickerelweed (*Pontederia cordata*), spikerush (*Eleocharis palustris*), and alligator weed (*Alternanthera philoxeroides*) (Manlove *et al.* 2002).

Wildlife. The wetland communities described above appear to be limited in their ability to support wildlife in the ROI because management practices include monotypic pine plantations and fire suppression, and because areas currently impacted by engine testing preclude nesting and roosting by birds (Blotzer 2007, USACE 2012). However, the variety of vegetation communities found in the ROI has

resulted in many documented amphibian, reptile, mammal, and bird species. This includes 20 frog species, 14 snake species, alligators, Virginia opossum (*Didelphis virginiana*), shrews (*Soricidae* sp.), cottontail and swamp rabbits (*Sylvilagus floridanus* and *S. aquaticus)*, cotton mice and deer mice (*Peromyscus gossypinus* and *Peromyscus maniculatus*), nutria (*Myocastor coypus*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*).

The Pearl River Wildlife Management Area, located in St. Tammany Parish, Louisiana, is west of and directly adjacent to the RZs in the WMA. Game species hunted here include white-tailed deer, squirrels (*Sciuridae sp.)*, rabbits, waterfowl, snipe (*Gallinago gallinago*), and woodcock (*Scolopax minor)*. In addition, trapping is permitted for beaver (*Castor canadensis)*, nutria, mink (*Neovision vison*), muskrat (*Ondatra zibethicus*), opossum, raccoon, coyote (*Canis latrans*), and bobcat (*Lynx rufus*); an alligator season is available on a bid or lottery contract basis (LADWF 2014).

Birds are common and numerous in the ROI as the area is located within the Mississippi Flyway. The Migratory Bird Treaty Act established Federal responsibilities for protecting nearly all migratory species of birds, eggs, and nests. For military readiness activities, DOD installations are exempt from incidental taking of migratory birds, pursuant to the USFWS Final Rule *Migratory Bird Permits; Take of Migratory Birds by the Armed Forces* (72 Federal Register 8931-8950). Congress defined military readiness activities as all training and operations of the U.S. Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. However, if any of the Armed Forces determine that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species, they must confer and cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects. An activity has a significant adverse effect if, over a reasonable period of time, it diminishes the capacity of a population of a migratory bird species to maintain genetic diversity, to reproduce, and to function effectively in its native ecosystem.

Bird migration is defined as the periodic seasonal movement of birds from one geographic region to another, typically coinciding with available food supplies or breeding seasons. In addition, there are also Birds of Conservation Concern present in the ROI. Birds of Conservation Concern are species, subspecies, and populations of migratory and nonmigratory birds that the USFWS determined to be the highest priority for conservation actions. The purpose of the Birds of Conservation Concern list is to prevent or remove the need for additional Endangered Species Act (ESA) bird listings by implementing proactive management and conservation actions needed to conserve these species. According to the USFWS's *2008 Birds of Conservation Concern*, there are 53 species located in the Southeastern Coastal Plan (USFWS 2008). Both migratory birds and Birds of Conservation Concern are managed under the Migratory and Resident Bird Program, as described in the SSC INRMP (MSU 2010). Of the approximate 119 migratory and nonmigratory bird species that have been found on SSC and WMA lands during surveys, 17 species are considered Birds of Conservation Concern (Table 3.11-1).

Table 3.11-1. Birds Potentially Present within Region of Influence

Common Name	Scientific Name
Acadian flycatcher	*Empidonax virescens*
American coot	*Fulica americana*
American crow	*Corvus brachyrhynchos*
American goldfinch	*Carduelis tristis*
American kestrel	*Falco sparverius*
American redstart*	*Setophaga ruticilla*
American robin	*Turdus migratorius*
American swallow-tailed kite	*Elanoides forficatus*
American woodcock	*Philohela minor*
Bachman's sparrow*	*Aimophila aestivalis*
Bald eagle*	*Haliaeetus leucocephalus*
Barn swallow	*Hirundo rustica*
Barred owl	*Strix varia*
Belted kingfisher	*Ceryle alcyon*
Black vulture	*Coraglypus atratus*
Black-billed cuckoo	*Coccyzus erythropthalmus*
Black-throated green warbler*	*Dendroica virens*
Blue grosbeak	*Passerina caerulea*
Blue jay	*Cyanocitta cristata*
Blue-gray gnatcatcher	*Polioptila caerulea*
Blue-headed vireo	*Vireo solitaries*
Broad-winged hawk	*Buteo platyperus*
Brown thrasher	*Toxostoma rufum*
Brown-headed cowbird	*Molothrus ater*
Brown-headed nuthatch*	*Sitta pusilla*
Canada warbler	*Wilsonia canadensis*
Carolina chickadee	*Parus carolinensis*
Carolina wren	*Thyrothorus ludovicianus*
Cedar waxwing	*Bombycilla cedrorum*
Chimney swift	*Chaetura pelagica*
Chipping sparrow	*Spizella passerina*
Chuck-will's-widow*	*Caprimulgus carolinensis*
Common grackle	*Quiscalus quiscula*
Common nighthawk	*Chordeiles minor*
Common snipe	*Gallinago*
Common yellowthroat	*Geothlypis trichas*
Cooper's hawk	*Accipiter cooperii*
Dark-eyed junco	*Junco hymalis*
Downy woodpecker	*Picoides pubescens*
Eastern bluebird	*Sialia sialis*

Common Name	Scientific Name
Eastern kingbird	*Tyrannus*
Eastern meadowlark	*Sternella magna*
Eastern pewee	*Contopus virens*
Eastern phoebe	*Sayornis phoebe*
European starling	*Sturnus vulgaris*
Field sparrow	*Spizella pusilla*
Fish crow	*Corvus ossifragus*
Golden-crowned kinglet	*Regulus satrapa*
Grasshopper sparrow	*Ammodramus savannarum*
Gray catbird	*Dumetella carolinensis*
Great blue heron	*Ardea herodias*
Great egret	*Casmerodius albus*
Great horned owl	*Bubo virginianus*
Great-crested flycatcher	*Myiarchus crinitus*
Green heron	*Butorides striatus*
Hairy woodpecker	*Picoides villosus*
Henslow's sparrow*	*Ammodramus henslowii*
Hermit thrush	*Catharus guttatus*
Hooded warbler	*Wilsonia citrina*
House wren	*Troglodytes aedon*
Indigo bunting	*Passerina cyanea*
Kentucky warbler*	*Oporornis formosus*
Killdeer	*Charadrius vociferus*
Least tern*	*Sternula antillarum*
Leconte's sparrow*	*Ammospiza leconteii*
Little blue heron	*Egretta caerulea*
Loggerhead shrike*	*Lanius ludovicianus*
Merlin	*Falco columbarius*
Mississippi kite	*Elanoides mississippiensis*
Mourning dove	*Zenaida macroura*
Nashville warbler	*Vermivora ruficapilla*
Northern bobwhite	*Colinus virginianus*
Northern cardinal	*Cardinalis*
Northern flicker	*Colaptes auratus*
Northern harrier	*Circus cyaneus*
Northern mockingbird	*Mimus polyglottus*
Northern parula	*Parula americana*
Northern rough-winged swallow	*Stelgydopterix serripennis*
Orange-crowned warbler	*Vermivoa celata*
Orchard oriole	*Icterius spurius*
Palm warbler	*Dendroica palmarum*
Pileated woodpecker	*Dryocopus pileatus*

Common Name	Scientific Name
Pine warbler	*Dendroica pinus*
Prairie warbler*	*Dendroica discolor*
Prothonotary warbler*	*Protonotaria citrea*
Purple gallinule	*Porphyrula martinica*
Purple martin	*Progne subis*
Red-bellied woodpecker	*Melanerpes carolina*
Red-eyed vireo	*Vireo olivaceus*
Red-headed woodpecker*	*Melanerpes erythrocephalus*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Rose-breasted grosbeak	*Pheucticus ludovicianus*
Ruby-crowned kinglet	*Regulus calendula*
Ruby-throated hummingbird	*Archilochus colubris*
Rufous-sided towhee	*Pipilo erythrophthalmus*
Savannah sparrow	*Passerculus sandwichensis*
Scarlet tanager	*Piranga olivacea*
Sedge wren*	*Cistothorus platensis*
Sharp-shinned hawk	*Accipiter striatus*
Solitary vireo	*Vireo solitarius*
Song sparrow	*Melospiza melodia*
Summer tanager	*Piranga rubra*
Swainson's warbler*	*Limnothlypis swainsonii*
Swamp sparrow	*Melospiza georgiana*
Tufted titmouse	*Parus bicolor*
Turkey vulture	*Cathartes aura*
White ibis	*Eudocimus albus*
White-eyed vireo	*Vireo griseus*
White-throated sparrow	*Zonotrichia albicollis*
Wild turkey	*Meleagris gallopavo*
Wood duck	*Aix sponsa*
Wood thrush*	*Hylocicla mustelina*
Yellow-billed cuckoo	*Coccyzus americanus*
Yellow-breasted chat	*Icteria virens*
Yellow-rumped warbler	*Dendroica coronata*
Yellow-throated vireo	*Vireo flavifrons*
Yellow-throated warbler	*Dendroica dominica*

Note: *Birds of Conservation Concern
Sources: GSRC 2012; MSU 2010; USFWS 2008

Aquatic/Wetland Habitats. This section describes the biological resource values of aquatic/wetland habitats. Wetlands as a protected water resource are further discussed in Section 3.13. Primary aquatic habitats in the Fee Area and surrounding Buffer Zone area include man-made impoundments and canals, sewage treatment lagoons, forested wetlands and swamps, marshes, rivers and streams, wet pine savannahs, and temporary pools (vernal and ephemeral pools in forests and savannahs) (MSU 2010). These habitats support a large diversity of plants and wildlife. Native aquatic plants can include pondweeds (*Potamogeton* spp.), duckweeds (*Lemna and Spirodella* spp.), water naiad (*Najas* spp.), watershield (*Brasienia shreberii*), water lilies (*Nelumbo, Nymphea* spp.), and frogbit (*Limnobium spongia*). Emergent species that provide littoral zone and shoreline food and cover include lizard's tail (*Saururus cernuus*), sedges (*Carex, Rhynchospora, Cyperus, Scirpus, and Eleocharis),* arrowleaf (*Sagittaria* spp.*),* rushes (*Juncus spp.*), button bush (*Cephalanthus occidentalis*), and grasses (*Panicum* spp.) (MSU 2010).

Wetlands on the WMA consist of riverine wetlands, large tracts of palustrine forested wetlands, and smaller isolated palustrine forested and emergent wetlands. Three aquatic habitat types exist within the WMA including rivers and streams, ponds, and abandoned mines (DON 2011). The streams and alluvial floodplains of Stennis WMA are part of the lower East Pearl River system. The East Pearl River, Mike's River, and McCarty Bayou provide important habitat for a variety of aquatic and semi-aquatic species. The lower reaches of the East Pearl River, south of the Stennis WMA, are designated as Essential Fish Habitat (EFH) for numerous marine and estuarine species (DON 2011).

Artificial lakes on the WMA are associated with the abandoned open surface mines that were subsequently filled by rain and groundwater. These areas vary greatly in size and depth; some presumably support stable populations of game fish, while others are barren (i.e., void of vegetation), quite turbid, and seem to support no stable biological community. Some of the more shallow open water areas tend to attract wading and shore birds, as well as numerous species of waterfowl during the winter migration. However, some are partially to completely vegetated and provide an emergent wetland habitat. Beaver ponds occur sporadically throughout the WMA and provide valuable and diverse habitat that supports many species of reptiles, amphibians, waterfowl, and mammals. Depending on the age and size of the beaver pond, fishes can establish sustainable populations within the ponds as well (DON 2011).

Approximately 125 acres, or 4 percent, of the WMA's 3,483 acres consists of abandoned aggregate mines. Isolated pockets of vegetation occur within the abandoned mine areas, consisting of pine (*Pinus* spp.), waxmyrtle (*Morella cerifera*), Japanese honeysuckle (*Lonicera japonica*), red maple, blackberry (*Rubus* spp.), and various grasses and forbs. Within some of the older abandoned mines, emergent wetland communities have become well-established, especially around the perimeter of the mines (DON 2011).

Sensitive Species. A list of Federally- and State-listed threatened or endangered species that may occur within Hancock County and/or St. Tammany Parish, along with the species' potential to occur in the ROI are listed in Table 3.11-2.

Occurrences are classified as "Slight" when a species has been found in the area but has been limited to a specific portion of the potential occurrence area and as "Unlikely" when a species is not likely to be found in the area but the area may contain potential habitat or be within the general range for the species. "Potentially" is used to describe a species identified as potentially occurring within the ROI, but the degree of likelihood has not been determined.

Historically, the gopher tortoise (*Gopherus Polyphemus*), eastern indigo snake (*Drymarchon corais couperi*), red-cockaded woodpecker (*Picoides borealis*), Louisiana black bear (*Ursus americanus luteolus*), and Louisiana quillwort (*Isoetes louisianensis*) have been found at the Fee Area and surrounding areas; however, it is not believed these Federally listed endangered or threatened species are currently present in this area, but may be present in adjacent properties or the WMA. Surveys conducted by the University of Mississippi and MSU have not detected the presence of any Federally threatened or endangered species within the Fee Area, including the Louisiana black bear, Eastern indigo snake, gopher tortoise, or red-cockaded woodpecker. Another formal survey is planned to be conducted in the next year or so to determine presence of any threatened and/or endangered species (MSU 2010). For the purposes of this EA, the Louisiana black bear and wood stork (*Mycteria americana*) have been documented in adjacent areas and are considered transients (MSU 2010).

Table 3.11-2. Potential Occurrence of Special Status Species within the Region of Influence

Common Name	Scientific Name	Status* Federal ESA/MS/LA	MS County/ LA Parish Listed	Potential Occurrence
FEDERALLY LISTED				
Mammals				
Louisiana black bear	*Ursus americanus luteolus*	T/E/T	Hancock/-	Likely (tracts of heavily wooded bottomland hardwoods and swamps).
Reptiles				
American alligator	*Alligator mississippiensis*	SAT/-/-	NA	Common; however, the species of similar appearance is the American crocodile, which does not occur within the ROI. Therefore, the American alligator is not discussed further.
Ringed map turtle	*Graptemys oculifera*	T/E/T	Hancock/ St. Tammany	Likely (occurs on the East Pearl River and Mike's River and uncommon but occasionally observed on the abandoned gravel pits in the WMA; prefers rivers with moderate currents, a lot of basking sites, and nests on sand bars).
Gopher tortoise	*Gopherus polyphemus*	T/E/T	Hancock/ St. Tammany	Slight (extreme northeast portion of WMA; inhabits well-drained sandy soils, especially in low-growing vegetation areas of longleaf pine).
Eastern indigo snake	*Drymarchon corais couperi*	T/E/-	Hancock/-	Unlikely (varied habitats near streams and marshes; known to occupy gopher tortoise burrows).
Amphibians				
Dusky gopher frog	*Rana sevosa*	E/E/-	-/ St. Tammany	Slight (extreme northeast portion of WMA; inhabits upland sandy habitats historically forested with longleaf pone and isolated, ephemeral wetland breeding sites).
Birds				
Bald eagle*	*Haliaeetus leucocephalus*	BGEPA/E/E	Hancock/-	Likely (nests in transitional area between forest and water).
Red-cockaded woodpecker	*Picoides borealis*	E/E/E	Hancock/ St. Tammany	Slight (extreme northeast portion of WMA; nests in cavities of mature longleaf pine forests and mixed pine-upland hardwood forests [60+ years old] and foraging habitats consisting of 30+ years old pine stands).
Piping plover	*Charadrius melodus*	T/E/T-E	Hancock/-	Unlikely (inhabits wash zones; intertidal ocean beach; wrack lines; washover passes; mud, sand, and algal flats; and shorelines of streams, ephemeral ponds, lagoons, and salt marshes).
Wood Stork	*Mycteria americana*	T/E/-	NA	Unlikely (Uncommon seasonal migrant).
Bachman's Warbler	*Vermivora bachmanii*	E/E/E	NA	Unlikely (breeds in timbered bottomland swamps with pools of still water).

Table 3.11-2. Potential Occurrence of Special Status Species within the Region of Influence

Common Name	Scientific Name	Status* Federal ESA/MS/LA	MS County/ LA Parish Listed	Potential Occurrence
Red Knot	*Calidris canutus rufa*	E/	Hancock County	Unlikely (inhabits wash zones; intertidal ocean beach; wrack lines; washover passes; mud, sand, and algal flats; and shorelines of streams, ephemeral ponds, lagoons, and salt marshes).
Fish				
Gulf sturgeon	*Acipenser oxyrhynchus desotoi*	T/E/T	Hancock/ St. Tammany	Likely (most commonly inhabits the Pearl, Bogue Chitto, and Tchefuncte rivers). Pearl River is designated critical habitat.
Pearl darter	*Percina aurora*	C/E/-	-/St. Tammany	Unlikely (prefers firm gravel substrate and sandstone exposures).
Invertebrates				
Inflated heelsplitter	*Potamilus inflatus*	T/E/T	Hancock/ St. Tammany	Unlikely (inhabits riffle and shoal areas with stable bottoms within the Pearl River basin).
Plants				
Louisiana quillwort	*Isoetes louisianensis*	E/-/	Hancock/ St. Tammany	Unlikely (inhabits small shallow streams with scour channels or in very wet habitats).
STATE-LISTED				
Reptiles				
Rainbow Snake	*Farancia erytrogramma*	-/E/-	Hancock/ St. Tammany	Potentially (found in a variety of aquatic habitats but are most common in cypress swamps and flowing-water habitats such as blackwater creeks, streams, and rivers).
Southern hognose snake	*Heterodon simus*	-/E/-	Hancock/-	Unlikely (although it prefers sandy soil habitats, is generally considered extirpated in MS).
Fish				
Crystal Darter	*Crystallaria asprella*	-/E/-	Hancock/-	Potentially (occurs in clean sand and gravel runs of small to medium rivers; historically inhabited the Pearl River).
Ironcolor Shiner	*Notropis chalybaeus*	-/E/-	Hancock/-	Potentially (common through parts of the Mississippi River to the Gulf of Mexico and along lower Gulf Coast; inhabits small to moderate-sized streams that drain pine woodlands)

Notes: - = not listed, BGEPA = Bald and Golden Eagle Protection Act, C = Candidate, E = Endangered, NA – not applicable, SAT = similarity of appearance (threatened), T = Threatened, T-E = Threatened-Endangered.

Sources: DON 2011; MSU 2010; USFWS 2010; USFWS 2014a; Mississippi Department of Wildlife, Fisheries, and Parks 2011, 2014; LADWF 2014.

GSRC performed neo-tropical migratory bird; rare, threatened, and endangered species; and invasive species surveys at the WMA from July 2010 through October 2011 (GSRC 2012). The primary species of concern that have the potential to occur on the WMA include the Louisiana black bear, Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), and ringed map turtle (*Graptemys oculifera*). In addition, there is a slight potential for the gopher tortoise, dusky gopher frog (*Rana sevosa*), and red-cockaded woodpecker to occur in the extreme northeastern portion of the WMA (DON 2011). Therefore, for the purpose of this EA, analysis focuses on the Louisiana black bear, red-cockaded woodpecker, wood stork, ringed map turtle, gopher tortoise, dusky gopher frog, and Gulf sturgeon. In addition, a discussion on the bald eagle (*Haliaeetus leucocephalus*) is included as it remains protected and is likely to occur.

Louisiana Black Bear. The Louisiana black bear is one of 16 recognized subspecies of the American black bear (USFWS 2014b). This bear is distinguishable from other black bears because it possesses a skull that is longer, more narrow, and flat (USFWS 2014c). Optimum habitat for Louisiana black bears consists of hardwood forested habitats that contain a diversity and abundance of food items such as beetles and other insects, carrion (occasionally), and soft mass such as blackberry, grape, red mulberry, sassafras, and persimmons (USFWS 2014b). Black bears do not truly hibernate, but go through a period of dormancy termed "carnivoran lethargy;" however, in warmer climates, bears can remain active all winter. Bear den in heavy cover or tree cavities and generally den from December through June.

At SSC, reported sightings are investigated and confirmed sightings are reported to USFWS and Mississippi Department of Wildlife, Fisheries, and Parks. In addition, SSC maintains forested streamside corridors, bottomland hardwood forests, and retention of older-age-class trees for food and den production. Searches for bear signs, including scat, den sites, and tracks, is a component of SSC threatened and endangered species surveys (MSU 2010). During the fall 2010 survey, a biologist found potential Louisiana black bear scat on the WMA (GSRC 2012). For the purposes of this EA, the Louisiana black bear is considered likely to occur within the Buffer Zone and within the WMA. Critical habitat has been designated for this species in Avoyelles, Catahoula, Concordia, East Carroll, Franklin, Iberia, Iberville, Madison, Pointe Coupee, Richland, St. Martin, St. Mary, Tensas, West Carroll, and West Feliciana Parishes in Louisiana; these areas are all located outside the ROI (USFWS 2014c).

Red-cockaded Woodpecker. This species is a rather small black-and-white woodpecker with a longish bill (USFWS 2014d). This species nests in cavities of mature longleaf pine forests and mixed pine-upland hardwood forests (60 or more years old), and foraging habitats consist of 30-years-or-more old pine stands. Surveys conducted by the University of Mississippi and MSU have not detected the presence of any red-cockaded woodpeckers within the Fee Area (MSU 2010). Furthermore, this species is not listed as occurring within Hancock County, but is listed as occurring in adjacent St. Tammany Parish (USFWS 2010, 2014a). While this species has not been detected within the Fee Area during surveys, the WMA INRMP EA and Endangered, Threatened, and Rare Species Survey Report noted the presence of marginal habitat within the extreme northeastern portion of the WMA (GSRC 2012, DON 2011). No critical habitat has been designated for this species (USFWS 2014d).

Wood Stork. Wood storks are large, long-legged wading birds, about 50 inches tall with a wingspan of 60 to 65 inches (USFWS 2014e). On December 26, 2012, the USFWS published a proposed rule and petition finding to reclassify the continental U.S. breeding population of wood stork from endangered to

threatened (USFWS 2013). Wood storks are frequently observed along the western border of Mississippi and may occur almost anywhere there are sloughs or swamps that provide habitat for feeding. Freshwater wetlands would be primary habitats frequented by wood storks in the area, and this species is considered a transient on the Fee Area and Buffer Zone (MSU 2010). Wood storks are unlikely to occur on the WMA (DON 2011). Furthermore, this species is not listed as occurring within Hancock County or in adjacent St. Tammany Parish (USFWS 2010, 2014a). No critical habitat exists for this species (USFWS 2014e).

Ringed Map Turtle**.** The ringed map turtle is small; males grow to 3.9 inches and females grow to 7.1 inches. Each shield of its carapace has a yellow ring bordered inside and a dark olive-brown ring bordered outside (USFWS 2014f). This species prefers river stretches with moderate currents, basking sites, and nests on sand bars (DON 2011). This species is unlikely to occur within the Fee Area, but it is commonly observed along the East Pearl and Mike's rivers on the WMA; this species is also occasionally observed on the abandoned gravel pits in the WMA (MSU 2010, DON 2011). This species is listed as occurring within Hancock County and in adjacent St. Tammany Parish (USFWS 2010 and 2014a). No critical habitat exists for this species (USFWS 2014f).

Gopher Tortoise. Gopher tortoise are burrowing turtles that inhabit well-drained sandy substrates that are adequate for nesting, burrow construction, and foraging. Open canopy habitats in grasslands and pine forests with abundant understory vegetation are ideal habitats. Soils present on SSC that could support tortoises include, but are not limited to Eustis, Lucedale, Malbis, McLaurin, Poarch, Ruston, and Smithdale soil types. No gopher tortoises or active burrows have been detected on SSC since 1998; however, earlier records indicate that tortoises historically occurred within the Fee Area at the north edge and central area of the Fee Area during surveys in 1988, 1991, and 1994 (SSC 2013, MSU 2010). Gopher tortoise surveys were conducted in 2011 and many burrows were observed within the deep sand areas of the WMA; however, the burrows were not determined to be utilized by special status species (GSRC 2012). Therefore, this species may potentially occur on the WMA; however, the possibility is slight (DON 2011).

Dusky Gopher Frog. This species inhabits upland sandy habitats historically forested with longleaf pine and isolated, ephemeral wetland breeding sites (DON 2011). While this species is not likely to occur in the Fee Area, there is slight possibility of occurrence in the extreme northeastern portion of the WMA (MSU 2010, DON 2011). USFWS designated critical habitat for the dusky gopher frog in July 2012. Specifically, critical habitat includes approximately 1,544 acres in St. Tammany Parish, Louisiana and approximately 4,933 acres in Forest, Harrison, Jackson, and Perry counties, Mississippi. In St. Tammany Parish, the critical habitat includes five isolated ephemeral wetlands similar to ponds where dusky gopher frogs currently breed in Mississippi (USFWS 2012). The designated critical habitat is located outside of the ROI.

Gulf Sturgeon. Gulf sturgeon are known to occur in the East Pearl River and are therefore likely to occur on the WMA and in other connected riverine systems throughout the buffer zone (GSRC 2012). This species has not been detected within the Fee Area during any surveys, and its presence there is considered unlikely (MSU 2010). Critical habitat has been designated as 14 geographic areas among the Gulf of Mexico rivers and tributaries including the Pearl River, which forms the eastern boundary of the

WMA. The Pearl River is a spawning river for the Gulf sturgeon (traveling upstream February through June and traveling downstream September through November) as is adjacent estuarine areas in Mississippi (National Marine Fisheries Service [NMFS] 2003).

Bald Eagle. On 9 August 2007, the USFWS determined that the bald eagle, once listed as threatened, had sufficiently recovered to warrant its removal from the Federal list of threatened and endangered species. However, the bald eagle remains protected from incidental take under the Federal Bald and Golden Eagle Protection Act. Bald eagles are considered a water-dependent species typically found near estuaries, large lakes, reservoirs, major rivers, and some seacoast habitats. Their distribution is influenced by the availability of suitable nest and perch sites near large open water bodies, typically with high amounts of water-to-land edge. The nesting season for this species (in the southeast) is from October to May. Bald Eagles have been documented along the Pearl River and on Endeavor Boulevard (located on the western side of the Fee Area) (USFWS 2010). Surveys to locate and document nests or resident birds are a component of threatened and endangered species surveys (MSU 2010). For the purposes of this EA, it is assumed bald eagles are likely to occur on SSC and the WMA.

3.11.2 Environmental Consequences

The impact analysis addresses potential effects to vegetation, wildlife, aquatic/wetland habitats, and sensitive species (i.e., species protected by Federal or local law) as a result of NASA and DOD operational activities within or adjacent to the ROI. Operational impacts are those related to the use of the proposed R-4403A, B, C, E, and F airspace and air-to-ground munitions impact and sensor training areas, as well as increased tempo of use at existing HLZs and RZs. For the purposes of this EA analysis, the following assumptions were made regarding the physical impacts that would occur with the development:

- the 5-acre munitions target areas would be completely disturbed (see Section 2.1.2.2),
- an acre of total disturbance for the installation of two access spur roads at the southern target area (FW1) (see Section 2.1.2.2),
- approximately two cumulative acres of dispersed disturbance to establish the sensor training area (FW2), to include access roads, mobile target, track for target, and trailer facility, and
- potential ground disturbance to establish the untethered autonomous flight vehicle program at SSC is assumed to be primarily related to vegetative conversion from forested to open grassy areas for up to approximately 300 acres at the proposed launch site. Minimal ground impact is expected at the emergency landing locations due to emergency landing and associated recovery events.

The analysis of potential impacts of airspace uses primarily relates to the disruption associated with noise exposure and, thus, the analysis focuses on areas of noise exposure as assessed in Section 3.4.2.

Factors considered in the analysis of potential impacts to biological resources include: (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource, (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to proposed activities, and (4) the duration of ecological ramifications. With respect to protected species, special consideration is given to any impacts that would potentially result

in a net large-scale or long-term reduction in the distribution, population size, or viability of a protected species, or in a permanent net loss of area or function of a protected habitat.

3.11.2.1 Alternative 1: Preferred Alternative

Under Alternative 1, the number, duration, and produced power of NASA static engine testing events and the NSW/SOCOM training opportunities and tempo are expected to increase over existing baseline operations. In addition, the proposed untethered autonomous flight vehicle testing operations and creation of two new HE target areas and a sensor training area are new functions within the ROI that may impact biological resources.

Vegetation. No additional impacts to vegetation are anticipated at the existing NASA test stands, the NSW SARC, and the eight HLZs in the WMA as these assets are already established and used in a similar way as anticipated under the baseline condition. Therefore, no adverse impacts to vegetation are anticipated from those elements of Alternative 1 analyzed in detail in this EA.

The launch site designated for the testing of the untethered autonomous flight vehicles is 365 acres, the northern landing site is 323 acres, the eastern landing site is 301 acres, and the alternative location is 163 acres. The launch, landing, and alternative sites are currently forested but, as they are located within the Fee Area, are designated for use for NASA mission. The alternative location for the untethered autonomous flight vehicle tests has been previously cleared per NASA SSC forest management protocol. Although the proposed action establishes the airspace to support the proposed test sites, detailed specifications for the design, construction, management, and maintenance of these areas have not been developed pending further evolution of untethered autonomous flight vehicle program requirements. The launch site may require site preparation such as clearing, grading, and compaction and maintenance such as pesticide application and mechanical treatments to keep the sites open and available. However, the extent of the earth disturbing activity is largely unknown and subject to further site-specific planning and engineering actions as appropriate per the NASA safety and certification process. The emergency landing sites would not be cleared, improved, or used during normal operations; therefore, impacts would only occur in the rare event that an emergency landing is required during a test event and localized to the emergency landing area.

The proposed 5-acre northern target area (IMP-A) site is within an active gravel quarry, and no direct loss of vegetation for the establishment of the target area is expected with the implementation of Alternative 1 (see Hi-Resolution Imagery of the northern target area, Section 2.1.2.2). Within the associated approximately 434-acre WDZ, stray munitions would be expected to cause varying levels of disturbance to vegetation (i.e., damage trees and shrubs) over time. Based on the volume of proposed annual ammunition use, these impacts are expected to be relatively minor in terms of the vegetative health of the area. Nearest the target area, where errant munitions are most expected, vegetation that is repeatedly damaged may become more vulnerable to pest infestation. Portions of these vegetated areas may become unsuitable for commercial timber harvest due to imbedded metal contamination. However, the vegetation would be managed consistent with the NASA SSC and DON INRMPs.

At the proposed southern target area (FW1) site, approximately 5 acres of bottomland hardwood would be cleared to establish the target area, and an additional approximate 1 acre would be affected for the

establishment of two access roads. The overall impact to ecosystem function as a result of lost vegetation is anticipated to be minor. There is an abundance of similar habitat available in adjacent areas. Further, in accordance with the DON INRMP, the target arrays would be laid out in a manner that minimizes impacts to vegetative habitats to the extent practicable and consistent with the military purpose of the target areas. In addition, approximately 582 acres of forested areas managed under the DON and SSC INRMPs are located within the associated WDZs, where potential impacts to vegetation would be expected to be the same as stated in the above paragraph for the northern target area (IMP-A).

The continued implementation of the burn control program to reduce fuel build up in the forest understory at the proposed munitions target areas and vicinity would continue to meet habitat management planning as reflected in the DON and NASA INRMPs and any increased wildfire risk under Alternative 1 would be negligible (see also Section 3.2.2).

Approximately 2 cumulative acres of land would be disturbed at the proposed sensor training area (FW2). Since an unrestricted line of sight is essential between the laser system (airborne) and the target (ground based), vegetation in the vicinity of the proposed sensor training area track and mobile target would need to be trimmed or removed. In addition, a program for vegetation control would be established to ensure a clear line of sight is maintained. The vegetation would be managed consistent with the NASA SSC INRMP.

The RZs in the WMA have been previously designated as SDZ for boat-platform and terrestrial live-fire SRTA delivery (NSWG-4 2009). The addition of SRTA delivery from aerial platforms under Alternative 1 would have negligible impacts to vegetation. No vegetation would be removed and ongoing vegetation management would continue in accordance with the DON INRMP.

In summary, implementation of Alternative 1 would result in minor, primarily localized, adverse impacts to vegetation that would be long-term in nature.

