ENVIRONMENTAL IMPACT STATEMENT

SPACEX STARSHIP-SUPER HEAVY LAUNCH VEHICLE AT LAUNCH COMPLEX 39A

at the Kennedy Space Center, Merritt Island, Florida

Final, Volume II, Appendix B.3, Part 1

January 2026

Federal Aviation Administration

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Appendix B *Regulatory Consultations*

This appendix provides regulatory consultation documentation for Endangered Species Act Section 7 consultation with the United States (U.S.) Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), Magnuson-Stevenson Fishery Conservation and Management Act consultation with the NMFS, National Historic Preservation Act (NHPA) Section 106 consultation with the Florida State Historic Preservation Officer (SHPO), U.S. Department of Transportation Act Section 4(f) consultation with officials with jurisdiction over affected properties, Coastal Zone Management Act consultation with the Florida Department of Environmental Protection, and Marine Mammal Protection Act Incidental Harassment Authorization with NMFS.

B.3 National Historic Preservation Act Section 106 Consultation (Florida SHPO)

NASA, as the lead agency for NHPA Section 106 consultation, initiated Section 106 consultation with the Florida SHPO and Tribal Historic Preservation Officers on December 20, 2024. NASA also extended consulting party invitations to the following public entities on the same date:

THPO/Consulting Party	Response
THPO – Seminole Tribe of Florida	Accepted (1/30/2025)
THPO – Miccosukee	Request for Additional Information
THPO – Muscogee (Creek) Nation	Formally declined to participate (6/15/25)
THPO – Seminole Nation of Oklahoma	Accepted (1/31/2025)
THPO – Thlopthlocco Tribal Town	Accepted (1/31/2025)
American Space Museum and Space Walk of Fame	No Response
Apollo One Memorial Foundation, Inc.	No Response
Brevard County Historical Commission	No Response
Brevard Museum of History and Natural Science	No Response
Canaveral National Seashore	Cooperating Agency
Cape Canaveral Lighthouse Foundation	Accepted (12/28/2024)
Cape Canaveral Space Force Museum (formerly Air Force Space and Missile Museum)	Cooperating Agency
Cape Canaveral Space Force Station	
City of Titusville	Accepted (1/13/2025)
City of Titusville Historic Preservation Board	No Response
Department of Anthropology, University of Central Florida	Declined (1/16/2025)
Florida Anthropological Society	No Response
Florida Historical Society	No Response
Florida Public Archaeology Network – East Central Region	No Response
Historical Society of North Brevard	Accepted (1/23/2025)
Indian River Anthropological Society	No Response
U.S. Fish and Wildlife Service	Cooperating Agency
NASA Alumni League-Florida Chapter	No Response
National Park Service, National Historic Landmark Program Southeast Region	No Response
National Space Club	No Response
North Brevard Heritage Foundation	Accepted (1/20/2025)
South Brevard Historical Society	No Response

Notes: NASA = National Aeronautics and Space Administration; THPO = Tribal Historic Preservation Officer; U.S. = United States.

The following provides a summary of the NHPA Section 106 consultation process:

Date	Major Action/Activity	Purpose/Result	36 CFR Part 800 Regulatory Reference
11/19/2024	Florida SHPO Section 106 Coordination Meeting	Consult on the development of the APE, and approach to and level of effort for the identification and evaluation of historic properties.	800.4(a) 800.4(b)
12/20/2024	Section 106 Initiation Letter Distributed to Florida SHPO, Tribes, and Consulting Parties	Letters define the APE, the approach to identification and evaluation, and the public involvement plan for the undertaking. The letters also identify and invite both federally recognized Native American tribes and other consulting parties to participate in the Section 106 process.	800.2(d) 800.3(e) 800.3(f) 800.4(a) 800.4(b)
Various	Reponses received from Tribes and Other Consulting Parties regarding invitation to participate in Section 106	See table above.	800.3(f)
1/23/2025	Florida SHPO Section 106 Coordination Meeting	Discuss information presented in the initiation letters including the adequacy of the APE, the proposed identification and evaluation methodology, and adequacy of the consulting party list. Other topics include the need for an agreement document to address effects. SHPO stated they agreed with the APE and consulting party list presented in the initiation letter, as well as the need for a Programmatic Agreement.	800.3(f) 800.4(a) 800.4(b)
1/31/2025	Meeting with Seminole Nation of Oklahoma	NASA held an in-person, informal meeting with the THPO to discuss the undertaking (no minutes available).	800.2(c)(2)(ii) 800.4(a)(4)
2/13/2025	Florida SHPO Section 106 Coordination Meeting	Provide SHPO a summary of results of the identification and evaluation efforts prior to formal distribution of the CRAS.	800.4(b) 800.4(c)
2/13/2025	Email update regarding public involvement plan and posting of Section 106 initiation letter to NASA CRM website for public review	Identify the use of NASA KSC's CRM website, rather than the FAA's website, as part of the public involvement plan. Allow public to review and comment. No public comments received to date.	800.2(d) 800.3(e)
2/17/2025	Draft CRAS delivered to Florida SHPO	Provide the Draft CRAS to Florida SHPO for review and comment prior to formal distribution.	800.4(b) 800.4(c)
2/28/2025	Florida SHPO comments received on the Draft CRAS	Draft CRAS revised to address Florida SHPO comments prior to formal distribution.	800.4(b) 800.4(c)
3/17/2025	Section 106 Consultation for Identification, Evaluation, and Effects Distributed to Florida SHPO, Tribes, and Consulting Parties (includes CRAS)	Consultation package defines the methods for identification and evaluation of historic properties, presents identification results and eligibility determinations, discusses potential effects, defines the need for a Programmatic	800.4(a) 800.4(b) 800.4(c) 800.4(d) 800.5(a)

Date	Major Action/Activity	Purpose/Result	36 CFR Part 800 Regulatory Reference
		Agreement, and identifies the formally recognized consulting parties.	800.5(d) 800.6(a) 800.14(b)(1)(ii)
3/17/2025	Posting of Section 106 Identification, Evaluation, and Effects Letter to NASA CRM website for public review	Allow public to review and comment. No public comments received to date.	800.2(d) 800.3(e)
3/20/2025	Notification to the ACHP	Notify the ACHP of the potential for adverse effects, submit documentation per 800.11(e), and determine ACHP participation in the development of the Programmatic Agreement.	800.6(a)(1)(i)(C) 800.11(e)
3/31/2025	Response from ACHP received	ACHP declines to participate in the Section 106 consultation.	800.6(a)(1)(iii)
4/8/2025	Meeting with Seminole Tribe of Florida	NASA and FAA meet in person with THPO representatives to discuss the undertaking. List of potentially affected archaeological sites is revised as a result of these discussions.	800.2(c)(2)(ii) 800.4(a)(4)
4/18/2025	Concurrence from Florida SHPO	Florida SHPO concurs on the development of a Programmatic Agreement to address effects and defers concurrence on the identification and evaluation of historic properties.	800.4(b)(2)
Various dates	Tribal and Consulting party comments received regarding Section 106 Consultation for Identification, Evaluation, and Effects	The following tribes and consulting parties provided information regarding the identification of and/or effects to historic properties: Seminole Tribe of Florida, City of Titusville, North Brevard Heritage Foundation, USFWS/MINWR, NPS/CANA.	800.4(a) 800.4(b)
5/13/2025	Consulting Party Consultation Meeting #1	Provide a summary overview of the information presented in the Section 106 Consultation Identification, Evaluation, and Effects package. Provide an overview of potential effects based upon previous studies. Discuss development of a monitoring plan and the Programmatic Agreement. NASA requests feedback on the development of a monitoring plan.	800.6(a)
5/19/2025	Tribal Consultation Meeting #1	Provide a summary overview of the information presented in the Section 106 Consultation Identification, Evaluation, and Effects package. Provide an overview of potential effects based upon previous studies. Discuss development of a monitoring plan and the Programmatic Agreement. NASA requests feedback on the development of a monitoring plan.	800.6(a)
Various dates	SHPO, Tribal, and Consulting Party comment received regarding development of a Monitoring Plan	Florida SHPO provided feedback. The following tribes and consulting parties also provided feedback on the Monitoring Plan: Seminole Tribe of Florida, Cape Canaveral	800.6(a)

Date	Major Action/Activity	Purpose/Result	36 CFR Part 800 Regulatory Reference
		Lighthouse Foundation, Cape Canaveral Space Force Station, City of Titusville, North Brevard Heritage Foundation, NPS/CANA. Feedback includes proposed structures and archaeological sites to be considered in the monitoring program.	
7/9/2025	Draft v1 Programmatic Agreement distributed to Florida SHPO, Tribes, and Consulting Parties	Draft Programmatic Agreement addresses roles and responsibilities; professional qualification standards; additional identification of historic properties; monitoring programs for historic properties within the APE; assessment of effects; resolution of adverse effects; tribal and consulting party consultation protocols; post-review discoveries and emergency situations; project or APE changes; monitoring and reporting; dispute resolution; duration, amendment and termination; and the anti-deficiency act. All parties are given 30 days to review and submit comments.	800.6(b)(1) 800.6(c)
7/22/2025	Florida SHPO Coordination Meeting	Discuss commitment within the Programmatic Agreement to address SHPO's request for the additional identification of historic properties and define the deliverable.	800.6(a)
7/28/2025	Consulting Party Consultation Meeting – Structures Monitoring Program Development (Part 1)	Discuss Programmatic Agreement. Provide an overview of structural monitoring and its goals. Answer Consulting Party questions about noise, vibration, and sonic boom effects of the proposed Starship Superheavy operations on structures. Present proposed list of structures for monitoring based upon Consulting Party recommendations.	800.6(a)
8/4/2025	Consulting Party Consultation Meeting – Structures Monitoring Program Development (Part 2)	Candidate structures presented to the Consulting Parties and identified for the structural monitoring program. Discuss the monitoring approach and reporting.	800.6(a)
NLT 8/8/2025	Comments Received on Draft v1 Programmatic Agreement	Comments received from: Cape Canaveral Space Force Station, City of Titusville, North Brevard Heritage Foundation, NPS/CANA, Seminole Tribe of Florida, SHPO, and SpaceX.	800.6(a)
8/14/2025	Meeting with Seminole Nation of Oklahoma	NASA meets in person with the THPO to provide an update on the undertaking and development of the Programmatic Agreement (no minutes available).	800.6(a)
8/26/2025	SpaceX Environmental Impact Statement Public Hearings	Two in-person public meetings were held. Cultural resources information was presented, and subject matter experts were available to answer questions from the public.	800.6(a)(4)

Date	Major Action/Activity	Purpose/Result	36 CFR Part 800 Regulatory Reference
8/28/2025	SpaceX Environmental Impact Statement Public Hearings	Two in-person public meetings were held. Cultural resources information was presented, and subject matter experts were available to answer questions from the public.	800.6(a)(4)
9/3/2025	SpaceX Environmental Impact Statement Public Hearing	One virtual public meeting was held. Cultural resources information was presented. Members of the public were given the opportunity to provide comments on cultural resources.	800.6(a)(4)
9/8/2025	Draft v2 Programmatic Agreement Distributed to Florida SHPO, Tribes, and Consulting Parties	In response to comments received on Version 1 of the Draft Programmatic Agreement, Consulting parties were presented with a revised draft of the document. Revisions resulted in changes to existing Stipulations and the addition of a new stipulation to address Confidentiality. All parties are given 30 days to review and submit comments.	800.6(b)(1) 800.6(c)
NLT 10/8/2025	Comments Received on Draft v2 Programmatic Agreement	Comments were received from: Cape Canaveral Space Force Station, North Brevard Heritage Foundation, Seminole Tribe of Florida, SHPO, and SpaceX. The following organizations confirmed they had no further comments: CANA, City of Titusville, and the Seminole Nation of Oklahoma.	800.6(a)
10/22/2025	Final Programmatic Agreement Distributed to Florida SHPO, Tribes, and Consulting Parties	Final draft distributed to Signatories (NASA, FAA, and SHPO) and Invited Signatories (SpaceX and the Seminole Tribe of Florida) for signature and to Consulting Parties for their records.	800.6(b)(1) 800.6(c)(1) and (2)
November 2025	Programmatic Agreement Executed	The Programmatic Agreement is signed by all Signatories. An executed version of the Programmatic Agreement was distributed to all Consulting Parties. The Programmatic Agreement was posted to NASA KSC's CRM website for public access.	800.6(b)(1) 800.6(c)(9)
November 2025	Programmatic Agreement Filed with the ACHP	The Programmatic Agreement and associated documentation filed with the ACHP.	800.6(b)(1)(iv)

Notes: # = number; ACHP = Advisory Council on Historic Preservation; APE = Area of Potential Effects; CANA = Canaveral National Seashore; CFR = Code of Federal Regulations; CRAS = Cultural Resource Assessment Survey; CRM = Comment Response Matrix; FAA = Federal Aviation Administration; KSC = Kennedy Space Center; MINWR = Merritt Island National Wildlife Refuge; NASA = National Aeronautics and Space Administration; NPS = National Park Service; SHPO = State Historic Preservation Officer; SpaceX = Space Exploration Technologies Corp.; THPO = Tribal Historic Preservation Officer; U.S. = United States; USFWS = United States Fish and Wildlife Service.

NASA, in coordination with the consulting parties, is developing a Programmatic Agreement to address potential adverse impacts and necessary mitigations. Substantive correspondence associated with development of the Programmatic Agreement is provided in this appendix; all other correspondence will be included in the EIS Administrative Record. The Programmatic Agreement, once finalized, will be

included in the Final EIS appendix once available. The State Historic Preservation Officer NHPA Section 106 initiation letter, an example tribal NHPA Section 106 initiation letter, example consulting party invitation letter, and related correspondence received from identified tribes and consulting parties, are provided in the following pages.

B.3.1 NHPA Section 106 Programmatic Agreement

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PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
THE FEDERAL AVIATION ADMINISTRATION,
THE FLORIDA STATE HISTORIC PRESERVATION OFFICER,
SPACE EXPLORATION TECHNOLOGIES CORP.,
AND THE SEMINOLE TRIBE OF FLORIDA
REGARDING THE ASSESSMENT OF ADVERSE EFFECTS FOR
SPACEX STARSHIP- SUPER HEAVY OPERATIONS
AT LAUNCH COMPLEX 39A
AT THE KENNEDY SPACE CENTER, FLORIDA

WHEREAS, the Federal Aviation Administration (FAA) Office of Commercial Space Transportation may issue or modify a Vehicle Operator License to Space Exploration Technologies Corp. (SpaceX) to conduct launches and landings of Starship-Super Heavy (SSH) vehicles under 14 CFR Part 450 within the National Aeronautics and Space Administration's (NASA) Launch Complex 39A (LC-39A) at Kennedy Space Center (KSC) in Brevard County, Florida (the Project); and

WHEREAS, the Project involves construction of launch support infrastructure within LC-39A; launching of the SSH from LC-39A; landing of the Starship and the Super Heavy Booster at LC-39A; landing of the Starship and the Super Heavy Booster on droneships (mobile floating platform vessels not attached to the seafloor) in the Atlantic Ocean, soft-water or hard-water landing with expending or recovery in the Atlantic Ocean, Pacific Ocean, or Indian Ocean; and static fire activities; and

WHEREAS, NASA owns and operates KSC and leases LC-39A to SpaceX. NASA is responsible for space-related development and operations within its lands and will coordinate appropriate use agreements and operating procedures for Project activities; and

WHEREAS, the Project is a federal undertaking (Undertaking) for both NASA and the FAA subject to review under Section 106 of the National Historic Preservation Act (NHPA), 54 U.S.C. § 306108, and its implementing regulations, 36 Code of Federal Regulations (CFR) Part 800 and NASA KSC is acting as lead federal agency for Section 106; and

WHEREAS, this Programmatic Agreement (PA) has been developed, pursuant to 36 CFR § 800.14(b)(1)(ii), to govern the implementation of a program for the assessment of effects on historic properties and, if required, the resolution of adverse effects on historic properties, resulting from this Project; and

WHEREAS, NASA, in consultation with the Florida State Historic Preservation Officer (SHPO), considered the potential direct, indirect, and cumulative effects of the Undertaking on historic properties when developing the areas of potential effects (APE) as provided in 36 CFR §§ 800.4(a) and 800.16(d); and

WHEREAS, NASA, in coordination with the FAA, and in consultation with the SHPO, developed APEs to consider a construction APE and an operational APE. The construction APE is limited to previously disturbed areas within the existing boundaries of LC-39A. The operational APE considers the visual, auditory, vibratory, and sonic boom overpressure effects of the SSH activities and was established as any area subjected to overpressure levels greater than or equal to 2 pounds per square foot (psf) associated with sonic booms under annual mean weather conditions for the range of launch/landing activities. This area contains a smaller area, focal to LC-39A, associated with sound levels exceeding 130 decibels (dB) (unweighted). The APE is 2,050,232.71 acres (ac) mostly extending off the Cape Canaveral coast over the Atlantic Ocean, leaving 168,770.55 ac of the APE as terrestrial (see Attachment A); and

WHEREAS, NASA, in consultation with the SHPO, federally recognized Indian tribes, and additional consulting parties, identified archaeological and architectural historic resources within the APEs that are listed, eligible for listing, potentially eligible for listing, or unevaluated for listing in the National Register of Historic Places (NRHP). Approximately 614 historic properties and potential historic properties were identified within the APEs. A summary of the approach to the identification and evaluation of historic properties and potential effects to them is included within Attachment B. A complete listing of these historic properties is included within *Cultural Resources Survey for the Starship-Super Heavy Project at LC-39A, Kennedy Space Center, Brevard County, Florida;* and

WHEREAS, the City of Titusville is a Certified Local Government in accordance with 36 CFR § 61.6. For the purposes of this Project, historic properties locally designated as significant by the City of Titusville pursuant to Land Development Code 29-116, are regarded as equivalent to those listed in the NRHP; and

WHEREAS, LC-39A was listed in the NRHP in 2000. A Historic American Engineering Record (HAER FL-8-11-F) at a Level II was completed for LC-39A in 2010 to pre-emptively mitigate for adverse effects resulting from the redevelopment of LC-39A after the Space Shuttle Program ended. The SHPO concurred in a letter dated May 10, 2013, that future consultation is not required for the reuse and modification of LC-39A and that the HAER record adequately mitigated for any resulting potential adverse effects. Therefore, no mitigation of adverse effects to LC-39A is required for this Undertaking; and

WHEREAS, NASA prepared the following report in its evaluation of potential effects of the proposed Project on historic properties: *Cultural Resources Survey for the Starship-Super Heavy Project at LC-39A, Kennedy Space Center, Brevard County, Florida,* which provides supporting information to this PA; and

WHEREAS, the FAA prepared the following report in its evaluation of the potential effects of the proposed Project on historic properties: *Environmental Impact Statement: SpaceX Starship-Super Heavy Launch Vehicle at Launch Complex-39A at the Kennedy Space Center, Merritt Island, Florida*, which provides supporting information to this PA; and

WHEREAS, NASA has determined that adverse effects resulting from the Undertaking are not likely but are possible, and that a final determination of how SSH operational activities will affect historic properties is not possible at this time; and

WHEREAS, the FAA, as a federal agency issuing a license directly supporting this Project, has a role and responsibility to ensure the terms of this PA are met, and is a Signatory to this PA; and

WHEREAS, NASA, the FAA, and SHPO are the Signatories to this PA and have the authority to execute, amend, or terminate the PA unless otherwise noted herein; and

WHEREAS, NASA has invited SpaceX to sign this PA as an Invited Signatory because SpaceX, as the project proponent, has obligations including a financial and operational role to fulfill commitments made in this PA, including avoidance, minimization, and mitigation measures; and

WHEREAS, the FAA requires SpaceX to maintain insurance in the event their operations result in claims of structural damage (14 CFR part 440); and

WHEREAS, NASA identified the Seminole Tribe of Florida, the Miccosukee Tribe of Indians of Florida, the Seminole Nation of Oklahoma, the Muscogee (Creek) Nation of Oklahoma, and the Thlopthlocco Tribal Town as having religious or cultural affiliation with the Project area and recognizes them as consulting parties; and

WHEREAS, the Muscogee (Creek) Nation of Oklahoma indicated that this project is not within their area of historic interest and declined to participate in the consultation in an email dated June 19, 2025; and

WHEREAS, the Seminole Tribe of Florida requested to be and is an Invited Signatory to this PA; and

WHEREAS, SpaceX and the Seminole Tribe of Florida as Invited Signatories to this PA have authority to amend or terminate this PA; and

WHEREAS, NASA, in coordination with the FAA and SHPO, identified 22 potential additional consulting parties pursuant to 36 CFR § 800.2(c)(3) and (5), and invited them to participate in Section 106 consultation for this Project in a letter dated December 20, 2024. A list of invited consulting parties is included within Attachment C of this PA; and

WHEREAS, seven (7) invitees, including the National Park Service Canaveral National Seashore (CNS), Department of the Air Force/U.S. Space Force Cape Canaveral Space Force Station (CCSFS), U.S. Fish and Wildlife Service Merritt Island National Wildlife Refuge (MINWR), Cape Canaveral Lighthouse Foundation, City of Titusville, Historical Society of North Brevard, and North Brevard Heritage Foundation, accepted the invitation to participate as a consulting party; and

WHEREAS, in accordance with 36 CFR § 800.6(a)(1), NASA notified the Advisory Council on Historic Preservation (ACHP) of its effect determination and intent to develop a Programmatic Agreement, providing the specified documentation on March 20, 2025. ACHP declined to participate by letter dated March 31, 2025; and

WHEREAS, per 36 CFR § 800.2(d), NASA, in coordination with the FAA, has involved the public and other interested parties early in the Federal decision-making process through NASA's existing Section 106 procedures and through FAA's NEPA process. This included public notices,

public meetings, and opportunities to comment on the 2025 Draft Environmental Impact Statement (EIS). It also included dissemination of information on the Project and its potential effects on historic properties that included opportunities to comment on the identification and evaluation of historic properties as well as resolution of adverse effects to historic properties; and

WHEREAS, the public has been provided opportunities to comment on the Project and participate in the Section 106 process in the following ways: FAA's publication of the Notice of Intent in the *Federal Register* on May 10, 2024 (89 *FR* 40526); public scoping meetings on June 12, 13, and 17, 2025 and public hearings on August 26 and 28, 2025 and September 3, 2025 as part of the NEPA process; a 52 day review and comment period for the *Environmental Impact Statement: SpaceX Starship-Super Heavy Launch Vehicle at Launch Complex-39A at the Kennedy Space Center, Merritt Island, Florida*; and posting Section 106 consultation materials for the Project on NASA KSC's Section 106 public-facing website (https://public.ksc.nasa.gov/environmental/section106). NASA and the FAA have considered the public's comments in development of this PA; and

NOW, THEREFORE, NASA, the FAA, SHPO, SpaceX, and the Seminole Tribe of Florida agree that the Undertaking will be implemented in accordance with the following Stipulations in order to take into account for and resolve the effects of the Undertaking on historic properties.

STIPULATIONS

NASA and the FAA will ensure the following measures are carried out:

I. PARTIES WITH ROLES AND RESPONSIBILITIES FOR PA IMPLEMENTATION

A. NASA: As the lead federal agency for Section 106, NASA will:
   1. Coordinate with the FAA in implementing the terms of this PA;
   2. Be responsible for ensuring the terms of the PA are carried out;
   3. Distribute correspondence, reports, and documentation to the Signatories, Invited Signatories, and additional consulting parties;
   4. Schedule and lead meetings with the Signatories, Invited Signatories, and additional consulting parties;
   5. Review and approve any reports and documentation prepared in fulfillment of the stipulations in this PA;
   6. Be responsible for making determinations of eligibility and findings of effect for the Undertaking; and
   7. Direct the implementation of any stipulated avoidance, minimization, or mitigation measures.

B. FAA: As the federal agency that may issue a license or license modification for the Undertaking, the FAA:
   1. Will coordinate with and assist NASA in implementing the terms of this PA. This may include reviewing and approving any reports and documentation prepared in fulfillment of the stipulations in this PA; making determinations of eligibility and findings of effect for the Undertaking; and directing the

implementation of any stipulated avoidance, minimization, or mitigation measures;
2. May distribute correspondence, reports, and documentation to or schedule meetings with the Signatories, Invited Signatories, and additional consulting parties on behalf of NASA;
3. Will be responsible for ensuring the terms of the PA are carried out; and
4. Is the lead for Government-to-Government consultation with federally recognized Indian tribes.

C. SpaceX: As the project proponent, SpaceX:
1. Funds any surveys and monitoring that may be required by this PA, including any subsequent reports and documentation;
2. Will ensure all cultural resources work is conducted by qualified individuals pursuant to Stipulation II, under the direction of NASA and the FAA;
3. Will submit required documentation directly to NASA and the FAA and address any noted concerns prior to NASA or the FAA's distribution of the materials to Signatories, Invited Signatories, and additional consulting parties; and
4. Funds any avoidance, minimization, or mitigation measures identified in the stipulations of this PA, under the direction of NASA and the FAA.

II. PROFESSIONAL QUALIFICATIONS

A. All cultural resources work required by this PA, including recommendations for determinations of eligibility, findings of effect, and avoidance, minimization, and mitigation measures, will be conducted by or under the direct supervision of professionals meeting the Federal qualification standards as established by the NHPA (54 U.S.C. § 30631) and set forth by the Secretary of the Interior through regulations published in 36 CFR § 61, Appendix A.

B. All other work conducted under this PA, including but not limited to vibration monitoring, will be conducted by a qualified professional appropriate to the type of work specified, working in coordination with the cultural resource professionals.

C. Standards, guidelines, and statutes: All cultural resource work conducted under this PA will be consistent with NHPA (54 U.S.C. § 306108); Chapter 267, *Florida Statutes*; as well as conducted in accordance with the following standards, guidelines, and statutes as applicable:

1. The Secretary of the Interior: *Standards and Guidelines for Archeology and Historic Preservation* (1983) (48 *FR* 44716), including the Standards for the Treatment of Historic Properties (1995) (36 CFR § 68);

2. Advisory Council on Historic Preservation: *Section 106 Archaeology Guidance* (2009), and the *ACHP Policy Statement on Burial Sites, Human Remains, and Funerary Objects* (2023);

3. Florida Division of Historical Resources: *Module Three Guidelines for Use by Historic Preservation Professionals*; and

4. Section 872.05, *Florida Statutes*, Unmarked Human Burials.

III. ADDITIONAL IDENTIFICATION OF HISTORIC PROPERTIES

A. Documentation of Resource Groups in Historic Neighborhoods: Within 60 calendar days of execution of this PA, SpaceX will complete Florida Master Site File (FMSF) forms for resource groups within historic neighborhoods identified in *Cultural Resources Survey for the Starship-Super Heavy Project at LC-39A, Kennedy Space Center, Brevard County, Florida.* The forms will contain sufficient detail to describe the character and general historic context of the resource groups. Documentation and evaluation of individual buildings and structures will not be included. SpaceX will submit the forms to NASA and the FAA for review. Once approved by NASA and the FAA, NASA will submit the FMSF forms to the SHPO.

