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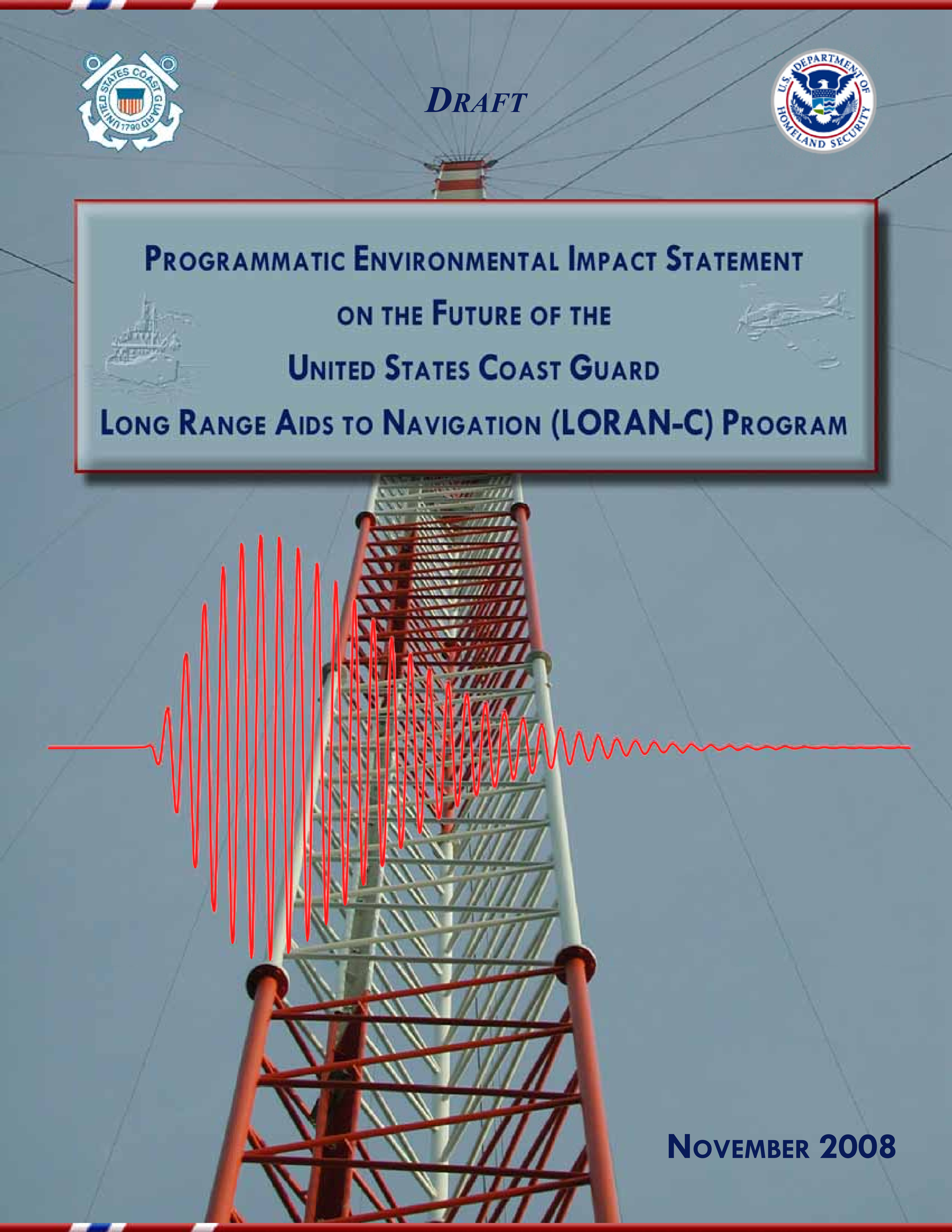
Programmatic Environmental Impact Statement on the Future of the United States Coast Guard Long Range Aids to Navigation (LORAN-C) Program



November 2008

Abbreviations and Acronyms

$\mu g/m^3$	micrograms per cubic meter
ACM	Asbestos-containing material
AIS	Automatic Identification System
APE	area of potential effect
AQCR	Air Quality Control Region
AST	aboveground storage tank
ATONIS	Integrated Aids to Navigation Information System
BLM	Bureau of Land Management
BMP	Best Management Practice
C&D	construction and demolition
C3	command, control, and communications
CAA	Clean Air Act
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resources System
CCZ	U.S. Coastal Confluence Zone
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIM	Commandant Instructions Manual
CMI	Commandant Instruction
CO	carbon monoxide
COMDTINST	Commandant Instruction
COMDTPUB	Commandant Publication
CONUS	Continental United States
CTIA	Cellular Telecommunications Industry Association
CWA	Clean Water Act
CY	Calendar Year
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
dB	decibel
dBA	A-weighted decibel
DHS	U.S. Department of Homeland Security
DOD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DOT	Department of Transportation
EA	Environmental Assessment
EECEN	Electronics Engineering Center
EEZ	exclusive economic zone
EIS	Environmental Impact Statement
eLORAN	Enhanced LORAN
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communication Commission
FEMA	Federal Emergency Management Agency
FPPA	Farmland Protection Policy Act
FRP	Federal Radionavigation Plan
ft^2	square feet
GPS	Global Positioning System
GSA	General Services Administration
HABS	Historic American Building Survey
HEA	harbor entrance and approach
HSWA	Hazardous and Solid Waste Amendment
HVAC	Heating, Ventilation, and Air Conditioning
IFR	Instrument Flight Rule
ILS	Instrument Landing System
kH	kilo Hertz
kVA	kilovolt amperes
kW	kilowatt
LBP	lead-based paint
LDC	LORAN Data Channel
LORAN–C	Long Range Aids to Navigation
LOS	Level of Service
LSU	LORAN Support Unit
MBTA	Migratory Bird Treaty Act
MDA	Maritime Domain Awareness
mg/m^3	milligrams per cubic meter
MHLS	Maritime Homeland Security
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MTS	Master Transmitting Stations
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAIS	Nationwide Automatic Identification System
NAS	National Airspace System
NAVCEN	Navigation Center

continued on inside back cover→

USCG DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

FOR

Future of the United States Coast Guard
Long Range Aids to Navigation (LORAN–C) Program

DOT DOCKET NUMBER: USCG-2007-28460

PREPARED BY: engineering-environmental Management, Inc. (e^2M) for
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ABSTRACT: This Programmatic Environmental Impact Statement (PEIS) provides an assessment of the potential environmental impacts associated with the future of the U.S. Coast Guard (USCG) LORAN–C Program. The Preferred Alternatives include Automate, Secure, Unstaff, and Transfer management of the LORAN–C Program to another Government agency; and Automate, Secure, Unstaff, and Transfer management of the LORAN–C Program to another Government agency to deploy an eLORAN system.

DATE OF PUBLICATION:

DATE COMMENTS MUST BE RECEIVED:

Date		Title/Position
16 DEC 2008	*Bob I. Feigenblatt, Commander, USCG* — Preparer/Environmental Project Manager	Technical Program Manager, CG-54132
22 DEC 2008	*Mr. Ed Wandelt* — Environmental Reviewer	Chief, Environmental Management

In reaching my decision on the USCG's proposed action, I will consider the information contained in EIS on environmental impacts.

Date		Title/Position
30 Dec 2008	*James A. Watson, Rear Admiral, USCG* — Responsible Official	Director Of Prevention Policy

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PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT
ON THE FUTURE OF THE USCG LORAN–C PROGRAM

Docket Number: USCG-2007-28460

Prepared By: U.S. Coast Guard (USCG) and their contractor, engineering-environmental Management, Inc. (e²M).

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Abstract: This Programmatic Environmental Impact Statement (PEIS) provides an assessment of the potential environmental impacts associated with the future of the USCG Long Range Aids to Navigation (LORAN–C) Program. LORAN is a radionavigation system first developed during World War II and operated by the USCG. The current system (LORAN–C) is a low-frequency hyperbolic radionavigation system approved for use in the U.S. Coastal Confluence Zone and as a supplemental air navigation aid. The LORAN–C signal can be used for navigation, location, and timing services for civilian and military air, land, and marine users. LORAN–C is approved as an en route supplemental air navigation system for both Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) operations. The USCG North American LORAN–C signal is transmitted from 18 LORAN–C stations and 17 monitoring sites in the Continental United States, and 6 LORAN–C stations and 7 monitoring sites in Alaska.