Wildlife. Under Alternative 1, impacts to wildlife could occur from loss of habitat due to human activity and noise. In general, the loss of habitat noted above as a result of the proposed development of target areas and sensor training area would have a negligible impact on wildlife as there is an abundance of similar habitat adjacent to these areas. As noted in Section 3.4.2, periodic noise impacts would occur from proposed DOD and NASA activities in the RA, with the greatest sources of noise resulting from NASA static rocket engine testing and DOD air-to-ground munitions delivery at the proposed munitions impact sites, and to a lesser and more localized extent, increased maneuvers at the eight HLZs. The following provides a summary of best available data on the types of impacts that would occur to wildlife based on the noise exposure analyzed in Section 3.4.2. It is important to note that this assessment is in context of the Fee Area, Buffer Zone, and WMA already being subject to periodic noise exposure from aircraft operations, small arms, riverine training, and rocket engine testing events.

Noise impacts on terrestrial animals can result in changing habitat use and activity patterns, increasing stress response, decreasing immune response, reducing reproductive success, increasing predation risks, degrading conspecific communications, and damaging hearing (Pater *et al.* 2009). However, animals

tend to be at little risk from hearing loss because they are seldom close enough to the source to be affected (Larkin 1994).

NASA rocket engine testing noise and vibration would be expected to temporarily disturb wildlife in nearby areas, with some vacating the area for the duration of a given test. These effects have been observed to be temporary over the long history of engine testing at SSC (NASA 2008).

In general, wildlife responses to various DOD training activities similar to those of the proposed action have been difficult to quantify and may vary between species (Krausman *et al.* 2005). In addition, most quantitative studies regarding the potential mammalian wildlife responses to military activities have focused on low-altitude military aircraft overflights (Telesco and Van Manen 2006). A few studies on mammalian species, such as black bears and Sonoran pronghorns, found that these particular species did not appear to avoid habitat areas that were continuously disturbed by DOD training activities (Telesco and Van Manen 2006, Krausman *et al.* 2005). Moreover, a few studies on birds indicated similar findings. Hayden *et al.* (2009) evaluated physiological response in free-living endangered and common passerine species to human disturbance and concluded that while the 1 hour of constant human exposure altered the birds' behavior, there was no clear physiological stress response in three bird studies and no evidence of elevated energetic costs due to human disturbances (Hayden *et al.* 2009). Red-cockaded woodpeckers have been found to successfully acclimate to DOD training-related noise events (Pater *et al*. 1999).

Aircraft noise is generally thought to be the most detrimental during periods of stress such as winter, gestation, and calving (Pepper *et al.* 2003, DeForge 1981). Studies on the effects of aircraft noise on wildlife have been predominantly conducted on mammals and birds. Some studies have shown that the responses of large mammals to aircraft noise are transient and of short duration and suggest that animals acclimate to the sounds (Workman *et al*. 1992; Krausman *et al*. 1993, 1998; Weisenberger *et al*. 1996). Similarly, the impacts to raptors and other nonmigratory birds (e.g., waterfowl, grebes) from aircraft low-level flights were found to be brief and not detrimental to reproductive success (Smith *et al*. 1988, Lamp 1989, Ellis *et al*. 1991, Grubb and Bowerman 1997).

Since Alternative 1 would be implemented in an area already subject to aircraft and rocket engine noise and operational activities, it is anticipated that wildlife present would generally be tolerant/acclimated to these noise and activity levels. This is especially true since the operations would be intermittent in duration and an abundance of suitable habitat is located adjacent to the areas that would be affected by training operations. Therefore, any adverse impacts to wildlife from the implementation of Alternative 1 are anticipated to be minor, but recurring.

Aquatic Habitat. Under Alternative 1, the potential for impact to aquatic habitats primarily focuses on the proposed air-to-ground firing of SRTA at the existing RZs and the development, use, and maintenance of munitions target areas and sensor training area. The other proposed DOD and NASA activities within the RA represent increasing operational tempo of existing testing and training activities, which do not affect aquatic habitat.

Training operations involving air-to-ground delivery of SRTA from rotary-wing aircraft at existing RZs would provide for interoperability with existing training ground/riverine firing of SRTA on the East Pearl

River, Mike's River, McCarty Bayou, and their tributaries. These areas are already subject to the impacts of delivery of SRTA in ground and riverine based training operations as assessed in the 2004 *Final Environmental Impact Statement for the Purchase of Land in Hancock County, Mississippi for a Naval Special Operations Forces Training Range.* These areas would continue to be managed in accordance with the DON INRMP to ensure no net loss of wetlands and for stream bank protection, and no impact to downstream EFH is anticipated. Therefore, associated impacts to aquatic habits associated with the proposed action are anticipated to be minor.

Wetland habitats are likely to be impacted at the northern target area (IMP-A) and southern target area (FW1), and could be encountered (but likely avoided) at the sensor training area (FW2) (Section 3.13.2). At the northern and southern target area, loss of wetlands may be minimized. At the southern target area (IMP-A), the target would be sited in a gravel quarry, and the standing water associated with the quarry does not support a stable aquatic ecosystem. As the sensor training area (FW2) site encompasses 100 acres, it is presumable that final site design will avoid wetland habitat to the greatest extent possible. At the southern target area (FW1), wetlands would be affected by the construction and use of the target area and construction and maintenance of the access roads. In addition, both WDZs for the northern and southern target areas fall within wetland habitats. As wetlands occur within WDZs, the wetlands could be impacted by lead from expended casings and other constituents of concern (see Section 3.9.2). Regular munitions clearance and disposal operations, site specific sampling, and pollution prevention practices, and adherence to the RSEPA program would minimize lead exposure and transport potential, and the need to manage off-target munitions in the WDZs would be balanced with the increased disturbance that additional management could cause (i.e., access to remote impact sites, removal of debris, etc.). Although there is a potential for moderate adverse impacts to wetland habitats, all impacts to wetlands would be further evaluated in accordance with the USACE Section 404 permitting process, and DON would continue to operate within all permitted guidelines, adhere to the Stormwater Pollution Prevention Plan (SWPPP), and conduct range operations in accordance with State and Federal guidelines and recommended BMPs. Therefore, any adverse impacts to wetland habitats from the implementation of Alternative 1 are anticipated to be minor.

Sensitive Species. Potential impacts to sensitive species as a result of implementation of Alternative 1 would be the same as the overall minor impacts described above for general wildlife. In accordance with DON and NASA policy, this analysis focuses on obligations under the ESA for Federally listed species, the Bald and Golden Eagle Protection Act, and Migratory Bird Treaty Act. In general, potential impacts to state-listed species included in Table 3.11-2 would be generally localized to DOD and NASA training and testing sites and generally confined to the testing/training occurrence of events that would not have ecological ramifications. Therefore, potential adverse impacts to state-listed species were found to be minor.

The potential impacts to Federally listed species potentially impacted by these minor adverse impacts were assessed by comparing the habitat present with the likelihood of species occurrence within the ROI and the species' preferred habitats, as identified in Table 3.11-2. In accordance with the ESA, NASA and DON made a preliminary effects determination for Federally listed species and designated critical habitat potentially impact by the implementation of the preferred alternative, Alternative 1, in the Draft

EA (see Appendix C.2). Any potential effects are anticipated to be lesser under Alternative 2. The Draft EA was provided to USFWS for ESA Section 7 consultation concurrent with the public's review under NEPA review process and requested USFWS concurrence on the conclusion that implementation of the preferred alternative may affect, but is not likely to adversely affect the Louisiana black bear, ringed map turtle, gopher tortoise, eastern indigo snake, dusky gopher frog, red-cockaded woodpecker, wood stork, and Bachman's warbler (Table 3.-11-3). The DON and NASA also requested concurrence with the determination that the implementation of the preferred alternative would not result in the destruction or adverse modification of designated critical habitat for the Gulf sturgeon (i.e., the Pearl River) (see Appendix C.2).

Table 3.11-3. Summary of Findings for ESA-Listed Threatened and Endangered Species

Common Name	Scientific Name	ESA Status	Effects Determination
Mammals			
Louisiana black bear	*Ursus americanus luteolus*	T	**May affect but is not likely to adversely affect**
Reptiles			
Ringed map turtle	*Graptemys oculifera*	T	**May affect but is not likely to adversely affect**
Gopher tortoise	*Gopherus polyphemus*	T	**May affect but is not likely to adversely affect**
Eastern indigo snake	*Drymarchon corais couperi*	T	**May affect but is not likely to adversely affect**
Amphibians			
Dusky gopher frog	*Rana sevosa*	E	**May affect but is not likely to adversely affect**
Birds			
Red-cockaded woodpecker	*Picoides borealis*	E	**May affect but is not likely to adversely affect**
Piping plover	*Charadrius melodus*	T	**No effect (not found/present in the ROI)**
Wood stork	*Mycteria americana*	T	**May affect but is not likely to adversely affect**
Bachman's warbler	*Vermivora bachmanii*	E	**May affect but is not likely to adversely affect**
Red Knot	*Calidris canutus rufa*	E	**No effect (not found/present in the ROI)**
Fish			
Gulf sturgeon	*Acipenser oxyrhynchus desotoi*	T, CH	**No effect** **No destruction or adverse modification of designated critical habitat.**
Mussels			
Inflated heelsplitter	*Potamilus inflatus*	T	**No effect (not found/present in the ROI)**
Plants			
Louisiana quillwort	*Isoetes louisianensis*	E	**No effect (not found/present in the ROI)**

USFWS concurred with the may affect, not likely to adversely affect determinations on Louisiana black bear, gopher tortoise, ringed map turtle, dusky gopher frog, red-cockaded woodpecker, Bachman's warbler, and Gulf sturgeon and its designated critical habitat on April 10, 2015 (see Appendix C.3).

Under Alternative 1, bald eagles would be subject to increased noise exposure as compared to the existing condition. In the April 2009 *Final EA for the Proposal to Permit Take as Provided Under the Bald and Golden Eagle Protection Act*, USFWS noted that golden eagles appear to be sensitive to human activity and may be more sensitive to disturbance than bald eagles; however, golden eagles rarely flushed from the nest during close approaches by fixed-wing aircraft and helicopters during various surveys in Montana, Idaho, and Alaska (USFWS 2009). According to the USFWS' May 2007 *National Bald Eagle Management Guidelines*, eagles are unlikely to be disturbed by routine use where such use pre-dates the eagles' successful nesting activity in a given area. In most cases involving ongoing existing uses, the activity can proceed with the same intensity with little risk of disturbing bald eagles (USFWS 2007). The *USFWS's National Bald Eagle Management Guidelines* recommend that helicopters and fixed-wing aircraft maintain a 1,000-ft buffer from the nest during nesting season; however, USFWS does not require a buffer where eagles have demonstrated tolerance for such activity (USFWS 2007). Federal regulations (50 CFR 22) require an eagle permit for activities that are likely to "take" (i.e., pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb) a bald or golden eagle. For the purposes of this EA and in accordance with 50 CFR 22, disturb means "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." Since research indicates that golden eagles rarely flushed from the nest during close approaches by fixed-wing aircraft and helicopters and appear more sensitive to disturbance than bald eagles (USFWS 2009), it can be reasonably concluded that implementation of Alternative 1 would not result in the incidental taking of bald eagles.

Migratory bird impacts are assessed consistent with the USFWS Final Rule *Migratory Bird Permits; Take of Migratory Birds by the Armed Forces* (72 Federal Register 8931-8950), which provides regulations pertaining to Congressional findings that incidental take of migratory birds as a result of military readiness activities is consistent with the Migratory Bird Treaty Act and the treaties. Accordingly, the analysis of potential migratory bird impacts provides appropriate consideration to the protection of migratory birds when planning and executing military readiness activities, but not at the expense of diminishing the effectiveness of such activities. As noted in Section 3.11.1, there are a number of migratory birds in the ROI and the SSC and WMA INRMPs provide management objectives for the protection of migratory birds. As with other wildlife, in general, impacts to migratory birds associated with implementation of Alternative 1 would result from ground impacts, including habitat impacts associated with the establishment and use of the munitions target areas and sensor training areas as well as periodic temporary noise impacts associated with proposed NASA testing and DOD training operations. Impacts to migratory birds are more pronounced during nesting and breeding seasons, which vary by individual species. Consistent with the USFWS Final Rule *Migratory Bird Permits; Take of Migratory Birds by the Armed Forces,* the DON would consider potential impacts to breeding and nesting migratory birds during construction activities for the establishment of the munitions target area and sensor training area, and continue to manage migratory birds in accordance with INRMP programs so as to not diminish readiness training activities.

3.11.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

In nearly all respects, the potential impacts to biological resources from implementation of Alternative 2 would be the same as described for Alternative 1. Under Alternative 2, as compared to Alternative 1, the

establishment and use of the northern target area (IMP-A) for TP-only munitions delivery (as opposed to for HE munitions delivery as assessed for Alternative 1) would be expected to have overall lower magnitude of impacts to vegetation within the smaller 47.45-acre WDZ (see Figure 2.4-4). Although the estimated quantity of munitions delivery would be the same under Alternative 2 as under Alternative 1, a smaller area of the northern target area (IMP-A) and lesser aquatic habitats would be potentially affected by errant and TP-only munitions. Therefore, implementation of Alternative 2 would also have potentially minor adverse and primarily localized but long-term impacts to vegetation at training sites and periodic, short-term, primarily noise-related impacts to wildlife and special status species as a result of proposed testing and training activities.

In accordance with the ESA, NASA and DON consulted with USFWS on Federally listed species and designated critical habitat potentially impacted by the implementation of the preferred alternative, Alternative 1 (see Section 3.11.2.1 and Appendix C).

3.11.2.3 No Action Alternative

Under the No Action Alternative, biological resources at SSC and the WMA would continue to be managed as specified in the respective INRMPs; thus, baseline conditions would persist under the No Action Alternative and no additional impacts are anticipated.

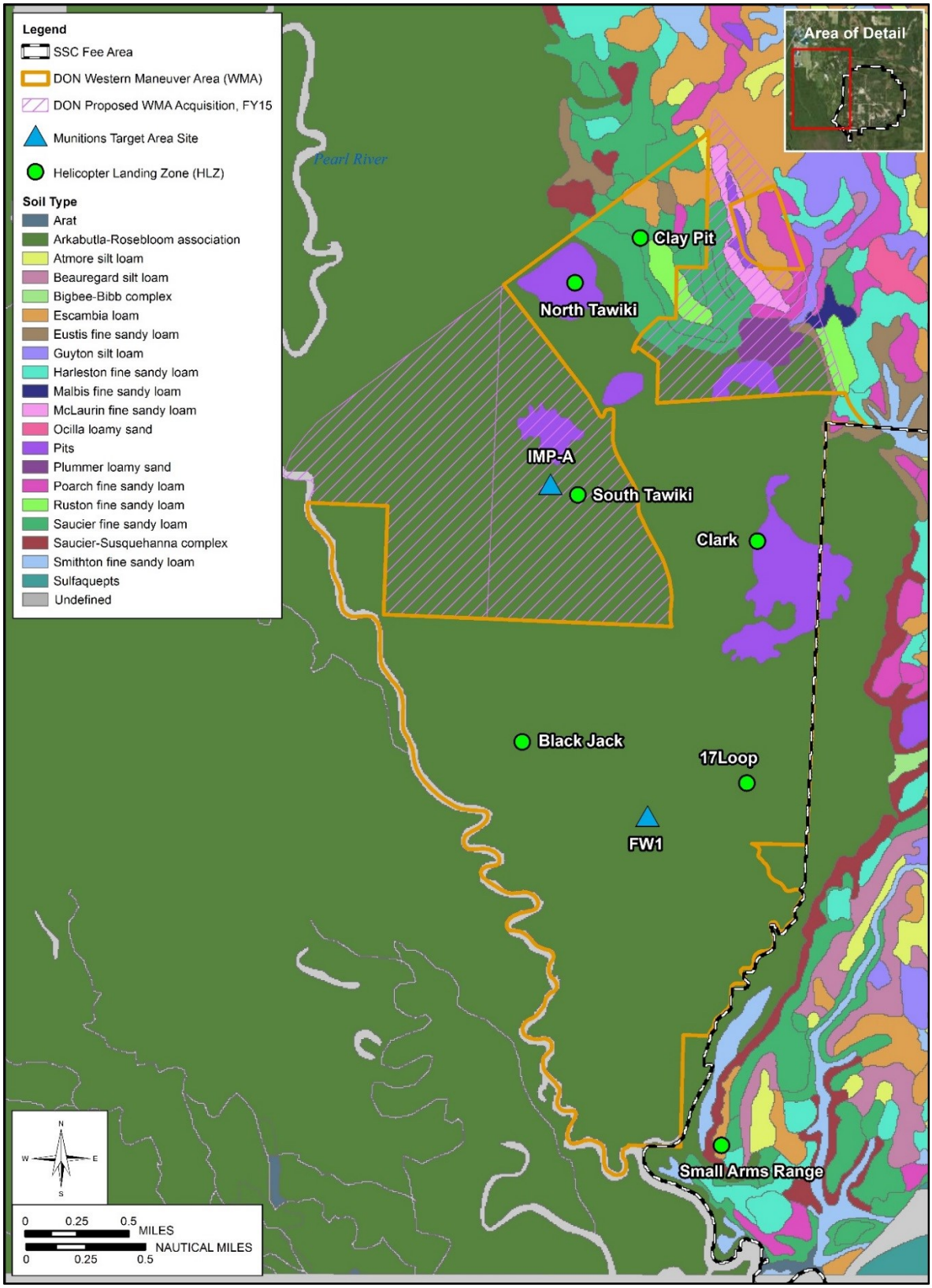
3.12 GEOLOGY AND SOILS

Geological resources are defined as the geology, topography, and soils of a given area. The geology of an area includes bedrock materials and mineral deposits. Topography describes the physical surface characteristics of the land such as slope, elevation, and general surface features. Soil refers to unconsolidated surface materials overlying bedrock or other parent material and is described in this EA in terms of drainage, erosion, and flooding potential.

3.12.1 Affected Environment

The redesignation and expansion of R-4403A, B, C, E, and F would not affect geology, topography, and soils. As a result, the affected environment for this resource is limited to understanding the soils that would be potentially disturbed by the construction, operation, and maintenance of FW1 and IMP-A in the WMA, FW2 in the Buffer Zone, site preparation and maintenance at the untethered autonomous flight vehicle launch and alternate site, and increased operations at the eight HLZs within the WMA and Fee Area (including CV-22 operations).

Proposed Munitions Target Areas. The southern and northern munitions target areas (FW1 and IMP-A, respectively) are composed solely of Arkabutla-Rosebloom association, frequently flooded soils with slopes ranging from 0 to 2 percent (Figure 3.12-1). This association consists of somewhat poorly drained silty soils that have slow to moderate permeability and very high water capacity. Runoff is slow and the erosion hazard is slight (MSU 2010). The Arkabutla soils comprise 50 percent of the unit. These soils typically have a surface layer of silt loam that is about 5 inches thick and subsoil that is silt loam. About 40 percent of the unit is Rosebloom soils. These soils typically have a surface layer of silt loam of about 5 inches and a subsoil of silt loam. Small areas of Eustis soils on higher positions make up about 10 percent of the association. Overall, the Arkabutla-Rosebloom association is poorly suited to crops, pasture, and urban uses because of flooding and wetness (U.S. Department of Agriculture [USDA] 1978).



(USDA 2014)

Figure 3.12-1. Soil Types for the Munitions Target Areas and HLZs

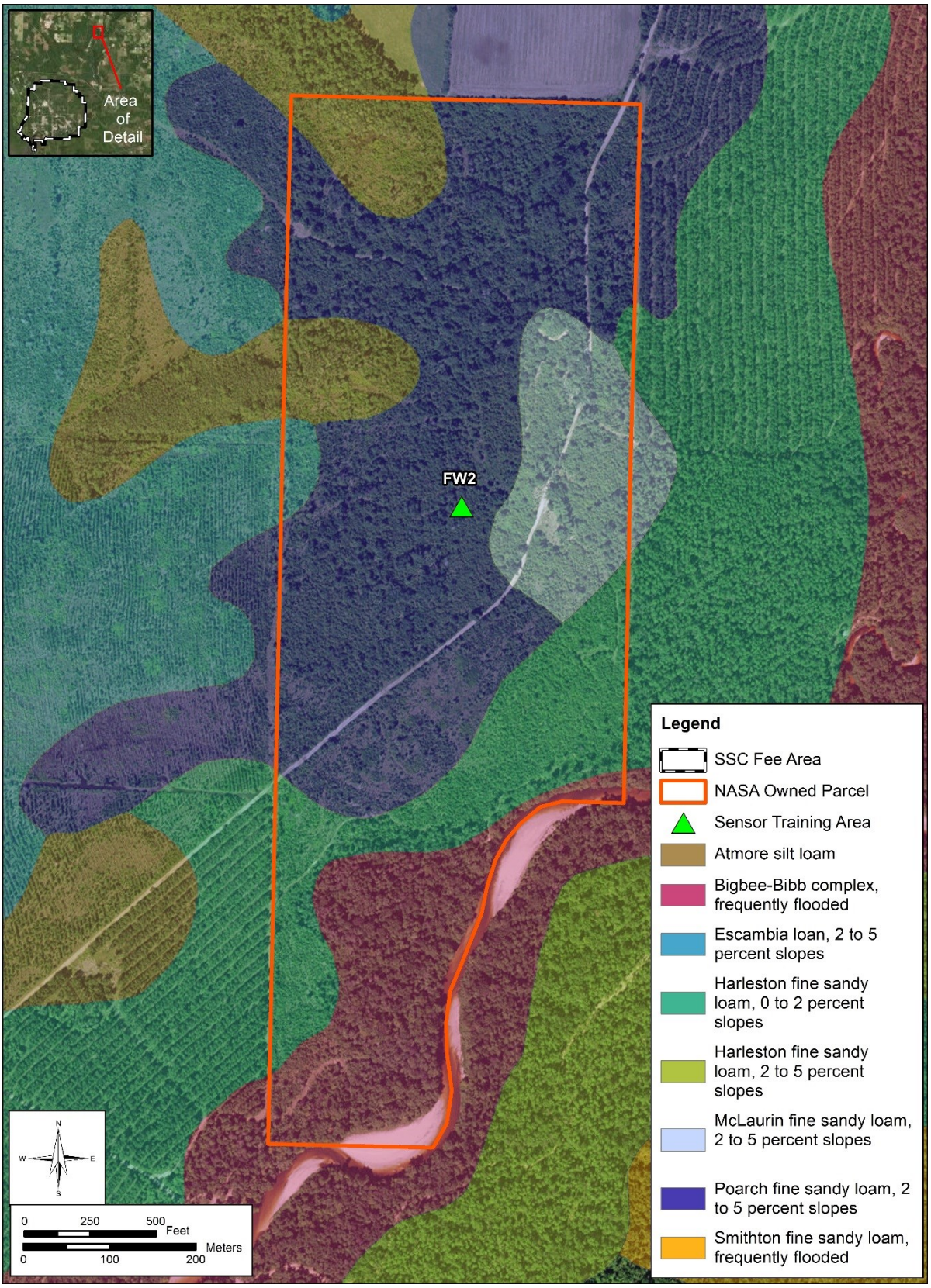
Proposed Sensor Training Area (FW2). The approximately 100-acre site composed of six soil types (Figure 3.12-2). These include:

- Poarch fine sandy loam, 2 to 5 percent slopes (52 acres) – A well-drained soil with moderate permeability and medium available water capacity. Runoff is slow and the erosion hazard is slight.
- Harleston fine sandy loam, 0 to 2 percent slopes (16 acres) – A moderately well drained soil with moderate permeability and medium available water capacity. Runoff is slow and the erosion hazard is slight.
- Bigbee-Bibb complex, frequently flooded (16 acres) – Bigbee soils are excessively drained soils with rapid permeability and low available water capacity. Runoff is slow and the erosion hazard is slight. Bibb soils are poorly drained with moderate permeability and high available water capacity. Runoff is very slow and the erosion hazard is slight.
- McLaurin fine sandy loam, 2 to 5 percent slopes (11 acres) – A well-drained soil with moderate permeability and medium available water capacity. Runoff is slow to medium and the erosion hazard is slight.
- Escambia loam, 2 to 5 percent slopes (1 acres) – A somewhat poorly drained soil with moderate permeability and high available water capacity. Runoff is slow to medium and the erosion hazard is slight.
- Atmore silt loam (9 acres) – A poorly drained soil with moderate permeability and high available water capacity. Runoff is slow and the erosion hazard is slight.

Helicopter Landing Zones. Three of the eight HLZs (Tawiki Park South, Black Jack, and 17 Loop) are located in areas composed solely of Arkabutla-Rosebloom association, frequently flooded soils with slopes ranging from 0 to 2 percent (see Figure 3.12-1). Soil types for the remaining four HLZs include Pits (Tawiki Park North and Clark), Saucier fine sandy loam (Clay Pit), Escambia Loam (Small Arms Range), and Harleston fine sandy loam (Robin). These soil types range from poorly to moderately drained with medium to high available water capacity. They are all moderately permeable with slow runoff and slight erosion potential.

3.12.2 Environmental Consequences

The analysis of potential environmental consequences focuses on ground disturbing activity related to the establishment and use of proposed live-fire air-to-ground training and sensor training areas. Factors considered in the analysis were physical impacts that could result in substantial soil erosion or loss of topsoil that would result in damage to waterways, ground instability, or impacts to animal or human habitats.



(USDA 2014)

Figure 3.12-2. Soil Types at the Proposed Sensor Training Area Site

3.12.2.1 Alternative 1: Preferred Alternative

The analytical assumptions introduced in Section 2.1.2 include noting that the following areas would be completely disturbed: 5 acres at the northern target area (IMP-A), 5 acres at the southern target area (FW1), 1 acre for the access road to the proposed southern target area (FW1), and 2 acres at the sensor training area. The 5-acre estimate for the munitions target area is conservative and reflective of the possible commitment of resources over the long-term. The short-term impacts would likely be confined to a smaller area and locations of impacts would be expected to shift over time as target locations are shifted and configurations altered. The following potential impacts to soils would be expected at the two munitions target areas:

- **Short-term impacts associated with establishment of the target arrays and access roads.** Heavy equipment would be used and an unforeseeable amount of fill to stabilize the underlying soil would be required in order to establish an array of approximately tank-sized targets with an ingress/egress and connecting road system throughout the target array for periodic range maintenance including management of UXO. Any impacts from construction-related activities would implement recommended BMPs, be compliant with the National Pollutant Discharges Elimination System (NPDES) program obtaining a Small (1-5 acres) or Large (5-10 acres) General Stormwater Permit and an SWPPP, and be localized to the sites. Thus, impacts to soils due to construction or maintenance activities supporting the establishment and use of the target areas would be minimal.
- **Periodic, long-term disturbance of soils for range clearance and range maintenance activities.** Generally, major range maintenance events typically would occur every 75 usage days. Subsurface detection and removal is completed when a range is being permanently closed or if rounds land off the target area and pose a threat to troops or vehicle traffic. Range clearance activities would disturb soils with use of heavy vehicles and equipment, detonation in place of UXO as needed, and digging up munitions up to 18 inches deep. Such activities are expected to disturb soils primarily within the 5-acre areas, but could also occur within the WDZs. In addition to the UXO clearance, range maintenance ground activities (such as road, target maintenance/replacement, debris removal, grading, and stabilization of soils) would use heavy equipment, including earth moving equipment within the 5-acre areas on an as needed basis and consist of periodic blocks of 2-4 week periods and approximately four times annually.
- **Periodic, long-term physical impacts of munitions with the earth.** The majority of the physical impacts from the munitions delivery (25mm, 30mm, 40mm and 105mm HE rounds, 25mm TP rounds, and SRTA) would occur within the proposed assumed 5-acre target areas. However, to a lesser degree, some level of physical impact to soils also would be expected to occur within the defined WDZ footprints. Detonation of HE munitions (especially 105mm), and to some degree TP and SRTA munitions, would cause soil displacement and impact craters of varying sizes.
- **Potential for munitions constituents to leach into and be transported with the soil.** Given the unconsolidated nature of the soils present, it would be expected that some amount of the munitions delivered to the munitions target areas would fail to detonate and/or not be collected during the standard range clearance operations. As further assessed in Section 4.9, the

constituents present in these munitions could leach into the soil. This could result in localized impacts to soils, which would be managed in accordance with the RSEPA program as long as the range is active and the CERCLA program should the range be placed into incompatible use. Monitoring of soils would occur under RSEPA process for range condition assessments, comprehensive range evaluations, and sustainable range oversight, thereby managing the potential impacts to soils associated with munitions constituents.

With the development of the sensor training area, there would be potential short-term impacts associated with disturbance of soils as a result of the clearing of up to 2 acres of vegetation to establish the semi-improved mobile vehicle target track, mobile sensor target with trailer, and perimeter fencing and security upgrades. These activities would be highly localized and would be expected to involve the use of heavy equipment and the use of fill material to stabilize the underlying soil prior to construction. The DON would comply with the NPDES program and obtain a small (1-5 acres) General Stormwater Permit and an SWPPP to include BMPs for soil stabilization. Thus, impacts to soils due to construction or maintenance activities supporting the establishment and use of the sensor training area site would be minimal and highly localized.

Likewise, soil disturbance could be caused by the sensor target training operations if the mobile target does not follow an established or improved trailway. Over-terrain operation of the mobile laser platform (i.e., truck) during training operations could result in loss of vegetative cover and impacts to soils such as increased erosion potential. However, for these impacts to be measurable, affected soils would need to be exposed, loose, and dry. Soils in the vicinity of the proposed sensor training area are generally covered completely by vegetation, fairly wet, and have only a slight erosion potential.

Soils at the proposed untethered autonomous flight vehicle launch site could potentially be impacted by earth moving activity associated with site preparation and maintenance. The type, extent, intensity, and duration of this impact are dependent on the specific requirements of untethered autonomous flight vehicle tests, and thus these areas may be subject to further site-specific planning and engineering actions as appropriate per the NASA safety and certification process. It is expected that much of the site would not require intense earth moving activity, the impacts would be primarily limited in duration in the site establishment phase, and the DON would comply with the NPDES program and obtain a General Stormwater Permit and an SWPPP to include BMPs for soil stabilization. Thus, impacts to soils due to construction or maintenance activities supporting the establishment and use of the untethered autonomous flight vehicle testing sites may be minimal and highly localized.

The proposed increase in existing rotary-wing operations and the addition of CV-22 flight operations have the potential to impact soils at and in the vicinity of the HLZs. Typically, impacts to soils from the operation helicopters and tiltrotor aircraft such as the CV-22 could occur directly from downdraft associated with rotorwash or indirectly from the reduction of ground cover and the exposure of ground surface. Any exposed surfaces would be affected by heavy rains and runoff leading to soil erosion. For measurable increases in soil erosion to occur as a result of the increase in operations, soils in the HLZs would need to be exposed, loose, and dry; rotorwash would need to be sufficient to cause loss of vegetation; and topography and soil types at HLZs would need to be conducive to erosion (e.g., steep topography, highly erodible soils, etc.). However, at the eight HLZ sites, the soils are generally covered

completely by vegetation, fairly wet, and have only a slight erosion potential. Therefore, impacts to soils directly from increased HLZ operations and the addition of CV-22 operations would be minimal.

In summary, with the management programs in place to manage potential impacts to soils, the overall impacts to soils from implementation of Alternative 1 would not result in substantial soil erosion or loss of topsoil that would result in damage to waterways, ground instability, or impacts to animal or human habitats. The potential impact would be minor overall.

3.12.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

The distinction between Alternative 1 and Alternative 2 is that under Alternative 2, the proposed northern target area (IMP-A) would be authorized for TP-only munitions delivery. The assumption of a 5-acre area of complete disturbance to soils for the northern target area (IMP-A) is retained for Alternative 2. There would be no difference in overall volume of munitions to be delivered – there would just be lesser munitions and only TP munitions delivered to the northern target area (IMPA-A). Therefore, overall, the impacts to soils under Alternative 2 would differ from those assessed for Alternative 1 only in the following respects:

- **The smaller WDZ area associated with the northern target area (IMP-A).** The impacts to soils from errant rounds and range clearance activities outside the 5-acre area and within the WDZ would be smaller in terms of the potential area of effect as well as the low likelihood that range clearance would be called for in this area given the low hazard associated with TP.
- **Less disturbance at the northern target area (IMP-A) from periodic, long-term range maintenance activities**. A TP-only target area requires less maintenance than one where HE is authorized due to the lesser intensity of use and slower degradation of the soils. Therefore, there would be less heavy equipment and earth moving activity at the northern target area (IMP-A) under Alternative 2 as compared to Alternative 1.
- **The distribution of munitions constituents that could potentially leach into the soil.** Under Alternative 2, there would be a higher concentration of munitions delivery overall to the southern target area (FW1), resulting in a greater potential for munitions constituents to affect soils at that location and a lesser potential at the northern target area (IMP-A) site.