IV. MONITORING PROGRAMS FOR HISTORIC PROPERTIES WITHIN THE APE

A. Archaeological Site Monitoring Program

1. An Archaeological Site Monitoring Program will be developed and finalized prior to the first scheduled SSH rocket engine ignition at LC-39A in order to monitor for potential effects of vibration and sonic boom overpressure on archaeological site integrity during static fire, launch, and landing activities.

2. A draft of the Archaeological Site Monitoring Program will be provided to the consulting parties no later than 90 days prior to the first scheduled SSH rocket engine ignition. The Archaeological Site Monitoring Program will be finalized, and implementation of the plan by SpaceX will begin within 30 days prior to the first scheduled SSH rocket engine ignition in order to collect baseline data.

3. NASA, in coordination with the FAA, will continue to consult with the SHPO, the Seminole Tribe of Florida, and other consulting tribes to develop the Archaeological Site Monitoring Program. Other federal agencies with management responsibilities over proposed monitoring sites will be included to help inform site selection and ensure site access.

4. All consulting parties will be given the opportunity to review the draft Archaeological Site Monitoring Program pursuant to Stipulation VI. NASA and the FAA may withhold or redact documents for review pursuant to Stipulations VIII.C and XIV.

5. Document review periods will be 30 calendar days to the extent feasible but may be shortened by NASA, in coordination with the FAA, in order to meet the implementation schedule specified in Stipulation IV.A.2.

6. The Archaeological Site Monitoring Program will at a minimum define:

    a) A representative sample of sites in varying psf ranges to be monitored;

    b) The monitoring program duration or minimum number of events to be monitored;

    c) The types of events to be monitored;

    d) A monitoring methodology;

    e) The data to be collected during the monitoring program;

    f) Reporting requirements and timelines;

    g) Adverse effect criteria;

    h) A monitoring program assessment; and

    i) The responsible entity for overseeing and completing the monitoring program.

B. Historic Structures Monitoring Program

1. Historic structures will be monitored for potential effects of vibration and sonic boom overpressure on their character-defining features during launch and landing activities. Due to unpredictable variables that affect operational schedules or landings (e.g. weather or mechanical issues), the monitoring program will be based on a minimum number of events rather than a timeframe. The monitoring program will capture no fewer than five (5) of each SSH launch and Super Heavy landing events and one (1) Starship landing at LC-39A. Super Heavy landing and Starship landing events may not occur concurrently with the first five (5) SSH launches and may take place later in time. Any static fires deemed operationally necessary by SpaceX during the first five (5) SSH launch events will be monitored if they occur.

2. The monitoring program will consist of the following components:

    a) Baseline Assessment: SpaceX will complete a baseline structural assessment prior to the first scheduled SSH rocket engine ignition in order to establish structure-specific monitoring protocols for each structure monitored under this program.

    b) Establishment of Monitoring Protocols: Once SpaceX establishes the specific monitoring protocols for each structure, a baseline assessment report and resulting monitoring protocols will be

distributed to the Signatories, Invited Signatories, and additional consulting parties for review and comment pursuant to Stipulation VI.

c) Monitoring: Once the monitoring protocols are finalized, SpaceX will install the monitoring equipment prior to the first SSH operationally necessary static fire or SSH launch activity and continuously monitor the structures through the completion of the first five (5) SSH launches. If five (5) Super Heavy landing and one (1) Starship landing events have not occurred at LC-39A at the end of the five (5) SSH launch events, the continuous monitoring approach will be reassessed pursuant to Stipulation IV.B.4 and the monitoring program will continue until the minimum number of events has occurred (unless Stipulation IV.B.4.e is applicable). The finalized monitoring protocols will remain unchanged unless they are modified pursuant to Stipulation IV.B.4.b.

d) Reporting: Within 30 calendar days of each monitored event, SpaceX will provide a monitoring report and note any changes to the structures resulting from the SSH launch and any associated static fire, Super Heavy landing, or Starship landing operations. This data will be cumulative and will track the performance of the structure over time. The monitoring reports will be distributed to the Signatories, Invited Signatories, and additional consulting parties for review and comment pursuant to Stipulation VI. SpaceX SSH launch, static fire or landing operations may continue during this review and comment period.

e) Monitoring Program Assessment: At the end of this monitoring program, NASA and the FAA will assess the results of the monitoring program in consultation with the Signatories, Invited Signatories, and additional consulting parties pursuant to Stipulation IV.B.4.

3. The following structures, which include a representative sample of sites across the psf ranges, will be monitored by SpaceX. If a selected site is not able to be monitored for any reason, a different site can be substituted in its place with written agreement from the SHPO:

a) 8BR177/St. Gabriel's Episcopal Church (2 psf/Titusville)

b) 8BR524/Pritchard House (2 psf/Titusville)

c) 8BR514/Walker Apartments, 302 S. Washington Ave (2 psf/Titusville)

d) 8BR278/Cocoa Jr. High (2 psf/Cocoa)

e) 8BR282/Aladdin Theater Building (2 psf/Cocoa)

f) 8BR212/Cape Canaveral Lighthouse (4 psf/CCSFS)

g) 8BR1873/John Sams House (4 psf/Merritt Island)

h) 8BR581/St. Luke's Episcopal Church (4 psf/Merritt Island)

i) 8BR2990/Beach House (10 psf/KSC)

4. Monitoring Program Assessment: After the completion of the first five (5) SSH launch events, NASA, in coordination with the FAA, will convene a meeting with the Signatories, Invited Signatories, and additional consulting parties to determine whether a change in the monitoring approach for any outstanding Super Heavy landing and Starship landing events is warranted or an extension of the monitoring program is warranted based upon the resulting data and an indication of the potential for adverse effects to occur. Outcomes may include, but are not limited to, any of the following:

    a) Continuation of the monitoring program for an agreed upon number of events; and/or

    b) Changes in the monitoring approach (e.g. continuous to event-specific) or monitoring protocol; and/or

    c) Changes to the number of sites being monitored (e.g. increase or reduction); and/or

    d) Changes to the sites being monitored; and/or

    e) Termination of the monitoring program due to a lack of noted changes in resources or adverse effects.

C. NASA and the FAA will utilize monitoring reports from both the Archaeological Site Monitoring Program and the Historic Structures Monitoring Program to note any potential adverse effects resulting from SSH operations. Any noted effects will be evaluated pursuant to Stipulation V. Resolution of Adverse Effects will proceed pursuant to Stipulation VII.

D. If at any time it is determined by NASA and the FAA that a monitoring program is unable to be executed as planned due to insufficient data, natural disaster, or equipment failures, the PA will be amended per Stipulation XIII. Changes to the properties being monitored can be changed through written agreement from SHPO, and the Seminole Tribe of Florida specific to the Archaeological Site Monitoring Program, without triggering the amendment process.

V. ASSESSMENT OF EFFECTS

A. Criteria for Adverse Effects

1. As defined as 36 CFR § 800.16(i), an effect is an alteration to the characteristics of the historic property qualifying it for inclusion in or eligibility for the NRHP. This definition of effect will also be applied to historic properties locally designated as significant by the City of Titusville.

2. NASA, in coordination with the FAA, will utilize the Criteria of Adverse Effect described at 36 CFR § 800.5(a)(1) to make an adverse effect finding.

B. Finding of Effects Process

1. For properties subject to the Archaeological Site Monitoring Program or the Historic Structures Monitoring Program: NASA and the FAA will utilize the reports resulting from the monitoring programs to make an effects finding. An effects finding will be made within 60 calendar days of distribution of the final monitoring report or when a potential effect is first noted, whichever comes first. NASA, in coordination with the FAA, will distribute a finding of effect pursuant to Stipulation VI.

2. For all other historic properties: Once SSH operations begin, SpaceX will compare properties with a valid insurance claim against the list of historic properties identified in the *Cultural Resources Survey for the Starship-Super Heavy Project at LC-39A, Kennedy Space Center, Brevard County, Florida* and the Florida Master Site File Resource Groups identified in Stipulation III. If a historic property is identified, SpaceX will notify NASA and the FAA of the property and describe the reported damage. If a historic property's character defining features are experiencing changes resulting from the Undertaking, SpaceX, in coordination with NASA and the FAA, will conduct a site visit to perform a property-specific assessment. SpaceX will conduct the property-specific assessment of effects using qualified professionals pursuant to Stipulation II. Within 14 calendar days of conducting the assessment, SpaceX will provide NASA and the FAA a recommendation for a finding of effect and, if necessary, any recommended avoidance or minimization measures. Within 30 calendar days of conducting the property-specific assessment, NASA, in coordination with the FAA, will distribute a finding of effect pursuant to Stipulation VI.

3. If a potential adverse effect is noted, the finding of effect may include avoidance and minimization measures, that when implemented by SpaceX, could result in a finding of No Adverse Effect.

4. If NASA, in coordination with the FAA, determines that an effect will be adverse, NASA and the FAA will resolve adverse effects pursuant to Stipulation VII.

VI. DEVELOPMENT, REVIEW, AND APPROVAL OF DOCUMENTS

A. NASA and the FAA will review all deliverables developed by SpaceX prior to distribution to the Signatories, Invited Signatories and additional consulting parties. SpaceX will address NASA and FAA's comments prior to distribution.

B. NASA, in coordination with the FAA, will distribute materials electronically for review and comment. Hard copies will be provided upon request.

C. Signatories, Invited Signatories and additional consulting parties will have 30 calendar days, or other timeframe specified in this PA, from the date of transmission to review and comment. NASA, in coordination with the FAA, will request SHPO concurrence with its determinations and findings.

D. If SHPO concurs with NASA's determinations and findings or does not respond within the specified timeframe, and no comments are received from Invited Signatories or additional consulting parties within the specified timeframe, no further action is required. NASA and the FAA will ensure that any noted avoidance and minimization measures are implemented by SpaceX.

E. If comments are received, NASA and the FAA, in coordination with SpaceX, will take all comments received within the specified timeframe into consideration. If necessary, NASA, in coordination with the FAA, will coordinate a meeting with the commenting party to resolve comments.

F. If SHPO does not concur or an objection is received within the specified timeframe, NASA, in coordination with the FAA, will coordinate a meeting with the SHPO or the objecting party to resolve the objection. If NASA and the FAA cannot resolve the objection, NASA, in coordination with the FAA, will follow the procedures in Stipulation XII.

G. If a deliverable is revised as a result of comments and/or an objection, NASA, in coordination with the FAA, will distribute the revised deliverable to the Signatories, Invited Signatories and additional consulting parties once finalized.

VII. RESOLUTION OF ADVERSE EFFECTS

A. Any adverse effects would be resolved through the consultation process outlined in 36 CFR § 800.6.

1. NASA, in coordination with the FAA, will consult with the Signatories, Invited Signatories, and additional consulting parties to seek ways to avoid or minimize adverse effects.

2. If adverse effects are not resolved through the implementation of avoidance and minimization measures agreed to by the Signatories and Invited Signatories, NASA and the FAA will execute a Memorandum of Agreement (MOA) with the Signatories, Invited Signatories, and additional consulting parties to document mitigation measures. Per 36 CFR § 800.6(a)(2), NASA, in consultation with the FAA, may invite additional consulting parties to participate in the development of the MOA.

3. NASA, in coordination with the FAA, will submit a copy of any executed MOA to the ACHP.

VIII. TRIBAL CONSULTATION PROTOCOLS

A. NASA and the FAA will afford the Seminole Tribe of Florida, the Miccosukee Tribe of Indians of Florida, the Seminole Nation of Oklahoma, and the Thlopthlocco Tribal Town a reasonable and meaningful opportunity to be involved in the implementation of commitments; in the development of deliverables as called for in this Agreement; and to review and comment on any draft plan, report, or deliverable associated with the Undertaking, including but not limited to, documentation related to the identification and evaluation of historic properties of religious and cultural significance to the Tribes, assessment of effects, evaluation of alternatives to avoid or minimize adverse effects, development of appropriate mitigation actions, and disposition and treatment of human remains and objects under the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) and Section 872.05, Florida Statutes, "Unmarked Human Burials".

B. The FAA will respond to any request made by a federally recognized Tribe for government-to-government consultation.

C. NASA and the FAA will respond to any request made by a federally recognized Tribe for confidentiality regarding their concerns about the effects of the Undertaking on properties of religious and cultural significance to the Tribe.

IX. POST-REVIEW DISCOVERIES OR EMERGENCIES

A. SpaceX or any party to this PA will notify NASA and the FAA within 24 hours of any: 1) unanticipated effect to a previously identified historic property within the *Cultural Resources Survey for the Starship-Super Heavy Project at LC-39A, Kennedy Space Center, Brevard County, Florida* and the Florida Master Site File Resource Groups identified in Stipulation III; or 2) the discovery of human remains or a new archaeological site resulting from SSH operational activities.

B. If potential unanticipated effects to historic properties or newly discovered archaeological sites are identified, the following measures will be taken:

1. Emergency Stabilization: In the event of an emergency, SpaceX will implement emergency stabilization measures to protect the historic property or

newly discovered archaeological site from further damage or to address an imminent danger to health or human safety. To the greatest extent feasible, emergency stabilization measures will be short-term and reversible without resulting in harm to historic materials or features.

2. Consulting Party Notification: NASA or the FAA will notify the Signatories, Invited Signatories and additional consulting parties within 48 hours of initial notification in Stipulation IX.A. If known, the notification will include details regarding the property's National Register eligibility, a description of effects to the historic property, and its character defining features.

3. Evaluation of Historic Properties:

    a) For previously unrecorded properties, NASA and the FAA may assume a property is eligible for the NRHP pursuant to 36 CFR § 800.13(c).

    b) If a property is not assumed eligible for the NRHP, SpaceX will utilize qualified professionals pursuant to Stipulation II to make a NRHP eligibility recommendation to NASA and the FAA within 72 hours of the initial notification. Within one (1) business day of receipt, NASA, in coordination with the FAA, will submit an NRHP eligibility determination to the Signatories, Invited Signatories, and additional consulting parties for review and comment pursuant to Stipulation VI. All parties will have 48 hours to respond.

    c) If NASA, in coordination with the FAA, determines that the property does not meet NRHP criteria, and SHPO concurs, then no further action is necessary.

    d) If SHPO does not concur with NASA's determination of eligibility, then NASA and the FAA will assume the property is eligible for the NRHP.

4. Finding of Effect: If a property is listed in, eligible for, or assumed eligible for listing in the NRHP, SpaceX will utilize a qualified professional pursuant to Stipulation II to make a finding of effect recommendation to NASA and the FAA. If the recommendation is a finding of Adverse Effects, SpaceX will also prepare and include a recommended treatment plan for the protection or rehabilitation of the historic property. The finding of effect and any treatment plan will be submitted to NASA and the FAA within 14 calendar days of initial notification.

5. NASA, in coordination with the FAA, will provide the documentation to the Signatories, Invited Signatories and additional consulting parties within seven (7) calendar days of receipt and pursuant to Stipulation VI. All parties will have 14 calendar days to review and comment.

a) For a No Adverse Effect finding, NASA will seek SHPO concurrence.
   i. If SHPO concurs, then no further action is necessary.
   ii. If SHPO does not concur, NASA in coordination with the FAA, will direct SpaceX to prepare a recommended treatment plan for the protection or rehabilitation of the historic property within 14 calendar days. NASA, in coordination with the FAA, will provide the documentation to the Signatories, Invited Signatories and additional consulting parties within seven (7) calendar days of receipt and pursuant to Stipulation VI. All parties will have 14 calendar days to review and comment.

b) If there is an Adverse Effect, NASA, in coordination with the FAA, will take comments received into account and finalize a treatment plan prior to SpaceX's implementation of it.

6. NASA, in coordination with the FAA, will provide a report of actions to the Signatories, Invited Signatories, and additional consulting parties, when they are complete.

C. If human remains are discovered:

1. On non-federal land, the requirements of Section 872.05, *Florida Statutes,* will be followed.
2. Within NASA KSC's secure area:
   a) NASA's Protective Services, as well as KSC's Cultural Resources Manager, will be immediately notified.
   b) NASA, in coordination with the FAA, will immediately notify the SHPO and the Seminole Tribe of Florida.
   c) If it is determined that the human remains are of Native American origin, NASA, in coordination with the FAA, will initiate consultation with the Seminole Tribe of Florida per the Native American Graves Protection and Repatriation Act, 43 CFR Part 10, which will include a draft plan of action. NASA, the FAA, and SpaceX will assist the Seminole Tribe of Florida to implement the plan of action, as necessary.
   d) If it is determined that the human remains are not of Native American origin, they will be considered archaeological in nature. Consultation will be initiated pursuant to Stipulations IX.B.2 through 6.
   e) If it is determined that the human remains are recent, then the issue becomes a matter for law enforcement officials and there are no further cultural resource responsibilities.
3. On other federal lands, NASA, in coordination with the FAA and the relevant federal agency, will follow human remains discovery protocols within that federal agency's most recent Integrated Cultural Resources Management Plan (ICRMP), Native American Graves Protection and Repatriation Act Plan of Action, and/or management plan. SpaceX will assist as necessary.

X. PROJECT OR APE CHANGES

A. Changes to the Undertaking: In the event the Undertaking changes, NASA, in coordination with the FAA, will notify the parties to this PA, provide them with the opportunity to review the proposed change, and determine whether it will require amendments to this PA. If amendments are needed, NASA, in coordination with the FAA, will consult in accordance with Stipulation XIII to make such revisions.

B. Changes to the APE: Every six (6) months from the execution of this PA, SpaceX will report to NASA and the FAA if any valid insurance claims related to structural damages are reported outside the APE (see Attachment A). NASA and the FAA will review the report to determine if changes to the APE are warranted.

1. If NASA and the FAA determine that changes to the APE are warranted, they will consult with the SHPO to determine what additional work is necessary to identify and/or evaluate historic properties in the new APE. The procedures for identification and evaluation will follow those described in 36 CFR § 800.4. SpaceX will be responsible for completing any necessary survey and data collection, as well as resulting reports, to inform NASA and FAA's identification and/or evaluation responsibilities. Resulting materials will be distributed pursuant to Stipulation VI.

2. If historic properties in a new APE are identified, assessment of effects and the resolution of adverse effects will follow the procedures in Stipulations V and VII.

XI. MONITORING AND REPORTING

A. Annual Report: Each year following the execution of this PA, SpaceX will coordinate with NASA and the FAA to develop an annual report detailing work undertaken pursuant to its terms during the previous year. NASA, in coordination with the FAA, will distribute the report to all Signatories, Invited Signatories, and additional consulting parties at least 15 calendar days prior to the Annual Meeting (described below).

The annual report will include:

1. A description of activities completed to comply with Stipulations III, IV, V, VII and IX of this PA, including a summary of any changes in monitoring programs; and

2. If relevant, information on any valid insurance claims related to structural damage outside of the APE; and

3. If relevant, progress on the implementation of mitigation activities conducted pursuant to a Memorandum of Agreement developed under Stipulation VII; and

4. Any disputes and objections received; and

5. Any anticipated or proposed amendments to the PA and/or any known changes to the Undertaking or the APE; and

6. A description of the future PA compliance activities.

B. Annual Meeting: For the life of this PA beginning approximately one (1) year after its execution, NASA, in coordination with the FAA, will coordinate a meeting with the Signatories, Invited Signatories, and additional consulting parties to be held each year in November, or another mutually agreed upon date, to discuss activities carried out pursuant to this PA during the preceding year and compliance activities scheduled for the upcoming year. The meeting will be conducted virtually or held in a location agreed upon by consensus of the Signatories and Invited Signatories, and parties may participate by video conference if they so desire. NASA, in coordination with the FAA, will distribute meeting minutes to all Signatories, Invited Signatories, and additional consulting parties within 14 calendar days of the meeting.

XII. DISPUTE RESOLUTION

A. If any Signatory, Invited Signatory, or additional consulting party objects to any plans or actions pursuant to this PA or the manner in which the terms of this PA are implemented, the objecting party will provide written notice to NASA and the FAA. NASA, in coordination with the FAA, will take the objection into account and consult, as needed, within 14 calendar days with the Signatories and Invited Signatories to resolve the objection. Copies of written objections will be submitted to all Signatories, Invited Signatories, and additional consulting parties.

B. If NASA and the FAA determine that the objection cannot be resolved, NASA, in coordination with the FAA, will forward all documentation relevant to the dispute to the ACHP and request that the ACHP provide its opinion on the resolution of the objection within 30 days of receiving adequate documentation.

C. NASA, in coordination with the FAA, will prepare a written response that considers comments from the ACHP. If the ACHP does not provide comment regarding the dispute within the 30 day period, NASA, in coordination with the FAA may make a final decision on the dispute. NASA, in coordination with the FAA, will provide the Signatories, Invited Signatories, and additional consulting parties with a copy of its final decision and then proceed accordingly.

D. Any ACHP comment provided in response to such a request will be considered by NASA and the FAA with reference only to the subject of the dispute. All responsibilities to carry out actions under this PA that are not subject to the dispute will remain unchanged.

XIII. DURATION, AMENDMENT, AND TERMINATION

A. This PA will become effective upon execution by NASA, the FAA, and SHPO and will remain in effect for a term of five (5) years from the date of execution of this PA. If either monitoring program has not reached conclusion within this timeframe, the PA will automatically be extended until the terms of the monitoring programs are complete.

B. Four (4) years after the execution of the PA, the Signatories and Invited Signatories will consult to determine whether the PA should be extended for a period to be determined. If the term of the PA is not extended through an amendment, then the PA will automatically expire at the end of the applicable duration period set forth in Stipulation XIII.A.

C. Any Signatory or Invited Signatory to this PA may request an amendment, in which case the parties will consult to consider the proposed amendment(s). The amendment will be effective on the date a copy is signed by all of the Signatories.

D. If any Signatory or Invited Signatory to this PA determines that its terms will not or cannot be carried out, that party will immediately consult with the other parties to attempt to develop an amendment per Stipulation XIII.C. If an amendment cannot be reached within 30 calendar days (or another time period agreed to by all Signatories), any Signatory or Invited Signatory may terminate the PA upon written notification to the other Signatories and Invited Signatories.

E. If the PA is terminated, prior to work continuing on the Undertaking, NASA, in coordination with the FAA, must either execute a new PA pursuant to 36 CFR § 800.6, or request, consider, and respond to the comments of the ACHP under 36 CFR § 800.7. NASA, in coordination with the FAA, will notify the Signatories, Invited Signatories, and additional consulting parties as to the course of action it will pursue.

F. Once the terms of the PA are complete, NASA, in coordination with the FAA, will send a formal letter to the Signatories, Invited Signatories, additional consulting parties, and the ACHP notifying them that the terms of the PA are complete, and any requirements set forth under the PA are concluded. NASA will default to its standard Section 106 procedures, as specified in NASA KSC's ICRMP. Any on-going activities triggering Section 106 consultation will include all consulting parties identified in this PA.

XIV. CONFIDENTIALITY

A. If disclosure of location information could result in the disturbance of a cultural resource, NASA and the FAA will ensure shared data, including data concerning the precise location and nature of historic properties, archeological sites, and properties of religious and cultural significance to Native American tribes, are protected from public disclosure to the greatest extent permitted by federal law including Section 304 of the NHPA; 36 CFR § 800.11(c)(1); 54 U.S.C. § 307103; Section 9 of the

Archaeological Resources Protection Act; 16 U.S.C. § 470hh); and the Freedom of Information Act, 5 U.S.C. 552.

B. Some consulting parties, as determined by NASA and the FAA, will not receive information protected from public disclosure or may receive redacted information.

XV. ANTI-DEFICIENCY ACT

NASA and FAA's future efforts to execute requirements arising from the stipulations of the PA are subject to the provisions of the Anti-Deficiency Act. If compliance with the Anti-Deficiency Act alters or impairs NASA or FAA's ability to implement the stipulations of the PA, NASA and the FAA shall consult in accordance with Stipulation XIII. No provision of the PA shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, Title 31 U.S.C. § 1341.

Execution of this Agreement by NASA, the FAA, and SHPO, and implementation of its terms by the Signatories and Invited Signatories, is evidence that NASA and the FAA have considered the effects of the Undertaking on historic properties.

PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
THE FEDERAL AVIATION ADMINISTRATION,
THE FLORIDA STATE HISTORIC PRESERVATION OFFICER,
SPACE EXPLORATION TECHNOLOGIES CORP.,
AND THE SEMINOLE TRIBE OF FLORIDA
REGARDING THE ASSESSMENT OF ADVERSE EFFECTS FOR
SPACEX STARSHIP- SUPER HEAVY OPERATIONS
AT LAUNCH COMPLEX 39A
AT THE KENNEDY SPACE CENTER, FLORIDA

SIGNATORY

FEDERAL AVIATION ADMINISTRATION

By: _____ Digitally signed by KATIE LYNNE CRANOR Date: 2025.10.28 09:26:33 -04'00'

Katie L. Cranor
Executive Director (D)
Office of Operational Safety
Commercial Space Transportation

Date: **October 28, 2025**

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PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
THE FEDERAL AVIATION ADMINISTRATION,
THE FLORIDA STATE HISTORIC PRESERVATION OFFICER,
SPACE EXPLORATION TECHNOLOGIES CORP.,
AND THE SEMINOLE TRIBE OF FLORIDA
REGARDING THE ASSESSMENT OF ADVERSE EFFECTS FOR
SPACEX STARSHIP- SUPER HEAVY OPERATIONS
AT LAUNCH COMPLEX 39A
AT THE KENNEDY SPACE CENTER, FLORIDA

SIGNATORY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

By: JANET PETRO Digitally signed by JANET PETRO Date: 2025.11.12 12:43:53 -05'00'

Janet E. Petro
Director, Kennedy Space Center

Date:

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PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
THE FEDERAL AVIATION ADMINISTRATION,
THE FLORIDA STATE HISTORIC PRESERVATION OFFICER,
SPACE EXPLORATION TECHNOLOGIES CORP.,
AND THE SEMINOLE TRIBE OF FLORIDA
REGARDING THE ASSESSMENT OF ADVERSE EFFECTS FOR
SPACEX STARSHIP- SUPER HEAVY OPERATIONS
AT LAUNCH COMPLEX 39A
AT THE KENNEDY SPACE CENTER, FLORIDA

SIGNATORY

FLORIDA STATE HISTORIC PRESERVATION OFFICER

By: Alissa Lotane

Alissa Lotane
Florida State Historic Preservation Officer

Date: _____

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PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
THE FEDERAL AVIATION ADMINISTRATION,
THE FLORIDA STATE HISTORIC PRESERVATION OFFICER,
SPACE EXPLORATION TECHNOLOGIES CORP.,
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SPACEX STARSHIP- SUPER HEAVY OPERATIONS
AT LAUNCH COMPLEX 39A
AT THE KENNEDY SPACE CENTER, FLORIDA

INVITED SIGNATORY

SPACE EXPLORATION TECHNOLOGIES CORP.