Five alternatives are analyzed in this PEIS: The No Action Alternative; Decommission the USCG LORAN–C Program and Terminate the North American LORAN–C Signal; Automate, Secure, and Unstaff LORAN–C stations; Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency; and Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an enhanced LORAN (eLORAN) System. This PEIS examines the direct, indirect, and cumulative impacts associated with each alternative on 12 resource areas: noise, air quality, earth resources, water resources, biological resources, cultural resources, visual resources, land use, infrastructure, hazardous substances, socioeconomics and environmental justice, and transportation and navigation.

Date of Publication: November 2008

Draft

PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT (PEIS)

ON THE

FUTURE OF THE UNITED STATES COAST GUARD LONG RANGE AIDS TO NAVIGATION (LORAN–C) PROGRAM

Prepared for

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Contract No.: BPA HSCG23-07-A-EEB013
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Executive Summary

Introduction

This Programmatic Environmental Impact Statement (PEIS) assesses the potential environmental impacts of a range of options associated with the future of the U.S. Coast Guard (USCG) Long Range Aids to Navigation (LORAN–C) Program. LORAN is a radionavigation system first developed during World War II and operated by the USCG. The current system (LORAN–C) is a low-frequency hyperbolic radionavigation system approved for use in the U.S. Coastal Confluence Zone and as a supplemental air navigation aid. The LORAN–C signal can be used for navigation, location, and timing services for civilian and military air, land, and marine users. LORAN–C is approved as an en route supplemental air navigation system for both Instrument Flight Rule and Visual Flight Rule operations. The USCG North American LORAN–C signal is transmitted and monitored from 18 LORAN–C stations and 17 monitoring sites in the Continental United States and six LORAN–C stations and seven monitoring sites in Alaska.

Since 1997, the official policy of the U.S. Government has been to "operate the LORAN–C system in the short term while evaluating the long-term need for the system" (DOD *et al*. 2005). In April 2003, the USCG, Department of Transportation (DOT), and the Federal Aviation Administration (FAA) entered into a Memorandum of Agreement that the USCG would disestablish the system by the end of Fiscal Year 2008 if a national policy requiring LORAN–C as a multi-modal backup to the Global Positioning System (GPS) was not established. More recently, there has been a determination that an enhanced LORAN (eLORAN) system would be well-suited to provide a complementary means of positioning, navigation, and timing (PNT) for critical infrastructure reliant upon GPS to mitigate the effects of a GPS outage. While LORAN–C is no longer needed for maritime navigation, the system, with modifications, is well suited to field eLORAN. Therefore, upon enacting the Fiscal Year 2007, 2008, and 2009 Appropriations Acts for the U.S. Department of Homeland Security (DHS) and USCG, Congress has assumed continuation of LORAN–C until a coordinated agreement on the future of the program is reached by the Executive Branch.

Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to end or reduce USCG management of the LORAN–C Program. LORAN was conceived and built as a maritime aid to navigation. However, its maritime usefulness has greatly diminished with the development of GPS and its augmentation, differential GPS. The LORAN–C Program's primary beneficiaries are those organizations that use the LORAN–C signal as a backup source of timing or frequency control. Operation of the system as a backup to GPS does not fit within the framework of USCG missions of maritime homeland security, regulatory and law enforcement authority, military capabilities, and humanitarian operations. As such, the Executive Branch proposed ending or reducing USCG management of the LORAN–C Program by requesting, in the President's budget request for Fiscal Year 2009, transfer of the Program's funding to the DHS National Protections and Programs Directorate (NPPD) for development of a national backup for critical systems used in PNT. NPPD is the DHS component with responsibility for strengthening the nation's risk management efforts for critical infrastructure. eLORAN has been identified as the primary system to provide this national backup. The Fiscal Year 2009 Appropriations Act did not contain any LORAN-C specific language. However the Conference Committee agreed that the administration of the LORAN-C program could migrate to NPPD in preparation for conversion of LORAN-C operations to eLORAN. They also denied the request to transfer funding to NPPD because the Coast Guard will continue operation of the system in 2009. If a national policy resulting in the long-term retention of the system is established, the USCG would still seek to end its management of the LORAN–C Program and recommend transferring management of the program to another Government agency with broad responsibility for critical infrastructure protection. In the event the USCG cannot transfer the LORAN–C Program to another Government agency it would seek changes to reduce USCG management of the program.

Scope of the PEIS

The USCG is committed to ensuring compliance with the National Environmental Policy Act of 1969 (NEPA) while administering the LORAN–C Program. Therefore, the USCG is fulfilling the U.S. Government's environmental obligations by evaluating the range of alternatives being considered during efforts to obtain a coordinated agreement on the future of the Program.

This PEIS is a program-level document that will provide the USCG with high-level analysis of the potential impacts of each alternative on the human and natural environments. The USCG is the lead agency for determining the scope of this review and has determined that a PEIS will best meet its needs. The PEIS will comply with NEPA, the Council on Environmental Quality (CEQ) regulations in Title 40 Code of Federal Regulations (CFR) Parts 1500–1508, DHS Management Directive 5100.1 (*Environmental Planning Program*), and Coast Guard Commandant Instruction (COMDTINST) M16475.1D (*National Environmental Policy Act Procedures and Policy for Considering Environmental Impacts*). The geographic scope of the LORAN–C PEIS is those areas covered by the radionavigation system. Should the USCG end or reduce its involvement with the LORAN–C Program, the analysis provided in the PEIS would enable the USCG to prepare tiered documents on the disposition of each LORAN station, monitoring site, and other associated facilities.

This PEIS examines the direct, indirect, and cumulative impacts associated with each alternative for the future of the USCG LORAN–C Program. The purpose of this PEIS is to determine the potential environmental effects of each alternative, and to inform USCG decisionmakers, expert agencies, interested parties, and the public of the potential impacts. The PEIS satisfies USCG requirements under NEPA, the CEQ regulations for implementing NEPA, and USCG policy.

A programmatic environmental document, such as this PEIS, is prepared when an agency is proposing to carry out a broad action, program, or policy. Consistent with the CEQ regulations the USCG prepared this PEIS to address the Proposed Action at a programmatic level. The programmatic, or system-wide, approach creates a comprehensive analytical framework of the global assets associated with the program that can support subsequent analyses of specific actions at specific locations within the overall system. Site-specific impact assessment on the future of each LORAN–C Station is not practicable at the program development level because specific site alternatives for the future of the LORAN–C Program are unknown at this time.

Public Review and Comment

The USCG invites public participation in the NEPA process. Public participation opportunities are guided by CEQ regulations and policies of the USCG. Consideration of the views and information of all interested persons promotes open communication and enables better decisionmaking. All agencies, organizations, and individuals having an interest in the future of the USCG LORAN–C Program are urged to participate in the decisionmaking process.

A Notice of Intent (NOI) to prepare a PEIS was published in the *Federal Register* on July 17, 2007. The publication of the NOI initiated a 45-day public scoping period. The USCG also mailed an Interested Party letter to approximately 1,100 potentially interested parties including Federal, state, and local agencies; elected officials; stakeholders; and individuals. The Interested Party letters included a copy of the NOI. Informational open houses and public meetings concerning the development of this PEIS were held in Washington, D.C.; Juneau, Alaska; and Seattle, Washington, on August 15, 21, and 23, 2007, respectively. Comments received at the meeting were taken into consideration in development of this PEIS.

A Notice of Availability (NOA) of the Draft PEIS will be published in the *Federal Register*. The USCG will make the Draft PEIS available to the public for 45 days and will hold public meetings on the Draft PEIS. All comments received will be taken into consideration in development of the Final PEIS. Upon completion, the USCG will make the Final PEIS available to the public for 30 days. At the conclusion of the 30-day period, the USCG will issue a Record of Decision (ROD), which will be published in the *Federal Register*.

Documents related to this PEIS are available in a public docket accessible at *http://www.regulations.gov* under docket number **USCG-2007-28460**. Documents can also be viewed at the Document Management Facility, U.S. Department of Transportation, West Building, Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE, Washington, D.C., between 9 a.m. and 5 p.m. Monday through Friday, except Federal holidays. Throughout the PEIS development process, the public can obtain information on the status of the PEIS through the LORAN–C PEIS Web site at *http://loranpeis.uscg.e2m-inc.com/*.

Description of the Proposed Action and Alternatives

This section identifies the alternatives considered by the USCG. NEPA requires that any agency proposing a major Federal action (as defined at 40 CFR 1508.18) must consider reasonable alternatives to the Proposed Action. Evaluation of alternatives broadens the scope of reasonable ways to achieve the stated purpose and assists an agency in avoiding unnecessary impacts by analyzing reasonable options to achieve the purpose and need for the action.