In conclusion, impacts to soils under Alternative 2 would be similar to those described for Alternative 1 – highly localized and managed by BMPs and the RSEPA program. Therefore, impacts to soil resources under Alternative 2 would be minor.

3.12.2.3 No Action Alternative

Under the No Action Alternative, the proposed action would not be implemented and baseline conditions for soil resources would persist. No additional impacts are anticipated.

3.13 WATER RESOURCES

Water resources in the ROI include surface and stormwater, groundwater, wetlands, and floodplains. The Clean Water Act (CWA) of 1972 (Public Law 95-217), the Safe Drinking Water Act of 1972 (Public Law 93-523) and Amendments of 1986 (Public Law 99-339), the Rivers and Harbors Act of 1899, and the

Water Quality Act of 1987 (Public Law 100-4) are the primary Federal laws protecting the nation's waters.

3.13.1 Affected Environment

Surface and Stormwater. Surface water includes streams, rivers, lakes, and reservoirs. Under the CWA, water bodies that do not meet their intended uses are included on the impaired waters list. There are no impaired waters located within or near the Buffer Zone.

Stormwater runoff, the part of the precipitation or irrigation water that appears in uncontrolled surface streams, rivers, drains, or sewers, can affect surface water quality by depositing sediment, minerals, or contaminants into surface water bodies. Stormwater runoff is influenced by meteorological factors such as rainfall intensity and duration, and physical factors such as vegetation, soil type, and topography.

The East Pearl River flows along the southwest boundary of the Fee Area and the Jourdan River flows in a southeasterly direction through the eastern portion of the Buffer Zone. Tributaries that drain the Fee Area and are hydraulically connected to these two rivers are Mike's River and Turtleskin Creek in the East Pearl River Basin, and the Lion and Wolf branches of Catahoula Creek in the Jourdan River Basin. Approximately 8.5 miles of constructed canals in the Fee Area are also connected through locks to the Pearl River (NASA 2013a).

The Pearl River is one of Mississippi's principal river systems, draining an approximate area of 8,760 square miles. The river divides into distinct channels west of Picayune, Mississippi where the main stream is known as the West Pearl River. The East Pearl River is formed by a confluence of Hobolochitto Creek and Farr's Slough, and forms the boundary between Mississippi and Louisiana. The East Pearl River drains to Lake Borgne and eventually to the Mississippi Sound (NASA 2013a). Dead Tiger Creek and Catahoula Creek form the Jourdan River System in the northeast portion of Hancock County. The Lion and Wolf branches are intermittent streams that drain the eastern section of the Buffer Zone. The Jourdan River drains to the Bay of St. Louis and eventually to the Mississippi Sound. The southeastern portion of SSC drains into the main access canal. The canal is connected to the East Pearl River through a lock system. A spillway and overflow of the canal drains into Devil's Swamp, which discharges into Bayou LaCroix and the Bay of St. Louis to the Mississippi Sound (NASA 2013a).

The Pearl River extends through the Buffer Zone, and the Jourdan River extends from the confluence of Catahoula Creek to the Bay of St. Louis. SSC holds a permit (MS-SW-02432) to divert or withdraw Mississippi waters for beneficial use. The permit (reissued on April 12, 2012 and expiring on April 12, 2020) covers an inlet and pumps that withdraw water from the East Pearl River into the elevated portion of the SSC Test Center facility's Access Canal. The Access Canal is the primary source of water for the 66 million gallons of industrial water used for deluge water for the rocket engine test stand, cooling water, and emergency fire suppression (NASA 2013a, 2013b, 2008). Runoff cooling water at Test Complex "A" (A-1 and A-2 test stands) drains directly to the Access Canal. Water from the canal is directed to the East Pearl River through a lock system. A spillway and overflow of the canal drains into Devil's Swamp, which discharges into Bayou LaCroix and the Bay of St. Louis to the Mississippi Sound. A retention pond exists at Test Complex "B" to receive runoff of cooling water from engine testing (NASA 2008).

Background surface water quality information specific to areas within the ROI is limited; however, the surface waters in the streams of the area are generally suitable for most uses (NASA 2013a). Two water quality impairments have been identified in proximity to but outside of the WMA. The Lower Pearl River segment from near Morgantown to the mouth of the river is listed on the 2008 Section 303(d) List of Impaired Water Bodies as impaired due to nutrients and sediment. Total maximum daily loads (TMDLs) have been completed for nutrients, but the sediment TMDL is still needed. Additionally, a segment of Turtleskin Creek, located near Santa Rosa from the headwaters to the confluence with Mike's River (Water Body ID 520511), is listed on the 2010 Section 303(d) List of Impaired Water Bodies as having a biological impairment (USEPA 2014). In accordance with USEPA regulations, MDEQ would develop a pollutant TMDL for this segment of Turtleskin Creek by June 23, 2017.

Stormwater discharges from SSC are authorized in accordance with Mississippi Water Pollution Control General NPDES Permits MS0021610 and MS0040797 (NASA 2013a, 2013b). These general permits provide authorization for point source discharges of stormwater associated with industrial activity to waters of the State. SSC's SWPPP identifies the facilities subject to these general permits, identified potential sources of pollution that could affect the quality of stormwater discharges, and identifies BMPs to reduce potential stormwater pollution (NASA 2013b).

Groundwater. Groundwater is defined as subsurface water contained within aquifers. Groundwater aquifers are usually relatively deep under the ground. Hancock County is underlain by fresh water-bearing, southward-tipping sands of the Miocene and Pliocene ages. The aquifers have plentiful supplies of fresh water (NASA 2013a).

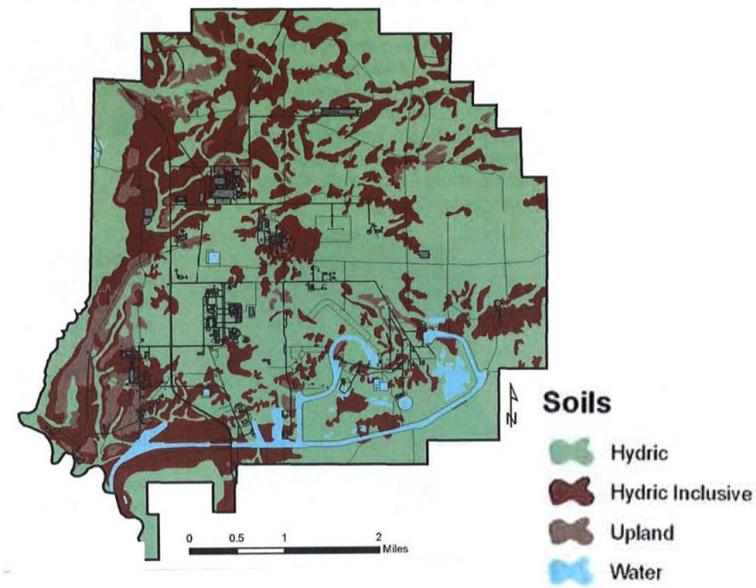
Water for potable and industrial use at SSC is supplied through 10 large-capacity wells onsite. The three industrial wells are located at depths of 672 ft to 1,873 ft. The seven drinking water wells are located at depths of 207 ft to 465 ft (NASA 2013a).

Wetlands. EO 11990, *Protection of Wetlands*, directs Federal agencies to take action to minimize the destruction, loss, or degradation of wetlands on their property and mandates review of proposed actions on wetlands through procedures established by NEPA. It requires that Federal agencies establish and implement procedures to minimize development in wetlands. Wetlands are defined as:

> "…those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and 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" (40 CFR 230.3(t)).

Section 404 of the CWA regulates areas above mean high water and a permit is required from the USACE for discharges of dredged or fill material into waters of the U.S. Before a Section 404 permit is issued, a Section 401 Water Quality Certification must be obtained by the MDEQ.

As shown in the image to the right, the majority of the soils found in the Fee Area and the Buffer Zone are hydric or hydric inclusive and hydrophytic vegetation is commonly found at the facility. As a result, a large portion of both the Fee Area and Buffer Zone are considered jurisdictional wetlands by the USACE (NASA 2013a).

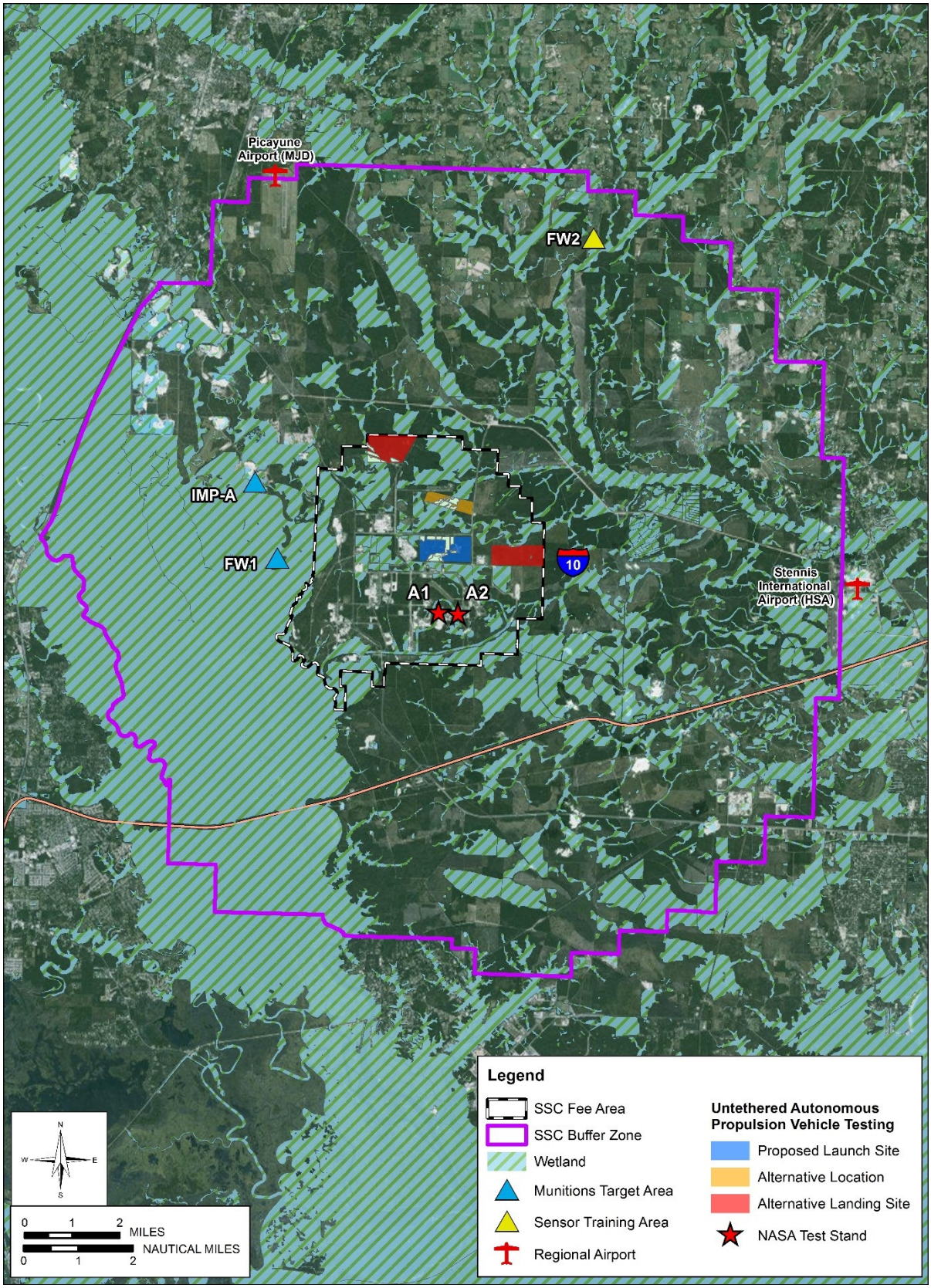


Hydric and hydric inclusive areas of the SSC Fee Area (NASA 2011)

Preliminary investigations of potential wetland acreage within the WMA based on analysis of Natural Resources Conservation Service soil survey data, aerial photography, and Light Detection and Ranging data indicates that 88 percent of the currently DON-owned 3,483 acres could be potentially jurisdictional waters of the U.S. Wetlands within the WMA consist of riverine wetlands, large tracts of palustrine forested wetlands, and smaller isolated palustrine forested and emergent wetlands found with poorly drained depressions and swales in otherwise well-drained uplands (NASA 2011). A map showing the locations of the wetlands in the ROI based on the National Wetlands Inventory (NWI) is included as Figure 3.13-1 (USFWS 2014). As with many of the wetlands in the region, the wetland areas in the WMA have been impacted over time by the numerous activities that have historically occurred, including agriculture, mining and silviculture and the roads and other infrastructure associated with such activities. Contrary to the results of NWI map analysis, portions of the northern target area (IMP-A) may actually include no wetland areas due to decades of quarry activities at that location.

Based on a planning level wetland delineation that was reviewed, modified, and approved by the Vicksburg District of the USACE, the northeast portion of the Buffer Zone is located in an area consisting of freshwater forested/shrub wetlands (NASA 2013a).

An August 2010 Wetland Mitigation Plan (Appendix I in the 2010 NASA INRMP) specifies the management of Wetland Mitigation Management Areas or Banks within the Fee Area and Buffer Zone (SSC 2010). Presently, the SSC Natural Resource Management Team oversees the following six Wetland Mitigation Areas: the Advanced Solid Rocket Motor, Component Test Facility, Energetic Materials Testing Facility, Pearlington Phase I, Pearlington Phase II, and Pearlington Phase III. These six areas, which total more than 1,000 acres, were developed and maintained to offset cumulative impacts of construction activities at SSC (SSC 2010). The 132-acre Advanced Solid Rocket Motor Mitigation Bank was established in 1992 as a mixed community of bottomland hardwoods, pitcher plant bog, and pine/hardwood flatlands. The Component Test Facility Hardwood Mitigation Area is a small drainage area encompassing approximately 6 acres; the site was planted in 1993 with an overall objective of establishing a bottomland hardwood habitat. The Energetic Materials Testing Facility area is a pine savannah site. Pearlington Phase I is a 115-acre pine savannah site. Pearlington Phase II is a 272-acre pine savannah site. Pearlington Phase III is a 352-acre pine savannah site (MSU 2010, SSC 2013).



(USFWS 2014)

Figure 3.13-1. Wetlands Located within the ROI

Within the Buffer Zone, there are seven active mitigation banks: Dead Tiger (located in the northern portion of the Buffer Zone east of Picayune Municipal Airport); Texas Flat (located just east of the Fee Area); Devil's Swamp Phase I, Devil's Swamp Phase II, Devil's Swamp Phase III (all three located just south of the Fee Area), and Lower Bay Road and Lower Devil's Swamp 2, both located in the southeastern portion of the Buffer Zone south of Highway 90. The closest active mitigation banks to the WMA are Dead Tiger (1,387 acres), Devil's Swamp Mitigation Bank Phase I (3,336 acres), Phase II (2,369 acres), and Phase III (936 acres) (USACE 2014, Wetlands Solutions, Inc. 2012).

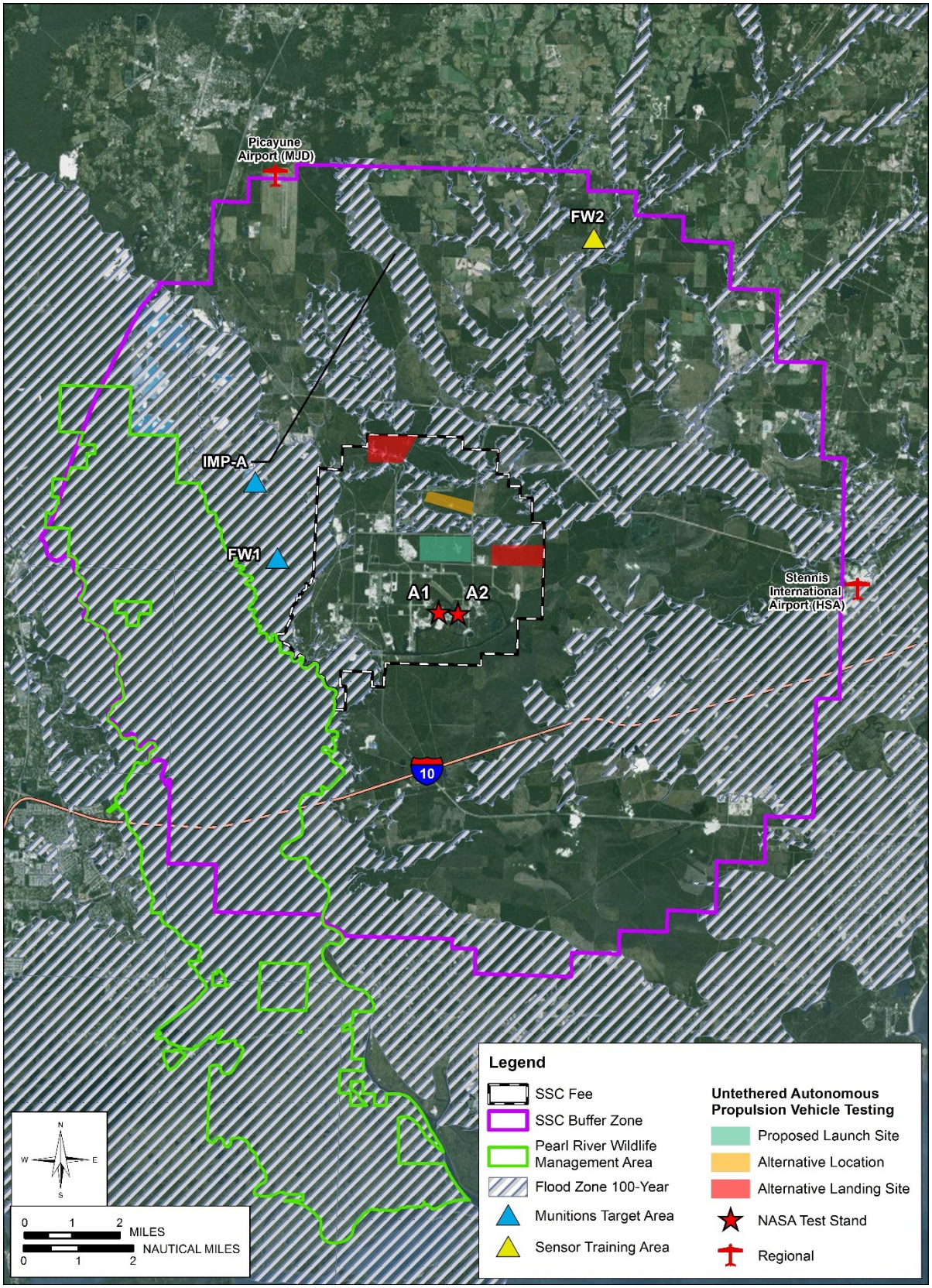
Floodplains. A floodplain is defined as "the lowland and relatively flat area adjoining inland and coastal waters and other flood prone areas such as offshore islands, including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year." A 100-year floodplain is defined as a floodplain with a 1 percent or greater chance of flooding in any given year. EO 11988, *Floodplain Management*, sets forth the responsibilities of Federal agencies for reducing the risk of flood loss or damage to personal property, minimizing the impacts of flood loss, and restoring the natural and beneficial functions of floodplains. This order was issued in furtherance of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. In January 2013, EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input* was issued as an amendment to EO 11988. EO 13690 includes new provisions applicable to how floodplain impacts are evaluated, but guidance regarding implementation of EO 13690 remains forthcoming and, therefore, EO 13690 impacts are not further analyzed in this EA.

In February 2014, the DOD issued the memorandum *Floodplain Management on Department of Defense Installations* (Under Secretary of Defense 2014). The memo directs DOD components to minimize construction in 100-year floodplains and document that flood mitigation measures will be incorporated into the project when mission needs require construction within the 100-year floodplain. In addition, DOD components are required to annually certify the appropriate flood damage vulnerability assessment has been completed for military construction projects sited within the 100-year floodplain (Under Secretary of Defense 2014).

The documented floodplains in the ROI include a 100-year floodplain along the East Pearl River at the western edge of the Fee Area, and 100-year floodplains along the Wolf Branch and along the Lion Branch of Catahoula Creek in the northeast portion of the Fee Area. The majority of the Fee Area is in an area of minimal flooding. A map showing the locations of the floodplains in the ROI is included as Figure 3.13-2.

3.13.2 Environmental Consequences

Effects to water resources could result from erosion and runoff. Impacts to water resources could occur if implementation of any of the alternatives resulting in changes to water quality or quantity, threatened or damaged unique hydrologic characteristics, or violated established laws or regulations. Factors considered in the analysis of impacts to water resources on either a short-term or long-term basis included the potential for:



(FEMA 1999)

Figure 3.13-2. 100-Year Floodplain within the ROI.

- chemical, physical, or biological effects that could be detectable and/or alter historical baseline or desired water quality conditions;
- violation of water quality standards/criteria;
- adverse impacts to water body currently considered impaired under the CWA; and
- CWA Section 404 wetlands impacts.

3.13.2.1 Alternative 1: Preferred Alternative

With implementation of Alternative 1, water resources could be impacted by the number, duration, and produced power of NASA static engine testing events; the increase of NSW/SOCOM training opportunities and tempo; untethered autonomous flight vehicle testing operations; and the construction, use, and maintenance of two new HE target areas and one new sensor training area.

Surface and Stormwater. The proposed NASA rocket engine testing at the Test Stand Complex would require deluge water. Although it is anticipated the deluge water needed for the rocket engine testing is within the existing permitting conditions, NASA would modify its permit if an increase in water deluge were to become necessary. In addition, under the current permit, monitoring of the surface water discharges is not required. If the permit is revised and monitoring is required, NASA would ensure any new permitting requirements are met. Therefore, any adverse impacts to surface and storm water would be minor.

Any construction or operation activities associated with the preparation of launch and landing sites for untethered autonomous flight vehicle testing would incorporate BMPs to minimize impacts to water quality in accordance with SSC's SWPPP (2013). In the event of a spill or launch failure, appropriate containment measures would be implemented in accordance with the SSC *Environmental Integrated Contingency Plan and Spill Prevention Control and Countermeasures Plan* (NASA 2012). Procedures may include containing the spill using disposable containment materials such as absorbent pigs and berms, fences, trenches, sandbags, and cleaning the area with absorbents or other material to reduce the magnitude and duration of any impact. Because mitigation and cleanup measures would be implemented quickly, only minor adverse impacts would be expected.

With implementation of minimization measures, impacts to surface or storm waters in the Fee Area from the implementation of Alternative 1 would be minor.

The potential impacts of the establishment and ongoing use and maintenance of munitions target area (FW1 and IMP-A) and sensor training area (FW2) sites because are all located in close proximity to surface water. Prior to construction of the target areas, further detailed planning and design would include considerations for CWA protection and other applicable State and Federal guidelines to ensure water quality is protected during both the construction phase and the long-term use and management of the sites. The process includes implementing project-specific BMPs to minimize impacts to water quality, including obtaining a construction stormwater permit from MDEQ, and obtaining a Section 404 permit from USACE and a 401 Water Quality Certification from MDEQ. Likewise, given the localized and minimal ground disturbing effects expected from ongoing DOD operations as well as BMPs used in construction and maintenance activities, it is unlikely that increased operational tempo at RZs, HLZs, or

the establishment and use of the munitions target areas or sensor training area would affect impaired waters connected to drainage systems within the WMA, Fee Area, or Buffer Zone.

Groundwater. Under Alternative 1, there would be no change in groundwater availability or supply. Stormwater BMPs would continue to be used to appropriately direct surface waters to recharge areas. As such, no to negligible adverse impacts to groundwater would occur under Alternative 1.

Wetlands. Under Alternative 1, no impacts to wetlands are anticipated with the redesignation and expansion of the proposed airspace, or rocket engine testing. SSC would continue to operate within all permitted guidelines, adhere to the SWPPP, and DON would continue to conduct range operations in accordance with State and Federal guidelines to ensure water quality continues to be protected from possible impacts of ongoing activities.

Although wetlands are present at the untethered autonomous flight vehicle launch testing sites (see Figure 3.13-1), it is expected that wetlands would be avoided during establishment of the launch site and alternate location, if necessary. If it is determined that wetland impacts would occur, further analysis will be conducted. While it is possible that wetlands at the two emergency landing sites may be impacted by emergency landing, these sites would only be used in the rare event of an emergency and all protocols to protect wetlands would be applied.

The construction and ongoing use and management of the munitions target area (FW1 and IMP-A) and sensor training area (FW2) sites would have the following potential impacts to wetlands:

- **Northern Target Area (IMP-A) (assumed 5 acres completely disturbed).** Based on best available data, the majority of the 5-acre area does not appear to be wetlands (see Hi-Resolution Imagery of the northern target area, Section 2.1.2.2), although the adjacent gravel pits may have some wetlands qualities. The associated WDZ would encompass potential wetland areas that would be subject to impacts from errant munitions (physical impact and munitions constituent related) and occasional range clearance activities, as needed.
- **Southern Target Area (FW1) (assumed 5 acres completely disturbed plus 1 acre of impact for new access roads).** Based on best available data, there likely are wetlands in this area, although the area has been configured to include upland areas and avoid apparent wetland areas to the extent practicable. The combined 1,325 ft of new road would result in potential linear roadway impacts to wetlands that cannot be avoided.
- **Sensor Training Area (FW2) (assumed 2 acres of dispersed impact at 100-acre site).** Although, based on best available data, portions of this 100-acre site are considered upland and therefore wetlands in this location may be affected. Given that the 2-acre development would be dispersed, it is likely that potential impacts to wetlands could largely be avoided or possibly completely avoided at this site.

As planning for development of the munitions target areas, sensor training areas, and locations for the untethered autonomous flight vehicle testing progresses, formal wetland delineation would be conducted to better define the limits of wetlands in those areas. Prior to permitting actions, a final engineering design for the required additional roads and target area components would be performed.

Once the limits of wetlands have been confirmed by the USACE, a Section 404 permit from the USACE and a Section 401 Water Quality Certification from the MDEQ would be required to authorize the implementation of the long-term plans for use of these sites. These permits would include measures to avoid, minimize, and mitigate impacts to wetlands. If wetlands mitigation were required, the DON would purchase credits from an appropriate wetland mitigation bank. As noted in Section 3.13.1, there are six NASA-managed mitigation banks within the Fee Area and Buffer Zone and seven additional privately operated wetland mitigation banks in the Buffer Zone, including the Dead Tiger bank located approximately 4 miles from the northeast corner of the WMA, and the Devil's Swamp bank, located approximately 2 miles from the southern tip of the WMA.

Floodplains. Under Alternative 1, no impacts to floodplains would occur with the redesignation and expansion of the proposed airspace, rocket engine testing, or increase of operational tempo at existing HLZs. However, both proposed munitions target areas (FW1 and IMP-A) are located entirely within the 100-year floodplain, and the southeastern portion of the 100-acre NASA owned property where the Sensor Training Area (FW2) is located is within the 100-year floodplain. Both alternative emergency landing sites for the untethered autonomous flight vehicle testing operations are in the 100-year floodplain. Compliance with EO 11988 and the February 2014 DOD memorandum would minimize impacts to the 100-year floodplain. Due to the assumed complete disturbance and potential requirement for fill at each of the 5-acre target areas and to establish approximately 1 additional acre of road to access to the southern target area (FW1), up to 11 acres of floodplain would potentially be impacted with implementation of Alternative 1. Potential impacts to floodplains from the untethered autonomous flight vehicle testing emergency landing operations are not anticipated.

Given that the location of the proposed munitions impact and sensor training area sites were dictated in the design of the airspace, there is no practicable alternative to avoiding potential adverse effects in the floodplain or development in the floodplain. However, for the munitions target areas, the 5-acre area of assumed disturbance was developed using a planning exercise to minimize potential harm to or within the floodplain consistent with EO 11988, including impacts to floodplains, to the greatest extent applicable. Potential harm to or within the floodplain would be minor given that the overall floodplain is largely unfragmented and would be expected to have adequate capacity to accommodate potential displacement. It is likely that the development of up to 2 acres of the 100-acre NASA property for the sensor training area (FW2) site can avoid the floodplains located in the southeast portion of the property.

As no habitable structures are located in proximity to the proposed munitions target area and sensor training area sites, there would be no impact on human safety, health, and welfare. Implementation of Alternative 1 would follow applicable Federal recommendation on floodplain construction and incorporate flood mitigation measures into the design. Therefore, any adverse impacts to the floodplain from the construction, use, and management of the munitions target areas (FW1 and IMP-A) and sensor training area (FW2) sites would be minimized to less than significant through compliance with EO 11988.

3.13.2.2 Alternative 2: Limit HE Delivery to a Single Munitions Target Area

The anticipated impacts to water resources associated with Alternative 2 would be similar to those described for Alternative 1. There would be little difference for wetlands or floodplains given that the

assumed 5-acre disturbance area for the northern target area (IMP-A) would be the same even with TP-only munitions delivery. As TP-only munitions have smaller impact craters as compared to HE munitions, ongoing use impacts from munitions delivery to water resources (e.g., increased sedimentation in surface waters and/or wetlands), would be expected to be somewhat lessened at the northern target area (IMP-A) and commensurately greater at the southern target area (FW2) both from intensity of use and the speed with which the impacts occur. In addition, there could potentially be lesser impacts under Alternative 2 as compared to Alternative 1 given the smaller WDZ and the commensurate expectation that less of the surface waters in the vicinity of the target area (i.e., the gravel pits) would potentially be subject to impacts associated with errant munitions.

3.13.2.3 No Action Alternative

Under the No Action Alternative, all regulations and plans that pertain to protecting water quality would continue to be followed; thus, baseline conditions would persist under the No Action Alternative and no additional impacts to surface waters or wetlands would be anticipated.

4.0 CUMULATIVE IMPACTS AND OTHER NEPA CONSIDERATIONS

4.1 DEFINITION OF CUMULATIVE IMPACTS

The approach taken in the analysis of cumulative impacts follows the objectives of NEPA, CEQ regulations, and CEQ guidance. Cumulative impacts are defined in 40 CFR Section 1508.7 as follows:

> The impact on the environment that results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

CEQ and the USEPA have published guidance addressing implementation of cumulative impact analyses — *Considering Cumulative Impacts Under NEPA, Guidance on the Consideration of Past Actions in Cumulative Effects Analysis*, and *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (CEQ 1997, 2005; USEPA 1999). CEQ (1997) states that cumulative impact analyses should "...determine the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative impacts of other past, present, and future actions...identify significant cumulative impacts…[and]...focus on truly meaningful impacts." CEQ (2005) states that "agencies should be guided in their cumulative effects analysis by the scoping process, in which agencies identify the scope and 'significant' issues to be addressed in an environmental impact statement." Furthermore, CEQ (2005) states that "in the context of scoping, agencies typically decide the extent to which 'it is reasonable to anticipate a cumulatively significant impact on the environment'."

Cumulative impacts are most likely to occur when a relationship or synergism exists between a proposed action and other actions within a specified geographic boundary 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 those actions more geographically separated. Similarly, relatively concurrent actions would tend to offer a higher potential for cumulative impacts versus actions that occur years apart from each other. To identify cumulative impacts, the analysis needs to address the following questions.

1. Does a relationship exist such that impacts to the proposed action's affected resource areas might interact with the impacts to resources of past, present, or reasonably foreseeable actions? If a relationship does exist, is the affected resource area(s) subject to incremental effects taking into account the temporal and geographic extent of the proposed action?
2. Have previous analyses identified a cumulative effects concern? If so, could the proposed action have an incremental effect on these resources?

4.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

Consistent with CEQ guidance (1997), the cumulative impacts analysis focuses on those resource areas that are relevant to the effects of the proposed action (previously discussed in Chapter 3). Based on the understanding and scope of the potential adverse impacts of the proposed action (as analyzed in Chapter 3) and issues and concerns related to cumulative impacts, the following resources were identified as the focus issues for this analysis:

- airspace and air operations,
- land use,
- socioeconomics,
- air quality,
- biological resources,
- soils, and
- wetlands.

The remaining resource areas were determined to not be issues of concern for the cumulative impacts analysis. This is because impacts to these resources would 1) not have the potential to cause cumulative impacts, or 2) the direct and/or indirect impacts of the proposed action would be localized and temporary based on the geographic and temporal scope of the cumulative impacts analysis (refer to Sections 4.2.2 and 4.2.3), and there is no reasonable likelihood the cumulative impacts would be significant. Therefore, since these resources are not subject to incremental effects taking into account the temporal and geographic extent of the proposed action, these resources were not carried forward into the detailed cumulative impacts analysis. This methodology is also consistent with CEQ (2005) which states, "scoping provides the agency the opportunity to focus in on those cumulative effects that may be significant."