By:_____

Sheila McCorkle
Vice President, Starship Legal and Regulatory

Date: October 29, 2025

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PROGRAMMATIC AGREEMENT
AMONG
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
THE FEDERAL AVIATION ADMINISTRATION,
THE FLORIDA STATE HISTORIC PRESERVATION OFFICER,
SPACE EXPLORATION TECHNOLOGIES CORP.,
AND THE SEMINOLE TRIBE OF FLORIDA
REGARDING THE ASSESSMENT OF ADVERSE EFFECTS FOR
SPACEX STARSHIP- SUPER HEAVY OPERATIONS
AT LAUNCH COMPLEX 39A
AT THE KENNEDY SPACE CENTER, FLORIDA

INVITED SIGNATORY

SEMINOLE TRIBE OF FLORIDA

By: Tina Osceola

Tina M. Osceola
Tribal Historic Preservation Officer

Date: 10/24/2025

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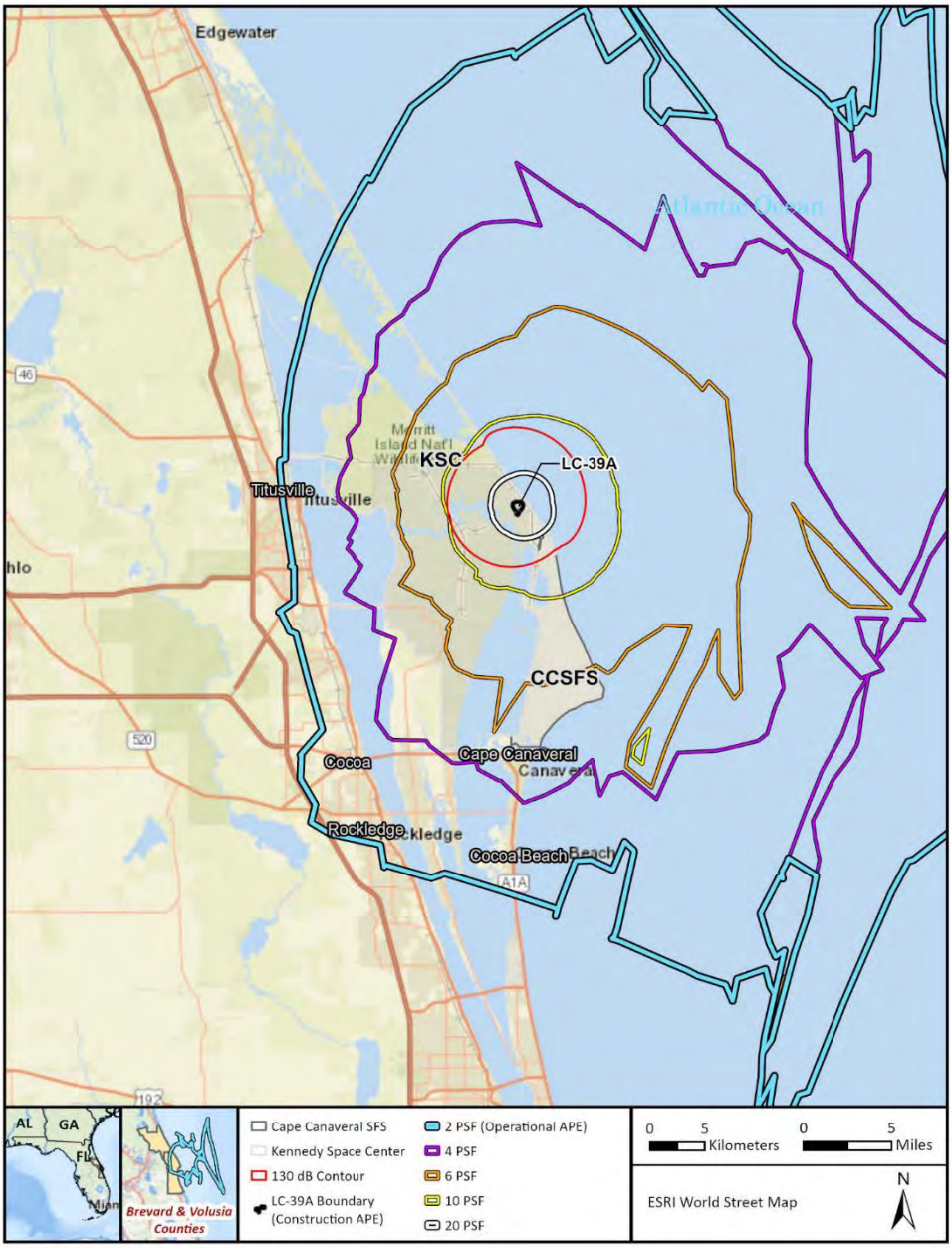
ATTACHMENT A. AREAS OF POTENTIAL EFFECTS



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ATTACHMENT B. SUMMARY: EFFORT TO IDENTIFY HISTORIC PROPERTIES IN THE APEs AND DISCUSSION OF POTENTIAL EFFECTS

Due to the size of the APE and the unique nature of the Undertaking, a specialized approach for the identification of historic properties was developed for this study. On federal property (NASA KSC and CCSFS), historic properties were identified through examination of relevant Integrated Cultural Resource Management Plans and information contained in the Florida Master Site File. No field survey for the identification of historic properties was conducted on federal property.

On non-federal property, NASA KSC compiled an inventory of previously recorded cultural resources within the APE that are listed in the NRHP, eligible for listing in the NRHP, potentially eligible for listing in the NRHP, and unevaluated for listing in the NRHP, using the Florida Master Site File. These data were supplemented with information on unrecorded cultural resources provided by consulting parties and the public. County property appraiser databases were queried to identify unrecorded historic aboveground resources within the APE. Historic maps and aerial photographs were used to examine land use and development changes over time, and a historic context was developed for the APE. The cumulative data was used to develop a geographic information system heat map of the APE to identify areas with high concentrations of unrecorded structures that are 45 years old or older. These data sets were used to identify and create a list of properties and areas that were subjected to survey fieldwork.

Survey fieldwork was then conducted with three primary objectives:

1. Conduct a windshield survey guided by the heat map discussed above, to identify potential historic properties.
2. Document and describe potential historic properties with a reasonable possibility to be adversely affected identified during the windshield survey.
3. Revisit previously recorded NRHP-listed or -eligible individual properties with a reasonable possibility to be adversely affected and assess their integrity.

The architectural history field methods consisted of an intensive architectural survey of previously recorded architectural resources and a windshield survey of unrecorded architectural resources that are likely to be 45 years or older.

The results of the effort to identify historic properties are included in *Cultural Resource Survey for the Starship Super-Heavy Project at LC-39A, Kennedy Space Center, Brevard County, Florida.*

Auditory/Vibration Effects

- Description of effect – Auditory and vibration effects may result from the Undertaking. The increased vibratory impacts from the Undertaking have the potential to cause adverse effects to cultural resources, including archaeological sites, buildings, structures, objects, and historic districts. While there is the potential for such adverse effects due to the vibratory and sonic-boom overpressure events related to SSH activities, notably no studies have been completed in Florida to date that examine these types of impacts to cultural resources. In 2021 an analysis was conducted that specifically addressed

potential impacts on cultural resources from engine noise and sonic booms associated with static tests and launches from the proposed Blue Origin Orbital Launch Site in Santa Barbara County, California (Nocerino et al. 2021). The results of this analysis and few other studies inform this section to posit some of the impacts that could be expected and outline what impacts would be considered an adverse effect to a historic property. It is also important to acknowledge that some adverse effects to cultural resources are more obvious than others; while a broken window can be identified immediately following a launch, for example, an alteration to subsurface archaeological deposits at a site due to vibration or overpressure events cannot be readily ascertained. The report examined what is known and unknown, concerning vibratory and overpressure impacts, and potential adverse effects to cultural resources.

For above-ground resources, including buildings, structures, objects, and historic districts, an understanding of the resource's character-defining features is integral to assessing adverse effects. Such features could include neon signage or a rural setting. For an archaeological resource, adverse effects are typically physical impacts that alter features or archaeological deposits and thus reduce the site's research potential.

Current literature does indicate that high sound pressure levels and vibrations have the potential to cause building/structural damage. In general, however, structural damage to buildings due to propulsion/engine noise is rare. The historic building element "most susceptible to damage from launch vehicle noise [are] windows, and more infrequently, plastered walls and ceilings" (Nocerino et al. 2021:15). Masonry buildings and structures are most susceptible to vibration damage through the "wearing of joints…which can cause load to be redistributed due to a weakening of a structural member" (National Cooperative Highway Research Program [NCHRP] 2012a:35). Further, vibration effects may be greatest to "non-structural building elements [such as] fragile glass, loose plaster mosaics or pieces of stone" (NCHRP 2012a:36). Previous analysis also indicates "wood and steel are more elastic than masonry, such as brick and stone" (NCHRP 2012a:2). Therefore, increased exposure to vibration may diminish the integrity of a resource's significant historic features.

Sonic booms also have the potential to result in structural damage. A large degree of variability exists in the possible effects of a sonic boom. For example, the probability of a window breaking when exposed to a sonic boom of 1 psf ranges from one in a billion to one in a million (Sutherland 1990) with much of the variability depending upon the condition of the glass. At 10 psf, the probability of glass breaking is between 1 in 100 and 1 in 1,000. Laboratory tests involving glass have shown that properly installed glass will not break at overpressures below 10 psf, even when exposed to repeated sonic booms (White 1970). Damage to plaster has the potential to occur in the same range of overpressures as damage to glass. Plaster often cracks due to shrinkage over time or due to structural settling. Sonic-boom damage to plaster may occur when internal stresses are already high as a result of these processes. In general, for well-maintained structures, the threshold for potential damage from sonic booms is 2 psf; below 2 psf, damage is unlikely (Haber et al. 1989).

Concerning archaeological resources, there is no research to support that archaeological deposits at or below ground surface are affected by vibratory effects or overpressure effects of increased sonic-boom exposure. Archaeological sites that consist of only

surface and/or buried archaeological material were excluded from 2021 analysis of potential impacts at the Blue Origin Orbital Launch Site because it was assumed that soil would protect materials in place (Nocerino et al. 2021). Although there is no research to support that assumption, as it relates to archaeological sites, sound dB and sonic boom overpressure would be significantly lower underground due to sound attenuation, and variable in the air depending on factors such as humidity, temperature and wind profiles (Leal et al. 2021), passing through the interface of the air and ground, and in the soil depending on conditions such as moisture and sediment type. Ground motion resulting from a sonic boom is rare (United States Air Force 2024).

Aboveground components of archaeological sites, such as building remains, have the potential to be affected by vibratory or overpressure effects like those described for buildings, structures, objects, and historic districts. These aboveground components of archaeological sites may contribute to their NRHP eligibility. Native American mounds are aboveground features and may have an unstable soil matrix due to lack of sufficient vegetation cover, human or animal disturbances, or are influenced by natural erosion processes and could be vulnerable to vibratory or overpressure effects. In addition, some sites within the APE have the potential to contain interred human remains and the vibratory or overpressure effects have the potential, although low, to compromise the integrity of their deposition.

Concerning submerged archaeological deposits, there is limited understanding of how they could be affected by vibratory effects or overpressure effects. A portion of a sound wave that originates above the water would be reflected into the air at the water and air interface depending on the angle of incidence. Water is acoustically dense, and the remaining portion of the sound wave would continue to travel but a sound wave has a higher dB in the air than in water (National Oceanic Atmospheric Administration [NOAA] 2022). Therefore, vibratory and overpressure effects are likely to be significantly less underwater from a sound that originates in the air.

Physical adverse effects that could occur due to the proposed Undertaking include, but are not limited to:

- Damage to glass elements, including original single-pane units and stained glass windows;
- Damage to neon signage on commercial buildings;
- Weakening to the structural members of a building, including joints;
- Damage to plaster elements, including plaster and lathe walls and decorative plaster medallions;
- Damage to fragile roof elements, including steeples, clay tiles, and slate shingles;
- Damage to poorly mixed or poorly maintained concrete elements, including within structures, headstones, and cemetery vaults;
- Damage to the loose matrix of a shell midden or mound; and
- Disarticulation of fragile and fragmentary human remains, within both cemeteries and archaeological sites.

ATTACHMENT C: CONSULTING PARTIES INVITED TO PARTICIPATE

Federal Agencies

- ***National Park Service Canaveral National Seashore (CNS)**
- National Park Service, National Historic Landmarks Program, Southeast Region
- ***Department of the Air Force/U.S. Space Force Cape Canaveral Space Force Station (CCSFS)**
- ***U.S. Fish and Wildlife Service Merritt Island National Wildlife Refuge (MINWR)**

Local Governments

- ***City of Titusville**
- City of Titusville Historic Preservation Board

Additional Consulting Parties

- American Space Museum and Space Walk Hall of Fame
- Apollo One Memorial Foundation, Inc.
- Brevard County Historical Commission
- Brevard Museum of History and Natural Science
- ***Cape Canaveral Lighthouse Foundation**
- Cape Canaveral Space Force Museum
- Department of Anthropology, University of Central Florida
- Florida Anthropological Society
- Florida Historical Society
- Florida Public Archaeology Network, East Central Region
- ***Historical Society of North Brevard**
- Indian River Anthropological Society
- NASA Alumni League, Florida Chapter
- National Space Club
- ***North Brevard Heritage Foundation**
- South Brevard Historical Society

*Designates officially recognized consulting parties, due to Cooperating Agency status under National Environmental Policy Act compliance and/or affirmative response to invitation.

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B.3.2 NHPA Section 106 Correspondence

National Aeronautics and Space Administration

John F. Kennedy Space Center
Kennedy Space Center, FL 32899

December 20, 2024

Reply to Attn of: SI-E3

Alissa S. Lotane
Director and State Historic Preservation Officer
Florida Division of Historic Preservationist
R.A. Gray Building
500 S. Bronough Street
Tallahassee, FL 32399-0250

Attention: Ms. Kelly Chase, Deputy SHPO; and Mr. Scott Edwards, Historic Preservationist

Subject: SpaceX Starship Super Heavy Launch and Reentry Vehicles at Launch Complex-39A, Kennedy Space Center

Dear Ms. Lotane:

The National Aeronautics and Space Administration's Kennedy Space Center (NASA KSC) is initiating consultation with your office pursuant to Section 106 of the National Historic Preservation Act (NHPA) of 1966 as part of the Federal Aviation Administration's (FAA) environmental review of the proposed action for the SpaceX Starship Super Heavy launch and reentry vehicles at Launch Complex-39A (LC-39A). Under the supervision of the FAA's Office of Commercial Space Transportation, SpaceX is preparing an Environmental Impact Statement (EIS) to evaluate the potential impacts of proposed infrastructure construction, and ground, launch, and reentry operations associated with the Starship Super Heavy launch and reentry vehicles at LC-39A. Because SpaceX plans to apply to the FAA's Office of Commercial Space Transportation for a vehicle operator license for Starship Super Heavy, the EIS will conform to the FAA's National Environmental Policy Act (NEPA) implementing policy, FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures,* regarding the potential infrastructure construction, ground operations, launch, and reentry-related impacts. NASA KSC is acting as the lead federal agency for compliance with Section 106 of the NHPA. As such, Section 106 will be conducted pursuant to the 2009 *Programmatic Agreement Among the National Aeronautics and Space Administration, John F. Kennedy Space Center, Advisory Council on Historic Preservation, and the Florida State Historic Preservation Officer: Regarding Management of Historic Properties at the Kennedy Space Center,* or any subsequent version thereof.

Description of the Undertaking

The undertaking involves issuance of a vehicle operator license by the FAA's Office of Commercial Space Transportation that will facilitate ground, launch, and reentry operations associated with the SpaceX Starship Super Heavy at LC-39A. Specifically, this would include up to 44 launches of Starship Super Heavy per year; return of the first stage booster to LC-39A; return of Starship to LC-39A; and construction of an air separation unit for liquid oxygen and liquid nitrogen, on-site natural gas liquefaction production and cryogenic liquid storage capability, roadway improvements, other associated infrastructure, and a catch tower (see **Enclosure 1**).

Area of Potential Effects (APE)

The area of potential effects (APE) considers any physical, visual, or auditory effects that the project may have on historic properties*. As such, the APE has been developed to consider both a construction APE and an operational APE. The construction APE is limited within the existing boundaries of LC-39A. Additionally, it is anticipated that proposed new construction associated with the operation of the Starship Super Heavy will be compatible with the characteristic of other launch complex infrastructure and will not pose viewshed effects to historic properties. The operational APE considers the auditory effects of the Starship Super Heavy launch activity as well as the overpressure effects of the sonic boom generated during atmospheric reentry. FAA guidance stipulates consideration of a 130 decibel (dB) threshold for launch effects and a 2.0 pounds per square foot (psf) threshold for effects from the sonic boom. Based on this information, and previous research regarding rocket engine noise and vibration effects to structures, the APE was established as any area subjected to greater than or equal to 2.0 psf sonic booms (see **Enclosure 2, Figure 2**). This area also encompasses the 130 dB threshold for launch effects, as well as the construction APE.

**Historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria. 36 CFR 800.16(l)*

Initial Identification of Historic Properties and Proposed Identification Efforts

The proposed identification approach is designed to make a reasonable and good faith effort to identify historic properties within the APE that may be affected by the undertaking. Effects related to construction will be limited within the footprint of LC-39A. This area has already been subject to survey and evaluation and will not require additional studies. The fieldwork and analysis will therefore focus on historic properties subject to the potential effects of elevated noise and vibrations associated with the undertaking.

The undertaking has the potential to affect historic properties from increased vibratory impacts. According to data provided by SpaceX, launch and reentry events are estimated to result in Lmax levels of 130 dB and/or sonic boom impacts of 2 psf or higher within the APE.

Archaeological resources consisting solely of either surface scatters or subsurface deposits are not likely to be affected by the vibratory effects of increased sonic boom exposure due to the protective qualities of the surrounding soil matrix. Similarly, underwater archaeological sites are unlikely to be affected. However, vibratory effects may be greater on historic age resources within the built environment. Architectural elements most susceptible to damage from launch and reentry vehicle noise include windows and, infrequently, plastered walls and ceilings. Vibration effects may be greatest to non-structural elements such as fragile glass and loose plaster/stone ornamentation. The enclosed memorandum provides additional information on this summation of the potential for vibratory effects on cultural resources (see **Enclosure 2**).

Previously Recorded Resources Within the APE

Historic properties within the construction APE include the Launch Complex 39 Pad A Historic District (**8BR1686**) which is listed in the National Register of Historic Places (NRHP). The historic district is the first of two launch pads constructed by NASA in the 1960s to accommodate the Saturn V launch vehicle for Apollo missions and modified in the 1970s to accommodate the Space Shuttle Program. The historic district contains 23 extant contributing resources all used to support launch operations. One contributing resource, Launch Complex 39 Pad A (**8BR1995**), is also individually listed in the NRHP. No archaeological sites have been recorded or documented within LC-39A.

A preliminary assessment of the operational APE, using data contained in the Florida Master Site File (FMSF), identified 2,964 previously recorded resources, including 2,315 structures, 31 bridges, 465 archaeological sites, 31 cemeteries, and 122 resource groups. Of these, 35 properties are listed in the NRHP and 353 have been evaluated as eligible (see **Enclosure 2**).

Approach for the Identification of Historic Properties

In 2010, NASA KSC completed HAER documentation of the LC-39A historic district and its associated contributing resources. As such, LC-39A is well documented and no further identification or evaluation of LC-39A is proposed.

Identification efforts will focus on historic properties that may be subject to physical damage from elevated noise and vibrations as well as cultural resources whose setting and feeling may be affected by audible and acoustic effects during launch and reentry activities. This will include buildings and structures within the APE that were not specifically designed to withstand the concussive forces of launching and landing spacecraft. Additionally, there are specific types of cultural resources for which aspects of setting and feeling are more likely to represent important components of historic integrity. These types of cultural resources potentially include:

- Designed historic landscapes such as parks and gardens
- Rural historic landscapes with continuity in their traditional use (farming, hunting fishing, sports/recreation)

- Historic districts
- Historic sites that feature outdoor spaces such as yards and plazas
- Cemeteries

Since the universe of properties in the APE will include many thousands of buildings and structures, identification efforts will focus on properties greater than 45 years of age, in areas that have not been surveyed within the last 10 years, and limited to historic properties and potential historic properties that may reasonably be affected by the undertaking. Previously recorded resources that were determined ineligible for listing in the NRHP will be excluded from further identification and evaluation efforts.

Historic properties will be identified in two ways. First, NASA KSC, supported by SEARCH, will compile an inventory of previously recorded cultural resources within the APE that are listed, eligible for listing, potentially eligible for listing, and unevaluated for listing in the NRHP. NASA KSC will use the FMSF database as well as the Integrated Cultural Resource Management Plans from both KSC and the Cape Canaveral Space Force Station. Additionally, county property appraiser databases will be queried to identify unrecorded historic aboveground resources within the APE. Parcel data contains built year information, which can be cross-referenced with recorded resources to identify parcels that contain structures 45 years old or older without recorded resources. Historic maps and aerial photographs will be used to examine land use and development changes over time, and a historic context will be developed for the APE. Data will be further supplemented with information on unrecorded cultural resources provided by consulting parties and the public. The cumulative data will be used to develop a Geographic Information System heat map within the APE to identify areas with high concentrations of unrecorded structures that are 45 years old or older. These data sets will be used to identify and create a list of properties that will be subject to survey fieldwork. The preliminary inventory data are provided in Enclosure 2.

Second, fieldwork will be conducted with three primary objectives:

1) Conduct a windshield survey guided by the heat map discussed above, in order to identify potential historic properties.

2) Complete FMSF documentation for potential historic properties identified during the windshield survey that have a reasonable possibility to be adversely affected by the undertaking. The architectural historians will identify and photograph potential historic properties that appear to embody historic significance established in the historic context. They will also identify and document the character-defining features that are indicative of NRHP eligibility and that may be susceptible to adverse effects, as discussed in Section 1.2. All newly recorded resources will be assumed NRHP-eligible, for the purposes of Section 106 consultation.

3) Revisit NRHP-listed or eligible historic properties that are individually eligible for the NRHP and that have with a reasonable possibility to be adversely affected to reassess their integrity.

A technical report presenting the results of the identification of historic properties will be prepared and submitted to your office for review.

Consulting Party Identification

An initial list of Consulting Parties (see **Enclosure 3**) who will be invited to consult for this undertaking has been compiled. NASA KSC is also consulting with the following Federally-recognized Tribes directly - the Seminole Tribe of Florida, the Seminole Nation of Oklahoma, the Miccosukee Tribe of Indians of Florida, and the Muscogee (Creek) Nation of Oklahoma.

Public Involvement Plan

NASA KSC intends to post this and subsequent letters it submits to SHPO on FAA's public facing project website with instruction on how the public may provide comment. Public postings will not contain confidential or sensitive information pursuant to 36 CFR Part 800.11(c) or information that is Export Controlled.

At this time, NASA KSC is requesting your comments related to: 1) the APE; 2) the proposed identification/evaluation approach, and 3) information on any additional consulting parties that should be included in our consultation effort. If you have any questions or require further assistance, please contact me at 321-867-8454.

Sincerely,

Katherine Zeringue Digitally signed by Katherine Zeringue
Date: 2024.12.20 13:11:14 -05'00'

Katherine Zeringue
KSC Cultural Resource Manager
Environmental Planning

Enclosures:

1. LC-39A Infrastructure Figure
2. Supplemental Background Information for the SpaceX Starship Super Heavy Launch and Reentry Vehicles Proposed Action at Launch Complex-39A, Kennedy Space Center
3. Initial list of Consulting Parties

Enclosure 1. LC-39A Infrastructure

TECHNICAL MEMORANDUM

SUPPLEMENTAL BACKGROUND INFORMATION FOR THE SPACEX STARSHIP SUPER HEAVY LAUNCH AND REENTRY VEHICLES PROPOSED ACTION AT LAUNCH COMPLEX-39A, KENNEDY SPACE CENTER

CONSULTANT:	SEARCH
AUTHORS:	Timothy Parsons, PhD; William Werner, MA; Gypsy Brafford, PhD
CLIENT:	Leidos
DATE:	December 2024
SEARCH PROJECT #:	240265

This technical memorandum presents supplementary background information in support of consultation between the National Aeronautics and Space Administration's Kennedy Space Center (NASA KSC) and the Florida State Historic Preservation Officer (SHPO) pursuant to Section 106 of the National Historic Preservation Act of 1966 as part of the Federal Aviation Administration's (FAA) environmental review for the proposed action for the SpaceX Starship Super Heavy Launch and reentry vehicles at KSC. Southeastern Archaeological Research, LLC (SEARCH) completed this cultural resources desktop study on behalf of Leidos, SpaceX, and FAA to provide additional information regarding the proposed area of potential effects (APE), known historic properties within the APE, and the approach for evaluating effects to previously unidentified historic properties within the APE.

1.1 AREA OF POTENTIAL EFFECTS

Area of potential effects means the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking [36 CFR 800.16(d)]. For launch operations, the FAA has typically selected a noise contour for a specific propulsion/engine noise level and/or a specific sonic boom/overpressure, because rocket noise has the greatest geographical extent of all of the potential sources of alterations to historic properties from launches (including landings and reentries).

In defining the APE for rocket launches, it is important to consider engine noise levels that may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register of Historic Places (NRHP) in a manner that would diminish the integrity of the property's setting or feeling. For projects at federal launch complexes, such as KSC, this typically is not an issue because of the historical nature of rocket launches occurring at the project site.

The APE considers the auditory and vibratory effects of the Starship Super Heavy Launch and reentry activities covered under the Federal Aviation Administration's operating license and is predicated on vibratory impacts based on data provided by SpaceX and prepared by Leidos. Vibratory impacts can be quantified using the Maximum Unweighted Sound Level (Bradley et al. 2020:3). Based on a study of structural damage during rocket static firing tests, Maximum Unweighted Sound Levels at 111 decibels (dB) result in one damage claim per 1,000 structures exposed, and levels at 120 dB result in one damage claim per 100 structures (Bradley et al. 2020:5). The National Academy of Sciences' "Guidelines for Preparing Environmental Impact Statements on Noise" (National Academy of Sciences 1977) state that one may conservatively consider all sound lasting more than one second with levels exceeding 130 dB (unweighted) as potentially damaging to structures. Vibratory impacts from sonic boom overpressure are quantified in pounds per square foot (psf). Studies have shown that damage from sonic booms is highly unlikely when structures are exposed to levels under 2 psf (Haber et al. 1989). However, when exposed to levels between 2 and 4 psf, structural components, including glass and plaster, demonstrate damage at a higher rate than expected due to natural wear in well-maintained structures (Haber et al. 1989).