No Action Alternative. The No Action Alternative refers to the current, existing conditions without implementation of the Proposed Action. The No Action Alternative is prescribed by the CEQ regulations (40 CFR 1502.14(d)) and serves as a benchmark against which impacts of Federal actions can be evaluated. Under the No Action Alternative, the LORAN–C signal would remain on air and LORAN–C Program operations would remain as they currently are with no change in staffing. Modernization of LORAN–C equipment would continue to keep the system operational. The current modernization started in 1999, and includes replacement of tube transmitters and signal control equipment.

Decommission the USCG LORAN–C Program and Terminate the North American LORAN–C Signal. Under this alternative, the USCG would end its management of the program and all USCG LORAN–C signals would be terminated at one time. All USCG LORAN–C stations, monitoring sites, and the LORAN Support Unit (LSU) would be decommissioned; LORAN artifacts, documents, and equipment would be removed; and USCG personnel would be reassigned. Other USCG programs could acquire the LORAN–C station, tower, and monitoring site property for its use. If no USCG or DHS program had a need for the property, it would be declared excess to the needs of the USCG following Federal guidelines on transfer of excess property. The disposition of each LORAN–C station would vary, ranging from transferring control or ownership of the property with such infrastructure as buildings, roads, piers, and airstrips intact, to returning the property to a natural state prior to its transfer. Returning the property to a natural state would entail removing existing structures, testing for and removing any contaminated soils, regrading to natural contours, and reseeding with natural vegetation.

If the USCG LORAN–C Program was decommissioned, the ability to upgrade the existing LORAN–C infrastructure to provide future eLORAN services or to mitigate the effects of a GPS outage would be lost. Positioning, navigation, and timing services to U.S. civilian and military vessels and aircraft would be provided primarily by the satellite-based GPS along with augmentations to GPS that increase its accuracy. As a backup to GPS, the National Airspace System (NAS) uses the following systems for air navigation: Very High Frequency Omnidirectional Range/Distance Measuring Equipment (VOR/DME), Instrument Landing System (ILS) and Aeronautical Nondirectional Beacons (NDB) for commercial purposes and Tactical Air Navigation (TACAN) for military purposes. These systems provide backup for landing aids, and in-flight navigation for FAA operations.

The 2005 Federal Radionavigation Plan (FRP) states that the Federal government will continue to operate the LORAN–C system in the short term while evaluating the long-term need for the system. This evaluation consists of determining the potential technical capability of eLORAN and a cost-benefit analysis of developing and operating eLORAN. DOT and FAA have determined that an eLORAN system could be technically capable of supporting non-precision approach operations for aviation users and harbor entrance and approach operations for maritime users (DOD *et al*. 2005). However, the 2005 FRP also states that "[w]ith respect to aviation, the FAA has determined that sufficient alternative navigational aids exist in the event of a loss of GPS-based services, and therefore Loran is not needed as a back-up navigation aid for aviation users….With respect to maritime safety, the USCG has determined that sufficient backups are in place to support safe maritime navigation in the event of a loss of GPS-based services, and therefore Loran is not needed as a back-up navigational aid for maritime safety" (DOD *et al*. 2005).

Automate, Secure, and Unstaff LORAN–C stations. Under this alternative, the USCG would continue to operate the LORAN–C Program but reduce its management of the program. The USCG would secure facilities and fully automate facilities in order to reduce staffing where practical. The LORAN–C stations would become LORAN sites operating unstaffed with preventive and corrective maintenance performed by off-site personnel that might be government or contract personnel. To the extent practical, the USCG would automate equipment; secure buildings to protect equipment, antenna, and antenna guides; and reassign personnel. Station doors would be upgraded and windows would be enclosed. Chain-link fence with a top guard would be constructed around the transmitter building, antenna base, locations where antenna guides are anchored into the ground, emergency generators, and electrical distribution equipment. LORAN–C Station Port Clarence would likely be moved to Nome. To facilitate unstaffing, the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. Under this alternative, the USCG would continue to modernize the LORAN–C system as necessary. Although this alternative would not fully meet the USCG's purpose and need, it would result in a substantial reduction in USCG personnel assigned to the LORAN–C Program and reduce personnel costs. A variation of this alternative would entail turning over LORAN–C operations to a private contractor under USCG management.

Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency. Under this alternative, the USCG would end its management of the program. The USCG would continue to operate the LORAN–C Program until the transfer to another agency or DHS component, such as NPPD. The LORAN–C signal would remain on the air but the USCG would begin to reduce staffing. This would allow for the reduction in operating costs for USCG in the short-term. Long-term benefits of transferring the program would allow USCG to reallocate all LORAN program costs. To the extent practical, the USCG would automate equipment; secure buildings and install fencing to protect equipment, antenna, and antenna guides; and reassign personnel. The LORAN–C stations would become LORAN sites operating unstaffed with preventive and corrective maintenance performed by off-site personnel. To facilitate un-staffing, LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. Under this alternative, until the Program is transferred the USCG would continue to modernize the LORAN–C system as necessary.

Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN system. The performance capabilities of the current system, LORAN–C are insufficient to backup GPS from a multi-modal radionavigation perspective. Under this alternative the USCG would end its management of the program, the program would be transferred to another Government Agency, and that agency would modify, upgrade, and expand the LORAN–C system to eLORAN signal specifications. eLORAN is the next generation LORAN concept with sufficient capabilities to be considered a viable GPS backup from a multi-modal radionavigation perspective. As such, there would be socioeconomic benefits to eLORAN users and industry stakeholders.

The eLORAN system would be an independent, dissimilar complement to the GPS. It would allow users to retain the benefits of GPS PNT in the event of a GPS disruption. The concept has been proven through research and field testing, and research shows eLORAN can meet the performance requirements for aviation non-precision instrument approaches (0.3 nautical miles [NM]s horizontal) and maritime harbor entrance and approach (10 to 20 meters) and provide a precise source of time and frequency for critical infrastructure (telecommunications, banking, and utilities systems).

The principal difference between the eLORAN signal specification and the current LORAN–C signal specification would be the addition of the LORAN Data Channel (LDC). The LDC would convey corrections, warnings, and signal integrity information to the user's receiver via the LORAN transmission. The LDC would transmit the following:

- The identity of the station; an almanac of LORAN transmitting and differential monitor sites
- Absolute time based on the Coordinated Universal Time (UTC) scale; leap-second offsets between eLORAN system time and UTC
- Warnings of anomalous radio propagation conditions including early skywaves; warnings of signal failures, aimed at maximizing the integrity of the system
- Official-use only messages that allow users to authenticate the transmissions
- Differential LORAN corrections to maximize accuracy for maritime and timing users.

To transmit the new eLORAN signal, modernization must be completed at all LORAN–C stations. eLORAN transmitting stations would operate unattended and the signal would be controlled from a centralized center such as Navigation Center (NAVCEN). Monitoring sites in the eLORAN coverage area would be used to provide integrity for the user community. Some of the monitoring sites would be used as reference stations to generate the data channel messages. Monitoring stations would be needed at harbors that require entrance and approach accuracy (10 to 20 meters); some large harbors might require multiple reference stations. Selected sites would also have at least one highly accurate clock for synchronization to UTC to provide time and frequency corrections for timing users. A monitoring network would be established to provide warnings for aviation users.

eLORAN receivers would operate in an "all-in-view" mode. That is, they would acquire and track the signals of many LORAN–C stations (the same way GPS receivers acquire and track multiple satellites) and employ them to make position and timing measurements. The new receivers would decode the LDC messages and apply this information based on the user-specific application. This information, coupled with the published Signal Propagation Corrections, would provide the user with a PNT solution.

The eLORAN signal specifications have not been finalized. It is anticipated that the eLORAN signal specification would not preclude the continued use of legacy LORAN–C receivers. Legacy receivers would not benefit from the LDC or all-in-view signal capabilities of eLORAN. However, during the development of eLORAN signal specifications, unforeseen technical or other issues could arise that would make legacy receivers incompatible with the eLORAN signal.

Summary of Environmental Impacts

This PEIS examines the direct, indirect, and cumulative impacts associated with each alternative on 12 resource areas: noise, air quality, earth resources, water resources, biological resources, cultural resources, visual resources, land use, infrastructure, hazardous substances, socioeconomics and environmental justice, and transportation and navigation.

Table ES-1 provides an overview of potential impacts anticipated under each of the alternatives considered, broken down by the resource area.