The overall geographic scope of cumulative effects analysis is consistent with the EA ROI (see Figure 1.2-1) focused on the lateral and vertical extent of R-4403A, B, C, E, and F and the physical impacts associated with the establishment of the munitions target areas and sensor training areas. Since the proposed action would be a long-term activity, the temporal boundary includes those past, present, and future activities that could potentially result in an incremental contribution to cumulative impacts when added to those impacts associated with the proposed action. The future temporal boundary is bound by activities that can be reasonably foreseen, which is approximately 5 years.

4.2.1 Other Actions Affecting the Resources of Concern

Other factors that could influence the resource areas carried forward for further analysis include the consideration of the locations of actions, the extent of their direct and indirect effects, any likely future actions, and their relative contribution to cumulative impacts on the specific resource. In accordance with CEQ guidance, past actions are relevant and useful in analyzing whether or not the reasonably foreseeable effects of the proposed action may have a continuing, additive, and significant relationship to those effects. The focus is placed on the current aggregate effects of past actions without delving into the historical details of individual past actions unless such information is necessary to describe the cumulative impact of all past actions combined. A review of recent, ongoing, and foreseeable actions that required NEPA documentation determined only select actions should be considered when analyzing the potential cumulative impacts of the proposed action. These projects are listed in Table 4.2-1, along with the status of the NEPA analysis, if applicable. A description of these actions immediately follows Table 4.2-1.

Table 4.2-1. SSC Cumulative Action Evaluation	
Action	**Level of NEPA Analysis Completed**
Relevant Past Actions	
Permanent Colocation of Naval Special Boat Unit 22 and Naval Small Craft Instruction and Technical Training School, Stennis Space Center	EA
Purchase of Land in Hancock County, Mississippi for a Naval Special Operations Forces Training Range	EIS
Integrated Natural Resources and Integrated Cultural Resources Management Plan Implementation	EA, as appropriate (some actions may not warrant an EA)
Expansion and Operation of a Combat Shooting Skills Training Center Stennis Space Center, Hancock County, Mississippi	EA
Present and Reasonably Foreseeable Future Actions	
Area Development Plan for the NSW Riverine Complex, Stennis	None anticipated
NASA Rocket Engine Testing	Various
Picayune International Airport	None anticipated
Stennis International Airport	None anticipated
Mississippi Gulf Coast Aerospace Industry	None anticipated

Permanent Colocation of Naval Special Boat Unit 22 and Naval Small Craft Instruction and Technical Training School, Stennis Space Center. NSW Special Boat Unit 22 relocated to SSC from Naval Support Activity New Orleans in 1998, and NAVSCIATTS relocated to SSC in 1999 following the disestablishment of Naval Station Rodman in Panama. An EA and FONSI were prepared in 2000 that addressed permanent facilities as well as operational activities in Mississippi and Louisiana. The operational activities covered and relevant to this EA include increasing the number of boat miles on the Pearl River and its tributaries used in NSW training by approximately 40 percent (estimated to increase to 14,400 boat miles by the year 2002). To improve coordination with LADWF, the DON agreed to the following with respect to the Pearl River Wildlife Management Area: establishment of a 24-hour manned phone line to ensure immediate response to LADWF on any issues or incidents that may occur, not to conduct on-bank excursion type training in areas conducive to turkey nesting during the nesting season, not to train on opening days for major hunting seasons, not to train on weekends from 1 October through 1 March except when required to meet reserve and emergent training commitments, and not to train over the Christmas-New Year's holiday (NAVFAC Southern Division 2000).

Purchase of Land in Hancock County, Mississippi for a Naval Special Operations Forces Training Range. In October 2004, a Record of Decision was signed for the purchase of approximately 5,200 acres of privately owned property in the northwestern Buffer Zone in Hancock County to establish the NSW Riverine Complex, Stennis. The purpose of the proposed action was to significantly improve the existing Naval Special Operations Forces (SOF) riverine and jungle training available at SSC by establishing a training range where Naval SOF have priority access to conduct live combat exercises using SRTA. All basic training action alternatives involved 36 weeks of training per year in the East Pearl River (an increase of 11 weeks from baseline/ongoing training). The selected alternative, Basic Training Alternative C, allows for the following training operations within the WMA and the Pearl River:

- Small arms training with SRTA at selected range locations in the WMA in a 360-degree field of fire inside the range perimeter from the East Pearl River and land-to-land SRTA use at various target sites.
- Small arms firing with simunitions (e.g., paint rounds, plastic rounds, wax rounds, marking rounds, and other types of nonlethal small arms rounds) and pyrotechnics (e.g., hand-activated pop-flares and other flares or smoke generators).
- Of the 36 weeks of training, 11 weeks would be using blank-fire and 25 weeks would be using SRTA. It was estimated that one million rounds of blank ammunition would continue to be used annually in the SSC area, with projected total SRTA usage being approximately 250,000 rounds annually.
- Use of high mobility multi-purpose wheeled vehicles (HMMWVs) for inland reconnaissance and surveillance, possible simulated combat events, and along existing unimproved/gravel roads. Maintenance of these roads as needed including repairs or replacements of culverts to restore them to useable conditions; did not include new road construction.
- UAS operations under FAA COAs, to include hand launching/deployment and recovery of the UAS.
- Use of unmanned riverine observation craft on the Pearl River for real-time intelligence operations during training exercises.
- Additional helicopter operations consisting of insertion and extraction of Army SOF surveillance and reconnaissance elements along with follow-up operations as indicated for Sea, Air, Land (SEAL) Team interoperability and coalition force usage. Includes two 60-man teams inserted, 10 helicopters (two CH-53s, four HH-60s, and four CH-47s), and supporting equipment (HMMWVs). The helicopters would operate as a group in performing up to 60 annual events. Includes the establishment of HLZs.

In support of these operations, the EIS also outlined the procedures and facilities that would be used to alert the public, LADWF, and boaters regarding SRTA training events and filing NOTAMs for planned helicopter operations.

The Final EIS analyzed direct, indirect, and cumulative environmental impacts on earth resources, air quality, noise, water resources, solid and HMs, biological resources, land use and aesthetics, socioeconomics and environmental justice, public health and safety, transportation, recreation, and cultural resources. No significant environmental impacts were identified for any resource area (NSWC 2004).

Integrated Natural Resources and Integrated Cultural Resources Management Plan Implementation Both NASA and DOD have management plans in place to manage the natural and cultural resources at SSC in the form of INRMPs and ICRMPs. As appropriate, the proper NEPA analysis is conducted for the implementation of these Plans (DON 2011). This addresses the agencies' responsibility for management of these resources consistent with applicable regulations and in consultation with Federal and State natural and cultural resource managers, as appropriate.

Expansion and Operation of a Combat Shooting Skills Training Center, Stennis Space Center, Hancock County, Mississippi. In September 2013, NSW released a Final EA evaluating the environmental impacts

of expanding the SARC at the NSW Riverine Complex, Stennis into a Combat Shooting Skills Training Center (CSSTC). Various subordinate commands use the site for small arms training, and the intent was to improve the original ranges and add new ranges with various capabilities to expand the training and development capacity for NSW. The purpose of the proposed action was to expand the existing SARC and provide an appropriate CSSTC, including the following: renovation, upgrade, and demolition of existing facilities; extension and improvements to existing utility infrastructure; and the construction of new ranges, new training and range support structures, and access roads. Features of the complex will provide for increased throughput and the simultaneous use of firing points on adjacent ranges. Improvements would also include new security and access control features. The proposed action was needed due to the continual increase in operational training demands and the lack of sufficient training range availability. The expansion took place at the SARC located at the southwest corner of the Fee Area adjacent to the WMA. The preferred (and action) alternative for the proposed CSSTC consisted of the following facilities:

- One 1,000-yards deep x 110-yards wide Unknown Target Distance Range (targets can be set at different distances to practice judging distances and developing the sight picture for long distance shooting).
- One Known Distance 500-yards deep by 110-yards wide range composed of 45 individual shooting lanes.
- Two linear assault ranges 100-yards deep by 200-yards wide.
- Two multi-purpose steel target ranges 100-yards deep by 100-yards wide.
- Two multi-purpose paper target ranges (static and turning) 100-yards deep by 100-yards wide.
- Two steel head-plate target ranges 25-yards deep by 50-yards wide accommodating 8 target racks per range.
- Two rogers-type ranges 25-yards deep by 50-yards wide.
- Two Close Quarter Combat ranges I facilities (1 basic and 1 complex) that occupy 50-yards deep by 50-yards wide of land area.
- Range infrastructure consisting of a range control tower, a consolidated target system, training, storage and maintenance buildings, other support facilities, concrete and covered firing lines, impact containment berms, and access roads to each range target(s) system(s).
- Associated SDZs and safety controls for the ranges.

The Final EA analyzed direct, indirect, and cumulative environmental impacts on air quality, noise, land and water resources, biological resources, cultural resources, recreation, socioeconomics and environmental justice, and safety resources. No significant environmental impacts were identified for any resource area (DON 2013), and a FONSI was signed on June 6, 2014 (DOD and DON 2014).

Area Development Plan for the NSW Riverine Complex, Stennis. The DON is in the process of developing an Area Development Plan (ADP) for the 341-acre NSW Compound and Range/Training Areas in the NSW Riverine Complex, Stennis located in the southwestern portion of SSC. The ADP provides a general update to prior NSW master planning efforts and establishes a planning vision, specific goals,

measurable supporting objectives, and further guidance for both the Compound and Range/Training Areas to meet long-term mission readiness. The Plan is being developed to be consistent with the NASA SSC Master Plan. The analysis focuses on optimizing use of DON lands and facilities and analyzes the potential capacity of the study area to support additional expansion capability (should it be identified). It includes planning and analysis of training facilities and operations in the northern portion of the WMA (pending planned Fiscal Year 2015 land acquisition) and lands within the Fee Area east to Trent Lott Parkway including the NSW Compound.

NASA Rocket Engine Testing. NASA continuously has ongoing and emerging operations and missions at SSC. NASA has coordinated processes in place to address potential impacts from these operations. The environmental impacts of these are addressed in various NEPA documents including:

- EIS of Engine Technology Support for NASA's Advanced Space Transportation Program (February 1998).
- EA for the Construction and Operation of the Constellation Program A-3 Test Stand (May 2007).
- Programmatic EIS for Constellation Program (January 2008); addressed various NASA flight and research centers nationwide responsible for the Constellation Program, including SSC.
- Engine testing will be conducted in the A/B test complex for other engines in addition to those analyzed in this EA, such as RS-68 (B-1) and RS-25 (A-1) along with SLS Core Stage (B-2) and AJ-26 in the E test complex (E-1 C-3).

Stennis International Airport. Stennis International Airport is located on the eastern edge of the Buffer Zone, approximately 10 miles from the Fee Area (see Figure 1.2-2). The airport is a 580-acre general aviation airport that is owned and operated by the Hancock County Development Commission. The airport has an 8,500-ft long, 150-ft wide main runway with sufficient pavement strength to support passenger and cargo aircraft (up to the military C-5). Approximately 1,100 acres adjacent to the airport were purchased for future expansion of the airpark (Hancock Chamber of Commerce 2014). Stennis International Airport operations averaged 175 per day for a 12-month period ending January 31, 2012, with 44 recorded as local general aviation, 113 as transient general aviation, and 18 as military (AirNav 2014). The airport includes a 54,000-square-ft, two-bay hangar that is large enough for two C-130s and a 125-acre drop zone has been developed within the Buffer Zone on airport property that is used for DOD C-130s air-delivery systems training. It is also available to private and commercial customers. Stennis International Airport has applied to the FAA for a COA for UAS operations (Gulf Coast Reporter's League 2014).

Mississippi Gulf Coast Aerospace Industry. Along the Mississippi Coast there are UAS activities, work in the field of composites, and propulsion and geospatial activities. Specifically, in Jackson County, Northrop Grumman has a plant at the Jackson County Aviation Technology Park for the final assembly of the Fire Scout unmanned helicopter as well as fuselage work on the Global Hawk fixed-wing UAS; Northrop Grumman has expressed interest in bringing more UAS work to the center. In addition, in Hancock County, companies such as Aerojet Rocketdyne, Lockheed Martin, Rolls-Royce, and Raytheon Technical Services have an aerospace presence. In addition to the COA for UAS operations at NSW

Riverine Complex, Stennis, there is a UAS COA for the area in and around Trent Lott International Airport in Pascagoula, Mississippi. The industry views a potential for expansion in the UAS sectors, citing an increasing trend of military mission reliance on UASs (Mississippi Gulf Coast Alliance 2012). The Mississippi Development Authority submitted a proposal to FAA for selecting the region as one of six UAS research and test site operators across the country. The proposal included Camp Shelby, Gulfport Combat Readiness Training Center, Stennis International Airport, SSC, MSU, Picayune Municipal Airport, and Trent Lott International Airport (Mississippi Development Authority 2013). After a rigorous 10-month selection process involving 25 proposals from 24 states, the Mississippi Development Authority proposal was not among the six sites chosen by FAA (FAA 2013).

The FAA has selected the Alliance for System Safety of UAS through Research Excellence (ASSURE), a Mississippi State University-led team, to operate a new National Center of Excellence for Unmanned Aircraft Systems. While research will take place at member universities throughout the U.S. and globally, the Center's work will be concentrated at SSC to take advantage of airspace over the Gulf of Mexico, as well as in the Mississippi Delta to conduct unmanned precision agriculture research, and around MSU's Raspet Flight Research Lab in Starkville. Mississippi's research university is leading the coalition of academic and industry partners that will launch a new era of commercial unmanned aircraft research, development, and integration into the nation's airspace.

4.2.2 Cumulative Impact Analysis

Airspace and Air Operations. As discussed in Section 3.4.2, the ROI for airspace and air operations cumulative impacts includes the proposed R-4403A, B, C, E, and F airspace. Other projects that include actions within the proposed SUA, including any expansion of Stennis International Airport or increase in the Gulf Coast aerospace industry, are part of the cumulative impacts analysis.

In general, the redesignation and expansion of R-4403A, B, C, E, and F would potentially provide an opportunity for adjacent civilian airports in potential growth of UAS and other commercial airspace operations. Specifically, the establishment of airport buffers for nearby Picayune Municipal Airport and Stennis International Airport, which are located directly adjacent to the proposed SUA, would benefit from the support of SUA without needing to create a restricted flight corridor. In addition, when the SUA is not needed for testing or training purposes, it would be returned to Houston FAA ATC for use by commercial and general air traffic. Any increase from other future air operations would be managed in accordance with existing procedures to minimize or avoid conflicts; therefore, no significant cumulative impacts to airspace and air operations are anticipated from the implementation of the proposed action.

Land Use and Socioeconomics. Specific to this cumulative impact analysis, the ROI for land use and socioeconomics includes Hancock County and Pearl River County since they overlay a portion of R-4403F. The land underlying a portion R-4403F airspace consists of residential homes and privately held vacant land that could be developed in the future. Specifically, there are an estimated 300 residents located within the 5,018-acre portion of R-4403F that extends north of the Buffer Zone into unincorporated Hancock and Pearl River counties. Although the land use in this area is currently considered compatible, Hancock County’s future land use plan for this area indicates a conversion of existing open space/undeveloped land use to residential use.

There will be no significant impacts to existing land use. The current low-density residential use of the area underlying the proposed R-4403F airspace extending north of the SSC Buffer Zone is currently compatible with DON's intended use of R-4403F. The DON would work with local counties through the completion of a study under DON's RAICUZ Program that would include recommendations for the land underlying the proposed R-4403A, B, C, E, and F airspace. The study recommendations are likely to include DON and NASA representatives working with Hancock County and Pearl River County to encourage the adoption of compatible land use zoning measures, such as retaining existing low-density land use in this area and avoiding establishment of certain land uses that could be incompatible with the intended use of R-4403F. Potential incompatible uses would include high density residential, schools, hospitals, and churches. Without the implementation of such controls, cumulative impacts could be adverse because such higher density land uses underlying restricted airspace are not considered compatible; however, the overall severity would depend on the success of the implementation of RAICUZ program and unforeseeable characterization of future land use conversion and ultimate development of the land.

Since land use affects certain economic opportunities, socioeconomic conditions could be cumulatively impacted. However, as stated above, the DON's policy is to work with local land use regulators to implement land use controls to address compatibility concerns. Any county process for rezoning or other type of land use control would be a public process with opportunity for landowner review and comment. As with land use, the overall severity of socioeconomic impact is not foreseeable, as it would depend on any future action to be taken by Hancock County and Pearl River County for compatible land use underlying R-4403F.

Air Quality. As stated in Section 3.10.2, there are small emission increases anticipated for all criteria pollutants; however, all increases are considered to be minor adverse impacts. As a result, this cumulative impacts analysis focuses on greenhouse gases (GHGs). Since individual sources of GHG emissions are not large enough to have an appreciable effect on climate change and the potential effects of proposed GHG emissions on climate change are global by nature, the study area for this aspect is not defined.

GHGs are gases in the Earth's atmosphere that prevent heat from escaping into space. GHGs result primarily from the combustion of fossil fuels, and include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, requires Federal agencies to inventory and report direct and indirect emissions of GHGs, including those associated with fuel consumption and the purchase of electricity. In addition, facilities with stationary combustion sources must determine applicability of the USEPA's Greenhouse Gas Reporting Program, as promulgated in 40 CFR Part 98, which requires reporting from facilities that emit 25,000 metric tons CO_2 -equivalent (CO_2e) or more per year from stationary source fuel combustion. Applicability is based on annual fuel consumption and is evaluated by SSC annually. Emission sources evaluated in this EA are exclusively associated with airspace operations and are limited to rocket engine testing, aircraft flight in existing and proposed airspaces, and munitions detonation. The primary GHG emission associated with these sources is CO_2, and to a lesser extent, CH_4, and emissions of these GHGs are carried forward in the analysis.

GHGs are produced from the burning of fossil fuels, as well as through industrial and biological processes. There are no published NEPA thresholds of significance for GHG emissions resulting from a proposed action and formulation of thresholds is difficult when attempting to identify what level of emissions would substantially contribute to global climate change. The cumulative effects for GHG emissions were evaluated for the proposed operation activities. CO_2 is the primary GHG emitted by aircraft engines and munition firing generates both CO_2 and CH_4.

Table 4.2-2 compares the GHG emissions associated with the proposed operations to both the baseline operations and the United States 2011 GHG emissions. The estimated GHG emissions from the proposed action are less than a hundred thousandth of 1 percent of the total GHG emissions generated by the United States in 2011.

Table 4.2-2. Estimated GHG Emissions from Operation Activities

Baseline	**CO_2e per Year in Metric Tons**
J-2X	ND
Helos	501.8
Fixed-wing Aircraft	37
Total	*538.89*
Proposed	**CO_2e per Year in Metric Tons**
J-2X	ND
Helos	1,008
Fixed-wing Aircraft	728
Munitions	14
Total	*1,750*
Net Change	1,211
[1]U.S. 2011 GHG Emissions	$6{,}708.3 \times 10^6$
Percent of U.S. 2011 GHG Emissions	.000018

Source: USEPA 2013.

Individual sources of anthropogenic GHG emissions are not large enough to have an appreciable effect on climate change. For this reason, emissions of GHGs from the Proposed Action alone would not cause appreciable global warming that would lead to climate change. These emissions would increase the atmosphere's concentration of GHGs, and, in combination with past and future emissions from all other sources, contribute incrementally to the global warming that produces the adverse effects of climate change. Therefore, an appreciable impact on global climate change would, if current predictions are accurate, only occur when proposed GHG emissions combine with other GHG emissions from other man-made activities on a global scale.

Biological Resources. As discussed in Section 3.11.2, implementation of the proposed action would involve clearing up to 11 acres in the WMA as well as intermittent noise disturbance from ongoing DOD operations within the WMA, at the NASA test stands, and within the proposed R-4403A, B, C, E, and F airspace. In addition, the DON and NASA determined that the proposed action may affect, but is not likely to adversely affect eight species protected under the ESA (see Table 3.-11-3).

The proposed action could have additive impacts to biological resources with ongoing DOD and NASA activities in the ROI as well as the other commercial air industry and activities in the ROI and the more

general activities within the ROI that affect vegetation, wildlife, and habitat such as gravel extraction, timber operations, sod farming, recreational hunting and fishing, and rural development.

The physical disturbance impacts are not expected to have significant cumulative impacts to biological resources given that the areas that would be disturbed contain common vegetation and impacts would be highly localized in a manner that would not impact overall habitat diversity or health for the potentially affected biotic communities. Even though these sites of physical disturbance are nearby other sites currently used for military training, cumulative impacts to biological resources would be minor as there is intervening habitat between the sites.

The effects of noise and human activity disturbance have the potential to have an additive impact with other sources of noise and human activity in the area. However, the range deconfliction process would have the effect of dispersing activities in order to adhere to safety buffers, which would also disperse the biological resource impacts. It is unlikely that the air-to-ground training activities would be occurring concurrent with the rocket engine testing activities, for example. Combined with the fact that the DOD training and NASA testing events would be intermittent, additive cumulative impacts to biological resources, including special status species, would not be expected to be significant. Moreover, the ongoing implementation of the NASA INRMP and the WMA INRMP (MSU 2010, DON 2011, respectively), would continue to monitor and adaptively manage towards a goal of species abundance and habitat availability. Thus, no significant adverse cumulative impact to biological resources is expected.

Soils. As detailed in Section 3.12.3, the primary disturbance to soils associated with the proposed action would be highly localized to approximately 13 acres at the munitions impact and sensor training area sites. The more minor soil disturbance would be additive to other ongoing training activities at NSW Riverine Center, Stennis to include soil disturbance from use of existing roads for range access and maintenance, additive impacts at HLZ sites from existing and proposed increase use, and addition of air-to-ground SRTA in the RZs. As evaluated in the EIS for the purchase of land for the WMA, the ongoing impacts to soils are widely dispersed and largely temporary since use of training is intermittent and varied and vehicle use occurs on established roads (Naval Surface Warfare Center 2004). DON and NASA would continue to implement BMPs for soil resources through adherence to the NPDES program and addressing any erosion issues through the range management programs and the INRMPs, as appropriate. Therefore, the cumulative impact to soils would be less than significant.

Wetlands. As discussed in Section 3.13.2, implementation of the proposed action could result in the loss of up to 11 acres of wetlands. In addition, other projects within the study area may result in the loss of wetlands. Construction and operational activities associated with the expansion of the CSSTC would impact up to 8.76 acres of wetlands. Additionally, there are already 14 miles of existing roads within the WMA that fragment the contiguous wetland system, and there are ongoing indirect impacts from ground-based SOF training activities in the WMA that could cause minor impacts such as turbidity, soil compaction, and trampling of vegetation within wetlands and other waters of the United States.

In determining whether the additive impacts would potentially be significant, it is important to discuss the regulatory requirements in place to offset wetland impacts through avoidance and minimization measures. Unavoidable impacts to wetlands under Alternatives 1 and 2, as well as all other unavoidable wetland impacts within the WMA boundaries since promulgation of the 1977 CWA Amendments (which

established the basic structure for Section 404 permits) and EO 11990, have been minimized to the greatest extent possible. In accordance with the CWA and EO 11990, NASA and the DON have secured the proper permits through the USACE. These permits have required compensation to ensure no net loss of wetlands. The additional impact of up to 11 acres in wetlands from implementation of this proposed action would be avoided and minimized to the greatest extent possible. The sites for ongoing ground-based training are dispersed throughout the WMA and used temporarily and at varied intervals and frequency, allowing the aquatic environment to recover shortly after training exercises. Any impacts that cannot be avoided would be permitted through the USACE to ensure no net loss of wetlands. Therefore, while unavoidable adverse impacts to wetlands would occur through implementation of Alternatives 1 and 2, no net loss of wetlands would occur due to the existence of regulations that require unavoidable impacts to be mitigated. Moreover, while the mitigation is determined at the time of permitting, it is often the case that the ration of wetlands created to wetlands lost is greater than 1:1. All the available wetland banks are local and thus have provided adequate mitigation and no net loss of wetlands in the watershed landscape. Therefore, no significant cumulative impacts would occur to wetlands.

4.3 OTHER NEPA CONSIDERATIONS

4.3.1 Consistency and Compliance with Federal, State, and Local Plans, Policies, and Regulations

The proposed action and action alternatives have been assessed to determine their consistency and compliance with applicable environmental regulations and other plans, policies, and controls. This analysis indicates the proposed action and action alternatives would not conflict with the objectives of applicable plans, policies, and regulations. A summary of applicable environmental regulations and regulatory compliance is provided in Table 4.3-1.

Table 4.3-1. Summary of Applicable Environmental Regulations and Regulatory Compliance

Regulation, Plan, Policy, or Control	Regulatory Agency Authority	Status of Compliance	Section of EA
NEPA and Public Review			
NEPA (Public Law 91-190, 42 USC 4341 *et seq*. as amended)	CEQ	This EA has been prepared in accordance with the CEQ regulations implementing NEPA, as well as DON, NASA, and FAA NEPA procedures. Public participation and review are being conducted in compliance with NEPA.	All of document
CEQ Implementing Regulations (40 CFR 1500–1508	CEQ		
DON NEPA Implementing Regulations (32 CFR 775)	DON		
NASA Procedures for Implementing NEPA (14 CFR 1216, Subpart 1216.3)	NASA		

Table 4.3-1. Summary of Applicable Environmental Regulations and Regulatory Compliance

Regulation, Plan, Policy, or Control	Regulatory Agency Authority	Status of Compliance	Section of EA
FAA Procedures for Implementing NEPA (FAA Order 1050.1E and DOT Oder 610.1C)	FAA		
Public Health and Safety			
RCRA, 42 USC 6901 *et al.*	USEPA and MDEQ	The exact amounts of hazardous waste that would be generated under the proposed action are unknown; however, NASA and NSW would continue to operate in accordance with all applicable regulations and it is not anticipated that existing LQG and SQG permits would be exceeded.	Section 3.2
CERCLA, 42 USC 9601 *et al.*	USEPA and MDEQ	NASA/EO contaminated site personnel would be consulted prior to commencement of untethered autonomous flight vehicle operations. It is not anticipated that rotorwash from the CV-22 at the SAR HLZ would disturb soils at Area D.	Section 3.2
Air Quality			
CAA, 42 USC *et al.*	USEPA and MDEQ	The air quality analysis in the EA concludes that proposed emissions under Alternatives 1 and 2 would not create a major regional source of air pollutants or affect the current attainment status, and would comply with all applicable State and regional air agency rules and regulations.	Section 3.10
Land Use			
Hancock County Comprehensive Plan	Hancock County	There is negligible overall risk of increased noise disturbance to human receptors as it is not anticipated that the noise associated with any other aspect of the proposed action would travel beyond the established boundaries of the Buffer zone. Approximately 300 residents are located under proposed R-4403F; however, the low-density residential land use in this area is currently considered compatible.	Section 3.5

Table 4.3-1. Summary of Applicable Environmental Regulations and Regulatory Compliance

Regulation, Plan, Policy, or Control	Regulatory Agency Authority	Status of Compliance	Section of EA
Pearl River Comprehensive Plan	Pearl River County	There is negligible overall risk of increased noise disturbance to human receptors as it is not anticipated that the noise associated with any other aspect of the proposed action would travel beyond the established boundaries of the Buffer zone. Approximately 300 residents are located under proposed R-4403F; however, the low-density residential land use in this area is currently considered compatible.	Section 3.5
RAICUZ Program (OPNAVINST 3550.1A)	DON	There is negligible overall risk of increased noise disturbance to human receptors as it is not anticipated that the noise associated with any other aspect of the proposed action would travel beyond the established boundaries of the Buffer Zone. DON would work with the local counties to encourage continued compatible land use in the area beyond the Buffer Zone underlying R-4403F.	Section 3.5
Mississippi Coastal Program	Section 57-15-6 of the Mississippi Code of 1972	The proposed action is consistent to the maximum extent practicable with the federal policies of the Mississippi Coastal Program.	Section 3.5 and Appendix E
Louisiana Coastal Resources Program	Louisiana State and Local Coastal Resources Management Act of 1978, as amended (Act 361, La. R.S. 49:214.21 *et seq.)*	The proposed action is consistent to the maximum extent practicable with the federal policies of the Louisiana Coastal Resources Program.	Section 3.5 and Appendix E
Cultural Resources			
NHPA of 1966, as amended in 1980, 16 USC 470 *et al.*	Mississippi SHPO and ACHP	Although no impacts to NRHP structures are anticipated, any construction or renovation that may become necessary at the NASA Test Stands will be coordinated through the NASA Historic Preservation office to ensure consistency with the PA and consistency with NASA and DON ICRMPs.	Section 3.8

Table 4.3-1. Summary of Applicable Environmental Regulations and Regulatory Compliance

Regulation, Plan, Policy, or Control	Regulatory Agency Authority	Status of Compliance	Section of EA
Archaeological Resources Protection Act of 1979, 16 USC 470 *et al.;* Final Uniform Regulations, 32 CFR Part 229 (1997).	Mississippi SHPO	IMP-A and FW2 have not yet been surveyed. Thus, in coordination with the NASA Historic Preservation Office, NAVFAC SE Historic Preservation Office will consult with Mississippi SHPO and other consulting parties as warranted regarding the use/maintenance of the proposed target area at IMP-A and the sensor training area at FW2. No effects to archaeological resources are anticipated at FW1. Actions will be consistent with NASA and DON ICRMPs.	Section 3.8
Water Quality			
CWA, 33 USC Sections 1251 to 1387 (1986 & Supplement 1997)	MDEQ and USEPA	NSW and NASA would continue to operate within all permitted guidelines and adhere to their respective SWPPPs. In the event of a spill in the Fee Area, appropriate containment measures would be implemented in accordance with the SSC Environmental Integrated Contingency Plan and SPCC Plan. In the event of a spill in the WMA, appropriate containment measures would be implemented in accordance with the DON Oil and Hazardous Substance Spill Contingency Plan and Red Plan (NAVFAC 2013).	Section 3.13
Protection of Wetlands, EO 11990 (1977)	USACE	There is no practicable alternative to locating the proposed target areas within wetlands; however, all practicable measures to minimize impacts to wetlands will be implemented. The purchase of mitigation credits at available wetland banks will be pursued, as appropriate. Additional analysis would be needed once range development plans are prepared for these proposed target areas (FW1, IMP-A, and FW2). A Section 401 Water Quality Certification from the MDEQ, as well as a Section 404 permit from the USACE, may be required.	Section 3.13

Table 4.3-1. Summary of Applicable Environmental Regulations and Regulatory Compliance

Regulation, Plan, Policy, or Control	Regulatory Agency Authority	Status of Compliance	Section of EA
Floodplain Management, EO 11988 (1977)	Federal Emergency Management Agency (FEMA)	FW1 and IMP-A are located entirely within the 100-year floodplain. Depending on the final design of FW2, the southeastern portion of FW2 would be within the 100-year floodplain. However, under the proposed action, there would be no structures constructed that would increase flood risks, duration, frequency, or water surface elevation. Implementation of Alternatives 1 and 2 would follow applicable Federal recommendation on floodplain construction and incorporate flood mitigation measures into the design. Therefore, any adverse effects to the floodplain from the construction, use, and management of the munitions target areas (FW1 and IMP-A) and sensor training area (FW2) sites would be minimized to less than significant through compliance with EO 11988.	Section 3.13
Natural Resources			
Migratory Bird Treaty Act of 1918, 16 USC 703 *et al.*	USFWS	NASA and DON would continue to manage migratory birds in accordance with their respective INRMPs.	Section 3.11
ESA of 1973, 16 USC *et seq.*	USFWS	Implementation of the proposed action may affect, but is not likely to adversely affect the Louisiana black bear, ringed map turtle, gopher tortoise, eastern indigo snake, dusky gopher frog, red-cockaded woodpecker, wood stork, and Bachman's warbler, and would not result in the destruction or adverse modification of designated critical habitat for the Gulf sturgeon (i.e., the Pearl River).	Section 3.11

4.3.2 Unavoidable Adverse Environmental Effects

Avoidance and minimization of adverse effects to environmental resources were integrated into the proposed action (please refer to Chapter 3) to the greatest extent possible and practicable.

4.3.3 Relationship between Short-Term Use of Man's Environment and Maintenance and Enhancement of Long-Term Productivity

NEPA requires analyzing the relationship between a project's short-term impacts on the environment and the effects those impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. Choosing one option may reduce future flexibility in pursuing

other options or committing a resource to a certain use may eliminate the possibility for other uses of that resource.

As discussed in Chapter 3, implementation of the proposed action would result in both short- and long-term environmental effects. However, implementation of the proposed action is not expected to result in the types of impacts that would reduce environmental productivity, affect biodiversity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to human safety or the general welfare of the public.