In summary, for rocket launch undertakings at federal launch complexes, the FAA recommends defining the APE using a peak sound pressure level of 130 dB for operations with launches only or 2 psf overpressure for operations with launches and landings. In cases with both launches and landings, the total extent of both areas should be used to define the APE when one does not fully encompass the other. Additionally, effects analyses should be conducted on the resources for both launch noise and landing noise impacts to the respective identified resources.

Based on this information and previous research regarding rocket engine noise and vibration effects to structures, the APE was established as areas subjected to greater than or equal to 130 dB or overpressure levels of 2 psf associated with sonic booms (**Figure 1** and **Figure 2**) (Fenton and Methold 2016, Guest and Slone 1972, Haber et al. 1989).

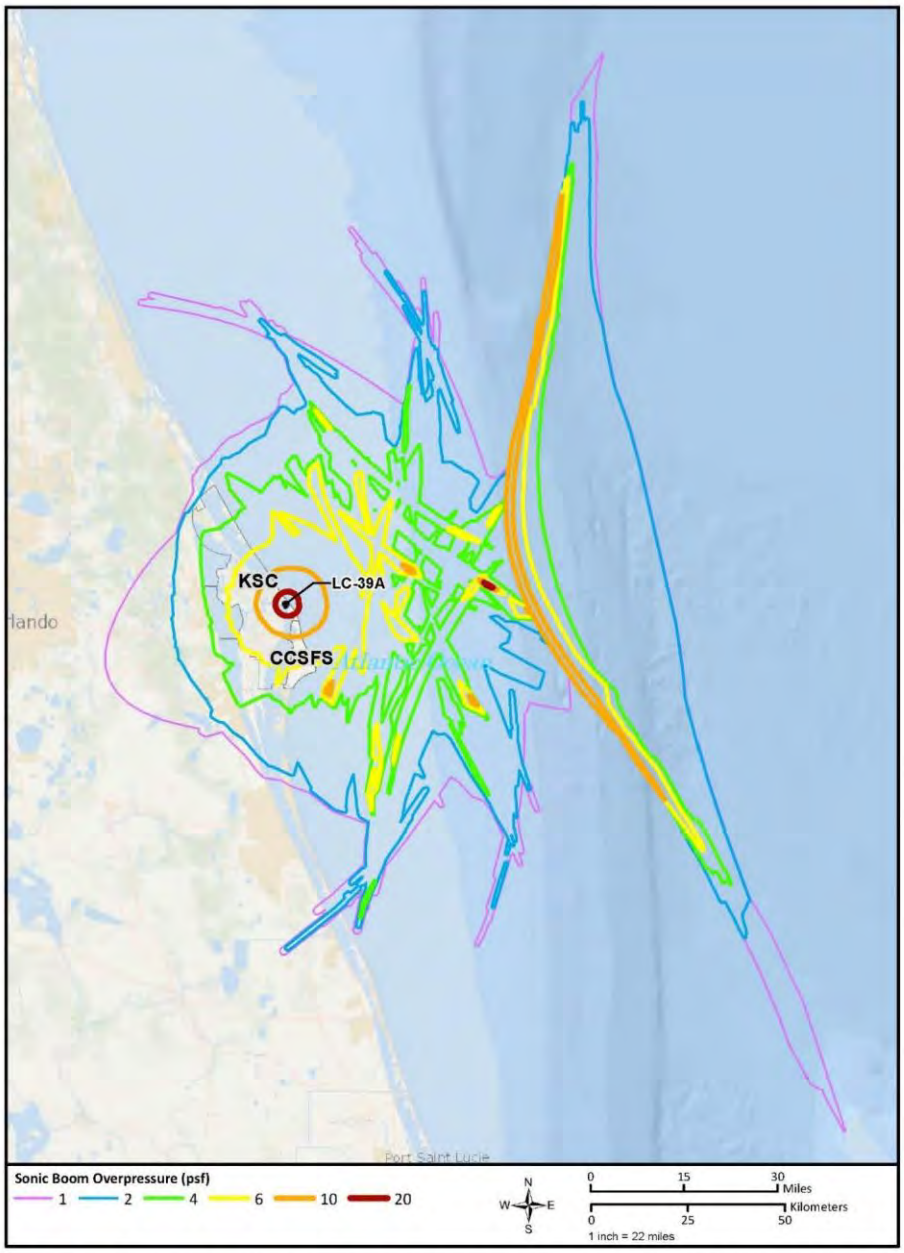

Figure 1. Sonic boom overpressure map for the Project area. The APE is defined as the area within the 2 psf contour (blue line) (Figure provided by Leidos).

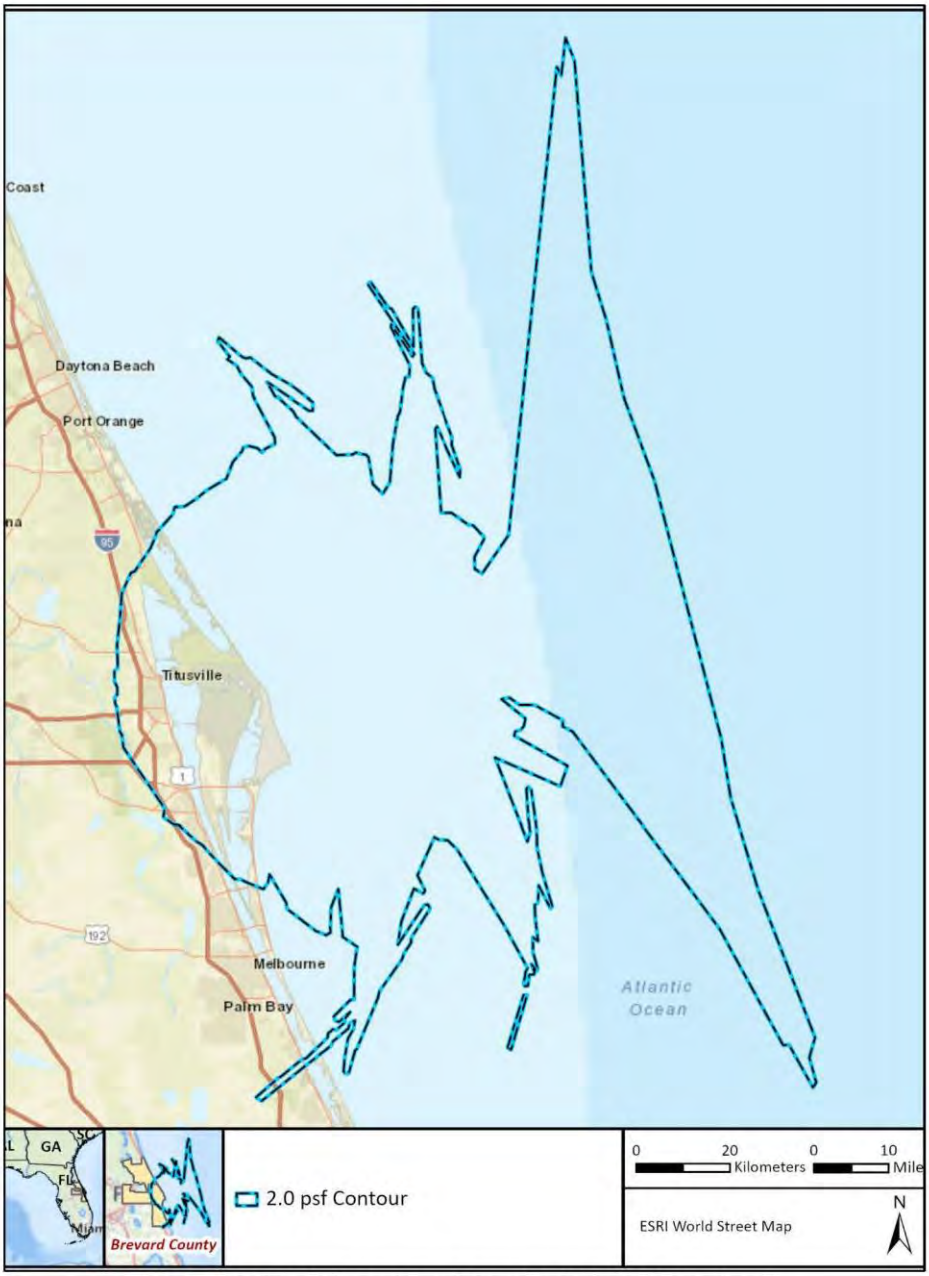

Figure 2. The APE, including portions of Brevard, Volusia, and Orange Counties.

1.2 POTENTIAL FOR ADVERSE EFFECTS

Per 36 Code of Federal Regulations 800.5, a federal undertaking has an adverse effect on a historic property when it diminishes one or more aspects of integrity to the extent that the property no longer conveys its significance per Criteria A–D for listing in the NRHP. NRHP eligibility is defined in 36 Code of Federal Regulations 60.4, under the authority of the National Historic Preservation Act of 1972, as amended:

> The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and,
>
> A. that are associated with events or activities that have made a significant contribution to the broad patterns of our history; or
> B. that are associated with the lives of persons significant in our past; or
> C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> D. that have yielded, or may be likely to yield, information important in prehistory or history.

The increased vibratory impacts from the proposed project have the potential to cause adverse effects to cultural resources. High sound pressure levels and vibrations have the potential to cause building/structural damage. In general, however, structural damage to buildings due to propulsion/engine noise is rare. The historic building element "most susceptible to damage from launch vehicle noise [are] windows, and more infrequently, plastered walls and ceilings" (Nocerino et al. 2021:15). Masonry buildings and structures are most susceptible to vibration damage through the "wearing of joints...which can cause load to be redistributed due to a weakening of a structural member" (National Cooperative Highway Research Program [NCHRP] 2012:35). Further, vibration effects may be greatest to "non-structural building elements [such as] fragile glass, loose plaster mosaics or pieces of stone" (NCHRP 2012:36). Previous analysis also indicates "wood and steel are more elastic than masonry, such as brick and stone" (NCHRP 2012:2). Therefore, increased exposure to vibration may diminish the integrity of a resource's significant historic features.

Sonic booms also have the potential to result in structural damage. A large degree of variability exists in the possible effects of a sonic boom. For example, the probability of a window breaking when exposed to a sonic boom of 1 psf ranges from one in a billion to one in a million (Sutherland 1990) with much of the variability depending on the condition of the glass. At 10 psf, the probability of glass breaking is between 1 in 100 and 1 in 1,000. Laboratory tests involving glass have shown that properly installed glass will not break at overpressures below 10 psf, even when exposed to repeated sonic booms (White 1972). Damage to plaster has the potential to occur in

the same range of overpressures as damage to glass. Plaster often cracks due to shrinkage over time or due to structural settling. Sonic boom damage to plaster often occurs when internal stresses are already high as a result of these processes. In general, for well-maintained structures, the threshold for potential damage from sonic booms is 2 psf; below 2 psf, damage is unlikely (Haber and Nakaki 1989).

Archaeological resources consisting solely of surface scatters or subsurface deposits are not likely to be affected by the vibratory effects of increased sonic boom exposure due to the protective qualities of the surrounding soil matrix (Nocerino et al. 2021). Vibratory effects may be greater on historic resources, particularly those elements that predate the mid-twentieth century and were not designed or built with the impacts of the aeronautical industry in mind.

The National Park Service (NPS) provides guidelines for interpreting the seven aspects of integrity (location, design, setting, materials, workmanship, feeling, and association) as they relate to the potential effects of an undertaking (NPS 1995:45). The effects of the undertaking are unlikely to impact the location or association of historic properties within the APE. As noted above, there are limited circumstances in which the effects of vibration may result in damage to aboveground structures. Such damage may potentially affect the design, materials, and workmanship of historic properties, particularly as they relate to exterior and ornamental detailing.

Additionally, the setting and feeling of historic properties may be temporarily altered by the visual, audible, and vibratory effects of the undertaking. Setting refers to the physical environment of a resource, while feeling refers to the aesthetic qualities of a resource as they relate to the specific time during which the resource became significant. There are specific types of cultural resources for which aspects of setting and feeling are more likely to represent important components of historic integrity, such as archaeological sites with aboveground features, historic districts and landscapes, and cemeteries.

1.3 PREVIOUSLY RECORDED CULTURAL RESOURCES WITHIN THE APE

The Florida Master Site File (FMSF), maintained by the Florida Division of Historical Resources, is the primary repository for information regarding cultural resources (archaeological sites, cemeteries, buildings, bridges, linear resources [e.g., highways, railroads, canals], districts, and landscapes) that have been formally documented in Florida, typically as a result of compliance with federal, state, or municipal historic preservation statutes. SEARCH performed a query of the FMSF Geographic Information System database in December 2024 to provide the background information discussed below. Alternate sources that will be consulted to create an inventory of previously recorded cultural resources will include the NRHP database, the Integrated Cultural Resource Management Plans for KSC and the Cape Canaveral Space Force Station, and information provided by consulting parties and members of the public. Procedures for identifying additional cultural resources that have not been previously recorded are discussed in the subsequent section.

The query of the FMSF database indicated that there are 2,964 previously recorded cultural resources within the APE, including 465 archaeological sites, 2,315 structures, 31 cemeteries, 122 resource groups (including building complexes, districts, landscapes, and linear resources), and 31 historic bridges. The following sections provide overviews of each of the resource categories present within the FMSF database, including discussion of the attributes most likely to be affected by the proposed project.

1.3.1 Structures

Historic structures include architectural resources such as residential, commercial, and public buildings, as well as other elements of the built environment. To be considered significant,

> the structure must represent a part of history, architecture, archeology, engineering, or culture of an area, and it must have the characteristics that make it a good representative of properties associated with that aspect of the past. (NPS 1995:7)

The FMSF database review identified 2,315 previously recorded buildings within the APE; at least 40 have been destroyed and will not be included in further analyses. Twenty-four buildings are listed in the NRHP, 324 have been evaluated eligible for listing, seven are potentially eligible for listing, 836 are not eligible for listing, and the remaining 1,084 have not been evaluated for eligibility. Though these historic structures are distributed throughout the APE, many are concentrated around the cities of Titusville and Cocoa Beach, or are associated with KSC, Cape Canaveral Space Force Station, or Patrick Space Force Base. **Table 1** summarizes the extant NRHP-listed and -eligible structures located on nonfederal lands within the APE. An additional 1,053 structures located on nonfederal lands have yet to be evaluated and are not included in the table.

Of the 1,439 buildings that are listed, eligible for listing, potentially eligible for listing, or have not been evaluated for NRHP eligibility, at least 545 recorded structures are composed at least in part of masonry materials such as brick, concrete, stone, and structural clay tile. As discussed above, these materials are less elastic than metal or wood and may be particularly susceptible to vibratory impacts. However, minor damage may not necessarily result in an adverse effect to these resources unless it diminishes the character-defining aspects of integrity that contribute to the eligibility of these structures. Because the remaining 876 buildings were either determined ineligible for listing in the NRHP or recorded as destroyed, it can be reasonably assumed that impacts to these resources, if any, would be insignificant.

Table 1. Structures within the APE that are NRHP-Listed or -Eligible.

Site	Site Name	Year Built	Style	NRHP Status
BR00172	Launch Complex 39	1968	Other	Listed
BR00177	St. Gabriel's Episcopal Church	1887	Gothic Revival, ca. 1840–present	Listed
BR00211	Porcher, E P House	1916	Georgian Revival, ca. 1880–present	Listed
BR00278	Cocoa Junior High	ca. 1924	Masonry Vernacular	Listed
BR00282	Aladdin Theater Building	1924	Italian Renaissance Rev ca. 1880-1935	Listed

Site	Site Name	Year Built	Style	NRHP Status
BR00397	Wager House	ca. 1891	Frame Vernacular	Listed
BR00399	Robbins, George, Judge House	ca. 1892	Georgian Revival, ca. 1880–present	Listed
BR00425	422 Julia St.	1926	Mission	Eligible
BR00426	428 Julia St.	1905	Masonry Vernacular	Eligible
BR00430	423 Main St.	ca. 1910	Frame Vernacular	Eligible
BR00454	La Grange Church and Cemetery	1869	Frame Vernacular	Listed
BR00465	Brevard County Courthouse	ca. 1912	Neo-Classical Revival, ca. 1880–1940	Eligible
BR00468	Palm Ave	1925	Mission	Eligible
BR00480	Spell House	ca. 1911	Queen Anne (Revival), ca. 1880–1910	Listed
BR00524	Pritchard House	1891	Queen Anne (Revival), ca. 1880–1910	Listed
BR00581	St. Luke's Episcopal Church	1889	Frame Vernacular	Listed
BR00681	825 Osceola Dr.	ca. 1926	Mediterranean Revival, ca. 1880–1940	Eligible
BR00724	Caldwell, Troy E. Residence	ca. 1905	Georgian Revival, ca. 1880–present	Eligible
BR00730	1277 Rockledge Dr.	ca. 1915	Frame Vernacular	Eligible
BR00860	Hill, Dr. George E, House	ca. 1880	Frame Vernacular	Listed
BR01163	Lamar, Mattie House	1917	Frame Vernacular	Eligible
BR01657	City Point Community Church	1885	Frame Vernacular	Listed
BR01658	Hotel Mims	ca. 1889	Frame Vernacular	Listed
BR01684	Vehicle Assembly Building (VAB)	ca. 1966	No style	Listed
BR01685	Launch Control Center (LCC)	ca. 1966	International, ca. 1925–present	Listed
BR01688	Missile Crawler Transporter Facilities	ca. 1965	Not applicable	Listed
BR01690	Press Site: Clock and Flag Pole	1969	No style	Listed
BR01693	Operations Checkout (O&C)	ca. 1964	International, ca. 1925–present	Listed
BR01702	Field, J.R. Homestead	ca. 1900	Frame Vernacular	Listed
BR01723	Cocoa Cemetery Storage Building	ca. 1931	Masonry Vernacular	Eligible
BR01739	Ashely's Café & Lounge	ca. 1932	Tudor Revival, ca. 1890–1940	Eligible
BR01741	Rockledge Gardens Nursery & Landscaping	ca. 1930	Industrial Vernacular	Eligible
BR01744	Harvey's Groves	ca. 1939	Masonry Vernacular	Eligible
BR01765	Bohn Equipment Company	ca. 1927	Industrial Vernacular	Eligible
BR01825	Cocoa Post Office	1940	Art Deco, ca. 1920–1940	Listed
BR01988	Landing Aids Control Building (LACB)	ca. 1976	Industrial Vernacular	Eligible
BR01991	Orbiter Processing Facility (OPF)	ca. 1977	Industrial Vernacular	Eligible
BR01992	Orbiter Processing Facility High Bay 3	1987	Industrial Vernacular	Eligible
BR01994	Thermal Protection System Facility	ca. 1988	Industrial Vernacular	Eligible
BR01995	Launch Complex 39: Pad A	ca. 1965	Not applicable	Eligible
BR01997	Rotation/Processing Building	1982	Industrial Vernacular	Eligible
BR01998	SRB ARF Manufacturing Building	1986	Industrial Vernacular	Eligible
BR02010	Launch Complex 39: Pad B	ca. 1966	Not applicable	Eligible
BR02016	Canister Rotation Facility	ca. 1993	Industrial Vernacular	Eligible
BR02021	Mobile Launcher Platform	ca. 1963	Not applicable	Eligible
BR02671	Space Station Processing Facility	1992	Industrial Vernacular	Eligible
BR02704	400 Lucerne Dr	ca. 1966	Other	Eligible
BR02779	317 Rosa Jones Drive	ca. 1962	Masonry Vernacular	Eligible
BR02908	NLAX 170	ca. 1985	Not applicable	Eligible

Site	Site Name	Year Built	Style	NRHP Status
BR02969	Engineering Development Laboratory	1966	No style	Eligible
BR02990	Beach House	1962	No style	Eligible
BR03046	Foam Building	ca. 1965	Masonry Vernacular	Eligible
BR03955	2460 Courtenay Parkway N	ca. 1965	Mid-Century Modern, ca. 1940s–early 1960s	Eligible
BR04215	Imperial Towers	ca. 1963	Mid-Century Modern, ca. 1940s–early 1960s	Listed

1.3.2 Building Complexes, Districts, and Landscapes

The FMSF classifies several types of cultural resources that consist of individual resources grouped into building complexes, districts, and landscapes. The FMSF includes 51 building complexes, districts, and landscapes within the APE that are listed (n = 8), eligible (n = 32) potentially eligible (n = 1), or unevaluated (n = 10) for listing in the NRHP (**Table 2**). Of these, five are archaeological districts, two are designed historic landscapes, nine are FMSF building complexes, 33 are historic districts, and two are mixed districts. Of the 40 NRHP-listed or -eligible resources within this group, most are late nineteenth- to twentieth-century historic districts (n = 20) or building complexes (n = 2) located on Cape Canaveral and associated with the aeronautical industry. These include 12 launch complexes, two test facilities, and various operations support facilities. The remaining 18 NRHP-listed or -eligible resources within this group include aeronautical facilities in Titusville (n = 5), Satellite Beach (n = 2), and at Patrick Space Force Base (n = 3). Although Cape Canaveral Air Force Station (8BR00216) is not formally listed in the NRHP and is therefore not included in the sum of listed properties above, it was designated a National Historic Landmark in 1984.

Potential effects to archaeological districts and archaeological components to "mixed" districts will be included in the discussion of archaeological sites below; the current section focuses on districts and landscapes containing aboveground elements. A historic district draws its significance from the density of historic resources within it, rather than from the individual significance of a resource. A contributing resource is one that adds to a historic district's context and integrity. A district is further composed of resources unified through common historical themes or architectural types or styles (NPS 1999:6). A contributing resource adds to these overall themes not necessarily by possessing individual significance, but rather by its expression of historic integrity. Given that the potential for physical damage from the effects of the undertaking is limited to very few individual buildings, as discussed above, it is unlikely that the undertaking would significantly alter the integrity of a historic district's materials, design, and workmanship. Analysis of effects to historic districts and building complexes within the APE will focus on those that are not associated with the aeronautical industry because these are more likely to contain physical elements that may be susceptible to vibration damage or have historical associations expressed through integrity of setting and feeling that may be affected by the visual and audible effects of the undertaking.

A designed historic landscape

> has significance as a design or work of art; was consciously designed and laid out by a master gardener, landscape architect, architect or horticulturalist to a design principle, or an owner or other amateur using a recognized style or tradition; has a historical association with a significant person, trend, event, etc." (Keller and Keller n.d:2)

Examples of designed historic landscapes include estate grounds, zoological gardens, plazas or other public spaces, city planning, battlefield parks and outdoor recreation areas (such as golf courses, stadiums, and racetracks). There are no NRHP-listed designed historic landscapes within the APE, but the PAFB Airfield (8BR02439) is eligible, and the Rockledge Country Club (8BR02143) has not been evaluated for NRHP eligibility. Analysis of potential effects to these designed historic landscapes will consider whether they have contributing physical elements that maintain integrity of design, materials, and workmanship that could be susceptible to vibration damage and how their aspects of setting and feeling may be affected by the visual and audible effects of the undertaking.

Table 2. Districts and Landscapes within the APE that are Listed, Eligible, or Unevaluated for Listing in the NRHP.

Site	Site Name	Classification	Time Period	NRHP status
BR00216	Cape Canaveral Air Force Station	FMSF building complex	1950-present	National Historic Landmark
BR00238	Canaveral Town	Archaeological district	1921-1940	Not evaluated
BR00560	Titusville Commercial District	Historical district	1880-1929	Listed
BR00564	Cocoa Historic District	Historical district	1861-1899	Not evaluated
BR01611	Rockledge Drive Residential District	Historical district	1880-1929	Listed
BR01612	Valencia Subdivision Residential District	Historical district	1921-1929	Listed
BR01613	Barton Avenue Residential District	Historical district	1880-1897	Listed
BR01686	Launch Complex 39: Pad A	Historical district	1950-present	Listed
BR01687	Launch Complex 39: Pad B	Historical district	1950-present	Listed
BR01975	Banana River Naval Air Station Seaplane	Historical district	1939-1989	Potentially eligible
BR01986	Shuttle Landing Facility Area HD	Historical district	1969 to 2010	Eligible
BR01990	Orbiter Processing Historic District	Historical district	1969 to 2010	Eligible
BR01996	Solid Rocket Booster Disassembly and Refurbishment Historic District	Historical district	1969 to 2010	Eligible
BR02022	Launch Complex 21/22	Historical district	1900–present	Eligible
BR02033	Cape Canaveral Lighthouse Station District	Mixed district	Precontact; 1861–1865; 1894–present	Not evaluated

Site	Site Name	Classification	Time Period	NRHP status
BR02143	Rockledge Country Club Resource Group	Designed historic landscape	1927–1957	Not evaluated
BR02170	PAFB Missile Instrumental Station	Historical district	1950–present	Eligible
BR02181	Bommarc - Sage Radome Facility	FMSF building complex	1945-1991	Eligible
BR02188	Launch Complex 9 Resource Group	FMSF building complex	1900–present	Eligible
BR02198	Launch Complex 13	Historical district	1956–1966	Eligible
BR02209	Launch Complex 14	Historical district	1950–present	Eligible
BR02234	Launch Complex 3 & 4	Historical district	1900–present	Eligible
BR02248	Launch Complex 1-2	Historical district	1900–present,	Eligible
BR02260	Launch Complex 19	Historical district	1956–1966	Eligible
BR02272	Launch Complex 30	FMSF building complex	1950–present	Eligible
BR02279	Launch Complex 34	Historical district	1961–1971	Eligible
BR02369	Launch Complex 17	Historical district	1957–1960	Eligible
BR02438	PAFB Landplane Facilities District	FMSF building complex	1945–1991	Eligible
BR02439	PAFB Airfield	Designed historic landscape	1950–present	Eligible
BR02440	PAFB Landplane Administrative District	FMSF building complex	1945–1991	Eligible
BR02518	Launch Complex 25	Historical district	1958–1969	Eligible
BR02529	Launch Complex 29	Historical district	1958–1969	Eligible
BR02535	Launch Complex 31/32	FMSF building complex	1900–present	Not evaluated
BR02540	Fuel Storage Area 3	Historical district	1952–present	Eligible
BR02935	Titusville Downtown Residential Historic	Historical district	1821–present	Not evaluated
BR03031	Area 55: Delta Operations Support Area	Historical district	1956–1980	Eligible
BR03034	Delta II Solid Rocket Motor Area	Historical district	1963–1965	Eligible
BR03036	Delta Spin Test Facility	Historical district	1966–2010	Eligible
BR03052	LC 5/6 Spin Test Facility	Historical district	1900–present	Eligible
BR03073	CCAFS Industrial Area	Historical district	1958–present	Eligible
BR03186	Skid Strip Historic District	Historical district	1950–present	Eligible
BR03345	Cocoa Maintenance Yard	FMSF building complex	1900–present	Not evaluated
BR03369	CCAFS Industrial Area Historic District	Historical district	1946–1989	Eligible
BR03407	Carpenter Homes Complex	FMSF building complex	1950–present	Not evaluated
BR03433	Control Tower Road Tracking Sites	Historical district	1950–present	Eligible
BR03921	Richard E. Stone Historic District	Historical district	Unknown	Not evaluated
BR04000	Cape Fish Company	Archaeological district	1900–present	Eligible
BR04229	Jonathan H. Sams Farmstead	Mixed district	Precontact	Eligible
VO00259	North Mosquito Lagoon Archaeological District	Archaeological district	Precontact	Not evaluated
VO02569	Ross Hammock Complex	Archaeological district	Precontact; nineteenth century	Listed

Site	Site Name	Classification	Time Period	NRHP status
VO09407	Elliot Plantation Complex	Archaeological district	British colonial; US territorial period	Eligible

1.3.3 Cemeteries

Table 3 summarizes the 31 cemeteries within the APE that are recorded in the FMSF database. Six have been evaluated eligible for listing in the NRHP, while the remaining 25 have not been evaluated. One of the NRHP-eligible cemeteries, La Grange Cemetery (BR04541), is associated with the NRHP-listed La Grange Church (BR00454). Approximately half of the FMSF-recorded cemeteries within the APE serve African American and Native American populations. Eight are federally owned cemeteries associated with the Cape Canaveral Space Force Station, and at least seven are privately owned.