Table ES-1. Summary of Anticipated Environmental Impacts by Alternative

Resource Area	No Action	Decommission the LORAN–C Program	Automate, Secure, and Unstaff the LORAN–C stations	Transfer Management of the LORAN–C Program	Transfer Management to Another Agency to Deploy eLORAN
Noise	No impacts would be expected.	Short-term negligible adverse impacts would be expected.	Short-term minor adverse and long-term beneficial impacts would be expected.	Short-term minor adverse and long-term beneficial impacts would be expected.	Short-term negligible to minor adverse impacts would be expected.
Air Quality	No impacts would be expected.	Short-term minor adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.
Earth Resources	No impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.	Short-term and Long-term negligible to minor adverse impacts would be expected
Water Resources	No impacts would be expected.	Short-term negligible to minor adverse impacts would be expected. Long-term beneficial impacts would be expected.	Short-term and long-term negligible to moderate adverse impacts would be expected.	Short-term and long-term negligible to moderate adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.

Resource Area	No Action	Decommission the LORAN–C Program	Automate, Secure, and Unstaff the LORAN–C stations	Transfer Management of the LORAN–C Program	Transfer Management to Another Agency to Deploy eLORAN
Biological Resources	No impacts would be expected to wetlands or vegetation. Continued minor to major adverse impacts on avian species and bats would continue.	Short-term negligible to minor adverse impacts would be expected. Short-term and long-term beneficial impacts would be expected.	Short-term and long-term negligible to moderate adverse impacts would be expected on avian species and bats.	Short-term and long-term negligible to moderate adverse impacts would be expected on avian species and bats.	Short-term and long-term negligible to moderate adverse impacts would be expected.
Cultural Resources	No impacts would be expected. Operation and maintenance activities and possible site remediation is not likely to affect properties listed or eligible for the National Register of Historic Places (NRHP).	Short-term and long-term negligible to major adverse impacts would be expected depending on the proximity and extent of ground disturbance of the LORAN site to archeological resources, historic buildings or structures, or Traditional Cultural Properties.	Short-term and long-term negligible to major adverse impacts would be expected depending on the proximity and extent of ground disturbance of the LORAN site to archeological resources, historic buildings or structures, or Traditional Cultural Properties.	Short-term and long-term negligible to major adverse impacts would be expected depending on the proximity and extent of ground disturbance of the LORAN site to archeological resources, historic buildings or structures, or Traditional Cultural Properties.	Short-term and long-term negligible to major adverse impacts would be expected depending on the proximity and extent of ground disturbance of the LORAN site to archeological resources, historic buildings or structures, or Traditional Cultural Properties.
Visual Resources	Long-term adverse and beneficial impacts would continue.	Long-term minor to moderate adverse and beneficial impacts would be expected.	Short-term and long-term negligible adverse impacts would be expected.	Short-term and long-term negligible adverse impacts would be expected.	Short-term and long-term negligible adverse impacts would be expected.

Resource Area	No Action	Decommission the LORAN–C Program	Automate, Secure, and Unstaff the LORAN–C stations	Transfer Management of the LORAN–C Program	Transfer Management to Another Agency to Deploy eLORAN
Land Use	No impacts would be expected, as the use of the land would not change.	Short-term and long-term negligible to major adverse impacts would be expected. Each LORAN site would be altered to meet the needs of the future user, resulting in negligible to major changes in current land uses depending on the zoning of each parcel.	Long-term negligible to minor adverse impacts would be expected.	Long-term negligible to minor adverse impacts would be expected.	Long-term negligible to minor adverse impacts would be expected.
Infrastructure	No impacts would be expected.	Short-term negligible adverse and beneficial impacts would be expected.	Short-term negligible adverse and beneficial impacts would be expected.	Short-term negligible adverse and beneficial impacts would be expected.	Short-term negligible adverse and beneficial impacts would be expected.

Resource Area	No Action	Decommission the LORAN–C Program	Automate, Secure, and Unstaff the LORAN–C stations	Transfer Management of the LORAN–C Program	Transfer Management to Another Agency to Deploy eLORAN
Hazardous Substances	No impacts would be expected. USCG would continue to manage hazardous substances according to all applicable Federal and state regulations.	Long-term adverse impacts would be expected. Impacts would range from minor to major depending upon the extent of remediation required at each site. Specific impacts would be discussed in detail in follow-on NEPA documents.	Negligible adverse impacts would be expected. Routine maintenance and upkeep of equipment would include the transportation and disposal of hazardous wastes, which would be handled in accordance with Federal and state regulations.	Negligible adverse impacts would be expected. Routine maintenance and upkeep of equipment would include the transportation and disposal of hazardous wastes, which would be handled in accordance with Federal and state regulations.	Negligible adverse impacts would be expected. Routine maintenance and upkeep of equipment would include the transportation and disposal of hazardous wastes, which would be handled in accordance with Federal and state regulations.
Socioeconomics and Environmental Justice	No impacts would be expected.	Long-term negligible to minor adverse and beneficial impacts would be expected.	Long-term negligible to minor adverse impacts would be expected.	Long-term beneficial impacts would be expected.	Long-term beneficial impacts would be expected.
Transportation and Navigation	No impacts would be expected. However, this alternative is inconsistent with the Federal Radio-navigation Plan.	Long-term, negligible to minor adverse and short-term, minor to major impact impacts would be expected.	No impacts would be expected.	No impacts would be expected.	Minor to major beneficial impacts would be expected.

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PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT (PEIS) ON THE FUTURE OF THE UNITED STATES COAST GUARD LONG RANGE AIDS TO NAVIGATION (LORAN–C) PROGRAM

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1. Purpose of and Need for the Proposed Action

1.1 Introduction

This Programmatic Environmental Impact Statement (PEIS) assesses the potential environmental and socioeconomic impacts associated with the future of the U.S. Coast Guard (USCG) Long Range Aids to Navigation (LORAN–C) Program.

LORAN is a radionavigation system first developed during World War II and operated by the USCG (a brief history of LORAN is presented on the next page). The current system (LORAN–C) is a low-frequency hyperbolic radionavigation system approved for use in the U.S. Coastal Confluence Zone (CCZ) and as a supplemental air navigation aid. The LORAN–C signal can be used for navigation, location, and timing services for civilian and military air, land, and marine users. LORAN–C is approved as an en route supplemental air navigation system for both Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) operations. The USCG North American LORAN–C signal is transmitted from 18 LORAN–C stations and 17 monitoring sites in the Continental United States (CONUS), and 6 LORAN–C stations and 7 monitoring sites in Alaska (**Figure 1-1**). Photographs of various USCG LORAN–C stations are included throughout the PEIS.

Since 1997, the official policy of the U.S. Government has been to "operate the LORAN–C system in the short term while evaluating the long-term need for the system" (DOD *et al*. 2005). In April 2003, the USCG, Department of Transportation (DOT), and the Federal Aviation Administration (FAA) entered into a Memorandum of Agreement that the USCG would disestablish the system by the end of Fiscal Year 2008 if a national policy requiring LORAN–C as a multi-modal backup to the Global Positioning System (GPS) was not established. More recently, there has been a determination that an enhanced LORAN (eLORAN) system would be well-suited to provide a complementary means of positioning, navigation and timing (PNT) for critical infrastructure reliant upon GPS to mitigate the effects of a GPS outage. While LORAN–C is no longer needed for maritime navigation, the system, with modifications, is well suited to field eLORAN. Therefore, upon enacting the Fiscal Year 2007, 2008 and 2009 Appropriations Acts for the U.S. Department of Homeland Security (DHS) and USCG, Congress has provided for the continuation of LORAN–C until a coordinated agreement on the future of the program is reached by the Executive Branch.

This PEIS is a program-level document that will provide the USCG with management-level analysis of the potential impacts of each alternative on the human and natural environments. The USCG is the lead agency for determining the scope of this review and has determined that a PEIS will best meet its needs. The PEIS complies with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations in Title 40 Code of Federal Regulations (CFR) Parts 1500–1508, DHS Management Directive 5100.1 (*Environmental Planning Program*), and Coast Guard Commandant Instruction (COMDTINST) M16475.1D (*National Environmental Policy Act Procedures and Policy for Considering Environmental Impacts*). The geographic scope of the PEIS is those areas of the earth's surface covered by the radionavigation system. Should the USCG end or reduce its involvement with the LORAN–C Program, the analysis provided in the PEIS would enable the USCG to prepare tiered documents on the disposition of each LORAN station, monitoring site, and other associated facilities.