4.3.4 Irreversible and Irretrievable Commitments of Resources

Implementation of the proposed action would involve irretrievable commitments of nonrenewable and renewable resources. With regard to operational missions and activities, resources such as fuels, energy, and munitions would be committed. The total amount of materials required for this action is relatively small when compared to the resources available in the region. The fuels required for operational missions and activities are not in short supply; their use would not have an adverse impact on the continued availability of these resources and the energy resource commitment is not anticipated to be excessive in terms of region-wide usage. Likewise, the energy required for additional operations is not in short supply. This energy use would not have an adverse impact on the continued availability of these resources and is not anticipated to be excessive in terms of region-wide usage. Furthermore, compliance with the requirements set forth in EOs 13423 and 13514 would minimize any irreversible or irretrievable effects to multiple non-renewable and renewable resources.

With respect to the delivery of HE munitions, military munitions are always subject to RCRA after they are deployed in a non-combat scenario. The MMR defines when military munition have entered in the waste stream. Although range management plans require range clearance operations, it is possible ejected munitions casings and other range debris would persist on the range in perpetuity. However, compliance with the range clearance procedures and MMRP would minimize any irreversible impacts to future potential land use.

In terms of GHGs and global climate change, EO 13693, *Planning for Federal Sustainability in the Next Decade* (80 Federal Register 15872, March 25, 2015) sets as a goal for all Federal agencies the improvement of energy efficiency and the reduction of GHG emissions of the agency through reduction of energy intensity by 2.5 percent annually through the end of Fiscal Year 2025 relative to the baseline of the agency's energy use in Fiscal Year 2015. Agencies are also required to implement a systematic increase in the use of clean energy (renewable electric energy and alternative energy) beginning in Fiscal Year 2016 and achieving not less than 25 percent by Fiscal Year 2025 and each year thereafter. The proposed action does not represent a net incremental addition to the global climate change problem. Furthermore, DON's continued compliance with EO 13693 would minimize any irreversible effects from GHG emissions.

5.0 LIST OF PREPARERS AND CONTRIBUTORS

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Section 4.0 Cumulative Impacts and Other NEPA Considerations

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APPENDIX A COOPERATING AGENCY AGREEMENT

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DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, DC 20350-2000

5090
Ser N45/13U139811
22 November 2013

Mr. Dennis E. Roberts
Director, Airspace Services
Mission Support Services
Orville Wright Building (FOB10A)
Federal Aviation Administration
800 Independence Ave, SW
Washington, DC 20591

Dear Mr. Roberts:

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Department of the Navy (Navy) is initiating the preparation of an Environmental Assessment (EA) to evaluate the potential environmental effects of modifying existing Special Use Airspace (SUA) associated with the John C. Stennis Space Center (SSC), Mississippi. The proposed action would expand the existing SUA at SSC to support the National Aeronautical and Space Administration's (NASA) proposed rocket engine testing program and proposed Special Operations training requirements for Navy and other Department of Defense (DoD) Services.

To complete the environmental and technical analyses required for establishing the proposed SUA, the Navy and Federal Aviation Administration (FAA) will need to work together. Therefore, pursuant to the Council on Environmental Quality's (CEQ) NEPA regulations (specifically, 40 CFR part 1501.6, Cooperating Agencies), CEQ's 2002 guidance on cooperating agencies, and in accordance with the Memorandum of Understanding (MOU) between the FAA and the DoD concerning the environmental review of SUA actions (dated February 4, 2012), the Navy invites the FAA to serve as a cooperating agency for the proposed action. Per MOU guidance, the Navy and NASA shall serve as the lead agencies for the preparation and processing of the EA and FAA shall act as a cooperating agency given its jurisdiction by law and special expertise on airspace issues. The Navy views this coordination as important to the successful completion of the environmental planning process for the modification of the SSC SUA.

As a cooperating agency, the Navy specifically requests FAA support and participation in the development of the EA, including:

a. Participating in the scoping process;

b. Assuming responsibility, upon the Navy's request for developing information and preparing analyses on issues for which you have special expertise;

c. Providing staff support for draft EA review;

d. Adhering to the overall schedule as set forth by Navy and NASA (Enclosure 1); and

e. Providing a formal, written response to this request.

We look forward to working closely with the FAA's Southern Region to produce an environmental analysis that meets the needs of NASA, FAA, and Navy.

My point of contact for this action is Dawn Roderique at (703) 695-5207, email: dawn.roderique@navy.mil.

Sincerely,

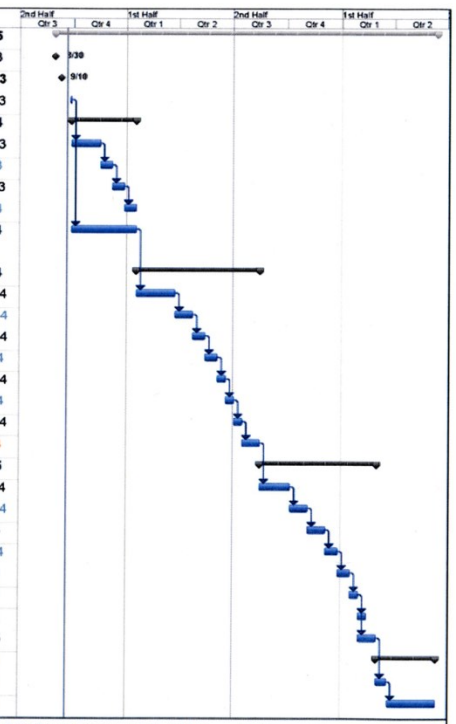
KAREN M. FOSKEY
Head, Operational Environmental Readiness and Planning Branch, Energy and Environmental Readiness Division (OPNAV N45)

Enclosure (1): Notional Schedule

Copy:
NASA SSC, Safety & Mission Assurance Directorate
NAVSPECWARCOM
FAA Eastern Service Center

Notional Schedule for John C. Stennis Space Center
Special Use Airspace Environmental Assessment (EA)

ID	Task Name	Duration	Start	Finish
0	**Stennis Airspace EA DRAFT Schedule**	**466 days**	**Fri 8/30/13**	**Fri 6/12/15**
1	**Notice to Proceed**	0 days	Fri 8/30/13	Fri 8/30/13
2	Pre Kick-off Meeting	**0 days**	**Tue 9/10/13**	**Tue 9/10/13**
3	**Kick-off Meeting**	2 days	Wed 9/25/13	Thu 9/26/13
4	**DOPAA Development**	**81 days**	**Thu 9/26/13**	**Fri 1/17/14**
5	Prepare and Submit Draft DOPAA	50 edays	Thu 9/26/13	Fri 11/15/13
6	Navy/NASA/AFSOC Comments on Draft DOPAA	21 edays	Fri 11/15/13	Fri 12/6/13
7	Prepare and Submit Revised DOPAA	21 edays	Fri 12/6/13	Fri 12/27/13
8	Navy/NASA/AFSOC Comments on Revised DOPAA	21 edays	Fri 12/27/13	Fri 1/17/14
9	***All ops data (platforms, frequency, day/night split, flight patterns/areas, etc) validated***	113 edays	Thu 9/26/13	Fri 1/17/14
10	**Draft EA/FONSI Development**	**150 days**	**Fri 1/17/14**	**Fri 8/15/14**
11	Prepare and Submit Draft EA v.1	66 edays	Fri 1/17/14	Mon 3/24/14
12	Navy/NASA/AFSOC Comments on Draft EA v.1	30 edays	Mon 3/24/14	Wed 4/23/14
13	Prepare and Submit Draft EA v.2	21 edays	Wed 4/23/14	Wed 5/14/14
14	Navy/NASA/AFSOC Comments on Draft EA v.2	21 edays	Wed 5/14/14	Wed 6/4/14
15	Prepare and Submit Draft EA v.3 and Draft FONSI	14 edays	Wed 6/4/14	Wed 6/18/14
16	Navy/NASA/AFSOC Comments on Draft EA v.3	14 edays	Wed 6/18/14	Wed 7/2/14
17	Prepare and Distribute Draft EA and FONSI to FAA	14 edays	Wed 7/2/14	Wed 7/16/14
18	**FAA Review and Comment on Draft EA/FONSI**	**30 edays**	**Wed 7/16/14**	**Fri 8/15/14**
19	**Final EA Development**	**141 days**	**Fri 8/15/14**	**Mon 3/2/15**
20	Prepare and Submit Final EA v.1	52 edays	Fri 8/15/14	Mon 10/6/14
21	Navy/NASA/AFSOC Comments on Final EA v.1	30 edays	Mon 10/6/14	Wed 11/5/14
22	Prepare and Submit Final EA v.2	30 edays	Wed 11/5/14	Fri 12/5/14
23	Navy/NASA/AFSOC Comments on Final EA v.2	21 edays	Fri 12/5/14	Fri 12/26/14
24	Prepare and Submit Final EA v.3 and Final FONSI	21 edays	Fri 12/26/14	Fri 1/16/15
25	Navy/NASA/AFSOC Comments on Final EA v.3	14 edays	Fri 1/16/15	Fri 1/30/15
26	Prepare and Distribute Final EA and FONSI to FAA	14 edays	Fri 1/30/15	Fri 2/13/15
27	Navy/NASA Signature	31 edays	Fri 1/30/15	Mon 3/2/15
28	**FAA Approval**	**74 days**	**Tue 3/3/15**	**Fri 6/12/15**
29	FAA Svc. Ctr. Prepares FONSI/ROD & Submits to FAA HQ for Review	14 days	Tue 3/3/15	Fri 3/20/15
30	FAA HQ Legal Sufficiency Review	60 days	Mon 3/23/15	Fri 6/12/15



Project: Stennis Airspace EA D
Date: Fri 9/20/13

Task | Split | Milestone | Summary | Project Summary | Progress

Page 1

Enclosure (1)

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U.S. Department
of Transportation
Federal Aviation Administration

Ms. Karen M. Foskey
Head, Operational Environmental Readiness and Planning Division
Department of the Navy
Office of the Chief of Naval Operations
2000 Navy Pentagon
Washington, DC 20350-2000

Dear Ms. Foskey:

Thank you for your November 22, 2013 letter requesting the Federal Aviation Administration (FAA) participate as a cooperating agency in the preparation of the Environmental Assessment for modifying existing special use airspace (SUA) associated with the John C. Stennis Space Center (SSC), Mississippi.

Since the proposal involves special use airspace, the FAA will cooperate following the guidelines described in the Memorandum of Understanding between the FAA and the Department of Defense Concerning SUA Environmental Actions, dated October 4, 2005, and in accordance with 40 CFR § 1501.6, NEPA regulations regarding cooperating agencies.

Modification of this SUA resides under the jurisdiction of the Eastern Service Center, Operations Support Group, College Park, GA. The Eastern Service Center will be the primary focal point for matters related to both airspace and environmental matters. Mr. Eric Fox serves as Acting Manager of the Operations Support Group.

FAA Order 7400.2, Procedures for Handling Airspace Matters, Chapter 32, indicates that airspace modifications and environmental processes should be conducted in tandem as much as possible; however, they are separate processes. Approval of either the aeronautical process or the environmental process does not automatically indicate approval of the entire proposal. I have enclosed Appendixes 2, 3, and 4 of FAA Order 7400.2 for additional details.

A copy of the incoming correspondence and this response is being forwarded to Mr. Fox. He can be contacted at 404-305-5571 for further processing of your proposal.

Sincerely,

Dennis E. Roberts
Director, Airspace Services
Air Traffic Organization

Enclosures (3)

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APPENDIX B NOTICE OF PUBLIC RULEMAKING FOR PROPOSED REDESIGNATION AND EXPANSION OF RESTRICTED AREA R-4403; GAINSVILLE, MS

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39344

Proposed Rules

Federal Register

Vol. 79, No. 132

Thursday, July 10, 2014

This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 73

[Docket No. FAA–2014–0370; Airspace Docket No. 14–ASO–2]

RIN 2120–AA66

Proposed Redesignation and Expansion of Restricted Area R–4403; Gainesville, MS

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This action proposes to remove restricted area R–4403 Gainesville, MS, and replace it with an expanded area that would be redesignated as R–4403A, B, C, D, E and F, Stennis Space Center, MS. The expanded restricted airspace would be used to support mission requirements of the National Aeronautics and Space Administration (NASA) and the Naval Special Warfare Command (NSWC).

DATES: Comments must be received on or before August 25, 2014.

ADDRESSES: Send comments on this proposal to the U.S. Department of Transportation, Docket Operations, M–30, 1200 New Jersey Avenue SE., West Building Ground Floor, Room W12–140, Washington, DC 20590–0001; telephone: (202) 366–9826. You must identify FAA Docket No. FAA–2014–0370 and Airspace Docket No. 14–ASO–2, at the beginning of your comments. You may also submit comments through the Internet at *www.regulations.gov.* Comments on environmental and land use aspects should be directed to: David Lorance, P.E., Center Operations Directorate, Roy S. Estess Building 1100, Mail Code RA02, Stennis Space Center, MS 39529–6000.

FOR FURTHER INFORMATION CONTACT: Paul Gallant, Airspace Policy and Regulations Group, Office of Airspace Services, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone: (202) 267–8783.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested parties are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments as they may desire. Comments that provide the factual basis supporting the views and suggestions presented are particularly helpful in developing reasoned regulatory decisions on the proposal. Comments are specifically invited on the overall regulatory, aeronautical, economic, environmental, and energy-related aspects of the proposal.

Communications should identify both docket numbers (FAA Docket No. FAA–2014–0370 and Airspace Docket No. 14–ASO–2) and be submitted in triplicate to the Docket Management System (see **ADDRESSES** section for address and phone number). You may also submit comments through the Internet at *www.regulations.gov.*

Commenters wishing the FAA to acknowledge receipt of their comments on this action must submit with those comments a self-addressed, stamped postcard on which the following statement is made: "Comments to FAA Docket No. FAA–2014–0370 and Airspace Docket No. 14–ASO–2." The postcard will be date/time stamped and returned to the commenter.

All communications received on or before the specified closing date for comments will be considered before taking action on the proposed rule. The proposal contained in this action may be changed in light of comments received. All comments submitted will be available for examination in the public docket both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerned with this rulemaking will be filed in the docket.

Availability of NPRMs

An electronic copy of this document may be downloaded through the Internet at *www.regulations.gov.*

You may review the public docket containing the proposal, any comments received and any final disposition in person at the Dockets Office (see **ADDRESSES** section for address and phone number) between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. An informal docket may also be examined during normal business hours at the office of the Operations Support Group, Eastern Service Center, Federal Aviation Administration, 1701 Columbia Ave., College Park, GA 30337.

Persons interested in being placed on a mailing list for future NPRM's should contact the FAA's Office of Rulemaking, (202) 267–9677, for a copy of Advisory Circular No. 11–2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedure.

Background

Restricted area R–4403, Gainesville, MS, was originally designated as of January 6, 1966 (30 FR 10287) for NASA's static testing of large space vehicle rocket stages. R–4403 is a rectangular area, measuring approximately 2 nautical miles (NM) by 2.5 NM with a designated altitude from the surface up to 5,000 feet MSL.

NASA and NSWC have jointly proposed an expansion of R–4403. The existing restricted area is too small to fully contain hazards to aviation associated with rocket engine testing and untethered space vehicle propulsion system testing. In addition, NSWC requested restricted airspace to be used for conducting full mission profile training for Special Operations Forces (SOF). This training allows air and ground units to practice integrating their operations to eliminate potential conflicts and coordination problems that could otherwise arise during complex missions when deployed.

R–4403A and B would be used for NASA activities, while R–4403C through F would be used by SOF units to conduct integrated training in air and ground tactics prior to their deployment on real-world missions. The Stennis Space Center has the potential to enable combined SOF training for riverine, jungle and airborne forces. Currently, the Stennis Space Center lacks a live-fire air-to-ground capability. This deficiency reduces SOF mission integration training in the employment of air and ground units to no more than a communications exercise. The proposed expansion of R–4403 would provide the live-fire air-to-ground capability which is critical to realistic full mission profile training.

The Proposal

The FAA is proposing an amendment to 14 CFR part 73 to remove restricted area R–4403, Gainesville, MS, and redesignate and expand the size of the airspace to consist of six subareas: R–4403A, B, C, D, E and F, Stennis Space Center, MS. The FAA is proposing this action at the request of NASA and the NSWC. R–4403A and B would be used for NASA activities, such as continuing rocket engine testing and untethered space vehicle propulsion system testing. The NSWC would use the proposed R–4403C, D, E and F for integrated Special Operations Forces training. The proposed restricted areas are described below.

R–4403A would extend within a 2.5-NM radius of lat. 30°21′51″ N., long. 89°35′39″ W. R–4403A would extend from the surface to 12,000 feet MSL. It would replace R–4403 with an expanded area to more fully contain NASA rocket engine testing hazards, including testing of new rocket engine technologies.

R–4403B would be used by NASA for untethered space vehicle propulsion testing. The area would extend upward from the surface to 6,000 feet MSL. These vehicles are utilized to explore planets and asteroids. Testing of these vehicles involves potential hazards since failure of the vehicle, its propulsion system or propellant tanks can result in explosion of the vehicle. The propensity for this to occur is greater with these vehicles than with a standard aircraft because of the extremely volatile nature of the propellants and the poor aerodynamic characteristics of the vehicle during earth-based operation. The proposed R–4403B is designed to contain the flight profiles of these vehicles as well as any potential hazards to nonparticipating aircraft.

R–4403C would contain a ground target for air-to-surface weapons firing by aircraft such as armed helicopters and AC–130 gunships. Surface-to-air laser firing would also be conducted. The area would extend upward from the surface to 6,000 feet MSL.

R–4403D would be used in conjunction with R–4403C. It would have the same lateral dimensions as R–4403C and would extend above R–4403C from 6,000 feet MSL to 10,000 feet MSL. This area would contain air-to-ground weapons firing, as well as surface-to-air laser firing.

R–4403E would contain a ground target for air-to-surface weapons firing and surface-to-air laser firing. The area would extend upward from the surface to 10,000 feet MSL.

R–4403F would be used in conjunction with R–4403E. R–4403F would wrap around the northeast corner of R–4403E and would extend upward from 4,000 feet MSL to 10,000 feet MSL.

The proposed time of designation for R–4403A and R–4403B is "Intermittent, 1000 to 0300 local time, as activated by NOTAM at least 24 hours in advance." The proposed time of designation for R–4403C, D, E and F is "Intermittent, 1800 to 2400 local time as activated by NOTAM at least 24 hours in advance; other times by NOTAM with ATC approval. (Note: The term "Intermittent" is used to indicate occasional, irregular, or changeable use periods). During periods when the proposed restricted areas are not needed by the using agencies, the airspace would be returned to the controlling agency for access by other airspace users.

A color graphic depiction of the proposed restricted areas will be posted under the "Supporting & Related Material" section on the *www.regulations.gov* Web site (search FAA–2014–0370).

The FAA has determined that this proposed regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. Therefore, this proposed regulation: (1) Is not a "significant regulatory action" under Executive Order 12866; (2) is not a "significant rule" under Department of Transportation (DOT) Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. Since this is a routine matter that will only affect air traffic procedures and air navigation, it is certified that this proposed rule, when promulgated, will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

The FAA's authority to issue rules regarding aviation safety is found in Title 49 of the United States Code. Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority.

This rulemaking is promulgated under the authority described in Subtitle VII, Part A, Subpart I, Section 40103. Under that section, the FAA is charged with prescribing regulations to assign the use of the airspace necessary to ensure the safety of aircraft and the efficient use of airspace. This regulation is within the scope of that authority as it would restructure the restricted airspace at the Stennis Space Center, MS, to enhance aviation safety and accommodate essential NASA and NSWC requirements.

Environmental Review

This proposal will be subjected to an environmental analysis in accordance with FAA Order 1050.1E, "Environmental Impacts: Policies and Procedures," prior to any FAA final regulatory action.

List of Subjects in 14 CFR Part 73

Airspace, Prohibited Areas, Restricted Areas.

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend 14 CFR part 73 as follows:

PART 73—SPECIAL USE AIRSPACE

■ 1. The authority citation for part 73 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120; E.O. 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389.

§ 73.44 (Amended)

■ 2. § 73.44 is amended as follows:

* * * * *

R–4403 Gainesville, MS [Removed]

* * * * *

R–4403A Stennis Space Center, MS [New]

Boundaries. Within a 2.5-NM radius centered at lat. 30°21′51″ N., long. 89°35′39″ W.

Designated altitudes. Surface to 12,000 feet MSL.

Time of designation. Intermittent, 1000 to 0300 local time, as activated by NOTAM at least 24 hours in advance.

Controlling agency. FAA, Houston ARTCC.

Using agency. NASA, Director, Stennis Space Center, Bay St. Louis, MS.

* * * * *

R–4403B Stennis Space Center, MS [New]

Boundaries. Beginning at lat. 30°29′37″ N., long. 89°35′16″ W.; to lat. 30°29′37″ N., long. 89°32′33″ W.; thence clockwise along a 0.85 NM arc centered at lat. 30°28′46″ N., long. 89°32′33″ W.; to lat. 30°28′46″ N., long. 89°31′34″ W.; to lat. 30°26′25″ N., long. 89°31′34″ W.; to lat. 30°24′02″ N., long. 89°31′34″ W.; thence counterclockwise along a 4.2 NM arc centered at lat. 30°22′04″ N., long. 89°27′17″ W.; to lat. 30°20′22″ N., long.

89°31′43″ W.; to lat. 30°19′25″ N., long. 89°35′00″ W.; to lat. 30°18′23″ N., long. 89°40′17″ W.; to lat. 30°21′08″ N., long. 89°42′25″ W.; to lat. 30°22′22″ N., long. 89°42′58″ W.; to lat. 30°23′44″ N., long. 89°42′43″ W.; to lat. 30°26′40″ N., long. 89°40′51″ W.; thence counterclockwise along a 3 NM arc centered at lat. 30°29′15″ N., long. 89°39′04″ W.; to lat. 30°27′08″ N., long. 89°36′37″ W.; to lat. 30°27′58″ N., long. 89°35′27″ W.; to lat. 30°28′47″ N., long. 89°35′27″ W.; to the point of beginning.

Designated altitudes. Surface to 6,000 feet MSL.

Time of designation. Intermittent, 1000 to 0300 local time, as activated by NOTAM at least 24 hours in advance.

Controlling agency. FAA, Houston ARTCC.

Using agency. NASA, Director, Stennis Space Center, Bay St. Louis, MS.

* * * * *

R–4403C Stennis Space Center, MS [New]

Boundaries. Beginning at lat. 30°27′58″ N., long. 89°35′27″ W.; to lat. 30°22′35″ N., long. 89°35′27″ W.; to lat. 30°20′22″ N., long. 89°31′43″ W.; to lat. 30°19′25″ N., long. 89°35′00″ W.; to lat. 30°18′23″ N., long. 89°40′17″ W.; to lat. 30°21′08″ N., long. 89°42′25″ W.; to lat. 30°22′22′ N., long. 89°42′58″ W.; to lat. 30°23′44″ N., long. 89°42′43″ W.; to lat. 30°26′40″ N., long. 89°40′51″ W.; thence counterclockwise along a 3 NM arc centered at lat. 30°29′15″ N., long. 89°39′04″ W.; to lat. 30°27′08″ N., long. 89°36′37″ W.; to the point of beginning.

Designated altitudes. Surface to but not including 6,000 feet MSL.

Time of designation. Intermittent, 1800 to 2400 local time, as activated by NOTAM at least 24 hours in advance; other times by NOTAM with ATC approval.

Controlling agency. FAA, Houston ARTCC.

Using agency. U.S. Navy, Deputy Commander, Naval Special Warfare Command, Naval Special Warfare N31 Branch, Stennis Space Center, Bay St. Louis, MS.

* * * * *

R–4403D Stennis Space Center, MS [New]

Boundaries. Beginning at lat. 30°27′58″ N., long. 89°35′27″ W.; to lat. 30°22′35″ N., long. 89°35′27″ W.; to lat. 30°20′22″ N., long. 89°31′43″ W.; to lat. 30°19′25″ N., long. 89°35′00″ W.; to lat. 30°18′23″ N., long. 89°40′17″ W.; to lat. 30°21′08″ N., long. 89°42′25″ W.; to lat. 30°22′22″ N., long. 89°42′58″ W.; to lat. 30°23′44″ N., long. 89°42′43″ W.; to lat. 30°26′40″ N., long. 89°40′51″ W.; thence counterclockwise along a 3 NM arc centered at lat. 30°29′15″ N., long. 89°39′04″ W.; to lat. 30°27′08″ N., long. 89°36′37″ W.; to the point of beginning.

Designated altitudes. 6,000 feet MSL to 10,000 feet MSL.

Time of designation. Intermittent, 1800 to 2400 local time, as activated by NOTAM at least 24 hours in advance; other times by NOTAM with ATC approval.

Controlling agency. FAA, Houston ARTCC.

Using agency. U.S. Navy, Deputy Commander, Naval Special Warfare Command, Naval Special Warfare N31 Branch, Stennis Space Center, Bay St. Louis, MS.

* * * * *

R–4403E Stennis Space Center, MS [New]

Boundaries. Beginning at lat. 30°29′37″ N., long. 89°35′16″ W.; to lat. 30°29′37″ N., long. 89°32′33″ W.; thence clockwise along a 0.85 NM arc centered at lat. 30°28′46″ N., long. 89°32′33″ W.; to lat. 30°28′46″ N., long. 89°31′34″ W.; to lat. 30°26′25″ N., long. 89°31′34″ W.; to lat. 30°24′02″ N., long. 89°31′34″ W.; thence counterclockwise along a 4.2 NM arc centered at lat. 30°22′04″ N., long. 89°27′17″ W.; to lat. 30°20′22″ N., long. 89°31′43″ W.; to lat. 30°22′35″ N., long. 89°35′27″ W.; to lat. 30°27′58″ N., long. 89°35′27″ W,; to lat. 30°28′47″ N., long. 89°35′27″ W.; to the point of beginning.

Designated altitudes. Surface to 10,000 feet MSL.

Time of designation. Intermittent, 1800 to 2400 local time, as activated by NOTAM at least 24 hours in advance; other times by NOTAM with ATC approval.

Controlling agency. FAA, Houston ARTCC.

Using agency. U.S. Navy, Deputy Commander, Naval Special Warfare Command, Naval Special Warfare N31 Branch, Stennis Space Center, Bay St. Louis, MS.

* * * * *

R–4403F Stennis Space Center, MS [New]

Boundaries. Beginning at lat. 30°29′37″ N., long. 89°35′16″ W.; thence clockwise along a 2.5 NM arc centered at lat. 30°28′46″ N., long. 89°32′33″ W.; to lat. 30°26′25″ N., long. 89°31′34″ W.; to lat. 30°28′46″ N., long. 89°31′34″ W.; thence counterclockwise along a 0.85 NM arc centered at lat. 30°28′46″ N., long. 89°32′33″ W.; to lat. 30°29′37″ N., long. 89°32′33″ W.; to the point of beginning.

Designated altitudes. 4,000 feet MSL to 10,000 feet MSL.

Time of designation. Intermittent, 1800 to 2400 local time, as activated by NOTAM at least 24 hours in advance; other times by NOTAM with ATC approval.

Controlling agency. FAA, Houston ARTCC.

Using agency. U.S. Navy, Deputy Commander, Naval Special Warfare Command, Naval Special Warfare N31 Branch, Stennis Space Center, Bay St. Louis, MS.

* * * * *

Issued in Washington, DC, on July 2, 2014.

Gary A. Norek,

Manager, Airspace Policy and Regulations Group.

[FR Doc. 2014–16059 Filed 7–9–14; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF STATE

22 CFR Part 181

[Public Notice: 8780]

RIN 1400–AD53

Publication, Coordination, and Reporting of International Agreements: Amendments

AGENCY: Department of State.

ACTION: Proposed rule with request for comment.

SUMMARY: The Treaties and Other International Acts Series (TIAS) is the official treaty series of the United States and serves as evidence of the treaties, and international agreements other than treaties, in all courts of law and equity of the United States, and in public offices of the federal government and of the states, without any need of further authentication. Certain international agreements may be exempted from publication in TIAS, if the Department of State provides notice in its regulations. With this proposed rule, the Department of State is proposing to update those regulations to exempt three additional agreement categories.

DATES: The Department of State will consider comments submitted before September 8, 2014.

FOR FURTHER INFORMATION CONTACT: Courtney Rusin, Treaty Affairs, Office of the Legal Adviser, Department of State, Washington, DC 20520, (202) 647–1345, or at *treatyoffice@state.gov.*

SUPPLEMENTARY INFORMATION: Pursuant to 1 U.S.C. 112a, the Secretary of State is required to cause to be published annually a compilation of all treaties and international agreements to which the United States is a party that were signed, proclaimed, or "with reference

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APPENDIX C PUBLIC AND AGENCY INVOLVEMENT

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C.1 Scoping

The following agencies received a scoping letter announcing the Environmental Assessment and soliciting comments during the scoping period. The scoping period began with the transmission of the letters on April 3, 2014.

Federal Agencies

Federal Aviation Administration
U.S. Environmental Protection Agency, Region 4
U.S. Environmental Protection Agency, Region 6
U.S. Fish and Wildlife Service, Jackson Mississippi Ecological Services Field Office

State Agencies

Mississippi Department of Environmental Quality
Mississippi Department of Marine Resources
Mississippi Department of Archives and History
Louisiana Department of Wildlife and Fisheries, Region 7
Louisiana Department of Natural Resources
Louisiana Department of Culture, Recreation, and Tourism

Native American Tribes

The Choctaw Nation of Oklahoma
Jena Band of Choctaw Indians
Mississippi Band of Choctaw Indians
Tunica-Biloxi Indian Tribe

A sample copy of the letter and enclosures is provided on the following pages

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/123
April 3, 2014

Federal Aviation Administration
Attn: Ms. Kristi Ashley
Environmental Specialist
Eastern Service Area Air Traffic Organization
1701 Columbia Ave
College Park GA 30337

Dear Ms. Ashley:

SUBJECT: ENVIRONMENTAL ASSESSMENT FOR THE ESTABLISHMENT OF SPECIAL USE AIRSPACE TO SUPPORT MILITARY AIR-TO-GROUND MUNITIONS TRAINING AND NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PROPOSED ROCKET TESTING AT STENNIS SPACE CENTER, MS

The Department of the Navy (DON) and the National Aeronautics and Space Administration (NASA), in cooperation with the Federal Aviation Administration (FAA), are preparing an Environmental Assessment (EA) for the proposed establishment of special use airspace that would overlay the NASA Stennis Space Center and a portion of the Stennis Acoustic Buffer Zone. The purpose of this letter is to seek scoping comments that will assist the DON and NASA in project planning and analysis in accordance with the National Environmental Policy Act (NEPA) of 1969.

The EA will assess the potential effects of the proposed action and alternative actions, to include a "no action" alternative. Enclosures (1) and (2) are a description of the project and a map showing the location of the project area. Based on the information presented, the DON and NASA respectfully request that your agency identify any specific information, issues or concerns that should be included in the EA and would facilitate the decision-making process. We would appreciate receiving your comments no later than May 5, 2014.

If you have any questions about this project, please feel free to contact Mr. Greg Timoney at (904) 542-6866 or by email: gregory.timoney@navy.mil. Written comments may be mailed to the attention of Mr. Timoney at the following address:

5090
Ser EV21/123
April 3, 2014

Commanding Officer
Naval Facilities Engineering Command Southeast
Attn: Mr. Greg Timoney (EV21)
P.O. Box 30, Bldg 903, NAS
Jacksonville, FL 32212

Your assistance in this project scoping effort is greatly appreciated.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosures: 1. Project Description
2. Proposed Special Use Airspace

Copy to:
NASA Stennis Space Center (Environmental)
Naval Special Warfare Command (Environmental/Operations)
Naval Construction Battalion Center, Gulfport (Public Works Officer)

2

ENCLOSURE 1

PROJECT DESCRIPTION

Background

Stennis Space Center (SSC) is a NASA installation located in southwestern Mississippi about 45 miles northeast of New Orleans, Louisiana, and 45 miles west of Gulfport, Mississippi. Stennis Space Center, originally established in 1961 for NASA rocket engine static testing, has evolved into a multidisciplinary federal city comprised of more than 30 other resident federal, state, academic and private organizations, and 35 technology-based companies engaged in space, environmental and national defense programs. The Naval Special Warfare Command has been a major tenant at SSC and has trained within the adjacent jungle and riverine training environment for approximately 15 years. To support both Navy and NASA training, testing, and research & development requirements, the proposed action will establish Restricted Airspace for both NASA and DOD use, approximately 15 miles long by 13 miles wide (110.5 square miles), 50 miles northeast of New Orleans, LA. The airspace will overlay Stennis Space Center and a portion of the Acoustic Buffer Zone in Pearl River County and Hancock County MS, and St. Tammany Parish, LA (Enclosure 2).