NPS guidelines state that cemeteries are typically ineligible for listing in the NRHP; however, they may be eligible if they are associated with persons of outstanding historical importance or are connected to important historical events. The materials, design, and workmanship evident in grave markers and the organization of burial grounds may reflect unique perspectives of ethnic and cultural groups in ways that can contribute to the eligibility of a cemetery. Furthermore, the analysis of the effects of the undertaking will consider whether setting and feeling potentially contribute to the eligibility of the cemeteries within the APE, as these aspects of integrity may be disrupted by visual, audible, and vibratory effects of the undertaking.

Table 3. Recorded Cemeteries in the APE.

Site	Site Name	Year Established	Ownership	Ethnicity	Status	NRHP Status
BR00186	Campbell-Jackson Cemetery	1913	Federal	African American	Maintained but not used	Not evaluated
BR00191	African American Graves/New Haulover 2	1880	Federal	African American	Maintained but not used	Not evaluated
BR00233	Cape Road Cemetery	ca. 1894	Federal	White, non-Hispanic	Abandoned	Not evaluated
BR00552	Historic Negro Cemetery	Unknown	Private-individual	African American	Abandoned	Not evaluated
BR01624	Emma Watton	ca. 1882	Federal	White, non-Hispanic	Maintained but not used	Not evaluated
BR01626	Crook/Watton	1915	Federal	White, non-Hispanic	Maintained but not used	Not evaluated
BR01631	Griffis	1897	Federal	White, non-Hispanic	Unspecified by surveyor	Not evaluated
BR01705	Pioneer Cemetery	ca. 1890	Private-community	White, non-Hispanic	Used	Eligible
BR01724	Hilltop Cemetery	ca. 1887	City	African American	Used	Eligible
BR01777	Cocoa Cemetery	ca. 1890	City	White,	Used	Eligible

Site	Site Name	Year Established	Ownership	Ethnicity	Status	NRHP Status
				non-Hispanic		
BR01979	City Point Cemetery	1878	Private-individual	African American, Native American, white, non-Hispanic	Maintained but not used	Not evaluated
BR02352	Fac. 77903-Burnham Family Cemetery	ca. 1866	Federal	White, non-Hispanic	Abandoned	Not evaluated
BR02354	Fac. 60201-Penny Family Cemetery	ca. 1890	Federal	White, non-Hispanic	Abandoned	Not evaluated
BR02355	Quarterman North	ca. 1920	Federal	White, non-Hispanic	Maintained but not used	Not evaluated
BR02356	Quarterman South	1869	Federal	White, non-Hispanic	Maintained but not used	Not evaluated
BR02357	Facility 6403-Osmon Grave	ca. 1913	Federal	White, non-Hispanic	Abandoned	Eligible
BR02358	Fac. 6405-Canaveral Fish Company Grave	1913	Federal	Other	Abandoned	Eligible
BR02401	White Lilly	ca. 1892	Private	African American	Used	Not evaluated
BR02406	Mt. Carmel Missionary Baptist Church Cem	ca. 1915	Unknown	African American	Unspecified by surveyor	Not evaluated
BR02411	Dennis Sawyer Cemetery	1956	Private	African American	Maintained but not used	Not evaluated
BR02785	Evergreen Memorial Cemetery	1942	Unknown	White, Non-Hispanic	Used	Not evaluated
BR02786	Canaveral Groves Cemetery	1884	County	White, Non-Hispanic	Used	Not evaluated
BR02808	Pinecrest Colored Cemetery	1949	Private-corporate/ nonprofit	African American	Used	Not evaluated
BR03000	Pinecrest Cemetery	1929	Private-corporate/ nonprofit	White, Non-Hispanic	Used	Not evaluated
BR03334	Fisher Plot	ca. 1884	Private-individual	Other	Maintained but not used	Not evaluated
BR03366	Fac. 77901-Wilson Brothers Cemetery	ca. 1940	Federal	White, Non-Hispanic	Abandoned	Not evaluated
BR04310	Pluckebaum's Tomb	ca. 1937	Private	White, Non-Hispanic	Unspecified by surveyor	Not evaluated
BR04482	Davis Memorial Cemetery	1956	Unknown	African American	Unspecified by surveyor	Not evaluated
BR04541	La Grange Cemetery	1875	Unknown	Unknown	Used	Eligible
BR04574	Oak Ridge Cemetery	ca. 1916	Private-corporate/ nonprofit	African American	Used	Not evaluated
BR04630	Georgiana Cemetery (aka Crooked Mile)	ca. 1884	Unknown	African American	Used	Not evaluated

1.3.4 Archaeological Sites

An archaeological property can be a precontact or postcontact district, site, structure or object. To be eligible for listing in the NRHP, an archaeological property should have local, state, or national significance, and qualities of integrity, which include location, design, setting, materials, workmanship, feeling and association (Little et al. 2000). Archaeological sites are usually eligible under NRHP Criterion D (yield or likely to yield important information), but they can be eligible under any of the criteria.

The FMSF database includes 465 previously recorded archaeological sites within the APE, including five submerged historic shipwrecks. Of these 465 previously recorded sites, one is listed in the NRHP, 40 have been evaluated eligible for listing in the NRHP, six have been evaluated potentially eligible for listing in the NRHP, and 122 have been evaluated ineligible for listing in the NRHP. The remaining 296 have not been evaluated for NRHP eligibility. As described above, the anticipated effects of the undertaking are limited to rare instances of physical damage to aboveground resources, as well as temporary visual, audible, or vibratory interruptions to historic setting and feeling. Most archaeological sites, consisting of scattered remains on or below the ground surface, are protected from vibration damage by the surrounding soil matrix (or by water in the case of maritime sites) and already lack integrity of setting and feeling. However, some archaeological sites may have preserved aboveground structural features. Furthermore, setting and feeling may be important aspects at sites that feature landscape elements, such as mounds or earthworks (Little et al. 2000:36). The 343 sites within the APE that are listed, eligible for listing, potentially eligible for listing, or have not been evaluated for NRHP eligibility were reviewed to identify those that potentially include these attributes. This review identified 103 sites, which are summarized below. The 122 sites previously found to be ineligible for listing in the NRHP presumably lack integrity, significant historical associations, or information potential; therefore impacts to these sites are not likely to be significant.

Table 4 summarizes the 103 archaeological sites that are eligible for listing, potentially eligible for listing, or have not been evaluated for NRHP listing and that also feature aboveground components or landscape features. Of these 103 sites, 43 are precontact Native American mounds, and the remaining 60 are the aboveground remains of houses, mills, historic forts, or other aboveground built structures. In total, 19 of the 103 archaeological sites summarized below are considered eligible for NRHP listing. Of these 19 sites, 15 are historic structures, which largely consist of aeronautical facilities, such as the Former NAA Control Tower Site (8BR03534) and Lighter-Than-Aircraft Factory (BR02477), and industrial facilities, such as the Ross Hommock Evaporation Plant (8VO00213) and Sugar Mill Ruins at Elliot Plantation (8VO00160). The remaining four are precontact burial mounds with associated midden deposits, including the Ross Hammock Mounds (8VO00131) and Haulover Sand Mound and Midden (A, B) (8BR01673).

Table 4. NRHP-Eligible and Unevaluated Archaeological Sites within the APE with Potential Aboveground or Landscape Features.

Site ID	Site Name	Site Type	NRHP Status
BR03279	Beachside Midden	Land (terrestrial)	Not evaluated
BR03335	Fac. 17200: Weather Theodolite Pad B	Building remains	Eligible

Site ID	Site Name	Site Type	NRHP Status
BR03336	Fac. 1331: Telemetry ELSEE 12-110-PL	Building remains	Eligible
BR03337	Fac. 1333B:Beat-Beat DOVAP 14-110-PLM	Building remains	Eligible
BR03338	Fac. 1333A:Beat-Beat DOVAP 14-110-PR	Building remains	Eligible
BR03339	Fac. 1334: Telemetry ELSEE 12-110-PRS	Building remains	Eligible
BR03341	Facility 74610: Camera Pad	Building remains	Eligible
BR00009	Indian Mound Station	Precontact burial(s)	Eligible
BR00031	Unknown	Precontact mound(s)	Not evaluated
BR00062	Moore Mound	Precontact midden(s)	Not evaluated
BR00063	Sams Mound	Land (terrestrial)	Not evaluated
BR00065	Unknown	Precontact mound(s)	Not evaluated
BR00066	Unknown	Precontact mound(s)	Not evaluated
BR00069	Unknown	Precontact burial mound(s)	Not evaluated
BR00072	Fairyland/Honeymoon Hill	Precontact burial mound(s)	Not evaluated
BR00077	Nauman's Place	Precontact burial(s)	Not evaluated
BR00078	Dummett's Place	Building remains	Not evaluated
BR00078B	Dummett Homestead	Building remains	Potentially eligible
BR00083	De Soto Grove Burial Mound	Land (terrestrial)	Eligible
BR00084	Unknown	Historic fort	Not evaluated
BR00085	Burns	Habitation (precontact)	Not evaluated
BR00086	Holmes Mound	Building remains	Eligible
BR00087	Gulbransen Mound	Habitation (precontact)	Not evaluated
BR00088A	Hammock Mound A	Habitation (precontact)	Not evaluated
BR00088B	Hammock Mound B	Habitation (precontact)	Not evaluated
BR00088C	Hammock Mound C	Habitation (precontact)	Not evaluated
BR00089	Norris Mound	Habitation (precontact)	Not evaluated
BR00090	Fuller Mound A	Precontact burial mound(s)	Not evaluated
BR00091	Fuller Mound B	Precontact burial mound(s)	Not evaluated
BR00092	Fuller Mound C	Precontact mound(s)	Not evaluated
BR00093	Fuller Mound D	Precontact burial mound(s)	Not evaluated
BR00094	Fuller Mound E	Precontact mound(s)	Not evaluated
BR00095	Fuller Mound F	Precontact mound(s)	Not evaluated
BR00142	Butler Campbell's Mound	Precontact burial(s)	Not evaluated
BR00150	Oyster Prong Creek Mound	Precontact burial mound(s)	Not evaluated
BR00151	Unknown	Precontact burial mound(s)	Not evaluated
BR00156	Unknown	Precontact mound(s)	Not evaluated
BR00162	Fairyland Hill Burial Mound	Precontact burial mound(s)	Not evaluated
BR00175	Fort Ann	Historic fort	Not evaluated
BR00205	Max Hoeck Mound and Midden	Precontact midden(s)	Not evaluated
BR00206	Pepper Hammock	Campsite (precontact)	Not evaluated
BR00223	Quarterman	Building remains	Not evaluated
BR00234	Old Lighthouse	Building remains	Not evaluated
BR00238A	Canaveral Town Site B	Building remains	Not evaluated

Site ID	Site Name	Site Type	NRHP Status
BR00238B	Canaveral Town Site C	Building remains	Not evaluated
BR00238C	Canaveral Town Site D	Building remains	Not evaluated
BR00238D	Canaveral Town Site E	Building remains	Not evaluated
BR00239	Stinktown and Jeffords	Building remains	Potentially eligible
BR00240	Hotel	Industrial	Not evaluated
BR00243	Pier Road Houses	House	Not evaluated
BR00243B	Pier Road Houses Site B	Building remains	Not evaluated
BR00243C	Pier Road Houses Site C	Building remains	Not evaluated
BR00540	Daigle Place	Building remains	Not evaluated
BR00544	Lopex Orchard	Building remains	Not evaluated
BR00567	UWF 3	Homestead	Not evaluated
BR01639	NS BR 4	Building remains	Not evaluated
BR01670	Haulover Canal Midden	Building remains	Not evaluated
BR01673	Haulover Sand Mound and Midden (A,B)	Precontact mound(s)	Eligible
BR02351	Murray Parcel	Farmstead	Not evaluated
BR02365	Fac. 1330B: Beat-Beat DOVAP 12-110-PLM	Building remains	Eligible
BR02396	Fac. 1343: East Compass Rose	Building remains	Eligible
BR02400	Ulumay Lagoon	Habitation (precontact)	Not evaluated
BR01855	Harry T. Moore Site	Building remains	Not evaluated
BR01872	Sam's Site	Agriculture/farm structure	Eligible
BR01933	Little Midden	Building remains	Eligible
BR01935	Lone Cistern	Building remains	Not evaluated
BR02052	Fac 1222 CZR Camera Pad U15R146	Building remains	Not evaluated
BR02053	Fac 36900: GLOTRAC Site	Building remains	Not evaluated
BR02054	Fac. 114-G: LC-25 Warning Horn Site	Building remains	Not evaluated
BR02055	Facility 1212-CZR Camera Site U36R175	Building remains	Not evaluated
BR02078	Pace's Landing	Building remains	Not evaluated
BR02160	FIM Van Site S-5	Building remains	Not evaluated
BR02161	Facility 1209-Rate Antenna Pad A	Building remains	Not evaluated
BR02165	Facility 289 - Flame Attenuation Site	Building remains	Not evaluated
BR02166	James W. Merchant Homestead	Building remains	Not evaluated
BR02167	Facility 1126: Telemetry ELSSE	Building remains	Not evaluated
BR02229	Clifton Schoolhouse	Agriculture/farm structure	Not evaluated
BR02477	Lighter-Than-Air Craft Factory	Building remains	Eligible
BR02507	Taylor House	Homestead	Not evaluated
BR02508	Hunters Camp	Building remains	Not evaluated
BR02509	Palm Hammock	Building remains	Not evaluated
BR02513	Facility 1390: Theodolite Tower 1.40	Building remains	Not evaluated
BR02514	Facility 1090 Security Police Bldg	Building remains	Not evaluated
BR02680	Klondike Beach Tower Ruins (2311.12)	Building remains	Not evaluated
BR03048	Old MacDonald's Farm	Farmstead	Not evaluated
BR03152	Clark Slough Earthwork	Precontact mound(s)	Not evaluated
BR03274	The Dunal Ridge Midden	Precontact mound(s)	Not evaluated
BR03534	Former NAA Control Tower Site	Building remains	Eligible
BR03998	CCAFS Facility 1430 - SHANICLE Building	Building remains	Not evaluated
IR00994	Sam Dale	Farmstead	Not evaluated
OR00008	Long Bluff 3	Precontact burial mound(s)	Not evaluated
OR10652	Streetman Cabin	Building remains	Not evaluated

Site ID	Site Name	Site Type	NRHP Status
VO02599	Mosquito Lagoon House of Refuge	Building remains	Not evaluated
VO00112	Castle Windy Midden	Precontact burial(s)	Not evaluated
VO00129	Scobey Place	Precontact burial mound(s)	Not evaluated
VO00131	Ross Hammock-Mounds	Precontact burial mound(s)	Eligible
VO00148	Griffis Place	Precontact burial mound(s)	Not evaluated
VO00149	Oak Hill Mound	Campsite (precontact)	Not evaluated
VO00160	Sugar Mill Ruins – Elliot Plantation	Building remains	Eligible
VO00213	Ross Hammock – Evaporation Plant	Building remains	Eligible
VO05312	CANA 26	Specialized procurement site	Not evaluated
VO08887	V-1 Impoundment	Land-terrestrial	Not evaluated
VO08936	Voorhees Midden	Campsite (precontact)	Not evaluated

1.3.5 Linear Resources

The FMSF includes 49 linear resources within the APE, two of which are listed in the NRHP. Fifteen have been evaluated eligible for listing in the NRHP, 24 have been evaluated ineligible for listing in the NRHP, and eight have not been evaluated for listing in the NRHP (**Table 5**). The two NRHP-eligible linear resources within the APE are the Old Haulover Canal (8BR00188), which connects the Indian River to Mosquito Lagoon north of Merritt Island, and Crawlerway (8BR01689), which connects the Vehicle Assembly Building (BR01684) and two launch pads (BR01686 and BR01687) at Launch Complex 39 at the KSC. The 24 eligible or unevaluated linear resources include canals and associated structures (n = 5), railroads (n = 5), roads (n = 8), trails (n = 3), and paved runways (n = 3) associated with aeronautical facilities. These include some of the oldest roads on Merritt Island (8BR04227 and 8BR04228) and sections of the Hernandez Capron Trail (8BR01766 and BR01924), which was built in part to forcefully remove the Seminole from south Florida during the Second and Third Seminole Wars. The linear resources within the APE that are associated with modern transportation uses and industrial aeronautical facilities are engineered to withstand frequent impacts and are unlikely to be affected by the undertaking. Linear resources dating to earlier historic periods typically consist of features at or below the ground surface and often lack physical integrity, so they are unlikely to be affected by the undertaking.

Table 5. Linear Resources within the APE that are NHRP-Listed, Eligible, or Unevaluated.

Site	Site Name	Classification	Date Established	NRHP status
BR04534	S Range Road Canal	Canal	Twentieth century	Not evaluated
BR00188	Old Haulover Canal	Canal	Late eighteenth–early nineteenth century	Listed
BR01689	Crawlerway	Runway	Late twentieth century	Listed
BR01766	Hernadez Trail	Trail	Mid-nineteenth century	Eligible
BR01870	Florida East Coast Railroad	Railroad	Early to mid nineteenth century	Eligible
BR01914	St. Johns Indian River RR/Tramway	Railroad	Nineteenth century	Eligible
BR01924	Old Dixie Highway	Road	Nineteenth century	Eligible
BR01987	Shuttle Landing Facility Runway	Runway	Late twentieth century	Eligible
BR02193	Magruder Road	Road	Late nineteenth–early twentieth century	Not evaluated
BR02230	New Smyrna to Haulover Canal Road	Road	Nineteenth century	Eligible
BR02258	New Haulover Canal	Canal	Nineteenth century	Not evaluated
BR02336	Facility 50305: Skid Strip	Runway	Mid to late twentieth century	Eligible
BR02363	Canaveral Beach Canal	Canal	Early twentieth century	Not evaluated
BR02544	Old Highway A-1-A	Road	Early twentieth century	Not evaluated
BR02931	NASA Railroad at Kennedy Space Center	Railroad	Mid to late twentieth century	Eligible
BR02932	NASA KSC Railroad System HD	Railroad	Mid to late twentieth century	Eligible
BR02936	Canaveral Lock	Lock	Mid to late twentieth century	Eligible
BR03051	Indian River Drive	Road	Nineteenth century	Not evaluated
BR04191	ICBM Road	Road	Mid-twentieth century	Eligible
BR04227	Homesteaders' Trail	Trail	ca. 1879	Eligible
BR04228	North Tropical Trail	Trail	ca. 1879	Eligible
BR04504	Pluckebaum Road Canal	Canal	1936–1943	Not evaluated
VO08606	Florida East Coast Railroad	Railroad	Nineteenth century	Eligible
VO08880	New Smyrna to Haulover Canal Road	Road	Nineteenth century	Eligible
VO09406	Plantation Road	Road	Nineteenth century	Not evaluated

1.3.6 Bridges

In total, 31 historic bridges are included in the FMSF database. Five of these historic bridges have been evaluated eligible for listing in the NRHP, 24 have been evaluated ineligible for listing in the NRHP, and the remaining two have not been evaluated for listing in the NRHP. A summary of NRHP-eligible and unevaluated historic bridges is provided in **Table 6**. The historic bridges within the APE were constructed in the twentieth century, and all but one are still in use. The four eligible bridges are located along roads that facilitate access to Merritt Island: two (BR01699,

BR02906) span the Indian River to the west, one spans the New Haulover Canal between the Indian River and Mosquito Lagoon to the north (BR02957), and the other spans the Banana River to the east of Merritt Island (BR02955). The eligible or unevaluated bridges within the APE are unlikely to be affected by the undertaking because they have been engineered for durability and frequent use by modern trains or motor vehicles; their construction dates range from 1948 to 1965.

Table 6. NHRP-Eligible and Unevaluated Historic Bridges within the APE.

Site	Site Name	Year Built	Ownership	Material	Status	NRHP Status
BR01699	Indian River Bridge	1948	County	Concrete, steel	Destroyed	Eligible
BR02906	Jay Jay Bridge	ca. 1963	Federal	Concrete, steel	In use	Eligible
BR02955	Banana River Bridge	1964	Federal	Steel	In use	Eligible
BR02957	Haulover Canal Bridge	1965	Federal	Steel	In use	Eligible
BR03015	Girard Blvd / Navigable Sykes Creek	1962	County	Concrete	In use	Not evaluated
VO10381	FDOT Bridge No. 790004	ca. 1956	State	Steel	In use	Not evaluated

1.4 Proposed Approach to the Identification of Previously Unrecorded Historic Properties

This approach is designed to make a reasonable and good faith effort to identify historic properties within the APE that may be affected by the undertaking. Because the properties in the APE will include thousands of buildings and structures, identification efforts will focus on properties greater than 45 years of age, in areas that have not been surveyed within the last 10 years, and limited to those historic properties and potential historic properties that may reasonably be affected by the undertaking. Previously recorded resources that were determined ineligible for listing in the NRHP will be excluded from further identification and evaluation efforts.

Historic properties will be identified in two ways. First, NASA KSC, supported by SEARCH, will compile an inventory of previously recorded cultural resources within the APE that are listed in, eligible for, potentially eligible for, and unevaluated for listing in the NRHP. NASA KSC will use the FMSF database and Integrated Cultural Resource Management Plans from both KSC and the Cape Canaveral Space Force Station. Additionally, county property appraiser databases will be queried to identify unrecorded historic aboveground resources within the APE. As illustrated in **Figure 3**, parcel data contains built year information, which can be cross-referenced with recorded resources to identify parcels that contain structures 45 years old or older without recorded resources. Historic maps and aerial photographs will be used to examine land use and development changes over time, and a historic context will be developed for the APE. Data will be supplemented with information on unrecorded cultural resources provided by consulting

parties and the public. The cumulative data will be used to develop a Geographic Information System heat map of the APE to identify areas with high concentrations of unrecorded structures that are 45 years old or older. These data sets will be used to identify and create a list of properties that will be subject to survey fieldwork. The preliminary inventory data are provided in this document.

Second, fieldwork will be conducted with three primary objectives:

1) Conduct a windshield survey guided by the heat map discussed above, in order to identify potential historic properties.

2) Complete FMSF documentation for potential historic properties identified during the windshield survey that have a reasonable possibility to be adversely affected by the undertaking. The architectural historians will identify and photograph potential historic properties that appear to embody historic significance established in the historic context. They will also identify and document the character-defining features that are indicative of NRHP eligibility and that may be susceptible to adverse effects, as discussed in Section 1.2. All newly recorded resources will be assumed NRHP-eligible, for the purposes of Section 106 consultation.

3) Revisit NRHP-listed or eligible historic properties that are individually eligible for the NRHP and that have with a reasonable possibility to be adversely affected to reassess their integrity.

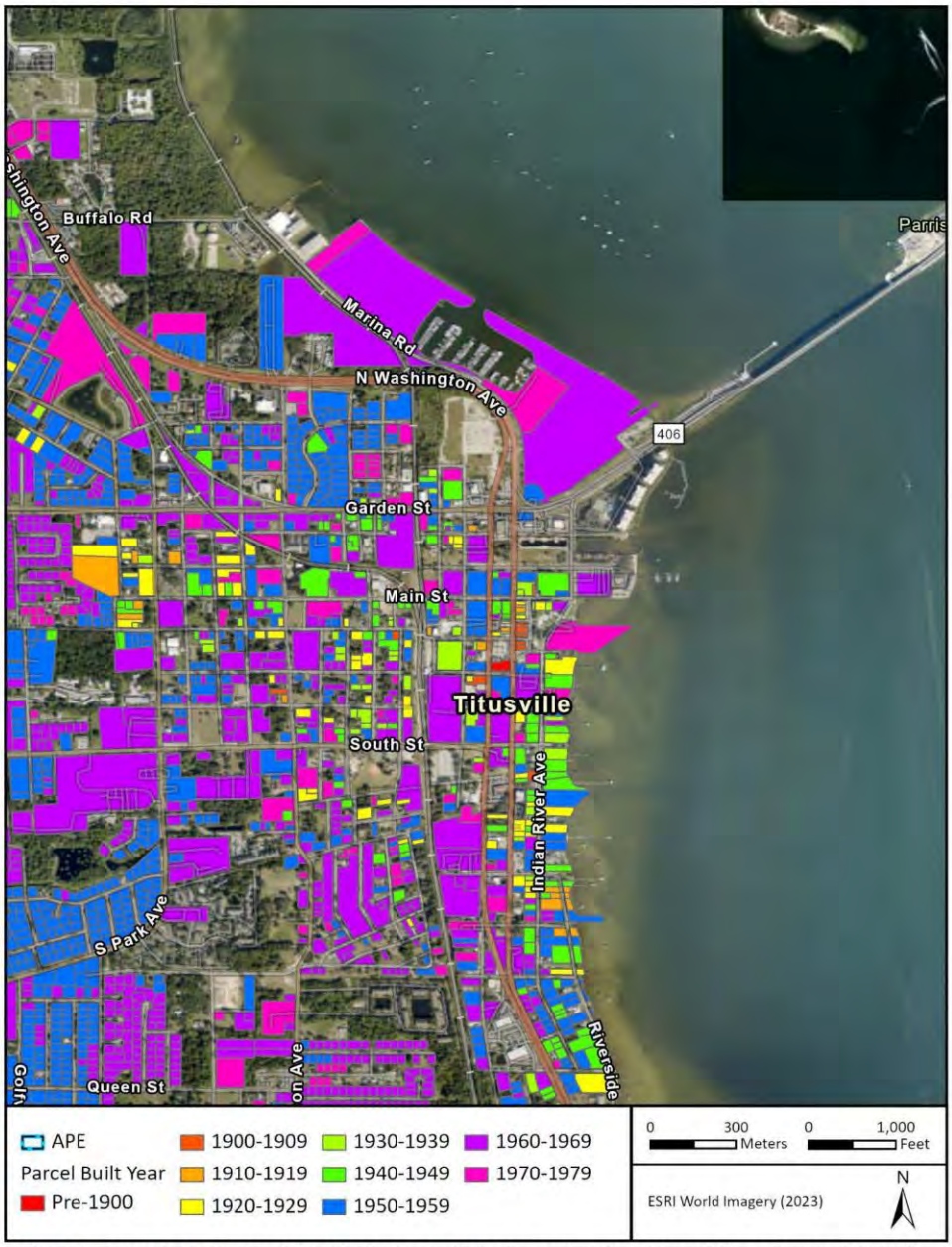

Figure 3. Brevard County parcel data illustrating variation in construction dates within and around Titusville, which lies within the APE.