Brief History of the USCG LORAN Program

During World War II, the British developed a navigation system (GEE) that used a series of two transmitters that sent out precisely timed signals. Where these signals crossed each other, bomber pilots could determine a line of position. With several signals, additional lines of position could be calculated. Pilots used these lines of position to determine their navigation route. LORAN was developed from the GEE system, with the addition of a third transmitter. The third transmitter allowed for more precise positioning by creating integrated regional arrays, or chains.

The original LORAN system (LORAN–A) was tested as early as World War II. Throughout the 1940s, the USCG, U.S. Navy, and U.S. Army worked together to develop LORAN transmission stations and receivers for both aircraft and vessels. During this time, the USCG was responsible for the construction of the stations, which were manned by the U.S. Navy. By the Vietnam War, LORAN–A was used extensively by boat and aircraft to navigate through fog. Receiver technology became affordable, and LORAN–A receivers were purchased by many fishermen, thus enhancing safety.

The current LORAN–C system was developed out of LORAN–A to provide coverage over much greater distances for use between islands in the Pacific Ocean. Research and development of LORAN–C was headed by the newly formed U.S. Air Force in the late 1940s, which tested LORAN–C along with several other navigation systems. The U.S. Air Force eventually stopped the development of LORAN–C to concentrate on Doppler systems for tactical use.

The Navy pursued LORAN–C development and recommissioned three original transmitters in New York, Florida, and North Carolina. Success with that chain led to the establishment of transmitters in the Northeastern Atlantic and Mediterranean during 1957. As marine and aircraft receivers became available throughout the 1960s, the LORAN–C system became widely used by military and commercial vessels and aircraft. The development of a chain in Southeast Asia in the 1960s for the U.S. Air Force was classified "Operation Tight Reign."

The 2005 Federal Radionavigation Plan (FRP) published by the Departments of Defense, Homeland Security, and Transportation outlines the short-term use and long-term need for the LORAN–C system.

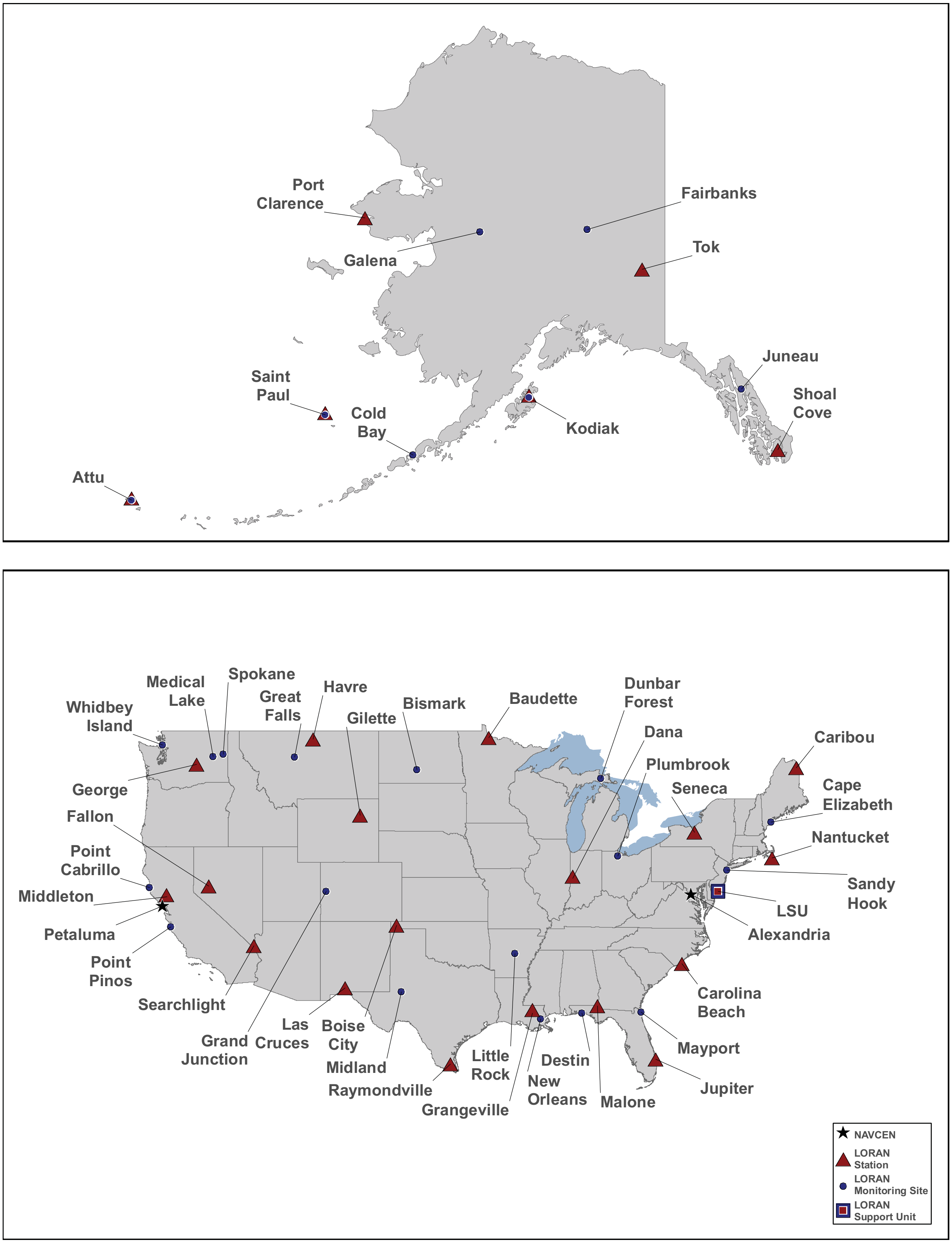

Figure 1-1. Locations of USCG LORAN–C Program Facilities

1.2 USCG Missions

The USCG is a multi-missioned military and maritime service within the DHS and one of the nation's five armed services. Its core roles are to protect the public, the environment, and U.S. economic and security interests in any maritime region in which those interests could be at risk, including international waters and America's coasts, ports, and inland waterways.

The USCG provides unique benefits to the nation because of its distinctive blend of military, humanitarian, and civilian law-enforcement capabilities. To serve the public, the USCG has five fundamental roles:

- **Maritime Safety:** Eliminate deaths, injuries, and property damage associated with maritime transportation, fishing, and recreational boating. The USCG's motto is *Semper Paratus* (Always Ready), and the service is always ready to respond to calls for help at sea.
- **Maritime Security:** Protect America's maritime borders from all intrusions by (a) halting the flow of illegal drugs, aliens, and contraband into the United States through maritime routes; (b) preventing illegal fishing; and (c) suppressing violations of Federal law in the maritime arena.
- **Maritime Mobility:** Facilitate maritime commerce and eliminate interruptions and impediments to the efficient and economical movement of goods and people, while maximizing recreational access to and enjoyment of the water.
- **National Defense:** Defend the nation as one of the five U.S. armed services. Enhance regional stability in support of the National Security Strategy, utilizing the USCG's unique and relevant maritime capabilities.
- **Protection of Natural Resources:** Eliminate environmental damage and the degradation of natural resources associated with maritime transportation, fishing, and recreational boating (USCG 2007a).

1.3 USCG LORAN–C Program

1.3.1 LORAN–C System

LORAN–C Station Attu

LORAN is a terrestrial-based navigation system developed for civilian marine use in coastal areas. LORAN is also certified as an en route supplemental navigation aid for civilian aviation. LORAN uses high power radio transmitter stations situated hundreds of miles apart. While the transmitter stations are separated by hundreds of miles their signal transmissions are precisely synchronized in time. LORAN signals are broadcast at a frequency of 100 kilo Hertz (kH) from a master station and its chain stations. The LORAN–C signal is monitored and controlled by the USCG from two locations. LORAN–C receivers measure the time interval between the radio signals received from the master and its chain stations to determine a two-dimensional position (latitude and longitude) to an accuracy of 0.25 nautical miles (NMs).