Proposed Action, Purpose & Need

The proposed action includes three basic elements: (a) the establishment of R-4403A-F, restricted airspace in southwestern Mississippi and southeastern Louisiana; (b) the establishment of up to three munitions impact areas for air-to-ground training; and (c) the use of the new R-4403A-F restricted airspace areas to accommodate ongoing and emerging DOD and NASA testing and training requirements.

The purpose of the proposed action is to provide expanded special use airspace (SUA) to support DOD special operations training and NASA engine and vehicle testing at SSC and the associated military training areas within the airspace over the SSC acoustic buffer zone.

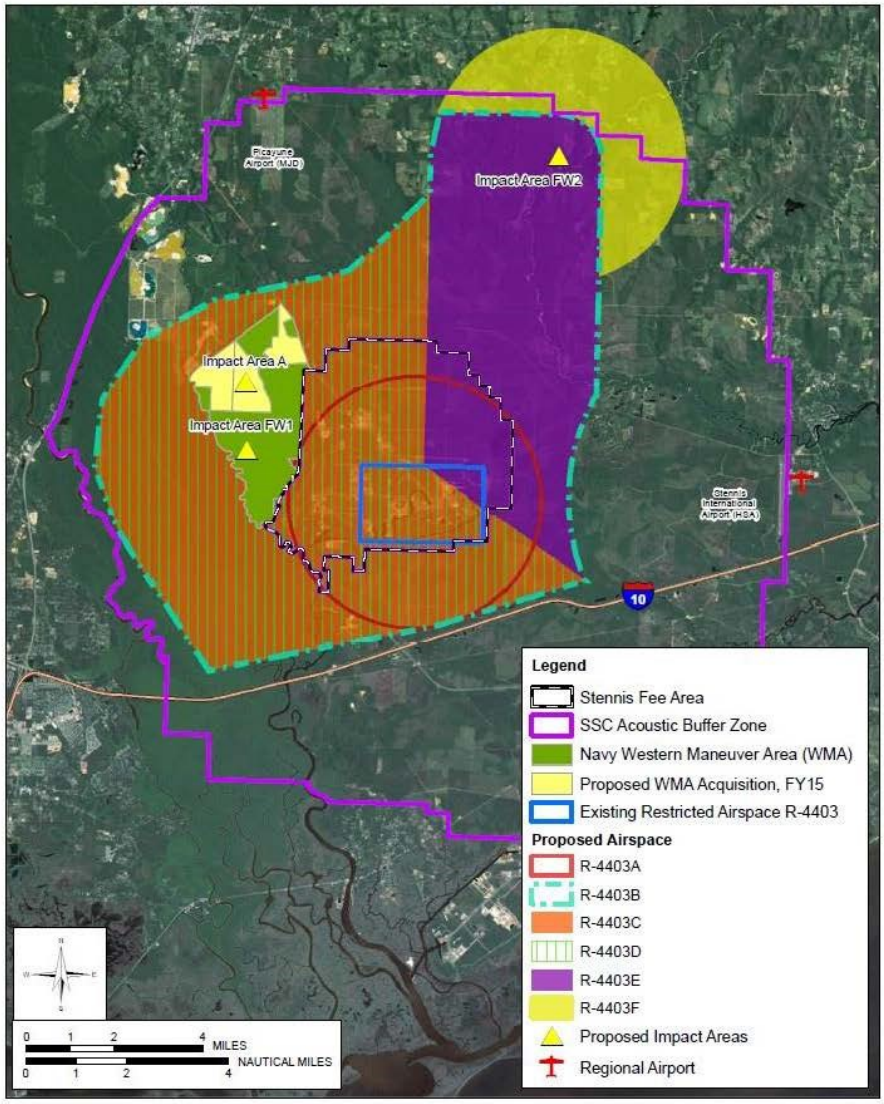
The proposed action is needed because the existing R-4403 airspace is not large enough to accommodate emergent NASA and DOD requirements. The proposed R-4403A-F airspace would provide an improved means of protecting non-participating aircraft and ground users from potentially hazardous airspace uses, including the munitions impact area locations for DOD air-to-ground training.

Alternatives

The configuration of the SUA will be determined by the results of the FAA's aeronautical study process and are common to all action alternatives. The EA will study the potential impacts for a range of alternatives; to include various SUA parameters and training uses of the proposed air-to-ground gunnery locations. The airspace design that has been jointly submitted to FAA has three proposed air-to-ground impact areas. The alternatives being considered will range from non-dud producing (no explosive filler) and dud producing munitions use at the various locations. The use of surface-to-air and air-to-surface lasers will also be a consideration for each alternate impact location and associated air space.

ENCLOSURE 2

PROPOSED SPECIAL USE AIRSPACE



A summary of the response to the scoping letter follows:

- The U.S. Environmental Protection Agency responded by email on April 24, 2014 with no comments, but provided a point of contact for distribution and requested two copies of the Draft EA be provided once it becomes available.
- The Mississippi Department of Marine Resources (MSDMR) responded by letter on May 15, 2014 indicating that, should wetlands be comprised as part of the proposed action, the MSDMR would require review under the Coastal Zone Management Act of 1972 and the Coastal Zone Reauthorization Amendments of 1990.
- The U.S. Fish and Wildlife Service Mississippi Field Office responded by email on May 13, 2014 indicating that there are a number of Federally listed threatened and endangered species located in the proposed project area and that the project may have some effect on some species. A point of contact was provided for follow-on coordination.
- The Mississippi Department of Archives and History responded by letter on April 15, 2014 indicating that after reviewing the project information in accordance with the agency's responsibilities under Section 106 of the National Historic Preservation Act and 36 Code of Federal Regulations (CFR) Part 800, the agency determined that no cultural resources are likely to be affected. Therefore, the agency indicated that they had no objection to the proposed undertaking and requested further coordination in the event of any changes to the project scope.

The Choctaw Nation of Oklahoma responded by email on May 8, 2014 indicating that their prime concern about the proposed project is the potential ground disturbance involved with the creation of munitions impact areas for air-to-ground training and requesting consultation when the National Historic Preservation Section 106 process begins.

C.2 Draft EA Distribution

As noted in Section 1.7 of the EA, the comment period for the Draft EA began with the distribution and publication of the Notice of Availability of the Draft EA on December 1, 2014.

The Draft EA was distributed to the recipients list that follows. The cover letters that accompanied the distribution of the Draft EA initiated Section 7 consultation under the Endangered Species Act and Essential Fish Habitat consultation under the Magnuson-Stevens Fishery Conservation and Management Act with U.S. Fish and Wildlife Service and Section 106 consultation under the National Historic Preservation Act with the Mississippi Department of Archives and History and the Choctaw Nation of Oklahoma, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, and Tunica-Biloxi Indian Tribe. Concurrence on the coastal consistency determination was requested from the Mississippi Department of Marine Resources and Louisiana Department of Natural Resources, Coastal Resources Program. Copies of those letters are provided following the distribution list that begins on the page that follows.

In addition, copies of the Draft EA were sent to the four libraries included in this distribution list. As noted in Section 1.7 of the EA, newspaper advertisements were placed in four local newspapers,

postcard notices were sent to 11 local agencies that commented on the Federal Aviation Administration's rulemaking process for the proposed redesignation and expansion of R-4403, and the document was made available at the following website:

http://www.ssc.nasa.gov/environmental/docforms/eas/eas.html

Federal Agencies

Federal Aviation Administration, Eastern Service Area Air Traffic Organization
National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division
U.S. Environmental Protection Agency, Region 4
U.S. Environmental Protection Agency, Region 6
U.S. Fish and Wildlife Service, Jackson Mississippi Field Office

State Agencies

Mississippi State Clearinghouse
Mississippi Department of Archives and History
Mississippi Department of Marine Resources
Louisiana Department of Natural Resources, Office of Coastal Management
Louisiana Department of Culture, Recreation, and Tourism
Louisiana Department of Wildlife and Fisheries, Region 7

Native American Tribes

The Choctaw Nation of Oklahoma
Jena Band of Choctaw Indians
Mississippi Band of Choctaw Indians
Tunica-Biloxi Indian Tribe

Libraries

Bay St. Louis Library
Kiln Public Library
St. Tammany Parish Library

Margaret Reed Crosby Memorial Library

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/511
November 24, 2014

U.S. Fish and Wildlife Service
Attn: Mr. Stephen Ricks
Field Supervisor
Mississippi Ecological Services Field Office
6578 Dogwood View Parkway, Suite A
Jackson, MS 39213

Dear Mr. Ricks:

SUBJECT: INFORMAL CONSULTATION - SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 AND ESTABLISHMENT OF AIR-TO-GROUND MUNITIONS AND SENSOR TRAINING AREAS AT STENNIS SPACE CENTER

This letter is to request concurrence of the findings in the *Draft Environmental Assessment (EA) for the Redesignation and Expansion of Restricted Airspace (RA) R-4403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration (NASA) Rocket Engine Testing at Stennis Space Center (SSC)* in accordance with Section 7 of the Endangered Species Act. A copy of the Draft EA is being mailed via separate correspondence and is also available electronically at the following NASA Stennis Space Center website:
http://www.ssc.nasa.gov/environmental/docforms/eas/eas.html.

The Department of the Navy (DON) and NASA propose the following three main actions in the vicinity of SSC, Mississippi:

1) Remove existing R-4403 at SSC and replace it with an expanded area that would be redesignated as R-4403A, B, C, D, E, and F;
2) Establish two munitions target areas and a sensor training area for Department of Defense (DOD) air-to-ground training underlying R-4403C-F; and
3) Use the new R-4403A-F airspace areas to accommodate ongoing and evolving DOD and NASA testing and training requirements.

As described in Section 1.4 of the Draft EA, the purpose of the proposed action is to provide an adequately sized and configured RA to ensure safe and effective operation of the NASA SSC test stands and air-to-ground training areas. The proposed action is needed to segregate non-participating aircraft from potentially hazardous activities associated with current and emerging NASA and DOD airspace and ground uses, including munitions target and sensor training areas for DOD air-to-ground training. Although site-specific range management plans are not available at this time, the

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November 21, 2014

locations have been chosen in association with the development of the proposed airspace configuration as well as to minimize potential environmental and operational effects. It is anticipated that approximately 11 acres will be affected in the DON Western Maneuver Area (WMA) for the establishment of the two target areas (IMP-A and FW1), and up to 2 acres may be disturbed for the establishment of the sensor training area in the Acoustic Buffer Zone (FW2) (see Section 2.1.2.2 for further description of the proposed munitions target areas and sensor training area).

As described in Section 3.11.1 of the Draft EA and listed in Table 1 below, there are 12 threatened and endangered species potentially occurring within the action area that are under the jurisdiction of U.S. Fish and Wildlife Service (USFWS). Based on the analysis documented in Section 3.11.2.1 of the Draft EA, the DON and NASA has determined that the proposed action will have no effect on piping plover, Gulf Sturgeon, inflated heelsplitter, and Louisiana quillwort, as well as no destruction or adverse modification of Gulf sturgeon critical habitat. In addition, the DON and NASA requests concurrence that the proposed action may affect, but is not likely to adversely affect the Louisiana black bear, ringed map turtle, gopher tortoise, eastern indigo snake, dusky gopher frog, red-cockaded woodpecker, wood stork, and Bachman's warbler. We request concurrence and any comments be received by December 31, 2014.

If further information is required or for questions regarding this letter, please contact Mr. Greg Timoney at (904) 542-6866 or by email: gregory.timoney@navy.mil.

Sincerely,

C.R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosure: Summary of Findings of ESA-Listed Threatened and Endangered Species

Copy to:
NASA SSC (Environmental Department)
Naval Special Warfare Command (N31/N4)
NCBC Gulfport (Public Works Officer)

2

Enclosure 1. Summary of Findings for ESA-Listed Threatened and Endangered Species

Common Name	*Scientific Name*	*ESA Status**	*Effects Determination*
Mammals			
Louisiana black bear	*Ursus americanus luteolus*	T	**May affect but is not likely to adversely affect.**
Reptiles			
Ringed map turtle	*Graptemys oculifera*	T	**May affect but is not likely to adversely affect.**
Gopher tortoise	*Gopherus polyphemus*	T	**May affect but is not likely to adversely affect.**
Eastern indigo snake	*Drymarchon corais couperi*	T	**May affect but is not likely to adversely affect.**
Amphibians			
Dusky gopher frog	*Rana sevosa*	E	**May affect but is not likely to adversely affect.**
Birds			
Red-cockaded woodpecker	*Picoides borealis*	E	**May affect but is not likely to adversely affect.**
Piping plover	*Charadrius melodus*	T	**No effect (not found/present in the ROI).**
Wood stork	*Mycteria americana*	T	**May affect but is not likely to adversely affect.**
Bachman's warbler	*Vermivora bachmanii*	E	**May affect but is not likely to adversely affect.**
Fish			
Gulf sturgeon	*Acipenser oxyrhynchus desotoi*	T, CH	**No effect.** **No destruction or adverse modification of designated critical habitat.**
Mussels			
Inflated heelsplitter	*Potamilus inflatus*	T	**No effect (not found/present in the ROI).**
Plants			
Louisiana quillwort	*Isoetes louisianensis*	E	**No effect (not found/present in the ROI).**

Notes: *CH = critical habitat, E = endangered, T = threatened, ROI = Region of Influence.

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/509
November 21, 2014

Mr. H. T. Holmes
Director, State Historic Preservation Office
Mississippi Department of Archives and History
PO Box 571
Jackson, MS 39205-0571

Dear Mr. Holmes:

SUBJECT: SECTION 106 CONSULTATION FOR THE REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 AND ESTABLISHMENT OF AIR-TO-GROUND MUNITIONS AND SENSOR TRAINING AREAS AT STENNIS SPACE CENTER

This letter is to request concurrence with the findings in the Draft Environmental Assessment (EA) for the Redesignation and Expansion of Restricted Airspace (RA) R-4403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration (NASA) Rocket Testing at Stennis Space Center (SSC) in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. A copy of the Draft EA is being mailed via separate correspondence and is also available electronically at the following NASA Stennis Space Center website: http://www.ssc.nasa.gov/environmental/docforms/eas/eas.html.

The Department of the Navy (DON) has identified no historic properties inside the Area of Potential Effects (APE). As detailed in the attached joint DON/NASA cultural resources findings statement (Enclosure 1), there are no known archaeological resources in the vicinity of proposed ground-disturbing activities at the impact and sensor training locations (IMP-A, FW1, and FW2). Per the NASA Environmental Resources Document (2013), actions at FW2 have the potential to disturb archaeological resources. As a result, the DON would conduct a Phase I archaeological identification survey prior to commencing any ground-disturbing activity at this location, and consult with the SHPO to avoid or mitigate effects on significant cultural resources, if present.

Similarly, within the draft EA and Enclosure (1), NASA has determined that the implementation of the actions proposed in the EA will have no adverse effect to historic properties,

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November 21, 2014

including the National Historic Landmarks comprising the Rocket Propulsion Test Complex.

The DON and NASA have therefore determined that there would be No Adverse Effect to historic properties in the APE. The DON and NASA request your concurrence with our finding of no adverse effect and any comments to be received by December 31, 2014.

If further information is required or for questions regarding this letter, please contact Mr. Greg Timoney at (904) 542-6866 or by email: gregory.timoney@navy.mil.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosure: DON/NASA Joint Cultural Resources Findings Statement for the Redesignation and Expansion of Restricted Airspace R-4403 and Establishment of Air-to-Ground Munitions and Sensor Training Areas at Stennis Space Center

Copy to:
NASA SSC (Environmental Department)
Naval Special Warfare Command (N31/N4)
NCBC Gulfport (Public Works Officer)

2

NAVY/NASA JOINT CULTURAL RESOURCES FINDINGS STATEMENT FOR THE REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 AND ESTABLISHMENT OF AIR-TO-GROUND MUNITIONS AND SENSOR TRAINING AREAS AT STENNIS SPACE CENTER

The Department of the Navy (DON) and National Aeronautics and Space Administration (NASA) propose the following three main actions in the vicinity of Stennis Space Center (SSC), Mississippi:

1) Remove existing Restricted Airspace (R-4403) at SSC and replace it with an expanded area that would be redesignated as R-4403A, B, C, D, E, and F;
2) Establish two munitions target areas (IMP-A and FW1) and a sensor training area (FW2) for Department of Defense (DOD) air-to-ground training underlying R-4403C-F (specifically, two munitions target areas in the DON Western Maneuver Area [WMA] and one sensor training area in the SSC Acoustic Buffer Zone); and
3) Use the new R-4403A-F airspace areas to accommodate ongoing and evolving DOD and NASA testing and training requirements.

As described in Section 1.4 of the Draft EA, the purpose of the proposed action is to provide an adequately sized and configured Restricted Airspace (RA) to ensure safe and effective operation of the NASA SSC test stands and DON air-to-ground training areas. The proposed action is needed to segregate non-participating aircraft from potentially hazardous activities associated with current and emerging NASA and DOD airspace and ground uses, including munitions target and sensor training areas for DOD air-to-ground training. Although site-specific range management plans are not available at this time, the ground locations have been chosen in association with the development of the proposed RA configuration as well as to minimize potential environmental and operational effects. It is anticipated that approximately 11 acres will be affected in the DON WMA for the establishment of the two target areas (IMP-A and FW1), and up to 2 acres may be disturbed for the establishment of the sensor training area (FW2) in the Acoustic Buffer Zone (see Section 2.1.2.2 for further description of the proposed munitions target areas and sensor training area).

The Area of Potential Effects (APE) for the undertaking includes the SSC Fee Area, SSC Acoustic Buffer Zone, the DON WMA, and a small area of privately owned land outside and to the north of the Buffer Zone Boundary in Pearl and Hancock

Enclosure 1

Counties. The entirety of the SSC Fee Area has been surveyed for the presence of cultural resources. As stated in Section 3.8 of the Draft EA, no cultural resources have been identified within the Acoustic Buffer Zone or the WMA. Within the WMA, the area surrounding the proposed southern impact area (FW1) has been surveyed for cultural resources. The northern impact area (IMP-A) and the sensor training area (FW2) have not been surveyed. There are known cultural resources in Pearl and Hancock Counties, but none of these are located within the project footprint.

National Register of Historic Places (NRHP)-listed properties within the SSC Fee Area include three NASA test stands (Buildings 4120, 4122, and 4220). These test stands and their associated control centers, known as the Rocket Propulsion Test Complex, are listed as National Historic Landmarks (NHL). Any required construction or renovation relating to new testing missions at the Test Complex would be coordinated through the NASA Historic Preservation Officer, the State Historic Preservation Officer, and the National Park Service pursuant to 36 CFR 800.10. All work will comply with the management guidelines in NASA's Integrated Cultural Resources Management Plan for SSC and no effects will be incurred on the NHL. Also within the SSC Fee Area is the town site of Gainesville, which has been determined eligible for listing in the NRHP. As stated in Section 3.8.2.1 of the Draft EA, the proposed action would not affect the town site of Gainesville. No historic buildings are located within the SSC Acoustic Buffer Zone or the DON Western Maneuver Area.

The proposed action does not include any other ground-disturbing activities that could affect archaeological resources within the SSC Buffer Zone. Impacts to archaeological resources are not anticipated in the WMA as the IMP-A location is already disturbed due to decades of mining activities in the area, and surveys at FW1 identified no cultural resources. The DON would ensure compliance with Section 106 of the NHPA prior to commencing any ground-disturbing activities at IMP-A and avoid or mitigate effects on significant cultural resources, if encountered.

Len Winter
Historic Preservation
Officer
Naval Facilities SE

Adam Murrah
Historic Preservation
Officer
Stennis Space Center

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
SER EV21/504
November 21, 2014

The Honorable Gregory E. Pyle
Chief, Choctaw Nation of Oklahoma
P. O. Box 1210
Durant, OK 74702-0210

Dear Chief Pyle:

SUBJECT: SECTION 106 and EO 13175 CONSULTATION FOR THE REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 AND ESTABLISHMENT OF AIR-TO-GROUND MUNITIONS AND SENSOR TRAINING AREAS AT STENNIS SPACE CENTER

This letter is to initiate government-to-government consultation on and to request concurrence with the findings in the Draft Environmental Assessment (EA) for the Redesignation and Expansion of Restricted Airspace (RA) R-4403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration (NASA) Rocket Testing at Stennis Space Center (SSC) in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 and Executive Order (EO) 13175 *Consultation and Coordination with Indian Tribal Governments*. The Mississippi Band of Choctaw Indians has been identified as having historic ties to this location. A copy of the Draft EA is being mailed via separate correspondence and is also available electronically at the following NASA Stennis Space Center website: http://www.ssc.nasa.gov/environmental/docforms/eas/eas.html.

The Department of the Navy (DON) has identified no sacred sites, no Traditional Cultural Properties, and no historic properties of religious or cultural importance located inside the Area of Potential Effects (APE). As detailed in the attached joint Navy/NASA cultural resources findings statement (Enclosure 1), there are no known archaeological resources in the vicinity of proposed ground-disturbing activities at the impact and sensor training locations (IMP-A, FW1, and FW2). Per the NASA Environmental Resources Document (2013), actions at FW2 have the potential to disturb archaeological resources. As a result, the Navy would conduct a Phase I archaeological identification survey prior to commencing any ground-disturbing activity at this location, and consult with the SHPO to avoid or mitigate effects on significant cultural resources, if present. As with all Federal projects, the discovery of

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November 21, 2014

cultural items subject to the provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) will prompt immediate consultation with your tribe.

Similarly, within the draft EA and Enclosure (1), NASA has determined that the implementation of the actions proposed in the EA will have no adverse effect to historic properties, including the National Historic Landmarks comprising the Rocket Propulsion Test Complex.

The DON and NASA have therefore determined that there would be No Adverse Effect to historic properties in the APE. The DON and NASA request your concurrence with our finding of no adverse effect and any comments to be received by December 31, 2014.

If further information is required or for questions regarding this letter, please contact Mr. Greg Timoney at (904) 542-6866 or by email: gregory.timoney@navy.mil.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosures: DON/NASA Joint Cultural Resources Findings Statement for the Redesignation and Expansion of Restricted Airspace R-4403 and Establishment of Air-to-Ground Munitions and Sensor Training Areas at Stennis Space Center

Copy to:
NASA SSC (Environmental Department)
Naval Special Warfare Command (N31/N4)
NCBC Gulfport (Public Works Officer)

2

NAVY/NASA JOINT CULTURAL RESOURCES FINDINGS STATEMENT FOR THE REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 AND ESTABLISHMENT OF AIR-TO-GROUND MUNITIONS AND SENSOR TRAINING AREAS AT STENNIS SPACE CENTER

The Department of the Navy (DON) and National Aeronautics and Space Administration (NASA) propose the following three main actions in the vicinity of Stennis Space Center (SSC), Mississippi:

1) Remove existing Restricted Airspace (R-4403) at SSC and replace it with an expanded area that would be redesignated as R-4403A, B, C, D, E, and F;
2) Establish two munitions target areas (IMP-A and FW1) and a sensor training area (FW2) for Department of Defense (DOD) air-to-ground training underlying R-4403C-F (specifically, two munitions target areas in the DON Western Maneuver Area [WMA] and one sensor training area in the SSC Acoustic Buffer Zone); and
3) Use the new R-4403A-F airspace areas to accommodate ongoing and evolving DOD and NASA testing and training requirements.

As described in Section 1.4 of the Draft EA, the purpose of the proposed action is to provide an adequately sized and configured Restricted Airspace (RA) to ensure safe and effective operation of the NASA SSC test stands and DON air-to-ground training areas. The proposed action is needed to segregate non-participating aircraft from potentially hazardous activities associated with current and emerging NASA and DOD airspace and ground uses, including munitions target and sensor training areas for DOD air-to-ground training. Although site-specific range management plans are not available at this time, the ground locations have been chosen in association with the development of the proposed RA configuration as well as to minimize potential environmental and operational effects. It is anticipated that approximately 11 acres will be affected in the DON WMA for the establishment of the two target areas (IMP-A and FW1), and up to 2 acres may be disturbed for the establishment of the sensor training area (FW2) in the Acoustic Buffer Zone (see Section 2.1.2.2 for further description of the proposed munitions target areas and sensor training area).

The Area of Potential Effects (APE) for the undertaking includes the SSC Fee Area, SSC Acoustic Buffer Zone, the DON WMA, and a small area of privately owned land outside and to the north of the Buffer Zone Boundary in Pearl and Hancock

Enclosure 1

Counties. The entirety of the SSC Fee Area has been surveyed for the presence of cultural resources. As stated in Section 3.8 of the Draft EA, no cultural resources have been identified within the Acoustic Buffer Zone or the WMA. Within the WMA, the area surrounding the proposed southern impact area (FW1) has been surveyed for cultural resources. The northern impact area (IMP-A) and the sensor training area (FW2) have not been surveyed. There are known cultural resources in Pearl and Hancock Counties, but none of these are located within the project footprint.

National Register of Historic Places (NRHP)-listed properties within the SSC Fee Area include three NASA test stands (Buildings 4120, 4122, and 4220). These test stands and their associated control centers, known as the Rocket Propulsion Test Complex, are listed as National Historic Landmarks (NHL). Any required construction or renovation relating to new testing missions at the Test Complex would be coordinated through the NASA Historic Preservation Officer, the State Historic Preservation Officer, and the National Park Service pursuant to 36 CFR 800.10. All work will comply with the management guidelines in NASA's Integrated Cultural Resources Management Plan for SSC and no effects will be incurred on the NHL. Also within the SSC Fee Area is the town site of Gainesville, which has been determined eligible for listing in the NRHP. As stated in Section 3.8.2.1 of the Draft EA, the proposed action would not affect the town site of Gainesville. No historic buildings are located within the SSC Acoustic Buffer Zone or the DON Western Maneuver Area.

The proposed action does not include any other ground-disturbing activities that could affect archaeological resources within the SSC Buffer Zone. Impacts to archaeological resources are not anticipated in the WMA as the IMP-A location is already disturbed due to decades of mining activities in the area, and surveys at FW1 identified no cultural resources. The DON would ensure compliance with Section 106 of the NHPA prior to commencing any ground-disturbing activities at IMP-A and avoid or mitigate effects on significant cultural resources, if encountered.

Len Winter
Historic Preservation
Officer
Naval Facilities SE

Adam Murrah
Historic Preservation
Officer
Stennis Space Center

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/505
November 21, 2014

The Honorable B. Cheryl Smith
Chief
Jena Band of Choctaw Indians
P.O. Box 14
Jena, LA 71342

Dear Chief Smith:

SUBJECT: SECTION 106 and EO 13175 CONSULTATION FOR THE REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 AND ESTABLISHMENT OF AIR-TO-GROUND MUNITIONS AND SENSOR TRAINING AREAS AT STENNIS SPACE CENTER

This letter is to initiate government-to-government consultation on and to request concurrence with the findings in the Draft Environmental Assessment (EA) for the Redesignation and Expansion of Restricted Airspace (RA) R-4403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration (NASA) Rocket Testing at Stennis Space Center (SSC) in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 and Executive Order (EO) 13175 *Consultation and Coordination with Indian Tribal Governments*. The Mississippi Band of Choctaw Indians has been identified as having historic ties to this location. A copy of the Draft EA is being mailed via separate correspondence and is also available electronically at the following NASA Stennis Space Center website: http://www.ssc.nasa.gov/environmental/docforms/eas/eas.html

The Department of the Navy (DON) has identified no sacred sites, no Traditional Cultural Properties, and no historic properties of religious or cultural importance located inside the Area of Potential Effects (APE). As detailed in the attached joint DON/NASA cultural resources findings statement (Enclosure 1), there are no known archaeological resources in the vicinity of proposed ground-disturbing activities at the impact and sensor training locations (IMP-A, FW1, and FW2). Per the NASA Environmental Resources Document (2013), actions at FW2 have the potential to disturb archaeological resources. As a result, the DON would conduct a Phase I archaeological identification survey prior to commencing any ground-disturbing activity at this location, and consult with the SHPO to avoid or mitigate effects on significant cultural resources, if

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Ser EV21/505
November 21, 2014

present. As with all Federal projects, the discovery of cultural items subject to the provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) will prompt immediate consultation with your tribe.

Similarly, within the draft EA and Enclosure (1), NASA has determined that the implementation of the actions proposed in the EA will have no adverse effect to historic properties, including the National Historic Landmarks comprising the Rocket Propulsion Test Complex.

The DON and NASA have therefore determined that there would be No Adverse Effect to historic properties in the APE. The DON and NASA request your concurrence with our finding of no adverse effect and any comments to be received by December 31, 2014.

If further information is required or for questions regarding this letter, please contact Mr. Greg Timoney at (904) 542-6866 or by email: gregory.timoney@navy.mil.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosures: DON/NASA Joint Cultural Resources Findings Statement for the Redesignation and Expansion of Restricted Airspace R-4403 and Establishment of Air-to-Ground Munitions and Sensor Training Areas at Stennis Space Center

Copy to:
NASA SSC (Environmental Department)
Naval Special Warfare Command (N31/N4)
NCBC Gulfport (Public Works Officer)

2

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/506
November 21, 2014

The Honorable Phyliss J. Anderson
Chief, Mississippi Band of Choctaw Indians
101 Industrial Road
Philadelphia, MS 39350

Dear Chief Anderson:

SUBJECT: SECTION 106 and EO 13175 CONSULTATION FOR THE REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 AND ESTABLISHMENT OF AIR-TO-GROUND MUNITIONS AND SENSOR TRAINING AREAS AT STENNIS SPACE CENTER

This letter is to initiate government-to-government consultation on and to request concurrence with the findings in the Draft Environmental Assessment (EA) for the Redesignation and Expansion of Restricted Airspace (RA) R-4403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration (NASA) Rocket Testing at Stennis Space Center (SSC) in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 and Executive Order (EO) 13175 *Consultation and Coordination with Indian Tribal Governments*. The Mississippi Band of Choctaw Indians has been identified as having historic ties to this location. A copy of the Draft EA is being mailed via separate correspondence and is also available electronically at the following NASA Stennis Space Center website: http://www.ssc.nasa.gov/environmental/docforms/eas/eas.html

The Department of the Navy (DON) has identified no sacred sites, no Traditional Cultural Properties, and no historic properties of religious or cultural importance located inside the Area of Potential Effects (APE). As detailed in the attached joint Navy/NASA cultural resources findings statement (Enclosure 1), there are no known archaeological resources in the vicinity of proposed ground-disturbing activities at the impact and sensor training locations (IMP-A, FW1, and FW2). Per the NASA Environmental Resources Document (2013), actions at FW2 have the potential to disturb archaeological resources. As a result, the DON would conduct a Phase I archaeological identification survey prior to commencing any ground-disturbing activity at this location, and consult with the SHPO to avoid or mitigate effects on significant cultural resources, if present. As with all Federal projects, the discovery of

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November 21, 2014

cultural items subject to the provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) will prompt immediate consultation with your tribe.

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If further information is required or for questions regarding this letter, please contact Mr. Greg Timoney at (904) 542-6866 or by email: gregory.timoney@navy.mil.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosures: DON/NASA Joint Cultural Resources Findings Statement for the Redesignation and Expansion of Restricted Airspace R-4403 and Establishment of Air-to-Ground Munitions and Sensor Training Areas at Stennis Space Center

Copy to:
NASA SSC (Environmental Department)
Naval Special Warfare Command (N31/N4)
NCBC Gulfport (Public Works Officer)

2

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/507
November 21, 2014

The Honorable Earl J. Barbry, Sr.
Tribal Chairman
Tunica-Biloxi Indian Tribe
P.O. Box 1589
Marksville, LA 71351

Dear Tribal Chairman Barbry:

SUBJECT: SECTION 106 and EO 13175 CONSULTATION FOR THE REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 AND ESTABLISHMENT OF AIR-TO-GROUND MUNITIONS AND SENSOR TRAINING AREAS AT STENNIS SPACE CENTER

This letter is to initiate government-to-government consultation on and to request concurrence with the findings in the Draft Environmental Assessment (EA) for the Redesignation and Expansion of Restricted Airspace (RA) R-4403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration (NASA) Rocket Testing at Stennis Space Center (SSC) in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 and Executive Order (EO) 13175 *Consultation and Coordination with Indian Tribal Governments*. The Mississippi Band of Choctaw Indians has been identified as having historic ties to this location. A copy of the Draft EA is being mailed via separate correspondence and is also available electronically at the following NASA Stennis Space Center website: http://www.ssc.nasa.gov/environmental/docforms/eas/eas.html

The Department of the Navy (DON) has identified no sacred sites, no Traditional Cultural Properties, and no historic properties of religious or cultural importance located inside the Area of Potential Effects (APE). As detailed in the attached joint DON/NASA cultural resources findings statement (Enclosure 1), there are no known archaeological resources in the vicinity of proposed ground-disturbing activities at the impact and sensor training locations (IMP-A, FW1, and FW2). Per the NASA Environmental Resources Document (2013), actions at FW2 have the potential to disturb archaeological resources. As a result, the Navy would conduct a Phase I archaeological identification survey prior to commencing any ground-disturbing activity at this location, and consult with the SHPO to avoid or mitigate effects on significant cultural resources, if

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November 21, 2014

present. As with all Federal projects, the discovery of cultural items subject to the provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) will prompt immediate consultation with your tribe.