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Enclosure 3. Consulting Parties List

- American Space Museum and Space Walk of Fame
- Apollo One Memorial Foundation, Inc.
- Brevard County Historical Commission
- Brevard Museum of History and Natural Science
- Cape Canaveral Lighthouse Foundation
- Cape Canaveral Space Force Museum (formerly Air Force Space and Missile Museum)
- Cape Canaveral Space Force Station
- City of Titusville
- City of Titusville Historic Preservation Board
- Department of Anthropology, University of Central Florida
- Florida Anthropological Society
- Florida Historical Society
- Florida Public Archaeology Network – East Central Region
- Historical Society of North Brevard
- Indian River Anthropological Society
- Merritt Island National Wildlife Refuge
- NASA Alumni League-Florida Chapter
- National Park Service, Canaveral National Seashore
- National Park Service, National Historic Landmark Program Southeast Region
- National Space Club
- North Brevard Heritage Foundation
- North Brevard Historical Museum
- South Brevard Historical Society

Example NHPA Section 106 Tribal Consultation Letter

National Aeronautics and Space Administration

John F. Kennedy Space Center
Kennedy Space Center, FL 32899

December 20, 2024

Reply to Attn of: SI-E3

Mr. David Hill, Principal Chief
Muscogee (Creek) Nation of Oklahoma
P.O. Box 580
Okmulgee, OK 74447

Subject: Section 106 Consultation SpaceX Starship Super Heavy Launch and Reentry Vehicles at Launch Complex-39A, Kennedy Space Center, Cape Canaveral, Florida

Dear Principal Chief Hill:

The purpose of this letter is to initiate consultation under Section 106 of the National Historic Preservation Act of 1966 (NHPA) and to invite the Muscogee (Creek) Nation of Oklahoma to participate as a Consulting Party.

The National Aeronautics and Space Administration's Kennedy Space Center (NASA KSC) is initiating consultation with your office as part of the Federal Aviation Administration's (FAA) environmental review of the proposed action for the SpaceX Starship Super Heavy launch and reentry vehicles at Launch Complex-39A (LC-39A). While NASA is leading Section 106 consultation, the FAA is leading Government to Government consultation which will be covered in a separate letter sent from the FAA. Under the supervision of the FAA's Office of Commercial Space Transportation, SpaceX is preparing an Environmental Impact Statement (EIS) to evaluate the potential impacts of proposed infrastructure construction, and ground, launch, and reentry operations associated with the Starship Super Heavy launch and reentry vehicles at LC-39A. Because SpaceX plans to apply to the FAA's Office of Commercial Space Transportation for a vehicle operator license for Starship Super Heavy, the EIS will conform to the FAA's National Environmental Policy Act (NEPA) implementing policy, FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures,* regarding the potential infrastructure construction, ground operations, launch, and reentry-related impacts.

Description of the Undertaking

The undertaking involves issuance of a vehicle operator license by the FAA's Office of Commercial Space Transportation that will facilitate ground, launch, and reentry operations associated with the SpaceX Starship Super Heavy at LC-39A. Specifically, this would include up to 44 launches of Starship Super Heavy per year; return of the first stage booster to

LC-39A; return of Starship to LC-39A; and construction of an air separation unit for liquid oxygen and liquid nitrogen, on-site natural gas liquefaction production and cryogenic liquid storage capability, roadway improvements, other associated infrastructure, and a catch tower (see **Enclosure 1**). Additional information is available on FAA's project website at: https://www.faa.gov/space/stakeholder_engagement/spacex_starship_ksc/.

Area of Potential Effects

The area of potential effects (APE) considers any physical, visual, or auditory effects that the project may have on historic properties*. As such, the APE has been developed to consider both a construction APE and an operational APE. The construction APE is limited within the existing boundaries of LC-39A. Additionally, it is anticipated that proposed new construction associated with the operation of the Starship Super Heavy will be compatible with the characteristic of other launch complex infrastructure and will not pose view shed effects to historic properties. The operational APE considers the auditory effects of the Starship Super Heavy launch activity as well as the overpressure effects of the sonic boom generated during atmospheric reentry. FAA guidance stipulates consideration of a 130 decibel (dB) threshold for launch effects and a 2.0 pounds per square foot (psf) threshold for effects from the sonic boom. Based on this information, and previous research regarding rocket engine noise and vibration effects to structures, the APE was established as any area subjected to greater than or equal to 2.0 psf sonic booms (see **Enclosure 2, Figure 2**). This area also encompasses the 130 dB threshold for launch effects, as well as the construction APE.

**Historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria. 36 CFR 800.16(l)*

Initial Identification of Historic Properties and Proposed Identification Efforts

The proposed identification approach is designed to make a reasonable and good faith effort to identify historic properties within the APE that may be affected by the undertaking. Effects related to construction will be limited within the footprint of LC-39A. This area has already been subject to survey and evaluation and will not require additional studies. The fieldwork and analysis will therefore focus on historic properties subject to the potential effects of elevated noise and vibrations associated with the undertaking.

The undertaking has the potential to affect historic properties from increased vibratory impacts. According to data provided by SpaceX, launch and reentry events are estimated to result in Lmax levels of 130 dB and/or sonic boom impacts of 2 psf or higher within the APE. Archaeological resources consisting solely of either surface scatters or subsurface deposits are not likely to be affected by the vibratory effects of increased sonic boom exposure due to the protective qualities of the surrounding soil matrix. Similarly, underwater archaeological sites are unlikely to be affected. However, vibratory effects may be greater on historic age

resources within the built environment. Architectural elements most susceptible to damage from launch and reentry vehicle noise include windows and, infrequently, plastered walls and ceilings. Vibration effects may be greatest to non-structural elements such as fragile glass and loose plaster/stone ornamentation. The enclosed memorandum provides additional information on this summation of the potential for vibratory effects on cultural resources (see **Enclosure 2**).

Previously Recorded Resources Within the APE

Historic properties within the construction APE include the Launch Complex 39 Pad A Historic District (**8BR1686**) which is listed in the National Register of Historic Places (NRHP). The historic district is the first of two launch pads constructed by NASA in the 1960s to accommodate the Saturn V launch vehicle for Apollo missions and modified in the 1970s to accommodate the Space Shuttle Program. The historic district contains 23 extant contributing resources all used to support launch operations. One contributing resource, Launch Complex 39 Pad A (**8BR1995**), is also individually listed in the NRHP. No archaeological sites have been recorded or documented within LC-39A.

A preliminary assessment of the operational APE, using data contained in the Florida Master Site File (FMSF), identified 2,964 previously recorded resources, including 2,315 structures, 31 bridges, 465 archaeological sites, 31 cemeteries, and 122 resource groups. Of these, 35 properties are listed in the NRHP and 353 have been evaluated as eligible (see **Enclosure 2**).

Approach for the Identification of Historic Properties

In 2010, NASA KSC completed HAER documentation of the LC-39A historic district and its associated contributing resources. As such, LC-39A is well documented and no further identification or evaluation of LC-39A is proposed.

Identification efforts will focus on historic properties that may be subject to physical damage from elevated noise and vibrations as well as cultural resources whose setting and feeling may be affected by audible and acoustic effects during launch and reentry activities. This will include buildings and structures within the APE that were not specifically designed to withstand the concussive forces of launching and landing spacecraft. Additionally, there are specific types of cultural resources for which aspects of setting and feeling are more likely to represent important components of historic integrity. These types of cultural resources potentially include:

- Designed historic landscapes such as parks and gardens
- Rural historic landscapes with continuity in their traditional use (farming, hunting/fishing, sports/recreation)
- Historic districts
- Historic sites that feature outdoor spaces such as yards and plazas
- Cemeteries

Since the universe of properties in the APE will include many thousands of buildings and structures, identification efforts will focus on properties greater than 45 years of age, in areas that have not been surveyed within the last 10 years, and limited to historic properties and potential historic properties that may reasonably be affected by the undertaking. Previously recorded resources that were determined ineligible for listing in the NRHP will be excluded from further identification and evaluation efforts.

Historic properties will be identified in two ways. First, NASA KSC, supported by SEARCH, will compile an inventory of previously recorded cultural resources within the APE that are listed, eligible for listing, potentially eligible for listing, and unevaluated for listing in the NRHP. NASA KSC will use the FMSF database as well as the Integrated Cultural Resource Management Plans from both KSC and the Cape Canaveral Space Force Station. Additionally, county property appraiser databases will be queried to identify unrecorded historic aboveground resources within the APE. Parcel data contains built year information, which can be cross-referenced with recorded resources to identify parcels that contain structures 45 years old or older without recorded resources. Historic maps and aerial photographs will be used to examine land use and development changes over time, and a historic context will be developed for the APE. Data will be further supplemented with information on unrecorded cultural resources provided by consulting parties and the public. The cumulative data will be used to develop a Geographic Information System heat map within the APE to identify areas with high concentrations of unrecorded structures that are 45 years old or older. These data sets will be used to identify and create a list of properties that will be subject to survey fieldwork. The preliminary inventory data are provided in Enclosure 2.

Second, fieldwork will be conducted with three primary objectives:

1) Conduct a windshield survey guided by the heat map discussed above, in order to identify potential historic properties.

2) Complete FMSF documentation for potential historic properties identified during the windshield survey that have a reasonable possibility to be adversely affected by the undertaking. The architectural historians will identify and photograph potential historic properties that appear to embody historic significance established in the historic context. They will also identify and document the character-defining features that are indicative of NRHP eligibility and that may be susceptible to adverse effects, as discussed in Section 1.2. All newly recorded resources will be assumed NRHP-eligible, for the purposes of Section 106 consultation.

3) Revisit NRHP-listed or eligible historic properties that are individually eligible for the NRHP and that have with a reasonable possibility to be adversely affected to reassess their integrity.

A technical report presenting the results of the identification of historic properties will be prepared and submitted to you for review.

Consultation

Please let me know if your Tribe would like to participate as a Consulting Party in the Section 106 process and if there are properties of religious or cultural importance to your Tribe within the Project Area. Early identification of Tribal concerns will allow NASA and FAA to consider ways to avoid and minimize potential impacts to Tribal resources and practices. Your timely response will greatly assist us in incorporating your comments into project planning.

If you have any questions or need further information on the project, please contact me at 321-867-8454 or via email at katherine.s.zeringue@nasa.gov.

Sincerely,

Katherine Zeringue Digitally signed by Katherine Zeringue
Date: 2024.12.20 16:15:26 -05'00'

Katherine Zeringue
KSC Cultural Resources Manger
Environmental Planning

Enclosures:

1. LC-39A Infrastructure Figure
2. Supplemental Background Information for the SpaceX Starship Super Heavy Launch and Reentry Vehicles Proposed Action at Launch Complex-39A, Kennedy Space Center

cc:
Mr. Turner Hunt, Tribal Historic Preservation Officer

Enclosure 1. LC-39A Infrastructure

TECHNICAL MEMORANDUM

SUPPLEMENTAL BACKGROUND INFORMATION FOR THE SPACEX STARSHIP SUPER HEAVY LAUNCH AND REENTRY VEHICLES PROPOSED ACTION AT LAUNCH COMPLEX-39A, KENNEDY SPACE CENTER

CONSULTANT:	SEARCH
AUTHORS:	Timothy Parsons, PhD; William Werner, MA; Gypsy Brafford, PhD
CLIENT:	Leidos
DATE:	December 2024
SEARCH PROJECT #:	240265

This technical memorandum presents supplementary background information in support of consultation between the National Aeronautics and Space Administration's Kennedy Space Center (NASA KSC) and the Florida State Historic Preservation Officer (SHPO) pursuant to Section 106 of the National Historic Preservation Act of 1966 as part of the Federal Aviation Administration's (FAA) environmental review for the proposed action for the SpaceX Starship Super Heavy Launch and reentry vehicles at KSC. Southeastern Archaeological Research, LLC (SEARCH) completed this cultural resources desktop study on behalf of Leidos, SpaceX, and FAA to provide additional information regarding the proposed area of potential effects (APE), known historic properties within the APE, and the approach for evaluating effects to previously unidentified historic properties within the APE.

1.1 AREA OF POTENTIAL EFFECTS

Area of potential effects means the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking [36 CFR 800.16(d)]. For launch operations, the FAA has typically selected a noise contour for a specific propulsion/engine noise level and/or a specific sonic boom/overpressure, because rocket noise has the greatest geographical extent of all of the potential sources of alterations to historic properties from launches (including landings and reentries).

In defining the APE for rocket launches, it is important to consider engine noise levels that may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register of Historic Places (NRHP) in a manner that would diminish the integrity of the property's setting or feeling. For projects at federal launch complexes, such as KSC, this typically is not an issue because of the historical nature of rocket launches occurring at the project site.

The APE considers the auditory and vibratory effects of the Starship Super Heavy Launch and reentry activities covered under the Federal Aviation Administration's operating license and is predicated on vibratory impacts based on data provided by SpaceX and prepared by Leidos. Vibratory impacts can be quantified using the Maximum Unweighted Sound Level (Bradley et al. 2020:3). Based on a study of structural damage during rocket static firing tests, Maximum Unweighted Sound Levels at 111 decibels (dB) result in one damage claim per 1,000 structures exposed, and levels at 120 dB result in one damage claim per 100 structures (Bradley et al. 2020:5). The National Academy of Sciences' "Guidelines for Preparing Environmental Impact Statements on Noise" (National Academy of Sciences 1977) state that one may conservatively consider all sound lasting more than one second with levels exceeding 130 dB (unweighted) as potentially damaging to structures. Vibratory impacts from sonic boom overpressure are quantified in pounds per square foot (psf). Studies have shown that damage from sonic booms is highly unlikely when structures are exposed to levels under 2 psf (Haber et al. 1989). However, when exposed to levels between 2 and 4 psf, structural components, including glass and plaster, demonstrate damage at a higher rate than expected due to natural wear in well-maintained structures (Haber et al. 1989).

In summary, for rocket launch undertakings at federal launch complexes, the FAA recommends defining the APE using a peak sound pressure level of 130 dB for operations with launches only or 2 psf overpressure for operations with launches and landings. In cases with both launches and landings, the total extent of both areas should be used to define the APE when one does not fully encompass the other. Additionally, effects analyses should be conducted on the resources for both launch noise and landing noise impacts to the respective identified resources.

Based on this information and previous research regarding rocket engine noise and vibration effects to structures, the APE was established as areas subjected to greater than or equal to 130 dB or overpressure levels of 2 psf associated with sonic booms (**Figure 1** and **Figure 2**) (Fenton and Methold 2016, Guest and Slone 1972, Haber et al. 1989).

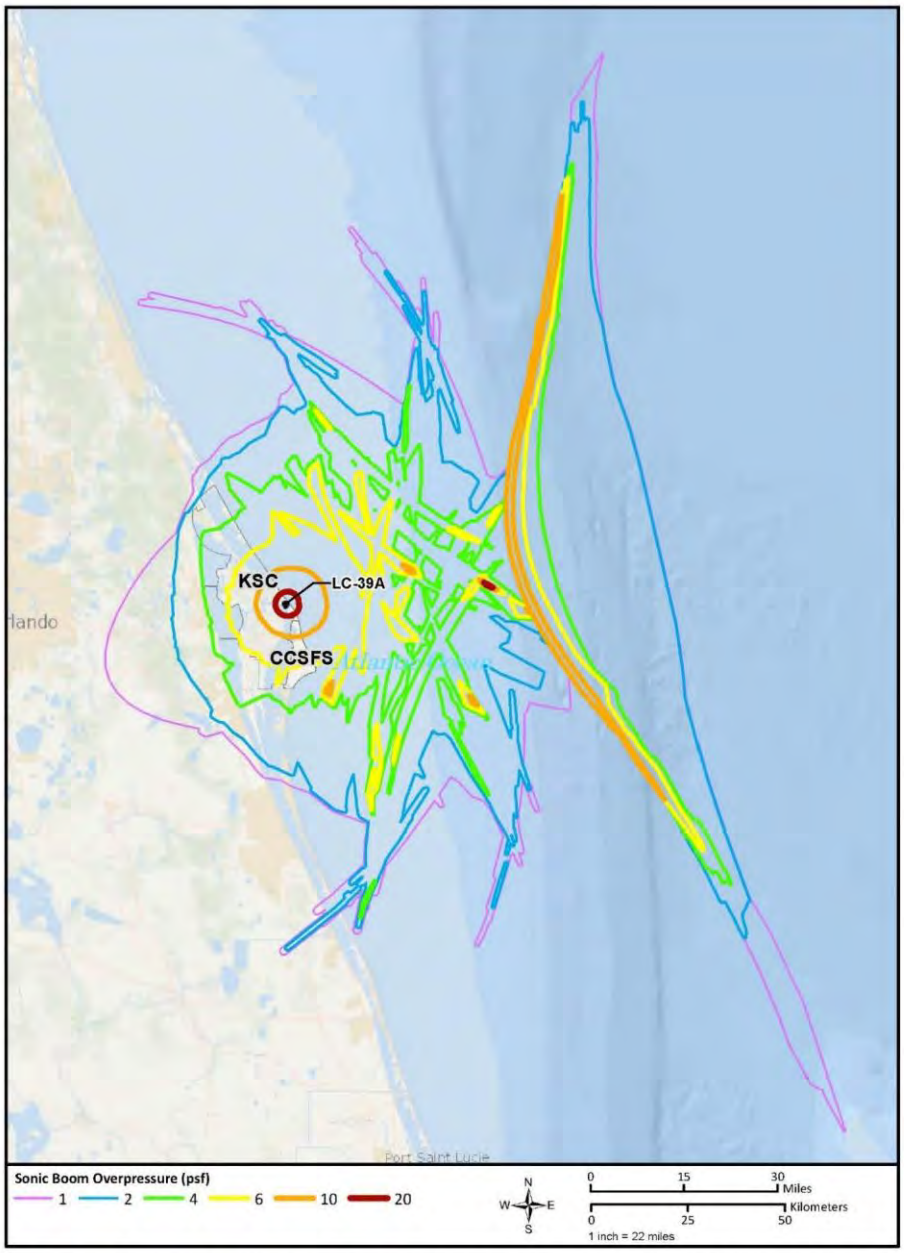

Figure 1. Sonic boom overpressure map for the Project area. The APE is defined as the area within the 2 psf contour (blue line) (Figure provided by Leidos).

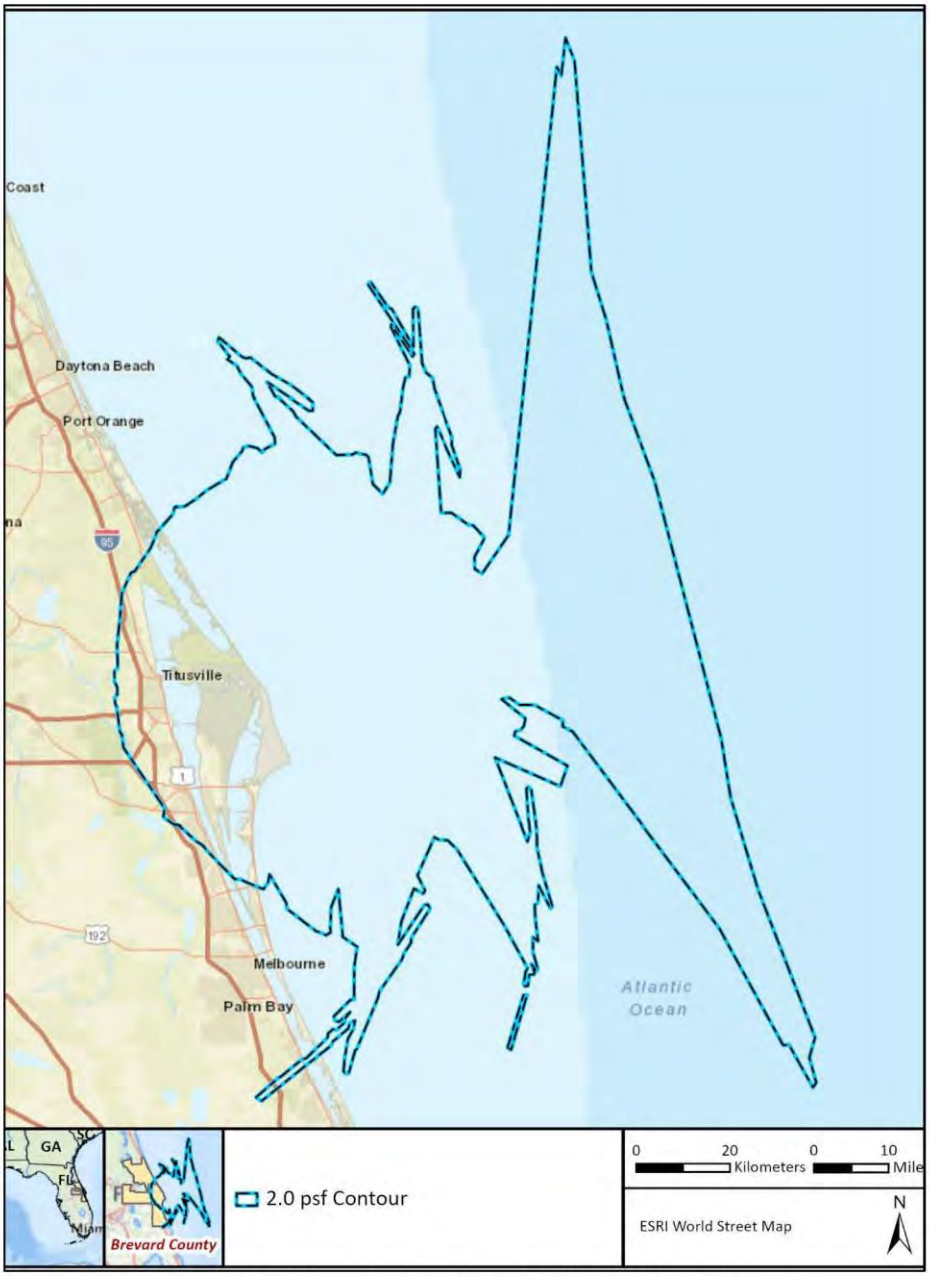

Figure 2. The APE, including portions of Brevard, Volusia, and Orange Counties.

1.2 POTENTIAL FOR ADVERSE EFFECTS

Per 36 Code of Federal Regulations 800.5, a federal undertaking has an adverse effect on a historic property when it diminishes one or more aspects of integrity to the extent that the property no longer conveys its significance per Criteria A–D for listing in the NRHP. NRHP eligibility is defined in 36 Code of Federal Regulations 60.4, under the authority of the National Historic Preservation Act of 1972, as amended:

> The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and,
>
> A. that are associated with events or activities that have made a significant contribution to the broad patterns of our history; or
> B. that are associated with the lives of persons significant in our past; or
> C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> D. that have yielded, or may be likely to yield, information important in prehistory or history.

The increased vibratory impacts from the proposed project have the potential to cause adverse effects to cultural resources. High sound pressure levels and vibrations have the potential to cause building/structural damage. In general, however, structural damage to buildings due to propulsion/engine noise is rare. The historic building element "most susceptible to damage from launch vehicle noise [are] windows, and more infrequently, plastered walls and ceilings" (Nocerino et al. 2021:15). Masonry buildings and structures are most susceptible to vibration damage through the "wearing of joints...which can cause load to be redistributed due to a weakening of a structural member" (National Cooperative Highway Research Program [NCHRP] 2012:35). Further, vibration effects may be greatest to "non-structural building elements [such as] fragile glass, loose plaster mosaics or pieces of stone" (NCHRP 2012:36). Previous analysis also indicates "wood and steel are more elastic than masonry, such as brick and stone" (NCHRP 2012:2). Therefore, increased exposure to vibration may diminish the integrity of a resource's significant historic features.

Sonic booms also have the potential to result in structural damage. A large degree of variability exists in the possible effects of a sonic boom. For example, the probability of a window breaking when exposed to a sonic boom of 1 psf ranges from one in a billion to one in a million (Sutherland 1990) with much of the variability depending on the condition of the glass. At 10 psf, the probability of glass breaking is between 1 in 100 and 1 in 1,000. Laboratory tests involving glass have shown that properly installed glass will not break at overpressures below 10 psf, even when exposed to repeated sonic booms (White 1972). Damage to plaster has the potential to occur in

the same range of overpressures as damage to glass. Plaster often cracks due to shrinkage over time or due to structural settling. Sonic boom damage to plaster often occurs when internal stresses are already high as a result of these processes. In general, for well-maintained structures, the threshold for potential damage from sonic booms is 2 psf; below 2 psf, damage is unlikely (Haber and Nakaki 1989).

Archaeological resources consisting solely of surface scatters or subsurface deposits are not likely to be affected by the vibratory effects of increased sonic boom exposure due to the protective qualities of the surrounding soil matrix (Nocerino et al. 2021). Vibratory effects may be greater on historic resources, particularly those elements that predate the mid-twentieth century and were not designed or built with the impacts of the aeronautical industry in mind.