The LORAN–C Modernization Project is an ongoing effort to modernize the LORAN–C radionavigation infrastructure in order to preserve operations and provide lower operational costs. The project is a cooperative effort between the USCG, DOT, and FAA for ongoing recapitalization, modernization, and operation of LORAN–C for the U.S. transportation infrastructure, to include the National Airspace System (NAS) and the Marine Transportation System (MTS). The LORAN–C Modernization Project allows the USCG to make significant improvements in the LORAN–C system such as the following:

- Replacing the aging vacuum tube transmitters with solid-state versions
- Replacing the time and frequency equipment at the transmitting stations
- Synchronizing the Master Transmitting Stations to Universal Time Coordinated (UTC)
- Improving timing stability with the installation of new Primary Frequency Standards at all of the Transmitting Stations
- Installing Uninterruptible Power Supplies (UPS) at the transmitting stations to reduce the number of service interruptions and loss of equipment caused by power anomalies
- Upgrading transmitters with a new switching mechanism that reduces the time the station is off air for equipment switches down to 3 seconds
- Providing for controlling and monitoring LORAN–C Stations by either of the two NAVCEN Control Stations.

Four LORAN–C stations in Alaska (i.e., Attu, Port Clarence, Tok, and Shoal Cove) still require modernization. The LORAN–C Station in St. Paul completed modernization in 2008.

1.3.2 USCG NAVCEN (LORAN Function)

The USCG Navigation Centers—NAVCEN and NAVCEN West—are respectively co-located on the grounds of the USCG Telecommunications and Information Systems Command (TISCOM) facility in Alexandria, Virginia and the USCG Training Center Petaluma (TRACEN Petaluma) facility in Petaluma, California. NAVCEN and NAVCEN West jointly operate the Navigation Information Service (NIS), the Nationwide Differential Global Positioning System (NDGPS), the LORAN–C Program, and other navigation-related projects.

The NIS disseminates navigation and maritime safety information to the public via the Internet and through NAVCEN's Operations Centers, which are operated 24-hour/7-days-per-week (24-7). NAVCEN and NAVCEN West Operations Centers collectively control 84 NDGPS sites, 24 United States LORAN–C stations, and 1 Canadian LORAN–C station. NAVCEN also serves as the civilian interface to the Department of Defense (DOD) on GPS operations and management.

Overview of U.S. Radionavigation Systems

The U.S. Government operates radionavigation systems to enable safe transportation and encourage commerce within the United States in the most cost-effective manner possible. The FRP is prepared by DOD and DOT to coordinate Federal radionavigation system planning and to utilize common systems wherever consistent with operational requirements. Many factors are considered in determining the optimum mix of these systems, including operational, technical, economic, and institutional needs; radio frequency spectrum allocation; needs of national defense; and international agreements.

According to the most recent (2005) FRP, the U.S. Government will reduce non-GPS-based radionavigation services based on reduced demand for those services. However, it is the government's policy not to rely on a single system for positioning, navigation, and timing. The U.S. Government will maintain back-up capabilities to meet (1) national, homeland, and economic security requirements, (2) civilian requirements, and (3) commercial and scientific demands. Operational, safety, and security considerations will dictate the need for complementary navigation systems. Backups to GPS for safety-of-life navigation applications, or other critical applications, can be other radionavigation systems, operational procedures, or a combination of these systems and procedures to form a safe and effective backup. The following is a description of the primary U.S. radionavigation systems.

GPS. GPS is a network of 24 satellites that circle the earth twice a day in very precise orbits and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. A GPS receiver must be locked on to the signal of at least three satellites to calculate a 2D position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's 3D position (latitude, longitude, and altitude). The GPS receiver can also calculate speed, bearing, distance to destination, and other information. GPS was originally developed for military applications, but in the 1980s the Federal government made the system available for civilian use.

GPS Augmentations. Augmentations to GPS have been developed to meet various user needs. For example, the USCG developed the NDGPS to meet Coastal and Harbor Entrance and Approach (HEA) vessel navigation needs and to enable automated buoy positioning. The Wide Area Augmentation System (WAAS) was developed by the FAA to provide increased navigation accuracy, availability, and integrity for aircraft operations. Augmentations must receive the basic GPS signal to operate.

LORAN–C. The LORAN system works by sending out precisely timed radio signals from a chain of stations. By taking readings from two or more stations, LORAN–C receivers can calculate their position. A series of LORAN–C stations comprise a "chain." For example, the Attu, Kodiak, Port Clarence, and St. Paul LORAN–C stations in Alaska comprise the North Pacific chain. Some stations are part of two chains.

Very High Frequency (VHF) Omnidirectional Range/Distance Measuring Equipment (VOR/DME). These systems provide guidance for en route air and terminal navigation, and nonprecision approach. VOR and DME are typically collocated in the same facility. VOR provides pilots with the magnetic azimuth relative to the VOR ground station, and DME provides a measurement of distance between an aircraft and the DME ground station.

Instrument Landing System (ILS). ILS is a precision approach system normally consisting of a localizer facility, a glide slope facility, and associated VHF marker beacons. It provides vertical and horizontal navigation information during the approach to landing at an airport runway.

Aeronautical Radiobeacons. Radiobeacons are nondirectional radio transmitting stations that operate in the low- and medium-frequency bands to provide ground wave signals to a receiver. Aircraft nondirectional beacons are used to supplement VOR-DME for transition from en route to airport precision approach facilities and as a nonprecision approach aid at many airports.

Source: DOD *et al.* 2005, DOD and DOT 2001.

1.3.3 LORAN Support Unit (LSU)

The LORAN Support Unit (LSU) is the Systems Management and Engineering Support Unit that manages and supports the LORAN–C Program for the USCG. The LSU is situated on approximately 120 acres at the southernmost portion of the former Coast Guard Electronics Engineering Center (EECEN), which was closed on August 1, 1997. LSU is adjacent to the Atlantic Ocean on one of the barrier islands along the peninsular southern tip of the State of New Jersey just north of Cape May.

LORAN–C Support Unit

The area provides a buffer zone of electromagnetic field silence necessary to perform signal test and experimental work. The high ground conductivity, proximity of the Atlantic Ocean and Delaware Bay, lack of geological discontinuities in the area, and freedom from local man-made electrical disturbances makes the location desirable for testing. The radio aids-to-navigation work the LSU performs cannot efficiently be performed elsewhere because the rather extensive antenna and ground systems require a large amount of space not available to the usual laboratory facility or equipment manufacturer.

1.4 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to end or reduce USCG management of the LORAN–C Program. LORAN was conceived and built as a maritime aid to navigation. However, its maritime usefulness has greatly diminished with the development of GPS and its augmentation, differential GPS. The LORAN–C Program's primary beneficiaries are organizations that use the LORAN–C signal as a backup source of timing or frequency control. Operation of the system as a backup to GPS does not fit within the framework of USCG missions of maritime homeland security, regulatory and law enforcement authority, military capabilities, and humanitarian operations. As such, the Executive Branch has proposed ending or reducing USCG management of the LORAN–C Program by requesting, in the President's budget request for Fiscal Year 2009, transfer of the Program's funding to the DHS National Protections and Programs Directorate, (NPPD) for development of a national backup for critical systems used in PNT. NPPD is the DHS component with responsibility for strengthening the nation's risk management efforts for critical infrastructure. eLORAN has been identified as the primary system to provide this national backup. If a national policy resulting in the long-term retention of the system is established, the USCG would still seek to end or reduce its management of the LORAN–C Program and recommend transferring management of the program to another Government agency with broad responsibility for critical infrastructure protection. In the event the USCG cannot transfer the LORAN–C Program to another Government agency it would seek changes to reduce USCG management of the program.

1.5 Statutory and Regulatory Requirements and Authorities

1.5.1 National Environmental Policy Act

LORAN–C Station Kodiak

NEPA is a Federal statute requiring the identification and analysis of environmental impacts of proposed Federal actions before those actions are taken. For each proposed major Federal action significantly affecting the quality of the human environment, NEPA requires the Federal agency to issue a "detailed statement" on the environmental impacts prior to deciding whether and how to implement a proposed action. The USCG has determined that the decision on the future of the USCG LORAN–C Program is a proposed Federal action requiring preparation of a PEIS. This PEIS fulfills USCG requirements under NEPA to consider potential environmental impacts of the action and assists in the decisionmaking process on the future of the LORAN–C Program.

The intent of NEPA is to inform Federal decision-making. NEPA requirements help ensure that environmental information is made available to the public during the decisionmaking process and prior to implementing proposed actions. The premise of NEPA is that the quality of Federal decisions will be enhanced when proponents provide information to the public and involve the public in the planning process.

The CEQ was established under NEPA to implement and oversee Federal policy in this process. CEQ regulations mandate that all Federal agencies use a systematic interdisciplinary approach to environmental planning and the evaluation of environmental impacts of proposed actions. The CEQ regulations also contain requirements and guidelines for the preparation of an EIS.