Similarly, within the draft EA and Enclosure (1), NASA has determined that the implementation of the actions proposed in the EA will have no adverse effect to historic properties, including the National Historic Landmarks comprising the Rocket Propulsion Test Complex.

The DON and NASA have therefore determined that there would be No Adverse Effect to historic properties in the APE. The DON and NASA request your concurrence with our finding of no adverse effect and any comments to be received by December 31, 2014.

If further information is required or for questions regarding this letter, please contact Mr. Greg Timoney at (904) 542-6866 or by email: gregory.timoney@navy.mil.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosures: DON/NASA Joint Cultural Resources Findings Statement for the Redesignation and Expansion of Restricted Airspace R-4403 and Establishment of Air-to-Ground Munitions and Sensor Training Areas at Stennis Space Center

Copy to:
NASA SSC (Environmental Department)
Naval Special Warfare Command (N31/N4)
NCBC Gulfport (Public Works Officer)

2

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/508
November 24, 2014

Mississippi State Clearinghouse
Attn: Ms. Jane Riddell
Department of Finance & Administration
1301 Woolfolk Building, Suite E
501 North West Street
Jackson, MS 39201

Dear Ms. Riddell:

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT AND FEDERAL COASTAL CONSISTENCY DETERMINATION FOR THE REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 AND ESTABLISHMENT OF AIR-TO-GROUND TRAINING AREAS AT STENNIS SPACE CENTER

This letter is to request concurrence with the findings in the Federal Coastal Consistency Determination (CCD) to support the attached *Draft Environmental Assessment for the Redesignation and Expansion of Restricted Airspace R-44403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration (NASA) Rocket Engine Testing at Stennis Space Center*. A copy of the Draft EA is being mailed via separate correspondence and is also available electronically at the following NASA Stennis Space Center website: http://www.ssc.nasa.gov/environmental/docforms/eas/eas.html.

The Department of the Navy (DON) and NASA propose the following three main actions in the vicinity of Stennis Space Center (SSC), Mississippi:

1) Remove existing Restricted Area (RA) R-4403 at SSC and replace it with an expanded area that would be redesignated as R-4403A, B, C, D, E, and F;
2) Establish two munitions target areas and a sensor training area for Department of Defense (DOD) air-to-ground training underlying R-4403C-F; and
3) Use the new R-4403A-F airspace areas to accommodate ongoing and evolving Department of Defense (DOD) and NASA testing and training requirements.

As described in Section 1.4 of the Draft EA, the purpose of the proposed action is to provide an adequately sized and configured RA to ensure safe and effective operation of the NASA SSC test stands and air-to-ground training areas. The proposed action is needed to segregate non-participating aircraft from potentially hazardous activities associated with current and emerging NASA and DOD airspace and ground uses, including munitions target and sensor training areas for DOD air-to-ground training. Although site-specific range management plans are not available at this time, the

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Ser EV21/508
November 21, 2014

locations have been chosen in association with the development of the proposed airspace configuration as well as to minimize potential environmental and operational effects. It is anticipated that approximately 11 acres will be affected in the Western Maneuver Area (WMA) for the establishment of the two target areas (IMP-A and FW-1), and up to 2 acres may be disturbed for the establishment of the sensor training area in the Acoustic Buffer Zone (FW-2) (see Section 2.1.2.2 of the Draft EA).

In accordance with the Section 307 of the Coastal Zone Management Act and 15 Code of Federal Regulations (CFR) Part 930, subpart C, all elements of the proposed action were reviewed for consistency with the enforceable policies of the Mississippi Statutes that comprise the Federally approved Mississippi Coastal Zone Management Program. Consideration was given for impacts reasonably likely to directly or indirectly (cumulatively or secondarily) affect any land or water use or natural resources within the coastal zone. The potential effects of the proposed action on Mississippi's coastal zone could result from changes in airspace and air operations and the establishment of air-to-ground target areas and laser sensor training area. Based on the analysis included in the attached CCD, DON and NASA have determined the proposed action would be consistent to the maximum extent practicable with the enforceable policies of the Mississippi Coastal Zone Management Program. The DON and NASA request that the Mississippi State Clearinghouse coordinate the review of this Federal CCD with the Mississippi Bureau of Marine Resources, Bureau of Pollution Control, Bureau of Land and Water Resources, and the Department of Archives and History. The DON and NASA hereby request concurrence with this determination for consistency of Federal agency activities under 15 CFR Part 930, Subpart C by December 31, 2014.

Please also note the following:

- In accordance with Section 106 of the National Historic Preservation Act of 1966, the DON and NASA concluded the proposed action would have no adverse effect to the significance or integrity of the Rocket Propulsion Test Complex, which is a National Historic Landmark, or the National Register of Historic Properties-eligible town site of Gainesville. The DON is requesting concurrence with this determination, from the Mississippi State Historic Preservation Officer.

- There are 8 State-listed threatened and endangered species potentially occurring within the action area. Based on the analysis documented in Section 3.11 of the Draft EA, the DON and NASA have determined that the proposed action will have no effect on State-listed species. The DON and NASA have initiated a request for concurrence with the U.S. Fish and

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November 21, 2014

Wildlife Service on the effects determination for Federally listed species.

Please provide the CCD concurrence and address any comments on the Draft EA by December 31, 2014 to the following point of contact:

Naval Facilities Engineering Command, Southeast
Attn: Mr. Greg Timoney, EV21
P.O. Box 30, Building 903
NAS Jacksonville, FL 32212-0030

If further information is required or for questions regarding this letter, please contact Mr. Greg Timoney, SSC SUA & Target Area EA Project Manager, at (904) 542-6866 or by email: gregory.timoney@navy.mil.

Sincerely,

C.R. DESTAFNEY, PE
Environmental Business Line Coordinator
By direction of the Commanding Officer

Enclosure: Coastal Consistency Determination for Mississippi

Copy to:
Mississippi Department of Marine Resources, Attn: Ms. Jan Boyd, Director, Office of Coastal Zone Management
NASA SSC (Environmental Department)
Naval Special Warfare Command (N31/N4)
Naval Construction Battalion Center, Gulfport (Public Works Officer)

3

Mississippi Coastal Program Consistency Review Under 15 Code of Federal Regulations Part 930, Subpart C - Consistency for Federal Agency Activities		
Mississippi Statute	**Scope**	**Consistency Determination**
Section 49-27-3. Coastal Wetlands Protection Act	Provides for the preservation of the natural state of the coastal wetlands and their ecosystems and to prevent the despoliation and destruction of them, except where a specific alteration of specific coastal wetlands would serve a higher public interest in compliance with the public purposes of the public trust in which coastal wetlands are held.	Consistent –Potentially 13 acres of wetlands could be impacted by the construction and ongoing use and management of the munitions target areas (FW1 and IMP-A) and sensor training area (FW2). However, during the design phase, wetlands would be delineated and measures would be taken to avoid, minimize, and mitigate wetland impacts. All required permits would be obtained (see Section 3.13.2, Water Resources, Environmental Consequences).
Section 57-15-6(1)(a). Coastal Program, Efficient Utilization of Waterfront Sites	Policy to provide for reasonable industrial expansion in the coastal area and to insure the efficient utilization of waterfront industrial sites so that suitable sites are conserved for water dependent industry.	Not Applicable – The proposed action does not involve waterfront development (see Section 2.1, Proposed Action).
Section 49-15-1. Seafood	Policy to recognize the need for a concerted effort to work toward the protection, propagation and conservation of its seafood and aquatic life in connection with the revitalization of the seafood industry.	Not Applicable – The proposed action would not affect coastal areas that support seafood or the seafood industry (see Section 1.2, Region of Influence).
Section 57-15-6(1)(d). Coastal Program, Preservation of Natural Scenic Qualities	Policy to encourage the preservation of natural scenic qualities in the coastal area.	Consistent – Proposed changes in airspace and air operations, along with construction and ongoing use and management of the munitions target areas (FW1 and IMP-A) and sensor training area (FW2) would not affect the natural scenic qualities of Mississippi's coastal area.
Section 57-15-6(1)(c). Coastal Program, National Interest	Policy to consider the national interest involved in planning for and in the siting of facilities in the coastal area.	Consistent – The proposed action would serve the public interests associated with the mission support needs of NASA and DOD for the testing and training requirements identified for proposed R-4403A-F.
Section 49-17-3. Air and Water Pollution Control Law	Policy to conserve the air and waters of the state and to protect, maintain and improve the quality thereof for public use, for the propagation of wildlife, fish and aquatic life, and for domestic, agricultural, industrial, recreational and other legitimate beneficial uses; to maintain such a reasonable degree of quality of the air resources of the state to protect the health, general welfare and physical property of the people, and to provide that no waste be discharged into any waters of the state without first	Consistent - Minor impacts to air quality are expected from small emission increases for all criteria pollutants, but none approach the comparative threshold of 250 tons per year (see Section 3.10.2, Air Quality Environmental Consequences). Although there may be additional use of water

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Mississippi Coastal Program Consistency Review Under 15 Code of Federal Regulations Part 930, Subpart C - Consistency for Federal Agency Activities		
Mississippi Statute	**Scope**	**Consistency Determination**
	receiving the necessary treatment or other corrective action to protect the legitimate beneficial uses of such waters; to provide for the prevention, abatement and control of new or existing air or water pollution; and to cooperate with other agencies of the State, agencies of other states, and the Federal government in carrying out these objectives	resources due to increased operational tempo, particularly for rocket engine testing, such use serves legitimate beneficial uses. The potential impacts to coastal natural resources, including wetlands and ecosystems would be highly localized. Development of the munitions target areas and sensor training area would avoid impacts consistent with DOD policy (see Section 3.13.2, Water Resources, Environmental Consequences).
Section 39-7-3. Antiquities Law of Mississippi	Policy to locate, protect, and preserve all sites, objects, buildings, shipwrecks, and locations of historical, archaeological, or architectural significance, including, but not limited to historically or architecturally significant buildings, structures relating to significant engineering accomplishments, prehistoric and historical American Indian or aboriginal campsites, dwellings, and habitation sites, archaeological sites of every character, treasure imbedded in the earth, sunken or abandoned ships and wrecks of the sea or any part or the contents thereof, maps, records, documents, books, artifacts, and implements of culture in any way related to the inhabitants, prehistory, history, natural history, government, or culture in, on or under any of the lands, tidelands, submerged lands, and bed of the sea within the jurisdiction of the State of Mississippi.	Consistent – The proposed action would have no adverse effect to historic properties in the area of potential effects (see Section 3.8.2, Cultural Resources, Enviromental Consequences).

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DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/510
November 21, 2014

Louisiana Department of Natural Resources
Attn: Mr. Donald Haydel
Consistency Section Administrator
Office of Coastal Management
617 N. Third St., Suite 1048
Baton Rouge, LA 70802

Dear Mr. Haydel:

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT AND FEDERAL COASTAL CONSISTENCY DETERMINATION FOR THE REDESIGNATION AND EXPANSION OF RESTRICTED AIRSPACE R-4403 AND ESTABLISHMENT OF AIR-TO-GROUND TRAINING AREAS AT STENNIS SPACE CENTER

This letter is to request concurrence with the findings in the Federal Coastal Consistency Determination (CCD) to support the attached *Draft Environmental Assessment for the Redesignation and Expansion of Restricted Airspace R-44403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration (NASA) Rocket Engine Testing at Stennis Space Center*. A copy of the Draft EA is being mailed via separate correspondence and is also available electronically at the following NASA Stennis Space Center website:
http://www.ssc.nasa.gov/environmental/docforms/eas/eas.html.

The Department of the Navy (DON) and National Aeronautics and Space Administration (NASA) propose the following three main actions in the vicinity of Stennis Space Center (SSC), Mississippi:

1) Remove existing Restricted Area (RA) R-4403 at SSC and replace it with an expanded area that would be redesignated as R-4403A, B, C, D, E, and F;
2) Establish two munitions target areas and a sensor training area for Department of Defense (DOD) air-to-ground training underlying R-4403C-F; and
3) Use the new R-4403A-F airspace areas to accommodate ongoing and evolving DOD and NASA testing and training requirements.

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Ser EV21/510
November 21, 2014

As described in Section 1.4 of the Draft EA, the purpose of the proposed action is to provide an adequately sized and configured RA to ensure safe and effective operation of the NASA SSC test stands and air-to-ground training areas. The proposed action is needed to segregate non-participating aircraft from potentially hazardous activities associated with current and emerging NASA and DOD airspace and ground uses, including munitions target and sensor training areas for DOD air-to-ground training. Although site-specific range management plans are not available at this time, the locations have been chosen in association with the development of the proposed airspace configuration as well as to minimize potential environmental and operational effects. It is anticipated that approximately 11 acres will be affected in the Western Maneuver Area(WMA)for the establishment of the two target areas (IMP-A and FW-1), and up to 2 acres may be disturbed for the establishment of the sensor training area in the Acoustic Buffer Zone (FW-2) (see Section 2.1.2.2 of the Draft EA).

In accordance with the Section 307 of the Coastal Zone Management Act and 15 Code of Federal Regulations (CFR) Part 930, subpart C, all elements of the proposed action were reviewed for consistency with the enforceable policies of the Louisiana Statutes that comprise the Federally approved Louisiana Coastal Zone Management Program. Consideration was given for impacts reasonably likely to directly or indirectly (cumulatively or secondarily) affect any land or water use or natural resources within the coastal zone. The potential effects of the proposed action on Louisiana's coastal zone could result from changes in airspace and air operations. Based on the analysis included in the attached CCD, DON and NASA have determined the proposed action would be consistent to the maximum extent practicable with the enforceable policies of the Louisiana Coastal Zone Management Program. The DON and NASA hereby request concurrence with this determination for consistency of Federal agency activities under 15 CFR Part 930, Subpart C by December 31, 2014.

Please provide the CCD concurrence and address any comments on the Draft EA by December 31, 2014 to the following point of contact:

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November 21, 2014

Commanding Officer
Attn: Mr. Greg Timoney, EV21
Naval Facilities Engineering Command, Southeast
P.O. Box 30, Building 903, NAS
Jacksonville, FL 32212-0030

If further information is required or for questions regarding this letter, please contact Mr. Greg Timoney, SSC SUA and Target Area EA Project Manager at (904) 542-6866 or by email: gregory.timoney@navy.mil.

Sincerely,

C.R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosure: Coastal Consistency Determination for Louisiana

Copy to:
NASA SSC (Environmental Department)
Naval Special Warfare Command (N31/N4)
NCBC Gulfport (Public Works Officer)

3

Louisiana Coastal Resources Program Consistency Review Under 15 Code of Federal Regulations Part 930, Subpart C - Consistency for Federal Agency Activities		
Louisiana Regulation	**Guideline**	**Consistency Determination**
Section 701.A	The guidelines must be read in their entirety. Any proposed use may be subject to the requirements of more than one guideline or section of guidelines and all applicable guidelines must be complied with.	Consistent – Acknowledged.
Subsection 701.B	Conformance with applicable water and air quality laws, standards and regulations, and with those other laws, standards and regulations which have been incorporated into the coastal resources program shall be deemed in conformance with the program except to the extent that these guidelines would impose additional requirements.	Consistent – Acknowledged.
Subsection 701.C	The guidelines include both general provisions applicable to all uses and specific provisions applicable only to certain types of uses. The general guidelines apply in all situations. The specific guidelines apply only to situations they address. Specific and general guidelines should be interpreted to be consistent with each other. In the event there is an inconsistency, the specific should prevail.	Consistent – Acknowledged.
Subsection 701.D	These guidelines are not intended to, nor shall they be, interpreted so as to result in an involuntary acquisition or taking of property.	Consistent – Acknowledged.
Subsection 701.E	No use or activity shall be carried out or conducted in such a manner as to constitute a violation of the terms of a grant or donation of any lands or waterbottoms to the State or any subdivision thereof. Revocations of such grants and donations shall be avoided.	Consistent – The proposed action would not cause violations or revocations of such grants or donations (see Section 2.1, Proposed Action).
Subsection 701.F	Information regarding the following general factors shall be utilized by the permitting authority in evaluating whether the proposed use is in compliance with the guidelines: 1. type, nature, and location of use; 2. elevation, soil, and water conditions and flood and storm hazard characteristics of site; 3. techniques and materials used in construction, operation, and maintenance of use; 4. existing drainage patterns and water regimes of surrounding area including flow, circulation, quality, quantity, and salinity; and impacts on them; 5. availability of feasible alternative sites or methods for implementing the use; 6. designation of the area for certain uses as part of a local program; 7. economic need for use and extent of impacts of use on economy of locality; 8. extent of resulting public and private benefits; 9. extent of coastal water dependency of the use; 10. existence of necessary infrastructure to support the use and public costs resulting from the use; 11. extent of impacts on existing and traditional uses of the area and on future uses for which the area is suited; 12. proximity to and extent of impacts on important natural features such as beaches, barrier islands, tidal passes, wildlife and aquatic habitats, and forest lands; 13. the extent to which regional, state, and national interests are served including the national interest in resources and the siting of facilities in the coastal zones as identified in the coastal resources program; 14. proximity to, and extent of impacts on, special areas,	Consistent – Acknowledged. The proposed action does not include ground-disturbing activities in Louisiana (see Section 2.1, Proposed Action).

Louisiana Coastal Resources Program Consistency Review Under 15 Code of Federal Regulations Part 930, Subpart C - Consistency for Federal Agency Activities		
Louisiana Regulation	**Guideline**	**Consistency Determination**
	particular areas, or other areas of particular concern of the state program or local programs; 15. likelihood of, and extent of impacts, resulting secondary impacts and cumulative impacts; 16. proximity to and extent of impacts on public lands or works, or historic, recreational or cultural resources; 17. extent of impacts on navigation, fishing, public access, and recreational opportunities; 18. extent of compatibility with natural and cultural setting; and 19. extent of long-term benefits or adverse impacts.	
Subsection 701.G	It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, and constructed, operated, and maintained to avoid to the maximum extent practicable significant: 1. reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow; 2. adverse economic impacts on the locality of the use and affected governmental bodies; 3. detrimental discharges of inorganic nutrient compounds into coastal waters; 4. alterations in the natural concentration of oxygen in coastal waters; 5. destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and waterbottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features; 6. adverse disruption of existing social patterns; 7. alterations of the natural temperature regime of coastal waters; 8. detrimental changes in existing salinity regimes; 9. detrimental changes in littoral and sediment transport processes; 10. adverse effects of cumulative impacts; 11. detrimental discharges of suspended solids into coastal waters, including turbidity resulting from dredging; 12. reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or wetland forest; 13. discharges of pathogens or toxic substances into coastal waters; 14. adverse alteration or destruction of archaeological, historical, or other cultural resources; 15. fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas; 16. adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands; 17. adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern; 18. adverse disruptions of coastal wildlife and fishery migratory patterns; 19. land loss, erosion, and subsidence; 20. increases in the potential for flood, hurricane, or other storm damage, or increases in the likelihood that damage will occur from such hazards; and 21. reductions in the long term biological productivity of the coastal ecosystem.	Consistent – The proposed action has the potential for noise and air quality impacts to the Pearl River Wildlife Management Area. However, impacts to wildlife are anticipated to be a slight increase over baseline disturbance from ongoing NASA testing and DOD training activities (see Section 3.4.2, Noise Environmental Consequences). Minor impacts to air quality are expected from small emission increases for all criteria pollutants, but none approach the comparative threshold of 250 tons per year (see Section 3.10.2, Air Quality Environmental Consequences).
Subsection 701.H	1. In those guidelines in which the modifier "maximum extent practicable" is used, the proposed use is in compliance with the guideline if the standard modified by the term is complied with. If the modified standard is not complied with, the use will be in compliance with the guideline if the permitting authority finds, after a systematic consideration of all pertinent information regarding the use, the site, and the impacts of the use as set forth in Subsection F, and a	Consistent – The proposed action, specifically, changes in airspace and air operations, would serve the public interests associated

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Louisiana Coastal Resources Program Consistency Review Under 15 Code of Federal Regulations Part 930, Subpart C - Consistency for Federal Agency Activities		
Louisiana Regulation	**Guideline**	**Consistency Determination**
	balancing of their relative significance, that the benefits resulting from the proposed use would clearly outweigh the adverse impacts resulting from noncompliance with the modified standard and there are no feasible and practical alternative locations, methods, and practices for the use that are in compliance with the modified standard and: a) significant public benefits will result from the use, or; b) the use would serve important regional, state, or national interests, including the national interest in resources and the sitting of facilities in the coastal zone identified in the coastal resources program, or; c) the use is coastal water dependent. 2. The systematic consideration process shall also result in a determination of those conditions necessary for the use to be in compliance with the guideline. Those conditions shall assure that the use is carried out utilizing those locations, methods, and practices which maximize conformance to the modified standard; are technically, economically, environmentally, socially, and legally feasible and practical; and minimize or offset those adverse impacts listed in Subsection 701.G and in the Subsection at issue.	with the mission support needs of NASA and DOD for the testing and training needs identified for proposed R-4403A-F (see Section 1.4, Purpose of and Need for the Proposed Action).
Subsection 701.I	Uses shall to the maximum extent practicable be designed and carried out to permit multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.	Consistent – Acknowledged.
Subsection 701.J	These guidelines are not intended to be, nor shall they be, interpreted to allow expansion of governmental authority beyond that established by R.S. 49:214.21-49:214.42, as amended; nor shall these guidelines be interpreted so as to require permits for specific uses legally commenced or established prior to the effective date of the coastal use permit program nor to normal maintenance or repair of such uses.	Consistent – Acknowledged.
Subsection 703.A-F	Guidelines for Levees	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 705.A-P	Guidelines for Linear Facilities	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 707.A-G	Guidelines for Dredged Spoil Deposition	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 709.A-I	Guidelines for Shoreline Modification	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 711.A-N	Guidelines for Surface Alterations	The guidelines have been read in their entirety and are not applicable to the project.

Louisiana Coastal Resources Program Consistency Review Under 15 Code of Federal Regulations Part 930, Subpart C - Consistency for Federal Agency Activities		
Louisiana Regulation	**Guideline**	**Consistency Determination**
Subsection 713.A-I	Guidelines for Hydrologic and Sediment Transport Modifications	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 715.A-I	Guidelines for Disposal of Wastes	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 717.A-C	Guidelines for Uses that result in the Alteration of Waters Draining into Coastal Waters	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 719.A-N	Guidelines for Oil, Gas, and other Mineral Activities	The guidelines have been read in their entirety and are not applicable to the project.

C.3 Comments Received on and Changes Made to Draft EA

Responses to the Request for Agency Concurrence were received from the following agencies (agency response letters follow):

U.S. Environmental Protection Agency, Region 4
U.S. Fish and Wildlife Service, Jackson Mississippi Field Office
Mississippi Department of Marine Resources
Mississippi Department of Archives and History
The Choctaw Nation of Oklahoma
Jena Band of Choctaw Indians

No substantive comments were received and no substantial changes were made between the Draft and Final EA. Minor comments and resulting changes to the EA are summarized below:

The U.S. Fish and Wildlife Service (USFWS), Mississippi Field Office advised (January 6, 2015) that the ringed map turtle (*Graptemys oculifera*) is listed in Hancock County and St. Tammany Parrish. Additionally, the USFWS, Mississippi Field Office advised that the Red Knot (*Calidris canutus rufa*) is listed for Hancock County, and, although no impacts are anticipated, this species should be included in Section 3.11.1, Affected Environment, and 3.11.2, Environmental Consequences. The Final EA was clarified accordingly. USFWS provided concurrence on the determination that the proposed project may affect, but is not likely to adversely affect the Louisiana black bear (*Ursus Americanus Luteolus)* and the gopher tortoise (*Gopherus Polyphemus)* (April 10, 2015).

The Choctaw Nation of Oklahoma (January 5, 2015) and the Jena Band of Choctaw Indians (December 22, 2014) both requested that, should any Native American artifacts, remains, or archaeological features be encountered during the scope of project activities, work shall cease and their respective offices shall be contacted immediately. The Choctaw Nation of Oklahoma and the Jena Band of Choctaw Indians had no further comments on the proposed action. No response was received from the Mississippi Band of Choctaw or the Tunica-Biloxi Indian Tribes.

Two Coastal Consistency Determinations were sent to the Mississippi Department of Marine Resources and Louisiana Department of Natural Resources, respectively, under a cover letter dated November 21, 2014. The Mississippi Department of Marine Resources (March 3, 2015) noted that, once design and construction of the impact areas is initiated, the Navy must complete Mississippi Coastal Zone Management Act (CZMA) requirements concurrent with U.S. Army Corps of Engineers wetlands permits submittal process (Joint Application and Notification Form) due to potential wetlands impacts during the construction of impact areas. The Mississippi Department of Marine Resources had no further comments on the proposed action. A response to the submitted Coastal Consistency Determination was not received by the Louisiana Department of Natural Resources within the 60-day timeframe specified in 15 CFR Section 930.41. Therefore, in accordance with 15 CFR Section 930.41, concurrence by the Louisiana Department of Natural Resources is presumed.

The Mississippi Department of Archives and History (December 26, 2014) requested the opportunity to review and comment on any earth-disturbing activities that may be required as the impact areas are constructed. The Mississippi Department of Archives and History had no further comments on the proposed action.

The U.S. Environmental Protection Agency (January 8, 2015) had no comments on the proposed action or EA.

Further internal agency review resulted in minor changes to further clarify Houston Air Traffic Control as the airspace "Controlling Agency," National Aeronautics and Space Administration as the "Scheduling Authority," and National Aeronautics and Space Administration as the "Using Agency" for proposed R-4403A, B and Naval Special Warfare as the "Using Agency" for proposed R-4403C, D, E, F.

Timoney, Gregory P CIV NAVFAC SE, EV-21

From: Ian Thompson
Sent: Monday, January 05, 2015 11:35 AM
To: Timoney, Gregory P CIV NAVFAC SE, EV-21
Cc: Rubye R. Taylor
Subject: Re: Section 106 and EO 13175 Consultation for the Redesignation and Expansion of Restricted Airspace R-4403 and Establishment of Air-To-Ground Munitions and Sensor Training Areas at Stennis Space Center

The Choctaw Nation of Oklahoma thanks the Department of the Navy for consultation on the draft EAN for the above-referenced project. The proposed project is partially located within lands ceded by the Choctaw Nation to the United States. Any human remains or artifacts encountered in the project area are potentially culturally affiliated with the Choctaw Nation of Oklahoma.

The Choctaw Nation of Oklahoma requests to be added to the list of parties that will be consulted when historic properties are inadvertently encountered in the proposed work. This is because the Choctaw Nation of Oklahoma has special knowledge on Choctaw history and culture relevant to determining a Choctaw site's National Register eligibility, which the other listed parties do not necessarily possess. It is also because only a Native American Tribe has the ability to determine if a property is a Native American sacred site. With this addition, the Choctaw Nation of Oklahoma would concur that the work outlined in the draft EAN would be unlikely to adversely impact historic properties.

Additionally, the EAN indicates that several cultural resources surveys have been conducted in the Fee Area, Buffer Zone, and Western Maneuver Area. It appears that our office does not have copies of all of these reports. We respectfully request electronic copies of the reports for the referenced surveys, so that our office will have the best available data to help the DON fulfill its obligations under NHPA on projects in the area.

Thank you for your time and assistance.

Sincerely,

Ian Thompson PhD, RPA

THPO, Tribal Archaeologist,

Director, Historic Preservation Dept.

Choctaw Nation of Oklahoma

1

PO Drawer 1210

Durant, OK 74701

1-800-522-6170 ext. 2216

This message is intended only for the use of the individual or entity to which it is addressed and may contain information that is privileged, confidential and exempt from disclosure. If you have received this message in error, you are hereby notified that we do not consent to any reading, dissemination, distribution or copying of this message. If you have received this communication in error, please notify the sender immediately and destroy the transmitted information. Please note that any view or opinions presented in this email are solely those of the author and do not necessarily represent those of the Choctaw Nation.

2

From: Timoney, Gregory P CIV NAVFAC SE, EV-21
To: Durig, Brock CIV NAVFAC SE, EV; Saboya, Adrianne V Ms CIV USSOCOM NAVSOC; Paulson, Amy
Cc: Wirth, Carol; Olander, Geoffrey
Subject: FW: EPA R4 Comments on Draft Environmental Assessment (EA) For the Resignation and Expansion of Restricted Airspace R-4403
Date: Thursday, January 08, 2015 12:26:28 PM

Adrianne, Brock, Amy,

"EPA concurs with the Draft as written and have no additional comments at this time. "

R,
GT

-----Original Message-----
From: Gissentanna, Larry [
Sent: Thursday, January 08, 2015 1:20 PM
To: Timoney, Gregory P CIV NAVFAC SE, EV-21
Subject: EPA R4 Comments on Draft Environmental Assessment (EA) For the Resignation and Expansion of Restricted Airspace R-4403

Commanding Officer
Attn: Mr. Greg Timoney (EV-21)
Naval Facilities Engineering Command
Box 30, Bldg. 903, NAS
Jacksonville, FL 32212-0030

Dear Mr. Timoney,

Consistent with Section 102(2)(c) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) appreciates the opportunity to review the Draft Environmental Assessment (EA) For the Redesignation and Expansion of Restricted Airspace R-4403 to support military Air-To-Ground munitions training and National Aeronautics and Space Administration (NASA) rocket engine testing at Stennis Space Center (SSC), Mississippi.

EPA understands that the purpose of this proposed action is to provide an adequately sized and configured restricted airspace to ensure safe and effective operation of the NASA SSC test stands and DOD air-to-ground training areas. This action will segregate non-participating aircraft from potentially hazardous activities and ground uses.

From EPA's perspective it appears that the major issues, e.g., , wetlands, and water/air quality, noise, protection of children and environmental justice are adequately addressed in this Draft EA.

EPA concurs with the Draft as written and have no additional comments at this time. Upon completion of your Final Environmental Assessment, please forward an electronic copy to this office. If you have any question, you may contact me via the information below.

Again, Thank you for the opportunity to provide comments to your Draft EA.

Larry O. Gissentanna
DoD and Federal Facilities, Project Manager

U.S. Environmental Protection Agency/ Region 4 National Environmental Policy Act (NEPA) Program Office
61 Forsyth Street, SW
Atlanta, GA 30303-8960
Office: 404-562-8248

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

April 10, 2015

IN REPLY REFER TO:
2015-CPA-0031
2015-I-0145

Department of the Navy
Attn: Greg Timoney
Naval Facilities Engineering Command Southeast
Jacksonville, FL 32212

Dear Mr. Timoney:

The Fish and Wildlife Service (Service) has reviewed your email (dated March 31, 2015), regarding informal consultation for the resignation and expansion of restricted airspace R-4403 and establishment of air-to-ground munitions and sensor training areas at Stennis Space Center. The project is located at Stennis Space Center in Hancock County, Mississippi. Our comments are submitted in accordance with the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e).

Based on your above referenced email and your letter dated November 24, 2014, you are requesting our office review your project for potential impacts to listed threatened and endangered species that may result from the proposed project activities so that you can complete an environmental assessment for the above-referenced project site. After reviewing the project details provided, the Service concurs with your determination that the proposed project may affect, but is not likely to adversely affect the Louisiana black bear (*Ursus Americanus Luteolus*), the Ringed map turtle (*Graptemys oculifera*), and the gopher tortoise (*Gopherus Polyphemus*). The project will have no effect on the Eastern indigo snake (*Drymarchon corais couperi*), the Dusky gopher frog (*Rana sevosa*), the Red-cockaded woodpecker (*Picoides borealis*), the Wood stork (*Mycteria americana*), and the Bachman's warbler (*Vermivora bachmanii*) because these species are not federally listed or known to occur in Hancock County, Mississippi.