The National Park Service (NPS) provides guidelines for interpreting the seven aspects of integrity (location, design, setting, materials, workmanship, feeling, and association) as they relate to the potential effects of an undertaking (NPS 1995:45). The effects of the undertaking are unlikely to impact the location or association of historic properties within the APE. As noted above, there are limited circumstances in which the effects of vibration may result in damage to aboveground structures. Such damage may potentially affect the design, materials, and workmanship of historic properties, particularly as they relate to exterior and ornamental detailing.

Additionally, the setting and feeling of historic properties may be temporarily altered by the visual, audible, and vibratory effects of the undertaking. Setting refers to the physical environment of a resource, while feeling refers to the aesthetic qualities of a resource as they relate to the specific time during which the resource became significant. There are specific types of cultural resources for which aspects of setting and feeling are more likely to represent important components of historic integrity, such as archaeological sites with aboveground features, historic districts and landscapes, and cemeteries.

1.3 PREVIOUSLY RECORDED CULTURAL RESOURCES WITHIN THE APE

The Florida Master Site File (FMSF), maintained by the Florida Division of Historical Resources, is the primary repository for information regarding cultural resources (archaeological sites, cemeteries, buildings, bridges, linear resources [e.g., highways, railroads, canals], districts, and landscapes) that have been formally documented in Florida, typically as a result of compliance with federal, state, or municipal historic preservation statutes. SEARCH performed a query of the FMSF Geographic Information System database in December 2024 to provide the background information discussed below. Alternate sources that will be consulted to create an inventory of previously recorded cultural resources will include the NRHP database, the Integrated Cultural Resource Management Plans for KSC and the Cape Canaveral Space Force Station, and information provided by consulting parties and members of the public. Procedures for identifying additional cultural resources that have not been previously recorded are discussed in the subsequent section.

The query of the FMSF database indicated that there are 2,964 previously recorded cultural resources within the APE, including 465 archaeological sites, 2,315 structures, 31 cemeteries, 122 resource groups (including building complexes, districts, landscapes, and linear resources), and 31 historic bridges. The following sections provide overviews of each of the resource categories present within the FMSF database, including discussion of the attributes most likely to be affected by the proposed project.

1.3.1 Structures

Historic structures include architectural resources such as residential, commercial, and public buildings, as well as other elements of the built environment. To be considered significant,

> the structure must represent a part of history, architecture, archeology, engineering, or culture of an area, and it must have the characteristics that make it a good representative of properties associated with that aspect of the past. (NPS 1995:7)

The FMSF database review identified 2,315 previously recorded buildings within the APE; at least 40 have been destroyed and will not be included in further analyses. Twenty-four buildings are listed in the NRHP, 324 have been evaluated eligible for listing, seven are potentially eligible for listing, 836 are not eligible for listing, and the remaining 1,084 have not been evaluated for eligibility. Though these historic structures are distributed throughout the APE, many are concentrated around the cities of Titusville and Cocoa Beach, or are associated with KSC, Cape Canaveral Space Force Station, or Patrick Space Force Base. **Table 1** summarizes the extant NRHP-listed and -eligible structures located on nonfederal lands within the APE. An additional 1,053 structures located on nonfederal lands have yet to be evaluated and are not included in the table.

Of the 1,439 buildings that are listed, eligible for listing, potentially eligible for listing, or have not been evaluated for NRHP eligibility, at least 545 recorded structures are composed at least in part of masonry materials such as brick, concrete, stone, and structural clay tile. As discussed above, these materials are less elastic than metal or wood and may be particularly susceptible to vibratory impacts. However, minor damage may not necessarily result in an adverse effect to these resources unless it diminishes the character-defining aspects of integrity that contribute to the eligibility of these structures. Because the remaining 876 buildings were either determined ineligible for listing in the NRHP or recorded as destroyed, it can be reasonably assumed that impacts to these resources, if any, would be insignificant.

Table 1. Structures within the APE that are NRHP-Listed or -Eligible.

Site	Site Name	Year Built	Style	NRHP Status
BR00172	Launch Complex 39	1968	Other	Listed
BR00177	St. Gabriel's Episcopal Church	1887	Gothic Revival, ca. 1840–present	Listed
BR00211	Porcher, E P House	1916	Georgian Revival, ca. 1880–present	Listed
BR00278	Cocoa Junior High	ca. 1924	Masonry Vernacular	Listed
BR00282	Aladdin Theater Building	1924	Italian Renaissance Rev ca. 1880-1935	Listed

Site	Site Name	Year Built	Style	NRHP Status
BR00397	Wager House	ca. 1891	Frame Vernacular	Listed
BR00399	Robbins, George, Judge House	ca. 1892	Georgian Revival, ca. 1880–present	Listed
BR00425	422 Julia St.	1926	Mission	Eligible
BR00426	428 Julia St.	1905	Masonry Vernacular	Eligible
BR00430	423 Main St.	ca. 1910	Frame Vernacular	Eligible
BR00454	La Grange Church and Cemetery	1869	Frame Vernacular	Listed
BR00465	Brevard County Courthouse	ca. 1912	Neo-Classical Revival, ca. 1880–1940	Eligible
BR00468	Palm Ave	1925	Mission	Eligible
BR00480	Spell House	ca. 1911	Queen Anne (Revival), ca. 1880–1910	Listed
BR00524	Pritchard House	1891	Queen Anne (Revival), ca. 1880–1910	Listed
BR00581	St. Luke's Episcopal Church	1889	Frame Vernacular	Listed
BR00681	825 Osceola Dr.	ca. 1926	Mediterranean Revival, ca. 1880–1940	Eligible
BR00724	Caldwell, Troy E. Residence	ca. 1905	Georgian Revival, ca. 1880–present	Eligible
BR00730	1277 Rockledge Dr.	ca. 1915	Frame Vernacular	Eligible
BR00860	Hill, Dr. George E, House	ca. 1880	Frame Vernacular	Listed
BR01163	Lamar, Mattie House	1917	Frame Vernacular	Eligible
BR01657	City Point Community Church	1885	Frame Vernacular	Listed
BR01658	Hotel Mims	ca. 1889	Frame Vernacular	Listed
BR01684	Vehicle Assembly Building (VAB)	ca. 1966	No style	Listed
BR01685	Launch Control Center (LCC)	ca. 1966	International, ca. 1925–present	Listed
BR01688	Missile Crawler Transporter Facilities	ca. 1965	Not applicable	Listed
BR01690	Press Site: Clock and Flag Pole	1969	No style	Listed
BR01693	Operations Checkout (O&C)	ca. 1964	International, ca. 1925–present	Listed
BR01702	Field, J.R. Homestead	ca. 1900	Frame Vernacular	Listed
BR01723	Cocoa Cemetery Storage Building	ca. 1931	Masonry Vernacular	Eligible
BR01739	Ashely's Café & Lounge	ca. 1932	Tudor Revival, ca. 1890–1940	Eligible
BR01741	Rockledge Gardens Nursery & Landscaping	ca. 1930	Industrial Vernacular	Eligible
BR01744	Harvey's Groves	ca. 1939	Masonry Vernacular	Eligible
BR01765	Bohn Equipment Company	ca. 1927	Industrial Vernacular	Eligible
BR01825	Cocoa Post Office	1940	Art Deco, ca. 1920–1940	Listed
BR01988	Landing Aids Control Building (LACB)	ca. 1976	Industrial Vernacular	Eligible
BR01991	Orbiter Processing Facility (OPF)	ca. 1977	Industrial Vernacular	Eligible
BR01992	Orbiter Processing Facility High Bay 3	1987	Industrial Vernacular	Eligible
BR01994	Thermal Protection System Facility	ca. 1988	Industrial Vernacular	Eligible
BR01995	Launch Complex 39: Pad A	ca. 1965	Not applicable	Eligible
BR01997	Rotation/Processing Building	1982	Industrial Vernacular	Eligible
BR01998	SRB ARF Manufacturing Building	1986	Industrial Vernacular	Eligible
BR02010	Launch Complex 39: Pad B	ca. 1966	Not applicable	Eligible
BR02016	Canister Rotation Facility	ca. 1993	Industrial Vernacular	Eligible
BR02021	Mobile Launcher Platform	ca. 1963	Not applicable	Eligible
BR02671	Space Station Processing Facility	1992	Industrial Vernacular	Eligible
BR02704	400 Lucerne Dr	ca. 1966	Other	Eligible
BR02779	317 Rosa Jones Drive	ca. 1962	Masonry Vernacular	Eligible
BR02908	NLAX 170	ca. 1985	Not applicable	Eligible

Site	Site Name	Year Built	Style	NRHP Status
BR02969	Engineering Development Laboratory	1966	No style	Eligible
BR02990	Beach House	1962	No style	Eligible
BR03046	Foam Building	ca. 1965	Masonry Vernacular	Eligible
BR03955	2460 Courtenay Parkway N	ca. 1965	Mid-Century Modern, ca. 1940s–early 1960s	Eligible
BR04215	Imperial Towers	ca. 1963	Mid-Century Modern, ca. 1940s–early 1960s	Listed

1.3.2 Building Complexes, Districts, and Landscapes

The FMSF classifies several types of cultural resources that consist of individual resources grouped into building complexes, districts, and landscapes. The FMSF includes 51 building complexes, districts, and landscapes within the APE that are listed (n = 8), eligible (n = 32) potentially eligible (n = 1), or unevaluated (n = 10) for listing in the NRHP (**Table 2**). Of these, five are archaeological districts, two are designed historic landscapes, nine are FMSF building complexes, 33 are historic districts, and two are mixed districts. Of the 40 NRHP-listed or -eligible resources within this group, most are late nineteenth- to twentieth-century historic districts (n = 20) or building complexes (n = 2) located on Cape Canaveral and associated with the aeronautical industry. These include 12 launch complexes, two test facilities, and various operations support facilities. The remaining 18 NRHP-listed or -eligible resources within this group include aeronautical facilities in Titusville (n = 5), Satellite Beach (n = 2), and at Patrick Space Force Base (n = 3). Although Cape Canaveral Air Force Station (8BR00216) is not formally listed in the NRHP and is therefore not included in the sum of listed properties above, it was designated a National Historic Landmark in 1984.

Potential effects to archaeological districts and archaeological components to "mixed" districts will be included in the discussion of archaeological sites below; the current section focuses on districts and landscapes containing aboveground elements. A historic district draws its significance from the density of historic resources within it, rather than from the individual significance of a resource. A contributing resource is one that adds to a historic district's context and integrity. A district is further composed of resources unified through common historical themes or architectural types or styles (NPS 1999:6). A contributing resource adds to these overall themes not necessarily by possessing individual significance, but rather by its expression of historic integrity. Given that the potential for physical damage from the effects of the undertaking is limited to very few individual buildings, as discussed above, it is unlikely that the undertaking would significantly alter the integrity of a historic district's materials, design, and workmanship. Analysis of effects to historic districts and building complexes within the APE will focus on those that are not associated with the aeronautical industry because these are more likely to contain physical elements that may be susceptible to vibration damage or have historical associations expressed through integrity of setting and feeling that may be affected by the visual and audible effects of the undertaking.

A designed historic landscape

> has significance as a design or work of art; was consciously designed and laid out by a master gardener, landscape architect, architect or horticulturalist to a design principle, or an owner or other amateur using a recognized style or tradition; has a historical association with a significant person, trend, event, etc." (Keller and Keller n.d:2)

Examples of designed historic landscapes include estate grounds, zoological gardens, plazas or other public spaces, city planning, battlefield parks and outdoor recreation areas (such as golf courses, stadiums, and racetracks). There are no NRHP-listed designed historic landscapes within the APE, but the PAFB Airfield (8BR02439) is eligible, and the Rockledge Country Club (8BR02143) has not been evaluated for NRHP eligibility. Analysis of potential effects to these designed historic landscapes will consider whether they have contributing physical elements that maintain integrity of design, materials, and workmanship that could be susceptible to vibration damage and how their aspects of setting and feeling may be affected by the visual and audible effects of the undertaking.

Table 2. Districts and Landscapes within the APE that are Listed, Eligible, or Unevaluated for Listing in the NRHP.

Site	Site Name	Classification	Time Period	NRHP status
BR00216	Cape Canaveral Air Force Station	FMSF building complex	1950-present	National Historic Landmark
BR00238	Canaveral Town	Archaeological district	1921-1940	Not evaluated
BR00560	Titusville Commercial District	Historical district	1880-1929	Listed
BR00564	Cocoa Historic District	Historical district	1861-1899	Not evaluated
BR01611	Rockledge Drive Residential District	Historical district	1880-1929	Listed
BR01612	Valencia Subdivision Residential District	Historical district	1921-1929	Listed
BR01613	Barton Avenue Residential District	Historical district	1880-1897	Listed
BR01686	Launch Complex 39: Pad A	Historical district	1950-present	Listed
BR01687	Launch Complex 39: Pad B	Historical district	1950-present	Listed
BR01975	Banana River Naval Air Station Seaplane	Historical district	1939-1989	Potentially eligible
BR01986	Shuttle Landing Facility Area HD	Historical district	1969 to 2010	Eligible
BR01990	Orbiter Processing Historic District	Historical district	1969 to 2010	Eligible
BR01996	Solid Rocket Booster Disassembly and Refurbishment Historic District	Historical district	1969 to 2010	Eligible
BR02022	Launch Complex 21/22	Historical district	1900–present	Eligible
BR02033	Cape Canaveral Lighthouse Station District	Mixed district	Precontact; 1861–1865; 1894–present	Not evaluated

Site	Site Name	Classification	Time Period	NRHP status
BR02143	Rockledge Country Club Resource Group	Designed historic landscape	1927–1957	Not evaluated
BR02170	PAFB Missile Instrumental Station	Historical district	1950–present	Eligible
BR02181	Bommarc - Sage Radome Facility	FMSF building complex	1945-1991	Eligible
BR02188	Launch Complex 9 Resource Group	FMSF building complex	1900–present	Eligible
BR02198	Launch Complex 13	Historical district	1956–1966	Eligible
BR02209	Launch Complex 14	Historical district	1950–present	Eligible
BR02234	Launch Complex 3 & 4	Historical district	1900–present	Eligible
BR02248	Launch Complex 1-2	Historical district	1900–present,	Eligible
BR02260	Launch Complex 19	Historical district	1956–1966	Eligible
BR02272	Launch Complex 30	FMSF building complex	1950–present	Eligible
BR02279	Launch Complex 34	Historical district	1961–1971	Eligible
BR02369	Launch Complex 17	Historical district	1957–1960	Eligible
BR02438	PAFB Landplane Facilities District	FMSF building complex	1945–1991	Eligible
BR02439	PAFB Airfield	Designed historic landscape	1950–present	Eligible
BR02440	PAFB Landplane Administrative District	FMSF building complex	1945–1991	Eligible
BR02518	Launch Complex 25	Historical district	1958–1969	Eligible
BR02529	Launch Complex 29	Historical district	1958–1969	Eligible
BR02535	Launch Complex 31/32	FMSF building complex	1900–present	Not evaluated
BR02540	Fuel Storage Area 3	Historical district	1952–present	Eligible
BR02935	Titusville Downtown Residential Historic	Historical district	1821–present	Not evaluated
BR03031	Area 55: Delta Operations Support Area	Historical district	1956–1980	Eligible
BR03034	Delta II Solid Rocket Motor Area	Historical district	1963–1965	Eligible
BR03036	Delta Spin Test Facility	Historical district	1966–2010	Eligible
BR03052	LC 5/6 Spin Test Facility	Historical district	1900–present	Eligible
BR03073	CCAFS Industrial Area	Historical district	1958–present	Eligible
BR03186	Skid Strip Historic District	Historical district	1950–present	Eligible
BR03345	Cocoa Maintenance Yard	FMSF building complex	1900–present	Not evaluated
BR03369	CCAFS Industrial Area Historic District	Historical district	1946–1989	Eligible
BR03407	Carpenter Homes Complex	FMSF building complex	1950–present	Not evaluated
BR03433	Control Tower Road Tracking Sites	Historical district	1950–present	Eligible
BR03921	Richard E. Stone Historic District	Historical district	Unknown	Not evaluated
BR04000	Cape Fish Company	Archaeological district	1900–present	Eligible
BR04229	Jonathan H. Sams Farmstead	Mixed district	Precontact	Eligible
VO00259	North Mosquito Lagoon Archaeological District	Archaeological district	Precontact	Not evaluated
VO02569	Ross Hammock Complex	Archaeological district	Precontact; nineteenth century	Listed

Site	Site Name	Classification	Time Period	NRHP status
VO09407	Elliot Plantation Complex	Archaeological district	British colonial; US territorial period	Eligible

1.3.3 Cemeteries

Table 3 summarizes the 31 cemeteries within the APE that are recorded in the FMSF database. Six have been evaluated eligible for listing in the NRHP, while the remaining 25 have not been evaluated. One of the NRHP-eligible cemeteries, La Grange Cemetery (BR04541), is associated with the NRHP-listed La Grange Church (BR00454). Approximately half of the FMSF-recorded cemeteries within the APE serve African American and Native American populations. Eight are federally owned cemeteries associated with the Cape Canaveral Space Force Station, and at least seven are privately owned.

NPS guidelines state that cemeteries are typically ineligible for listing in the NRHP; however, they may be eligible if they are associated with persons of outstanding historical importance or are connected to important historical events. The materials, design, and workmanship evident in grave markers and the organization of burial grounds may reflect unique perspectives of ethnic and cultural groups in ways that can contribute to the eligibility of a cemetery. Furthermore, the analysis of the effects of the undertaking will consider whether setting and feeling potentially contribute to the eligibility of the cemeteries within the APE, as these aspects of integrity may be disrupted by visual, audible, and vibratory effects of the undertaking.

Table 3. Recorded Cemeteries in the APE.

Site	Site Name	Year Established	Ownership	Ethnicity	Status	NRHP Status
BR00186	Campbell-Jackson Cemetery	1913	Federal	African American	Maintained but not used	Not evaluated
BR00191	African American Graves/New Haulover 2	1880	Federal	African American	Maintained but not used	Not evaluated
BR00233	Cape Road Cemetery	ca. 1894	Federal	White, non-Hispanic	Abandoned	Not evaluated
BR00552	Historic Negro Cemetery	Unknown	Private-individual	African American	Abandoned	Not evaluated
BR01624	Emma Watton	ca. 1882	Federal	White, non-Hispanic	Maintained but not used	Not evaluated
BR01626	Crook/Watton	1915	Federal	White, non-Hispanic	Maintained but not used	Not evaluated
BR01631	Griffis	1897	Federal	White, non-Hispanic	Unspecified by surveyor	Not evaluated
BR01705	Pioneer Cemetery	ca. 1890	Private-community	White, non-Hispanic	Used	Eligible
BR01724	Hilltop Cemetery	ca. 1887	City	African American	Used	Eligible
BR01777	Cocoa Cemetery	ca. 1890	City	White,	Used	Eligible

Site	Site Name	Year Established	Ownership	Ethnicity	Status	NRHP Status
				non-Hispanic		
BR01979	City Point Cemetery	1878	Private-individual	African American, Native American, white, non-Hispanic	Maintained but not used	Not evaluated
BR02352	Fac. 77903-Burnham Family Cemetery	ca. 1866	Federal	White, non-Hispanic	Abandoned	Not evaluated
BR02354	Fac. 60201-Penny Family Cemetery	ca. 1890	Federal	White, non-Hispanic	Abandoned	Not evaluated
BR02355	Quarterman North	ca. 1920	Federal	White, non-Hispanic	Maintained but not used	Not evaluated
BR02356	Quarterman South	1869	Federal	White, non-Hispanic	Maintained but not used	Not evaluated
BR02357	Facility 6403-Osmon Grave	ca. 1913	Federal	White, non-Hispanic	Abandoned	Eligible
BR02358	Fac. 6405-Canaveral Fish Company Grave	1913	Federal	Other	Abandoned	Eligible
BR02401	White Lilly	ca. 1892	Private	African American	Used	Not evaluated
BR02406	Mt. Carmel Missionary Baptist Church Cem	ca. 1915	Unknown	African American	Unspecified by surveyor	Not evaluated
BR02411	Dennis Sawyer Cemetery	1956	Private	African American	Maintained but not used	Not evaluated
BR02785	Evergreen Memorial Cemetery	1942	Unknown	White, Non-Hispanic	Used	Not evaluated
BR02786	Canaveral Groves Cemetery	1884	County	White, Non-Hispanic	Used	Not evaluated
BR02808	Pinecrest Colored Cemetery	1949	Private-corporate/ nonprofit	African American	Used	Not evaluated
BR03000	Pinecrest Cemetery	1929	Private-corporate/ nonprofit	White, Non-Hispanic	Used	Not evaluated
BR03334	Fisher Plot	ca. 1884	Private-individual	Other	Maintained but not used	Not evaluated
BR03366	Fac. 77901-Wilson Brothers Cemetery	ca. 1940	Federal	White, Non-Hispanic	Abandoned	Not evaluated
BR04310	Pluckebaum's Tomb	ca. 1937	Private	White, Non-Hispanic	Unspecified by surveyor	Not evaluated
BR04482	Davis Memorial Cemetery	1956	Unknown	African American	Unspecified by surveyor	Not evaluated
BR04541	La Grange Cemetery	1875	Unknown	Unknown	Used	Eligible
BR04574	Oak Ridge Cemetery	ca. 1916	Private-corporate/ nonprofit	African American	Used	Not evaluated
BR04630	Georgiana Cemetery (aka Crooked Mile)	ca. 1884	Unknown	African American	Used	Not evaluated

1.3.4 Archaeological Sites

An archaeological property can be a precontact or postcontact district, site, structure or object. To be eligible for listing in the NRHP, an archaeological property should have local, state, or national significance, and qualities of integrity, which include location, design, setting, materials, workmanship, feeling and association (Little et al. 2000). Archaeological sites are usually eligible under NRHP Criterion D (yield or likely to yield important information), but they can be eligible under any of the criteria.

The FMSF database includes 465 previously recorded archaeological sites within the APE, including five submerged historic shipwrecks. Of these 465 previously recorded sites, one is listed in the NRHP, 40 have been evaluated eligible for listing in the NRHP, six have been evaluated potentially eligible for listing in the NRHP, and 122 have been evaluated ineligible for listing in the NRHP. The remaining 296 have not been evaluated for NRHP eligibility. As described above, the anticipated effects of the undertaking are limited to rare instances of physical damage to aboveground resources, as well as temporary visual, audible, or vibratory interruptions to historic setting and feeling. Most archaeological sites, consisting of scattered remains on or below the ground surface, are protected from vibration damage by the surrounding soil matrix (or by water in the case of maritime sites) and already lack integrity of setting and feeling. However, some archaeological sites may have preserved aboveground structural features. Furthermore, setting and feeling may be important aspects at sites that feature landscape elements, such as mounds or earthworks (Little et al. 2000:36). The 343 sites within the APE that are listed, eligible for listing, potentially eligible for listing, or have not been evaluated for NRHP eligibility were reviewed to identify those that potentially include these attributes. This review identified 103 sites, which are summarized below. The 122 sites previously found to be ineligible for listing in the NRHP presumably lack integrity, significant historical associations, or information potential; therefore impacts to these sites are not likely to be significant.

Table 4 summarizes the 103 archaeological sites that are eligible for listing, potentially eligible for listing, or have not been evaluated for NRHP listing and that also feature aboveground components or landscape features. Of these 103 sites, 43 are precontact Native American mounds, and the remaining 60 are the aboveground remains of houses, mills, historic forts, or other aboveground built structures. In total, 19 of the 103 archaeological sites summarized below are considered eligible for NRHP listing. Of these 19 sites, 15 are historic structures, which largely consist of aeronautical facilities, such as the Former NAA Control Tower Site (8BR03534) and Lighter-Than-Aircraft Factory (BR02477), and industrial facilities, such as the Ross Hommock Evaporation Plant (8VO00213) and Sugar Mill Ruins at Elliot Plantation (8VO00160). The remaining four are precontact burial mounds with associated midden deposits, including the Ross Hammock Mounds (8VO00131) and Haulover Sand Mound and Midden (A, B) (8BR01673).

Table 4. NRHP-Eligible and Unevaluated Archaeological Sites within the APE with Potential Aboveground or Landscape Features.