1.5.2 Integration of Other Environmental Laws and Regulations

According to CEQ regulations (40 CFR 1500.4(k) and 40 CFR 1502.25), NEPA requirements should be integrated with "other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively." The NEPA process does not replace the procedural or substantive requirements of these laws or regulations. Rather, it addresses them collectively so that decisionmakers have a comprehensive view of the major environmental issues and requirements associated with each alternative.

As a result, an agency's decision on whether to proceed with an action would occur within the context of numerous environmental laws, implementing regulations, and Executive Orders (EOs) that establish standards and provide guidance on environmental and natural resources management and planning. A comprehensive list of regulations, laws, and EOs that might reasonably be expected to apply to the Proposed Action (e.g., the National Historic Preservation Act) is included in **Appendix A**. It is not intended to be a complete description of the entire legal framework under which the USCG conducts its missions. The full text of these laws, regulations, and EOs is available on the U.S. Government's Official Web Portal at <*http://www.firstgov.gov/*>.

1.6 Scope of this Programmatic EIS

This PEIS examines the direct, indirect, and cumulative impacts associated with each alternative for the future of the USCG LORAN–C Program. The purpose of this PEIS is to determine the potential environmental effects of each alternative, and to inform USCG decision-makers, expert agencies, interested parties, and the public of the potential impacts. The PEIS satisfies USCG requirements under NEPA, the CEQ regulations for implementing NEPA, and USCG policy[1].

A programmatic environmental document, such as this PEIS, is prepared when an agency is proposing to carry out a broad action, program, or policy. Consistent with the CEQ regulations[2], the USCG prepared this PEIS to address the Proposed Action at a programmatic level. The programmatic, or system-wide, approach creates a comprehensive analytical framework of the global assets associated with the program that can support subsequent analyses of specific actions at specific locations within the overall system. Site-specific impact assessment on the future of each LORAN–C Station is not practicable at the program development level because specific site alternatives for the future of the LORAN–C Program are unknown at this time.

Tiering refers to the process of addressing a broad, general program, policy, or proposal in an initial Environmental Impact Statement (EIS) and analyzing narrower site-specific proposals related to the parent program in subsequent site-specific documents. The concept of tiering is specifically identified in the CEQ regulations. This PEIS will enable the USCG to tier site-specific environmental analysis under NEPA coincident with the identification of alternatives for each LORAN–C Station (see **Figure 1-2**). The USCG would continue to involve the public in those follow-on site-specific actions that would flow out of this PEIS and that are connected to the future of the USCG LORAN–C Program. This PEIS is a first-tier environmental review; subsequent tiered environmental analysis and documentation (e.g., Categorical Exclusion [CE] or Environmental Assessment [EA]) would be prepared, as necessary, for future individual actions to address potential site-specific impacts.

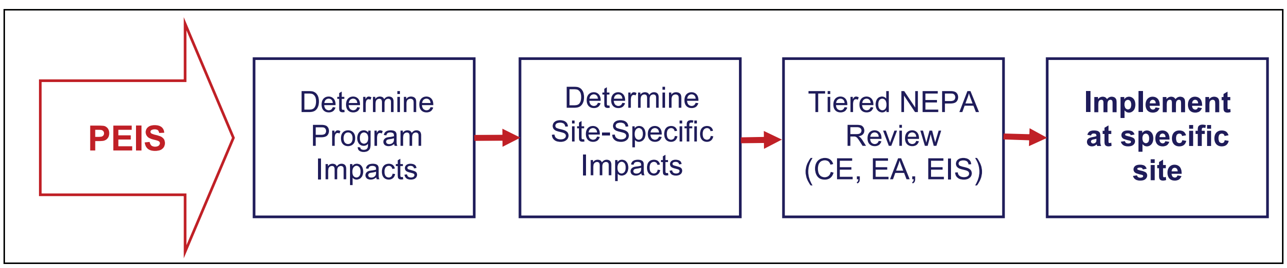

Figure 1-2. PEIS and Follow-on NEPA Documentation Flow Diagram

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[1] NEPA, Public Law (P.L.) 91-190, 42 U.S. Code (U.S.C.) 4321–4347, as amended; *CEQ Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*, 40 CFR Parts 1500–1508; and COMDTINST M16475.1D, *National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts*.

[2] 40 CFR 1502.4(b)

1.7 Public Involvement Process

The USCG encourages public participation in the NEPA process. Public participation opportunities are guided by CEQ regulations and policies of the USCG. A flowchart summarizing the public involvement process for this PEIS is provided as **Figure 1-3**. Consideration of the views and information of all interested persons promotes open communication and enables better decision-making. All agencies, organizations, and individuals having an interest in the future of the USCG LORAN–C Program are urged to participate in the NEPA public participation process.

Documents related to this PEIS are available in a public docket accessible at *http://www.regulations.gov* under docket number **USCG-2007-28460**. Documents can also be viewed at the Document Management Facility, U.S. Department of Transportation, West Building, Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE, Washington, D.C., between 9 a.m. and 5 p.m. Monday through Friday, except Federal holidays. Throughout the PEIS development process, the public can obtain information on the status of the PEIS through the LORAN–C PEIS Web site at *http://loranpeis.uscg.e2m-inc.com/*. A copy of the NOI, newspaper advertisement, and Interested Party letter and mailing list are provided in **Appendix B**.

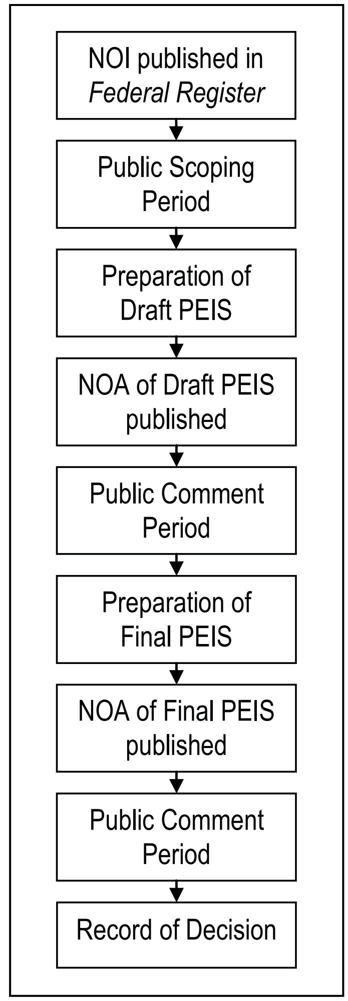

Figure 1-3. Public Involvement Flow Chart

A Notice of Intent (NOI) to prepare a PEIS was published in the *Federal Register* on July 17, 2007. The publication of the NOI initiated a 45-day public scoping period. The USCG also mailed an Interested Party letter to approximately 1,100 potentially interested parties including Federal, state, and local agencies; elected officials; stakeholders; and individuals. The Interested Party letters included a copy of the NOI. Informational open houses and public meetings concerning the development of this PEIS were held in Washington, D.C.; Juneau, Alaska; and Seattle, Washington, on August 15, 21, and 23, 2007, respectively. Approximately 1,000 comments were received from the public during scoping. Commenter's included LORAN–C organizations, commercial and recreational users, and industry stakeholders. Approximately 80 percent of the comments requested that USCG either maintain the LORAN–C program or deploy eLORAN. Comments received during the scoping period were taken into consideration in development of this PEIS. Approximately 20 percent of the stakeholders requested the decommissioning of the program.

The USCG developed five alternatives to respond to comments received during the scoping process. The No Action Alternative (Section 2.1.1), the alternative to Automate, Secure, and Unstaff LORAN–C Stations (Section 2.2.3), and the alternative to Automate, Secure, and Unstaff LORAN–C Stations and Transfer Management of the LORAN–C Program to Another Government Agency (Section 2.2.4) represent alternatives for the continued transmission of the LORAN–C signal. Section 2.25, Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to another Government Agency to Deploy eLORAN was added as an alternative after the scoping process to address comments to deploy eLORAN. Finally, Section 2.2.2 discusses the alternative to decommission the LORAN program and signal.

A Notice of Availability (NOA) of the Draft PEIS will be published in the *Federal Register*. The USCG will make the Draft PEIS available to the public for a 45-day comment period and will hold public meetings on the Draft PEIS. All comments received will be taken into consideration in the development of the Final PEIS. Upon completion, the USCG will make the Final PEIS available to the public for 30 days. At the conclusion of this 30-day period, the USCG can issue a Record of Decision (ROD), which would be published in the *Federal Register*.