The Louisiana black bear and the gopher tortoise could be found within the project area, however, these species will not likely be found in the project area. Additionally, these species are mobile, and could easily avoid the project area.

Should the above listed species or any other federally listed species be observed in the project area at any time in the future, all munitions training should cease, and consultation should be reinitiated with our office. This concludes informal consultation. If you have any questions, please contact Paul Necaise in our office, telephone: (228) 493-6631.

Sincerely,

for Paul Necaise

Stephen Ricks
Field Supervisor

From: Durig, Brock CIV NAVFAC SE, EV
To: Sabova, Adrianne V Ms CIV USSOCOM NAVSOC; Lorance, David K. (SSC-RA02)
Cc: Kennedy, Carolyn D. (SSC-RA02); Paulson, Amy; Wirth, Carol; Timoney, Gregory P CIV NAVFAC SE, EV-21
Subject: FW: Section 106 and EO 13175 Consultation for the Redesdignation and Expansion of Restricted Airspace R-4403 and Establishment of Air-to-GroundMunitions and Sensor Training Areas at Stennis Space Center
Date: Thursday, December 25, 2014 12:28:07 PM

Adrianne / David

FYSA

-----Original Message-----
From: Timoney, Gregory P CIV NAVFAC SE, EV-21
Sent: Thursday, December 25, 2014 7:45 AM
To: Winter, Len E CIV NAVFAC SE, JAXS; Durig, Brock CIV NAVFAC SE, EV
Subject: FW: Section 106 and EO 13175 Consultation for the Redesdignation and Expansion of Restricted Airspace R-4403 and Establishment of Air-to-GroundMunitions and Sensor Training Areas at Stennis Space Center

---

From: Laminda Brazil
Sent: Monday, December 22, 2014 2:37 PM
To: Timoney, Gregory P CIV NAVFAC SE, EV-21
Subject: RE: Section 106 and EO 13175 Consultation for the Redesdignation and Expansion of Restricted Airspace R-4403 and Establishment of Air-to-GroundMunitions and Sensor Training Areas at Stennis Space Center

December 22, 2014

Department of the Navy

Naval Facilities Engineering Command Southeast

Jacksonville, FL 32212-0030

RE: Section 106 and EO 13175 Consultation for the Redesignation and Expansion of Restricted Airspace R-4403 and Establishment of Air-to-GroundMunitions and Sensor Training Areas at Stennis Space Center

Dear Gregory Timoney:

We are in receipt of your letter dated November 21, 2014 and hereby concur with the determination of "No

Properties". Also, we are unaware of any known sacred and/or ceremonial sites located within the immediate area.

However, should any Native American artifacts, remains or archaeological features be encountered during the scope of said project activities, work shall cease and our office shall be contacted immediately.

We appreciate your efforts on this project and our ability to comment. Should you have any questions, please contact our office via the information below.

Sincerely,

Alina J. Shively

JBC Deputy THPO

P. O. Box 14

Jena, Louisiana 71342-0014

(318)-992-1205

Prepared by:

Laminda Dee Brazil

THPO Secretary / 106 Specialist

P. O. Box 14

Jena, LA 71342-0014

318-992-1205

MISSISSIPPI
DEPARTMENT OF MARINE RESOURCES

March 3, 2015

Commanding Officer
Naval Facilities Engineering Command Southeast
Attn: Greg Timoney
P.O. Box 30, Bldg 903, NAS
Jacksonville, FL 32212

RE: DMR-140259; Department of the Navy

Dear Mr. Timoney:

The Department of Marine Resources in cooperation with other state agencies is responsible under the Mississippi Coastal Program (MCP) for managing the coastal resources of Mississippi. Proposed activities in the coastal area are reviewed to insure that the activities are in compliance with the MCP.

The Department has received a request to review a proposal for the Department of the Navy to establish new restricted airspace in southwestern Mississippi, establish two munitions impact areas and a sensor training area, and the use of the new restricted airspace areas to accommodate DOD and NASA testing and training requirements in Hancock County, Mississippi. It appears that the proposed activity will impact wetlands. These are activities that are regulated by the U.S. Army Corps of Engineers, and will require review by this office under the Coastal Zone Management Act of 1972 and the Coastal Zone Reauthorization Amendments of 1990. Please submit a Joint Application and Notification Form to our office once the project plans are completed. Thank you for the opportunity to comment on your project.

For more information, questions concerning this correspondence, to obtain an application packet, or to schedule a pre-application meeting, contact Chris Pickering with the Bureau of Wetlands Permitting at (228) 523-4117 or chris.pickering@dmr.ms.gov.

Sincerely,

Willa J. Brantley
Bureau Director, Wetlands Permitting

WJB/csp

1141 Bayview Avenue • Biloxi, MS 39530 • (228) 374-5000

MISSISSIPPI DEPARTMENT *of* ARCHIVES AND HISTORY

MDA&H

PO Box 571, Jackson, MS 39205-0571
601-576-6850 • Fax 601-576-6975
mdah.state.ms.us
H.T. Holmes, Director

December 26, 2014

Commanding Officer
Naval Facilities Engineering Command Southeast
Attention: C. R. Destafney and Len Winter (EV23)
P. O. Box 30A (Bldg 903)
Jacksonville, Florida 32212-0030

RE: Consultation for the redesignation and expansion of restricted airspace R-4403 and establishment of air-to-ground monitors and sensor training areas at Stennis Space Center, MDAH Project Log #12-005-14, Hancock County

Dear Mr. Winter:

We have reviewed your request to comment, received on December 1, 2014, regarding potential impacts to cultural resources for the above referenced undertaking in accordance with our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After review, we agree that the proposed undertaking is unlikely to affect any cultural resources eligible for listing in the National Register of Historic Places, provided that we have the opportunity to review and comment on any earth-disturbing activities that may be required. With this condition, we would agree with a finding of no significant impact to cultural resources. As such, we have no reservations with the project.

If you have any questions, please contact me at 601-576-6538.

Sincerely,

Greg Williamson
Review and Compliance Officer

FOR: H.T. Holmes
State Historic Preservation Officer

From: Timoney, Gregory P CIV NAVFAC SE, EV-21
To: Paulson, Amy; Saboya, Adrianne V Ms CIV USSOCOM NAVSOC; Durig, Brock CIV NAVFAC SE, EV
Cc: Wirth, Carol; Kemp, Royce B CIV NAVFAC SE, Environmental; Nemeth, Doug CIV NAVFAC SE
Subject: FW: Draft EA for the Redesignation and expansion of restricted airspace.....
Date: Tuesday, January 06, 2015 10:42:02 AM

Adrianne, Brock, Amy,

New input from US FWS on WMA EA.

R,
GT

-----Original Message-----
From: Paul Necaise
Sent: Tuesday, January 06, 2015 11:23 AM
To: Timoney, Gregory P CIV NAVFAC SE, EV-21
Subject: Draft EA for the Redesignation and expansion of restricted airspace.....

Gregory,

The US Fish and Wildlife Service's Mississippi Field Office has reviewed your subject letter dated November 24, 2014, and the attached Draft EA document. Our comments are as follows:

- The last sentence on page 3-76 states that "this species is not listed as occurring within Hancock County,…". This species is listed for Hancock County, Mississippi.

- The table on page 3-78 has a section title Birds. There is a new bird that has just been listed called the Red Knot that should also be included in this table. The Red Knot is listed for Hancock County, MS. However, this species is a migratory sand beach/shorebird species that utilizes similar habitat as the piping plover. So, you will not have any occurrences on the subject lands, but should be noted in the subject table on page 3-78 for this project and future projects. The Red Knot also has designated critical habitat, but in Mississippi the only designated critical habitat is Cat Island.

If you have any questions or concerns, you may contact me via email or at the telephone number listed below.

Paul Necaise

Coastal Biologist

U.S. Fish and Wildlife Service

6578 Dogwood View Parkway, Suite A

Jackson, MS 39213

228-493-6631

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APPENDIX D WDZ TOOL APPLICATION

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Naval Special Warfare Riverine Complex, Stennis AC-130 Weapons Danger Zones for the Proposed Northern Impact Area (IMP-A) and Southern Impact Area (FW1)

A Weapons Danger Zone (WDZ) encompasses the minimum safety requirements designed for aviation weapons training on Department of Defense (DOD) ranges, serving as the protective buffer area for an Impact Area. WDZs include the ground and airspace for lateral and vertical containment of projectiles, fragments, debris, and components resulting from the firing, launching, and/or detonation of aviation-delivered ordnance. The WDZ accounts for weapon accuracy, failures, and ricochets. It also accounts for weapon, aircraft, and munition types as well as angles and distances from which they are fired.

The WDZs were developed for planning purposes only for the delivery of High Explosive (HE) and Target Practice (TP) munitions at both proposed Impact Areas. There is no Short Range Training Ammunition (SRTA) option in the WDZ Tool to map hazard zones for helicopter (MH-60, MH-47, MH-6) and tiltrotor aircraft (CV-22); thus, helicopter use of the proposed Northern Impact Area (IMP-A) and Southern Impact Area (FW1) for live-fire training was not included in the WDZ analysis at this time. However, given the nature of SRTA (i.e., it is restricted in its effective range to allow for training realism without the requirement of huge expanses of land), the firing of SRTA from helicopters is not expected to expand the WDZs beyond those described for AC-130 HE munitions.

The proposed R-4403C-F airspace was initially configured through the Federal Aviation Administration (FAA) Airspace Proposal process using munition impact area points IMP-A and FW1 as conceptual targets and developing WDZs for these sites. Then, in order to provide realistic training and account for the movement of targets throughout the life of the impact areas, 5-acre rectangular areas encompassing and surrounding the munition impact area sites were developed and used in the WDZs that align with the 5-acre areas rather than the single point locations. Based on best available data, each 5-acre area was developed in such a way as to minimize impacts to surrounding resources including wetlands, surface water, culturally sensitive areas, ground safety, and existing roads, and to minimize conflict with current ground- and riverine-based training operations. In using rectangular impact areas, the resulting WDZs are elliptical.

What the Stennis WDZs Represent

- *Aircraft:* AC-130
- *Munitions Caliber, HE:* 25 millimeter (mm), 30mm, 40mm, 105mm
- *Munitions Caliber, TP:* 25mm
- *Altitudes:* 8,000 to 10,000 feet (ft)
- *Lookdown/Release Angles:* -40 to -50 degrees
- *Target Type*: "All" to account for the effect of hard targets on the TP rounds (most conservative)
- *Containment:* 99.9999%
- *Approach Angle & Firing Restrictions:* *None*

These WDZs were developed for planning level analysis only. Additional analysis would be conducted once the layout of the target array and range procedures are planned in more detail at the proposed impact sites. These efforts will align with the DOD range certification process. Table D-1 displays the WDZ Tool inputs that were used to create, and can be used to replicate, the proposed WDZs.

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Table D-1: WDZ Tool Input Specifications

Installation Settings													
Magnetic Declination	*Containment (Bombs/Rockets)*	*Containment (Guns)*	*Terrain Type*	*Target Type*	*Altitude Type*	*Altitude Units*	*Airspeed Units*	*Release Angle Units*	*Release Range Units*	*FW1 Lat.*	*FW1 Lon.*	*IMP-A Lat.*	*IMP-A Lon.*
1 E	99.9999	99.9999	All	Hard	AGL	feet	KTAS	degrees	NM	30.379489	-89.651399	30.40258	-89.6599

WDZ Settings for Impact Areas																					
Date Created	*Aircraft*	*Weapon*	*Live/Inert*	*Event*	*Altitude Min.*	*Altitude Max.*	*Airspeed Min.*	*Airspeed Max.*	*Release Angle Min.*	*Release Angle Max.*	*Target*	*Target Elevation*	*Target Type*	*Terrain Type*	*Aircraft Heading Min.*	*Aircraft Heading Max.*	*Release Range Min.**	*Release Range Max.**	*Firing Direction Min.*	*Firing Direction Max.*	*Figure Color*
23-Sep-2014	AC-130	25mm	Inert	Sidefire	8000	10000	170	180	-40	-50	Northern Impact Area	0	Hard	All	0	359	1.0000	1.5000	0	359	Dk. Blue
23-Sep-2014	AC-130	25mm	Live	Sidefire	8000	10000	170	180	-40	-50	Northern Impact Area	0	Hard	All	0	359	1.0000	1.5000	0	359	Green
23-Sep-2014	AC-130	30mm	Live	Sidefire	8000	10000	170	180	-40	-50	Northern Impact Area	0	Hard	All	0	359	1.0000	1.4988	0	359	Red
23-Sep-2014	AC-130	40mm (PGU-9)	Live	Sidefire	8000	10000	170	180	-40	-50	Northern Impact Area	0	Hard	All	0	359	1.0077	1.5000	0	359	Purple
23-Sep-2014	AC-130	105mm	Live	Sidefire	8000	10000	170	180	-40	-50	Northern Impact Area	0	Hard	All	0	359	1.0000	1.5000	0	359	Lt. Blue
23-Sep-2014	AC-130	25mm	Inert	Sidefire	8000	10000	170	180	-40	-50	Southern Impact Area	0	Hard	All	0	359	1.0000	1.5000	0	359	Dk. Blue
23-Sep-2014	AC-130	25mm	Live	Sidefire	8000	10000	170	180	-40	-50	Southern Impact Area	0	Hard	All	0	359	1.0000	1.5000	0	359	Green
23-Sep-2014	AC-130	30mm	Live	Sidefire	8000	10000	170	180	-40	-50	Southern Impact Area	0	Hard	All	0	359	1.0000	1.4988	0	359	Red
23-Sep-2014	AC-130	40mm (PGU-9)	Live	Sidefire	8000	10000	170	180	-40	-50	Southern Impact Area	0	Hard	All	0	359	1.0077	1.5000	0	359	Purple
23-Sep-2014	AC-130	105mm	Live	Sidefire	8000	10000	170	180	-40	-50	Southern Impact Area	0	Hard	All	0	359	1.0000	1.5000	0	359	Lt. Blue

Notes:

* - Min and Max Release Ranges provided were 1.0-1.5 NM. Highlighted cells indicate an error was produced when using these inputs, stating range was not achievable for specified conditions.
The WDZ tool then set Min and Max Release Ranges to the default range it calculated, as shown in the table.

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APPENDIX E COASTAL CONSISTENCY DETERMININATIONS

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Coastal Consistency Determinations – Mississippi and Louisiana

In accordance with Section 307 of the Coastal Zone Management Act (CZMA) and 15 Code of Federal Regulations (CFR) 930 subpart C, Federal agency activities affecting a land or water use or natural resource of a state's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the state's coastal management program. The Department of the Navy (DON) and National Aeronautics and Space Administration (NASA) have prepared these Coastal Consistency Determinations (CCDs) in support of the *Draft Environmental Assessment for the Redesignation and Expansion of Restricted Airspace R-4403 to Support Military Air-to-Ground Munitions Training and National Aeronautics and Space Administration Rocket Engine Testing at Stennis Space Center*.

All elements of the proposed action were reviewed for consistency with the enforceable policies of the Federally approved CZMA programs for Mississippi Coastal Program (Mississippi Department of Marine Resources 1983) and the Louisiana Coastal Resources Program (Louisiana Department of Natural Resources 2014). Consideration was given for impacts reasonably likely to directly or indirectly (cumulatively or secondarily) affect any land or water use or natural resources within the coastal zone. The potential effects of the proposed action on Mississippi's coastal zone could result from changes in airspace and air operations and the establishment of air-to-ground target areas and a laser sensor training area. The potential effects of the proposed action on Louisiana's coastal zone could result from changes in airspace and air operations.

Implementation of the Mississippi Coastal Program is the primary responsibility of the Office of Coastal Zone Management. The Mississippi Coastal Program was legislatively mandated in Section 57-15-6 of the Mississippi Code of 1972 and approved by the National Oceanic and Atmospheric Administration under the provisions of the CZMA of 1972. Per Section 57-15-6 of Mississippi Code, the coastal area of Mississippi is composed of Hancock, Harrison, and Jackson Counties.

The Louisiana Department of Natural Resources, Office of Coastal Management is responsible for implementing the Louisiana Coastal Resources Program under the authority of the Louisiana State and Local Coastal Resources Management Act of 1978, as amended (Act 361, La. R.S. 49:214.21 *et seq.)*. The Louisiana Coastal Resources Program was approved by the National Oceanic and Atmospheric Administration in September 1980. The inland boundary for the Louisiana coastal zone contains all or part of 20 parishes, including St. Tammany Parish.

Based on best available data, DON and NASA determined that the actions proposed would be consistent to the maximum extent practicable with the enforceable policies of the Mississippi Coastal Program and the Louisiana Coastal Resources Program. Table E-1 details the CCDs for the Mississippi Coastal Program and Table E-2 details the CCDs for the Louisiana Coastal Resources Program. Within the determinations, there are cross-references to more detailed analysis provided in the Draft Environmental Assessment (EA).

During the Draft EA review period, DON and NASA submitted the CCDs and Draft EA to the Mississippi Department of Marine Resources and Louisiana Department of Natural Resources, respectively, for concurrence (see Appendix C).

Table E-1. Mississippi Coastal Program Consistency Review		
Mississippi Statute	**Scope**	**Consistency Determination**
Section 49-27-3. Coastal Wetlands Protection Act	Provides for the preservation of the natural state of the coastal wetlands and their ecosystems and to prevent the despoliation and destruction of them, except where a specific alteration of specific coastal wetlands would serve a higher public interest in compliance with the public purposes of the public trust in which coastal wetlands are held.	Consistent –Potentially 13 acres of wetlands could be impacted by the construction and ongoing use and management of the munitions target areas (FW1 and IMP-A) and sensor training area (FW2). However, during the design phase, wetlands would be delineated and measures would be taken to avoid, minimize, and mitigate wetland impacts. All required permits would be obtained (see Section 3.13.2, Water Resources, Environmental Consequences).
Section 57-15-6(1)(a). Coastal Program, Efficient Utilization of Waterfront Sites	Policy to provide for reasonable industrial expansion in the coastal area and to insure the efficient utilization of waterfront industrial sites so that suitable sites are conserved for water dependent industry.	Not Applicable – The proposed action does not involve waterfront development (see Section 2.1, Proposed Action).
Section 49-15-1. Seafood	Policy to recognize the need for a concerted effort to work toward the protection, propagation, and conservation of its seafood and aquatic life in connection with the revitalization of the seafood industry.	Not Applicable – The proposed action would not affect coastal areas that support seafood or the seafood industry (see Section 1.2, Region of Influence).
Section 57-15-6(1)(d). Coastal Program, Preservation of Natural Scenic Qualities	Policy to encourage the preservation of natural scenic qualities in the coastal area.	Consistent – Proposed changes in airspace and air operations, along with construction and ongoing use and management of the munitions target areas (FW1 and IMP-A) and sensor training area (FW2) would not affect the natural scenic qualities of Mississippi's coastal area.
Section 57-15-6(1)(c). Coastal Program, National Interest	Policy to consider the national interest involved in planning for and in the siting of facilities in the coastal area.	Consistent – The proposed action would serve the public interests associated with the mission support needs of NASA and DOD for the testing and training requirements identified for proposed R-4403A-F.
Section 49-17-3. Air and Water Pollution Control Law	Policy to conserve the air and waters of the state and to protect, maintain, and improve the quality thereof for public use, for the propagation of wildlife, fish and aquatic life, and for domestic, agricultural, industrial, recreational, and other legitimate beneficial uses; to maintain such a reasonable degree of quality of the air resources of the state to protect	Consistent - Minor impacts to air quality are expected from small emission increases for all criteria pollutants, but none approach the comparative threshold of 250 tons per year (see Section 3.10.2, Air Quality, Environmental

Table E-1. Mississippi Coastal Program Consistency Review		
Mississippi Statute	**Scope**	**Consistency Determination**
	the health, general welfare, and physical property of the people, and to provide that no waste be discharged into any waters of the state without first receiving the necessary treatment or other corrective action to protect the legitimate beneficial uses of such waters; to provide for the prevention, abatement, and control of new or existing air or water pollution; and to cooperate with other agencies of the State, agencies of other states, and the Federal government in carrying out these objectives.	Consequences). Although there may be additional use of water resources due to increased operational tempo, particularly for rocket engine testing, such use serves legitimate beneficial uses. The potential impacts to coastal natural resources, including wetlands and ecosystems would be highly localized. Development of the munitions target areas and sensor training area would avoid impacts consistent with DOD policy (see Section 3.13.2, Water Resources, Environmental Consequences).
Section 39-7-3. Antiquities Law of Mississippi	Policy to locate, protect, and preserve all sites, objects, buildings, shipwrecks, and locations of historical, archaeological, or architectural significance, including, but not limited to historically or architecturally significant buildings, structures relating to significant engineering accomplishments, prehistoric and historical American Indian or aboriginal campsites, dwellings, and habitation sites, archaeological sites of every character, treasure imbedded in the earth, sunken or abandoned ships and wrecks of the sea or any part or the contents thereof, maps, records, documents, books, artifacts, and implements of culture in any way related to the inhabitants, prehistory, history, natural history, government, or culture in, on, or under any of the lands, tidelands, submerged lands, and bed of the sea within the jurisdiction of the state of Mississippi.	Consistent – The proposed action would have no adverse effect to historic properties in the area of potential effects (see Section 3.8.2, Cultural Resources, Environmental Consequences).

Table E-2. Louisiana Coastal Resources Program Consistency Review		
Louisiana Regulation	**Guideline**	**Consistency Determination**
Section 701.A	The guidelines must be read in their entirety. Any proposed use may be subject to the requirements of more than one guideline or section of guidelines and all applicable guidelines must be complied with.	Consistent – Acknowledged.
Subsection 701.B	Conformance with applicable water and air quality laws, standards, and regulations, and with those other laws, standards, and regulations which have been incorporated into the coastal resources program shall be deemed in conformance with the program except to the extent that these guidelines would impose additional requirements.	Consistent – Acknowledged.
Subsection 701.C	The guidelines include both general provisions applicable to all uses and specific provisions applicable only to certain types of uses. The general guidelines apply in all situations. The specific guidelines apply only to situations they address. Specific and general guidelines should be interpreted to be consistent with each other. In the event there is an inconsistency, the specific should prevail.	Consistent – Acknowledged.
Subsection 701.D	These guidelines are not intended to, nor shall they be, interpreted so as to result in an involuntary acquisition or taking of property.	Consistent – Acknowledged.
Subsection 701.E	No use or activity shall be carried out or conducted in such a manner as to constitute a violation of the terms of a grant or donation of any lands or waterbottoms to the State or any subdivision thereof. Revocations of such grants and donations shall be avoided.	Consistent – The proposed action would not cause violations or revocations of such grants or donations (see Section 2.1, Proposed Action).
Subsection 701.F	Information regarding the following general factors shall be utilized by the permitting authority in evaluating whether the proposed use is in compliance with the guidelines: 1. type, nature, and location of use; 2. elevation, soil, and water conditions and flood and storm hazard characteristics of site; 3. techniques and materials used in construction, operation, and maintenance of use; 4. existing drainage patterns and water regimes of surrounding area including flow, circulation, quality, quantity, and salinity, and impacts on them; 5. availability of feasible alternative sites or methods for implementing the use; 6. designation of the area for certain uses as part of a local program; 7. economic need for use and extent of impacts of use on economy of locality; 8. extent of resulting public and private benefits; 9. extent of coastal water dependency of the use; 10. existence of necessary infrastructure to support the use and public costs resulting from the use; 11. extent of impacts on existing and traditional uses of the area and on future uses for which the area is suited; 12. proximity to and extent of impacts on important natural features such as beaches, barrier islands, tidal passes, wildlife and aquatic habitats, and forest lands; 13. the extent to which regional, state, and national interests are served including the national interest in resources and the siting of facilities in the coastal zones as identified in the coastal resources program; 14. proximity to, and extent of impacts on,	Consistent – Acknowledged. The proposed action does not include ground-disturbing activities in Louisiana (see Section 2.1, Proposed Action).

Table E-2. Louisiana Coastal Resources Program Consistency Review		
Louisiana Regulation	**Guideline**	**Consistency Determination**
	special areas, particular areas, or other areas of particular concern of the state program or local programs; 15. likelihood of, and extent of impacts, resulting secondary impacts and cumulative impacts; 16. proximity to and extent of impacts on public lands or works, or historic, recreational, or cultural resources; 17. extent of impacts on navigation, fishing, public access, and recreational opportunities; 18. extent of compatibility with natural and cultural setting; and 19. extent of long-term benefits or adverse impacts.	
Subsection 701.G	It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, and constructed, operated, and maintained to avoid to the maximum extent practicable significant: 1. reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow; 2. adverse economic impacts on the locality of the use and affected governmental bodies; 3. detrimental discharges of inorganic nutrient compounds into coastal waters; 4. alterations in the natural concentration of oxygen in coastal waters; 5. destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and waterbottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features; 6. adverse disruption of existing social patterns; 7. alterations of the natural temperature regime of coastal waters; 8. detrimental changes in existing salinity regimes; 9. detrimental changes in littoral and sediment transport processes; 10. adverse effects of cumulative impacts; 11. detrimental discharges of suspended solids into coastal waters, including turbidity resulting from dredging; 12. reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or wetland forest; 13. discharges of pathogens or toxic substances into coastal waters; 14. adverse alteration or destruction of archaeological, historical, or other cultural resources; 15. fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas; 16. adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands; 17. adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern; 18. adverse disruptions of coastal wildlife and fishery migratory patterns; 19. land loss, erosion, and subsidence; 20. increases in the potential for flood, hurricane, or other storm damage, or increases in the likelihood that damage will occur from such hazards; and 21. reductions in the long-term biological productivity of the coastal ecosystem.	Consistent – The proposed action has the potential for noise and air quality impacts to the Pearl River Wildlife Management Area. However, impacts to wildlife are anticipated to be a slight increase over baseline disturbance from ongoing NASA testing and DOD training activities (see Section 3.4.2, Noise, Environmental Consequences). Minor impacts to air quality are expected from small emission increases for all criteria pollutants, but none approach the comparative threshold of 250 tons per year (see Section 3.10.2, Air Quality, Environmental Consequences).
Subsection 701.H	1. In those guidelines in which the modifier "maximum extent practicable" is used, the proposed use is in compliance with the guideline if the standard modified by the term is complied with. If the modified standard is not complied with, the use will be in compliance with	Consistent – The proposed action, specifically, changes in airspace and air

Table E-2. Louisiana Coastal Resources Program Consistency Review		
Louisiana Regulation	**Guideline**	**Consistency Determination**
	the guideline if the permitting authority finds, after a systematic consideration of all pertinent information regarding the use, the site, and the impacts of the use as set forth in Subsection F, and a balancing of their relative significance, that the benefits resulting from the proposed use would clearly outweigh the adverse impacts resulting from noncompliance with the modified standard and there are no feasible and practical alternative locations, methods, and practices for the use that are in compliance with the modified standard and: a) significant public benefits will result from the use, or; b) the use would serve important regional, state, or national interests, including the national interest in resources and the sitting of facilities in the coastal zone identified in the coastal resources program, or; c) the use is coastal water dependent. 2. The systematic consideration process shall also result in a determination of those conditions necessary for the use to be in compliance with the guideline. Those conditions shall assure that the use is carried out utilizing those locations, methods, and practices which maximize conformance to the modified standard; are technically, economically, environmentally, socially, and legally feasible and practical; and minimize or offset those adverse impacts listed in Subsection 701.G and in the Subsection at issue.	operations, would serve the public interests associated with the mission support needs of NASA and DOD for the testing and training needs identified for proposed R-4403A-F (see Section 1.4, Purpose of and Need for the Proposed Action).
Subsection 701.I	Uses shall to the maximum extent practicable be designed and carried out to permit multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.	Consistent – Acknowledged.
Subsection 701.J	These guidelines are not intended to be, nor shall they be, interpreted to allow expansion of governmental authority beyond that established by R.S. 49:214.21-49:214.42, as amended; nor shall these guidelines be interpreted so as to require permits for specific uses legally commenced or established prior to the effective date of the coastal use permit program nor to normal maintenance or repair of such uses.	Consistent – Acknowledged.
Subsection 703.A-F	Guidelines for Levees	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 705.A-P	Guidelines for Linear Facilities	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 707.A-G	Guidelines for Dredged Spoil Deposition	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 709.A-I	Guidelines for Shoreline Modification	The guidelines have been read in their entirety and are not applicable to the project.

Table E-2. Louisiana Coastal Resources Program Consistency Review

Louisiana Regulation	Guideline	Consistency Determination
Subsection 711.A-N	Guidelines for Surface Alterations	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 713.A-I	Guidelines for Hydrologic and Sediment Transport Modifications	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 715.A-I	Guidelines for Disposal of Wastes	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 717.A-C	Guidelines for Uses that result in the Alteration of Waters Draining into Coastal Waters	The guidelines have been read in their entirety and are not applicable to the project.
Subsection 719.A-N	Guidelines for Oil, Gas, and other Mineral Activities	The guidelines have been read in their entirety and are not applicable to the project.

Note: [a] Administrative Code Title 43, Part 1, Chapter 7, Subchapter B, Coastal Use Guidelines.

References

Louisiana Department of Natural Resources, Office of Coastal Management. 2014. A Coastal User's Guide to the Louisiana Coastal Resources Program. January.

Mississippi Department of Marine Resources. 1983. Coastal Zone Management. http://www.dmr.ms.gov/index.php/coastal-zone-management. Accessed 6 October.

APPENDIX F OPERATIONS ESTIMATES USED FOR NOISE AND AIR EMMISSIONS MODELS

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Table F-1. Existing and Proposed Annual Air Operations

Airspace Unit	NASA				DOD			
	Rocket Engine Type/Vehicle Type	Total Annual Test Events / Sorties	Typical Rocket Engine Event / UAS Sortie Durationa	Estimated Day/Night Splitb (Percent)	Aircraft Type	Total Annual Number of Sorties (Emerald Warrior/Other)	Typical Sortie Durationa	Estimated Day/Night Splitb (Percent)
Existing								
R-4403	J-2X (Representative)	17	Test:1300 seconds RA Activation:7-12 hours	95/5	Not applicable			
Class G	Not applicable				AC-130	NA/20	90 minutes	0/100
					CV-22	NA/20	55 minutes	0/100
					NSAv	NA/20	30 minutes	0/100
					Helicopters (MH-60, MH-47, MH-6)	NA/100	120 minutes	50/50
					UAS (Category 1)	NA/300	60 minutes	75/25
Total					**Total**	**460**		
Proposed								
R-4403A	J-2X	20-40	7-12 hours	95/5c	Not applicable			
R-4403B	Untethered Autonomous Flight Vehicle Testing	3	Test: 450 seconds RA Activation:7-12 hours	95/5c				
	UAS (Category 1)c	208	unknown	unknown				
	UAS (Category 2)c	156	unknown	unknown				
	UAS (Category	104	unknown	unknown				

Table F-1. Existing and Proposed Annual Air Operations

Airspace Unit	NASA				DOD			
	Rocket Engine Type/Vehicle Type	Total Annual Test Events / Sorties	Typical Rocket Engine Event / UAS Sortie Durationa	Estimated Day/Night Splitb (Percent)	Aircraft Type	Total Annual Number of Sorties (Emerald Warrior/Other)	Typical Sortie Durationa	Estimated Day/Night Splitb (Percent)
	3)c							
	Total (UAS)	**468**						
R-4403C	Not applicable				AC-130	40/80	10-60 minutes	7/93
					CV-22	20/180	20-25 minutes	10/90
					MH-60	20/108	80 minutes	50/50
					MH-47	20/108	80 minutes	50/50
					MH-6	0/24	80 minutes	50/50
					UAS (Category 1)c	0/300	30 minutes	75/25
					UAS (Category 2)c	0/275	60 minutes	73/27
					UAS (Category 3)c	0/75	120 minutes	80/20
R-4403D	Not applicable				AC-130	40/160	30-60 minutes	40/60
R-4403E	Not applicable				AC-130	20/80	10-60 minutes	70/30
					CV-22	20/180	20-25 minutes	10/90
					NSAv	20/40	25 minutes	0/100
					MH-60	20/0	40 minutes	50/50
					MH-47	20/0	40 minutes	50/50
					UAS (Category 1)c	0/100	30 minutes	75/25
					UAS (Category 2)c	0/75	60 minutes	67/33
					UAS (Category 3)c	0/75	120 minutes	80/20
R-4403F	Not applicable				AC-130	20/80	10-20 minutes	70/30
					CV-22	20/0	5 minutes	0/100
					NSAv	20/40	5-45 minutes	0/100
					UAS (Category 2)c	0/50	60 minutes	60/40
					UAS (Category 3)c	0/50	120 minutes	60/40
					Total C-F Operations	**300/2,080**		