Site ID	Site Name	Site Type	NRHP Status
BR03279	Beachside Midden	Land (terrestrial)	Not evaluated
BR03335	Fac. 17200: Weather Theodolite Pad B	Building remains	Eligible

Site ID	Site Name	Site Type	NRHP Status
BR03336	Fac. 1331: Telemetry ELSEE 12-110-PL	Building remains	Eligible
BR03337	Fac. 1333B:Beat-Beat DOVAP 14-110-PLM	Building remains	Eligible
BR03338	Fac. 1333A:Beat-Beat DOVAP 14-110-PR	Building remains	Eligible
BR03339	Fac. 1334: Telemetry ELSEE 12-110-PRS	Building remains	Eligible
BR03341	Facility 74610: Camera Pad	Building remains	Eligible
BR00009	Indian Mound Station	Precontact burial(s)	Eligible
BR00031	Unknown	Precontact mound(s)	Not evaluated
BR00062	Moore Mound	Precontact midden(s)	Not evaluated
BR00063	Sams Mound	Land (terrestrial)	Not evaluated
BR00065	Unknown	Precontact mound(s)	Not evaluated
BR00066	Unknown	Precontact mound(s)	Not evaluated
BR00069	Unknown	Precontact burial mound(s)	Not evaluated
BR00072	Fairyland/Honeymoon Hill	Precontact burial mound(s)	Not evaluated
BR00077	Nauman's Place	Precontact burial(s)	Not evaluated
BR00078	Dummett's Place	Building remains	Not evaluated
BR00078B	Dummett Homestead	Building remains	Potentially eligible
BR00083	De Soto Grove Burial Mound	Land (terrestrial)	Eligible
BR00084	Unknown	Historic fort	Not evaluated
BR00085	Burns	Habitation (precontact)	Not evaluated
BR00086	Holmes Mound	Building remains	Eligible
BR00087	Gulbransen Mound	Habitation (precontact)	Not evaluated
BR00088A	Hammock Mound A	Habitation (precontact)	Not evaluated
BR00088B	Hammock Mound B	Habitation (precontact)	Not evaluated
BR00088C	Hammock Mound C	Habitation (precontact)	Not evaluated
BR00089	Norris Mound	Habitation (precontact)	Not evaluated
BR00090	Fuller Mound A	Precontact burial mound(s)	Not evaluated
BR00091	Fuller Mound B	Precontact burial mound(s)	Not evaluated
BR00092	Fuller Mound C	Precontact mound(s)	Not evaluated
BR00093	Fuller Mound D	Precontact burial mound(s)	Not evaluated
BR00094	Fuller Mound E	Precontact mound(s)	Not evaluated
BR00095	Fuller Mound F	Precontact mound(s)	Not evaluated
BR00142	Butler Campbell's Mound	Precontact burial(s)	Not evaluated
BR00150	Oyster Prong Creek Mound	Precontact burial mound(s)	Not evaluated
BR00151	Unknown	Precontact burial mound(s)	Not evaluated
BR00156	Unknown	Precontact mound(s)	Not evaluated
BR00162	Fairyland Hill Burial Mound	Precontact burial mound(s)	Not evaluated
BR00175	Fort Ann	Historic fort	Not evaluated
BR00205	Max Hoeck Mound and Midden	Precontact midden(s)	Not evaluated
BR00206	Pepper Hammock	Campsite (precontact)	Not evaluated
BR00223	Quarterman	Building remains	Not evaluated
BR00234	Old Lighthouse	Building remains	Not evaluated
BR00238A	Canaveral Town Site B	Building remains	Not evaluated

Site ID	Site Name	Site Type	NRHP Status
BR00238B	Canaveral Town Site C	Building remains	Not evaluated
BR00238C	Canaveral Town Site D	Building remains	Not evaluated
BR00238D	Canaveral Town Site E	Building remains	Not evaluated
BR00239	Stinktown and Jeffords	Building remains	Potentially eligible
BR00240	Hotel	Industrial	Not evaluated
BR00243	Pier Road Houses	House	Not evaluated
BR00243B	Pier Road Houses Site B	Building remains	Not evaluated
BR00243C	Pier Road Houses Site C	Building remains	Not evaluated
BR00540	Daigle Place	Building remains	Not evaluated
BR00544	Lopex Orchard	Building remains	Not evaluated
BR00567	UWF 3	Homestead	Not evaluated
BR01639	NS BR 4	Building remains	Not evaluated
BR01670	Haulover Canal Midden	Building remains	Not evaluated
BR01673	Haulover Sand Mound and Midden (A,B)	Precontact mound(s)	Eligible
BR02351	Murray Parcel	Farmstead	Not evaluated
BR02365	Fac. 1330B: Beat-Beat DOVAP 12-110-PLM	Building remains	Eligible
BR02396	Fac. 1343: East Compass Rose	Building remains	Eligible
BR02400	Ulumay Lagoon	Habitation (precontact)	Not evaluated
BR01855	Harry T. Moore Site	Building remains	Not evaluated
BR01872	Sam's Site	Agriculture/farm structure	Eligible
BR01933	Little Midden	Building remains	Eligible
BR01935	Lone Cistern	Building remains	Not evaluated
BR02052	Fac 1222 CZR Camera Pad U15R146	Building remains	Not evaluated
BR02053	Fac 36900: GLOTRAC Site	Building remains	Not evaluated
BR02054	Fac. 114-G: LC-25 Warning Horn Site	Building remains	Not evaluated
BR02055	Facility 1212-CZR Camera Site U36R175	Building remains	Not evaluated
BR02078	Pace's Landing	Building remains	Not evaluated
BR02160	FIM Van Site S-5	Building remains	Not evaluated
BR02161	Facility 1209-Rate Antenna Pad A	Building remains	Not evaluated
BR02165	Facility 289 - Flame Attenuation Site	Building remains	Not evaluated
BR02166	James W. Merchant Homestead	Building remains	Not evaluated
BR02167	Facility 1126: Telemetry ELSSE	Building remains	Not evaluated
BR02229	Clifton Schoolhouse	Agriculture/farm structure	Not evaluated
BR02477	Lighter-Than-Air Craft Factory	Building remains	Eligible
BR02507	Taylor House	Homestead	Not evaluated
BR02508	Hunters Camp	Building remains	Not evaluated
BR02509	Palm Hammock	Building remains	Not evaluated
BR02513	Facility 1390: Theodolite Tower 1.40	Building remains	Not evaluated
BR02514	Facility 1090 Security Police Bldg	Building remains	Not evaluated
BR02680	Klondike Beach Tower Ruins (2311.12)	Building remains	Not evaluated
BR03048	Old MacDonald's Farm	Farmstead	Not evaluated
BR03152	Clark Slough Earthwork	Precontact mound(s)	Not evaluated
BR03274	The Dunal Ridge Midden	Precontact mound(s)	Not evaluated
BR03534	Former NAA Control Tower Site	Building remains	Eligible
BR03998	CCAFS Facility 1430 - SHANICLE Building	Building remains	Not evaluated
IR00994	Sam Dale	Farmstead	Not evaluated
OR00008	Long Bluff 3	Precontact burial mound(s)	Not evaluated
OR10652	Streetman Cabin	Building remains	Not evaluated

Site ID	Site Name	Site Type	NRHP Status
VO02599	Mosquito Lagoon House of Refuge	Building remains	Not evaluated
VO00112	Castle Windy Midden	Precontact burial(s)	Not evaluated
VO00129	Scobey Place	Precontact burial mound(s)	Not evaluated
VO00131	Ross Hammock-Mounds	Precontact burial mound(s)	Eligible
VO00148	Griffis Place	Precontact burial mound(s)	Not evaluated
VO00149	Oak Hill Mound	Campsite (precontact)	Not evaluated
VO00160	Sugar Mill Ruins – Elliot Plantation	Building remains	Eligible
VO00213	Ross Hammock – Evaporation Plant	Building remains	Eligible
VO05312	CANA 26	Specialized procurement site	Not evaluated
VO08887	V-1 Impoundment	Land-terrestrial	Not evaluated
VO08936	Voorhees Midden	Campsite (precontact)	Not evaluated

1.3.5 Linear Resources

The FMSF includes 49 linear resources within the APE, two of which are listed in the NRHP. Fifteen have been evaluated eligible for listing in the NRHP, 24 have been evaluated ineligible for listing in the NRHP, and eight have not been evaluated for listing in the NRHP (**Table 5**). The two NRHP-eligible linear resources within the APE are the Old Haulover Canal (8BR00188), which connects the Indian River to Mosquito Lagoon north of Merritt Island, and Crawlerway (8BR01689), which connects the Vehicle Assembly Building (BR01684) and two launch pads (BR01686 and BR01687) at Launch Complex 39 at the KSC. The 24 eligible or unevaluated linear resources include canals and associated structures (n = 5), railroads (n = 5), roads (n = 8), trails (n = 3), and paved runways (n = 3) associated with aeronautical facilities. These include some of the oldest roads on Merritt Island (8BR04227 and 8BR04228) and sections of the Hernandez Capron Trail (8BR01766 and BR01924), which was built in part to forcefully remove the Seminole from south Florida during the Second and Third Seminole Wars. The linear resources within the APE that are associated with modern transportation uses and industrial aeronautical facilities are engineered to withstand frequent impacts and are unlikely to be affected by the undertaking. Linear resources dating to earlier historic periods typically consist of features at or below the ground surface and often lack physical integrity, so they are unlikely to be affected by the undertaking.

Table 5. Linear Resources within the APE that are NHRP-Listed, Eligible, or Unevaluated.

Site	Site Name	Classification	Date Established	NRHP status
BR04534	S Range Road Canal	Canal	Twentieth century	Not evaluated
BR00188	Old Haulover Canal	Canal	Late eighteenth–early nineteenth century	Listed
BR01689	Crawlerway	Runway	Late twentieth century	Listed
BR01766	Hernadez Trail	Trail	Mid-nineteenth century	Eligible
BR01870	Florida East Coast Railroad	Railroad	Early to mid nineteenth century	Eligible
BR01914	St. Johns Indian River RR/Tramway	Railroad	Nineteenth century	Eligible
BR01924	Old Dixie Highway	Road	Nineteenth century	Eligible
BR01987	Shuttle Landing Facility Runway	Runway	Late twentieth century	Eligible
BR02193	Magruder Road	Road	Late nineteenth–early twentieth century	Not evaluated
BR02230	New Smyrna to Haulover Canal Road	Road	Nineteenth century	Eligible
BR02258	New Haulover Canal	Canal	Nineteenth century	Not evaluated
BR02336	Facility 50305: Skid Strip	Runway	Mid to late twentieth century	Eligible
BR02363	Canaveral Beach Canal	Canal	Early twentieth century	Not evaluated
BR02544	Old Highway A-1-A	Road	Early twentieth century	Not evaluated
BR02931	NASA Railroad at Kennedy Space Center	Railroad	Mid to late twentieth century	Eligible
BR02932	NASA KSC Railroad System HD	Railroad	Mid to late twentieth century	Eligible
BR02936	Canaveral Lock	Lock	Mid to late twentieth century	Eligible
BR03051	Indian River Drive	Road	Nineteenth century	Not evaluated
BR04191	ICBM Road	Road	Mid-twentieth century	Eligible
BR04227	Homesteaders' Trail	Trail	ca. 1879	Eligible
BR04228	North Tropical Trail	Trail	ca. 1879	Eligible
BR04504	Pluckebaum Road Canal	Canal	1936–1943	Not evaluated
VO08606	Florida East Coast Railroad	Railroad	Nineteenth century	Eligible
VO08880	New Smyrna to Haulover Canal Road	Road	Nineteenth century	Eligible
VO09406	Plantation Road	Road	Nineteenth century	Not evaluated

1.3.6 Bridges

In total, 31 historic bridges are included in the FMSF database. Five of these historic bridges have been evaluated eligible for listing in the NRHP, 24 have been evaluated ineligible for listing in the NRHP, and the remaining two have not been evaluated for listing in the NRHP. A summary of NRHP-eligible and unevaluated historic bridges is provided in **Table 6**. The historic bridges within the APE were constructed in the twentieth century, and all but one are still in use. The four eligible bridges are located along roads that facilitate access to Merritt Island: two (BR01699,

BR02906) span the Indian River to the west, one spans the New Haulover Canal between the Indian River and Mosquito Lagoon to the north (BR02957), and the other spans the Banana River to the east of Merritt Island (BR02955). The eligible or unevaluated bridges within the APE are unlikely to be affected by the undertaking because they have been engineered for durability and frequent use by modern trains or motor vehicles; their construction dates range from 1948 to 1965.

Table 6. NHRP-Eligible and Unevaluated Historic Bridges within the APE.

Site	Site Name	Year Built	Ownership	Material	Status	NRHP Status
BR01699	Indian River Bridge	1948	County	Concrete, steel	Destroyed	Eligible
BR02906	Jay Jay Bridge	ca. 1963	Federal	Concrete, steel	In use	Eligible
BR02955	Banana River Bridge	1964	Federal	Steel	In use	Eligible
BR02957	Haulover Canal Bridge	1965	Federal	Steel	In use	Eligible
BR03015	Girard Blvd / Navigable Sykes Creek	1962	County	Concrete	In use	Not evaluated
VO10381	FDOT Bridge No. 790004	ca. 1956	State	Steel	In use	Not evaluated

1.4 Proposed Approach to the Identification of Previously Unrecorded Historic Properties

This approach is designed to make a reasonable and good faith effort to identify historic properties within the APE that may be affected by the undertaking. Because the properties in the APE will include thousands of buildings and structures, identification efforts will focus on properties greater than 45 years of age, in areas that have not been surveyed within the last 10 years, and limited to those historic properties and potential historic properties that may reasonably be affected by the undertaking. Previously recorded resources that were determined ineligible for listing in the NRHP will be excluded from further identification and evaluation efforts.

Historic properties will be identified in two ways. First, NASA KSC, supported by SEARCH, will compile an inventory of previously recorded cultural resources within the APE that are listed in, eligible for, potentially eligible for, and unevaluated for listing in the NRHP. NASA KSC will use the FMSF database and Integrated Cultural Resource Management Plans from both KSC and the Cape Canaveral Space Force Station. Additionally, county property appraiser databases will be queried to identify unrecorded historic aboveground resources within the APE. As illustrated in **Figure 3**, parcel data contains built year information, which can be cross-referenced with recorded resources to identify parcels that contain structures 45 years old or older without recorded resources. Historic maps and aerial photographs will be used to examine land use and development changes over time, and a historic context will be developed for the APE. Data will be supplemented with information on unrecorded cultural resources provided by consulting

parties and the public. The cumulative data will be used to develop a Geographic Information System heat map of the APE to identify areas with high concentrations of unrecorded structures that are 45 years old or older. These data sets will be used to identify and create a list of properties that will be subject to survey fieldwork. The preliminary inventory data are provided in this document.

Second, fieldwork will be conducted with three primary objectives:

1) Conduct a windshield survey guided by the heat map discussed above, in order to identify potential historic properties.

2) Complete FMSF documentation for potential historic properties identified during the windshield survey that have a reasonable possibility to be adversely affected by the undertaking. The architectural historians will identify and photograph potential historic properties that appear to embody historic significance established in the historic context. They will also identify and document the character-defining features that are indicative of NRHP eligibility and that may be susceptible to adverse effects, as discussed in Section 1.2. All newly recorded resources will be assumed NRHP-eligible, for the purposes of Section 106 consultation.

3) Revisit NRHP-listed or eligible historic properties that are individually eligible for the NRHP and that have with a reasonable possibility to be adversely affected to reassess their integrity.

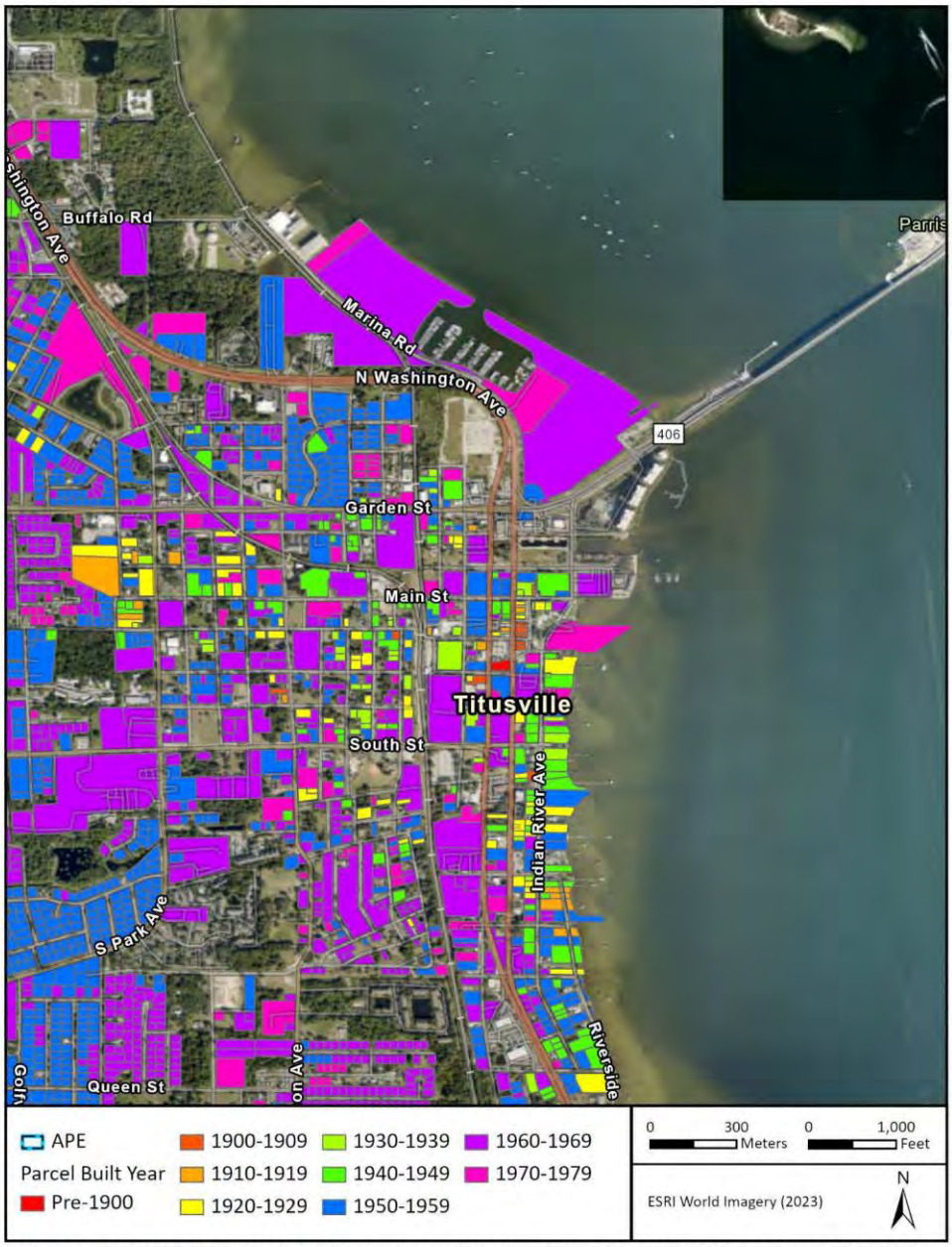

Figure 3. Brevard County parcel data illustrating variation in construction dates within and around Titusville, which lies within the APE.

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Example NHPA Section 106 Consulting Party Consultation Invitation Letter

National Aeronautics and Space Administration

John F. Kennedy Space Center
Kennedy Space Center, FL 32899

December 20, 2024

Reply to Attn of: SI-E3

Brad Parrish
Community Development Director
City of Titusville
555 South Washington Ave
Titusville, FL 32796

Subject: SpaceX Starship Super Heavy Launch and Reentry Vehicles at Launch Complex-39A, Kennedy Space Center

Dear Mr. Parrish:

The National Aeronautics and Space Administration's Kennedy Space Center (NASA KSC) is inviting your organization to participate as a Consulting Party, pursuant to Section 106 of the National Historic Preservation Act of 1966, for the Federal Aviation Administration's (FAA) environmental review for the proposed action for the SpaceX Starship and Super Heavy launch and reentry vehicles at Launch Complex-39A (LC-39A). Under the supervision of the FAA's Office of Commercial Space Transportation, SpaceX is preparing an Environmental Impact Statement (EIS) to evaluate the potential impacts of proposed infrastructure construction, and ground, launch, and reentry operations associated with the Starship Super Heavy launch and reentry vehicles at LC-39A. Because SpaceX plans to apply to the FAA's Office of Commercial Space Transportation for a vehicle operator license for Starship Super Heavy, the EIS will conform to the FAA's National Environmental Policy Act (NEPA) implementing policy, FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures,* regarding the potential infrastructure construction, ground operations, launch, and reentry-related impacts. NASA KSC is acting as the lead federal agency for compliance with Section 106 of the NHPA. As such, Section 106 will be conducted pursuant to the 2009 *Programmatic Agreement Among the National Aeronautics and Space Administration, John F. Kennedy Space Center, Advisory Council on Historic Preservation, and the Florida State Historic Preservation Officer: Regarding Management of Historic Properties at the Kennedy Space Center,* or any subsequent version thereof.

If you are unfamiliar with the Section 106 consultation process or the role of a Consulting

Party, please review the Advisory Council on Historic Preservation's *Protecting Historic Properties: A Citizen's Guide to Section 106 Review* which can be found at: https://www.achp.gov/protecting-historic-properties.

Description of the Undertaking

The undertaking involves issuance of a vehicle operator license by the FAA's Office of Commercial Space Transportation that will facilitate ground, launch, and reentry operations associated with the SpaceX Starship Super Heavy at LC-39A. Specifically, this would include up to 44 launches of Starship Super Heavy per year; return of the first stage booster to LC-39A; return of Starship to LC-39A; and construction of an air separation unit for liquid oxygen and liquid nitrogen, on-site natural gas liquefaction production and cryogenic liquid storage capability, roadway improvements, other associated infrastructure, and a catch tower (see **Enclosure 1**).

Area of Potential Effects

The area of potential effects (APE) considers any physical, visual, or auditory effects that the project may have on historic properties(1). As such, the APE has been developed to consider both a construction APE and an operational APE. The construction APE is limited within the existing boundaries of LC-39A. Additionally, it is anticipated that proposed new construction associated with the operation of the Starship Super Heavy will be compatible with the characteristic of other launch complex infrastructure and will not pose view shed effects to historic properties. The operational APE considers the auditory effects of the Starship Super Heavy launch activity as well as the overpressure effects of the sonic boom generated during atmospheric reentry. FAA guidance stipulates consideration of a 130 decibel (dB) threshold for launch effects and a 2.0 pounds per square foot (psf) threshold for effects from the sonic boom. Based on this information, and previous research regarding rocket engine noise and vibration effects to structures, the APE was established as any area subjected to greater than or equal to 2.0 psf sonic booms (see **Enclosure 2, Figure 2**). This area also encompasses the 130 dB threshold for launch effects, as well as the construction APE.

**Historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria. 36 CFR 800.16(l)*

Initial Identification of Historic Properties and Proposed Identification Efforts

The proposed identification approach is designed to make a reasonable and good faith effort to identify historic properties within the APE that may be affected by the undertaking. Effects related to construction will be limited within the footprint of LC-39A. This area has already been subject to survey and evaluation and will not require additional studies. The fieldwork and analysis will therefore focus on historic properties subject to the potential effects of elevated noise and vibrations associated with the undertaking.

The undertaking has the potential to affect historic properties from increased vibratory

impacts. According to data provided by SpaceX, launch and reentry events are estimated to result in Lmax levels of 130 dB and/or sonic boom impacts of 2 psf or higher within the APE. Archaeological resources consisting solely of either surface scatters or subsurface deposits are not likely to be affected by the vibratory effects of increased sonic boom exposure due to the protective qualities of the surrounding soil matrix. Similarly, underwater archaeological sites are unlikely to be affected. However, vibratory effects may be greater on historic age resources within the built environment. Architectural elements most susceptible to damage from launch and reentry vehicle noise include windows and, infrequently, plastered walls and ceilings. Vibration effects may be greatest to non-structural elements such as fragile glass and loose plaster/stone ornamentation. The enclosed memorandum provides additional information on this summation of the potential for vibratory effects on cultural resources (see **Enclosure 2**).

Previously Recorded Resources Within the APE

Historic properties within the construction APE include the Launch Complex 39 Pad A Historic District (**8BR1686**) which is listed in the National Register of Historic Places (NRHP). The historic district is the first of two launch pads constructed by NASA in the 1960s to accommodate the Saturn V launch vehicle for Apollo missions and modified in the 1970s to accommodate the Space Shuttle Program. The historic district contains 23 extant contributing resources all used to support launch operations. One contributing resource, Launch Complex 39 Pad A (**8BR1995**), is also individually listed in the NRHP. No archaeological sites have been recorded or documented within LC-39A.

A preliminary assessment of the operational APE, using data contained in the Florida Master Site File (FMSF), identified 2,964 previously recorded resources, including 2,315 structures, 31 bridges, 465 archaeological sites, 31 cemeteries, and 122 resource groups. Of these, 35 properties are listed in the NRHP and 353 have been evaluated as eligible (see **Enclosure 2**).

Approach for the Identification of Historic Properties

In 2010, NASA KSC completed HAER documentation of the LC-39A historic district and its associated contributing resources. As such, LC-39A is well documented and no further identification or evaluation of LC-39A is proposed.

Identification efforts will focus on historic properties that may be subject to physical damage from elevated noise and vibrations as well as cultural resources whose setting and feeling may be affected by audible and acoustic effects during launch and reentry activities. This will include buildings and structures within the APE that were not specifically designed to withstand the concussive forces of launching and landing spacecraft. Additionally, there are specific types of cultural resources for which aspects of setting and feeling are more likely to represent important components of historic integrity. These types of cultural resources potentially include:

- Designed historic landscapes such as parks and gardens
- Rural historic landscapes with continuity in their traditional use(farming, hunting/ fishing, sports/recreation)
- Historic districts
- Historic sites that feature outdoor spaces such as yards and plazas
- Cemeteries

Since the universe of properties in the APE will include many thousands of buildings and structures, identification efforts will focus on properties greater than 45 years of age, in areas that have not been surveyed within the last 10 years, and limited to historic properties and potential historic properties that may reasonably be affected by the undertaking. Previously recorded resources that were determined ineligible for listing in the NRHP will be excluded from further identification and evaluation efforts.

Historic properties will be identified in two ways. First, NASA KSC, supported by SEARCH, will compile an inventory of previously recorded cultural resources within the APE that are listed, eligible for listing, potentially eligible for listing, and unevaluated for listing in the NRHP. NASA KSC will use the FMSF database as well as the Integrated Cultural Resource Management Plans from both KSC and the Cape Canaveral Space Force Station. Additionally, county property appraiser databases will be queried to identify unrecorded historic aboveground resources within the APE. Parcel data contains built year information, which can be cross-referenced with recorded resources to identify parcels that contain structures 45 years old or older without recorded resources. Historic maps and aerial photographs will be used to examine land use and development changes over time, and a historic context will be developed for the APE. Data will be further supplemented with information on unrecorded cultural resources provided by consulting parties and the public. The cumulative data will be used to develop a Geographic Information System heat map within the APE to identify areas with high concentrations of unrecorded structures that are 45 years old or older. These data sets will be used to identify and create a list of properties that will be subject to survey fieldwork. The preliminary inventory data are provided in Enclosure 2.

Second, fieldwork will be conducted with three primary objectives:

1) Conduct a windshield survey guided by the heat map discussed above, in order to identify potential historic properties.

2) Complete FMSF documentation for potential historic properties identified during the windshield survey that have a reasonable possibility to be adversely affected by the undertaking. The architectural historians will identify and photograph potential historic properties that appear to embody historic significance established in the historic context. They will also identify and document the character-defining features

that are indicative of NRHP eligibility and that may be susceptible to adverse effects, as discussed in Section 1.2. All newly recorded resources will be assumed NRHP-eligible, for the purposes of Section 106 consultation.

3) Revisit NRHP-listed or eligible historic properties that are individually eligible for the NRHP and that have with a reasonable possibility to be adversely affected to reassess their integrity.

NASA KSC has two requests. First, please provide NASA KSC with any information your organization has about cultural resources within the APE that may need to be a part of the identification effort and/or for which you have concerns regarding project effects. Second, **please respond in writing to confirm your participation as a Consulting Party for this project by January 24, 2025**. If you decline to be a Consulting Party or do not respond by the deadline, no further Section 106 consultation materials will be forwarded to your organization. However, your organization will still have the opportunity to review and comment on materials available to the public on FAA's project website at: https://www.faa.gov/space/stakeholder_engagement/spacex_starship_ksc/.

Cultural resource information and/or Consulting Party participation responses should be emailed to Katherine.s.zeringue@nasa.gov. If you have any questions or require further assistance, please contact me at 321-867-8454.

Sincerely,

Katherine Zeringue Digitally signed by Katherine Zeringue
Date: 2024.12.23 11:52:14 -05'00'

Katherine Zeringue
KSC Cultural Resource Manager
Environmental Planning

Enclosures:
1. LC-39A Infrastructure Figure
2. Supplemental Background Information for the SpaceX Starship Super Heavy Launch and Reentry Vehicles Proposed Action at Launch Complex-39A, Kennedy Space Center

cc:
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KSC/AD/D. Thorpe
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Enclosure 1. LC-39A Infrastructure