LORAN–C Station Shoal Cove

1.8 Organization of the PEIS

The sections of this PEIS are organized as follows:

Section 1: Purpose of and Need for the Proposed Action. This section provides background, identifies the purpose and need for the Proposed Action, and discusses NEPA and the public involvement process.

Section 2: Proposed Action and Alternatives. This section describes the Proposed Action and alternatives considered, identifies the environmentally preferred alternative, and presents a summary comparison of the alternatives addressed in detail in this PEIS.

Section 3: Affected Environment. This section describes the environmental settings in the areas which components of the Proposed Action and alternatives would occur.

Section 4: Environmental Consequences. This section identifies the potential environmental and socioeconomic impacts associated with each alternative presented by each of the various resource areas addressed.

Section 5: Cumulative Impacts. This section discusses the potential cumulative impacts that could result from the impacts of each alternative combined with other past, present, and reasonably foreseeable future actions.

Sections 6 and 7. These sections identify the preparers of the PEIS, and provide a list of references used in its preparation, respectively.

Appendices. **Appendix A** includes a list of those regulations, laws, and EOs that might reasonably be expected to apply to the alternatives on the future of the USCG LORAN–C Program. **Appendix B** contains copies of scoping materials. **Appendix C** provides calculations for air emissions.

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2. Proposed Action and Alternatives

2.1 Introduction

This section presents detailed information on the alternatives considered by the USCG for the analysis in this PEIS. The USCG is proposing to end or reduce its management of the LORAN–C Program. NEPA requires that any agency proposing a major Federal action (as defined at 40 CFR 1508.18) must consider reasonable alternatives to the Proposed Action. Evaluation of alternatives broadens the scope of reasonable approaches to achieving the stated purpose and assists an agency in avoiding unnecessary impacts by analyzing reasonable options to achieving the purpose of and need for the action.

To warrant detailed evaluation, an alternative must be reasonable. Alternatives concerning the future of the USCG LORAN–C Program must meet essential technical and economic requirements, comply with governing standards and regulations, and meet the USCG's purpose and need (see **Section 1.4**). The USCG initially identified five potential alternatives for the Proposed Action. During the scoping process for this PEIS, the USCG received comments that suggested it should consider converting the LORAN–C signal to eLORAN. The USCG is not currently funded to implement this alternative and no requirement for the system exists. However, it is technically feasible and will be evaluated in detail in this PEIS. The ordering of the alternatives discussed in the PEIS does not reflect ranking of possible alternatives. The five alternatives selected for analysis in this PEIS are listed below and described in detail in **Section 2.2:**

- No Action Alternative
- Decommission the USCG LORAN–C Program and Terminate the North American LORAN–C Signal
- Automate, Secure, and Unstaff LORAN–C Stations
- Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency
- Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System.

LORAN–C Station George

2.2 Alternatives

2.2.1 No Action Alternative

The No Action Alternative refers to the current, existing conditions without implementation of the Proposed Action. The No Action Alternative is prescribed by CEQ regulations (40 CFR 1502.14(d)) and serves as a benchmark against which impacts of the Proposed Action and alternatives can be evaluated. Under the No Action Alternative, the LORAN–C signal would continue to be transmitted and the LORAN–C Program operations would remain as they currently are with no change in staffing. The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics), as necessary as funding permits. Current modernization started in 1999, and includes the replacement of tubes in each LORAN station, which will allow some stations to be unmanned on a daily basis. Maintenance and modernization of equipment would continue to keep the signal operating.

2.2.2 Decommission the USCG LORAN–C Program and Terminate the North American LORAN–C Signal

Under this alternative, the USCG would end its management of the program and all USCG LORAN–C signals would be terminated at one time. All USCG LORAN–C stations, monitoring sites, and the LSU would be decommissioned; NAVCEN would remain operational, but personnel would be reassigned. LORAN artifacts, documents, and equipment would be removed; and USCG personnel would be reassigned. If the USCG LORAN–C Program was decommissioned the ability to upgrade the existing LORAN–C infrastructure to provide future eLORAN services or to mitigate the effects of a GPS outage would be lost. **Table 2-1** contains a list of USCG LORAN–C stations and monitoring sites that would be decommissioned under this alternative. Each LORAN–C Station (examples of which are shown in **Figures 2-1**, **2-2**, and **2-3**) typically includes the following:

LORAN–C Station Tok

- Between 74 and 2,646 acres of land (average is 160 acres).
- A 625- to 700-foot-tall guyed transmission tower (the Port Clarence LORAN–C Station tower is 1,350 feet, and 6 LORAN–C stations have 4 towers). The antennae includes up to 120 copper ground-plane wire radials that radiate from the central tower at equal intervals, like spokes in a bicycle wheel, each stretching out for a distance of approximately 1,000 feet from the base of the tower (see **Figure 2-1**). This ground plane creates a circle with a diameter of approximately 6,300 feet. Approximately 24 “top loading elements” radiate from the top of the tower at equal intervals and meet the ground plane at a distance of approximately 750 feet from the tower base.
- A 5,000-square-foot (ft^2) building housing transmitter equipment with a heating/ventilation/air conditioning (HVAC) system, an operations building, a parking area, and sidewalks.
- 3-phase electricity source from reliable commercial power with a minimum 300-kilovolt amperes (kVA) electrical utility transformer. Two 400-Kilowatt (kW) backup generators and associated fuel tanks to provide multiple redundant uninterruptible backup power systems. Note that the Attu, Port Clarence, and Shoal Cove LORAN–C stations in Alaska generate their own power because they do not have access to the electric power grid.
- Reliable communications for remote monitoring and control. Line-of-site microwave technology is appropriate, particularly in a treeless environment.
- Access to publicly maintained roads and a commercial airport, as well as a good access road. The Attu, Port Clarence, and St. Paul LORAN–C stations are only accessible by air, so these stations also have an air strip and associated runway support facilities. LORAN–C Station Shoal Cove is accessible via small boat or float plane.
- Some stations also contain diesel power generators, a tank farm containing fuel for the generators, an equipment building, potable water and wastewater treatment plants, a permitted landfill, an air strip, and airstrip support facilities.
- A typical monitoring site is approximately 100 ft^2 and contains a small equipment hut and an 8-foot antenna.

1 **Table 2-1. Summary of USCG LORAN–C Stations**

LORAN Station	State	Chain(s)	Real Property	Year Established	Number of Towers	Tower Height (feet)
Attu	Alaska	Russian American North Pacific	Owned	1960	1	625
Baudette	Minnesota	North Central Great Lakes	Owned	1979	1	720
Boise City	Oklahoma	Great Lakes South Central	Permit (USFS 1989)	1991	1	700
Caribou	Maine	Canadian East Coast Northeast	Owned	1972	4	700
Carolina Beach	North Carolina	Southeast Northeast	Owned	1966	4	625
Dana	Indiana	Great Lakes Northeast	Permit (Army) in process of owning	1966	1	625
Fallon	Nevada	West Coast	Bureau of Land Management (BLM)	1975	1	625
George	Washington	Canadian West Coast West Coast	MOA (Bureau of Reclamation 1978)	1975	4	700
Gillette	Wyoming	North Central South Central	Lease (FAA 1988)	1991	1	700
Grangeville	Louisiana	Southeast South Central	Owned	1977	1	700
Havre	Montana	North Central	Lease (State to FAA)/Owned housing	1991	1	700
Jupiter	Florida	Southeast	Lease (State)	1961	1	625
Kodiak	Alaska	Gulf of Alaska North Pacific	MOA (Alaska Department of Natural Resources)	1975	1	625
Las Cruces	New Mexico	South Central	BLM (1990)	1991	1	700
LSU	New Jersey	N/A	Owned	1997	2	625, 129
Malone	Florida	Southeast Great Lakes	Owned	1977	1	700
Middletown	California	North Central West Coast	Owned	1975	1	625

LORAN Station	State	Chain(s)	Real Property	Year Established	Number of Towers	Tower Height (feet)
Nantucket	Massachusetts	Canadian East Coast Northeast	Owned	1961	1	625
Port Clarence	Alaska	Gulf of Alaska North Pacific	Owned	1962	1	1350
Raymondville	Texas	Southeast South Central	Owned	1977	1	700
Searchlight	Nevada	South Central West Coast	MOA (FAA 1983)	1975	4	700
Seneca	New York	Great Lakes Northeast	Owned	1977	1	700
Shoal Cove (Ketchikan)	Alaska	Canadian West Coast Gulf of Alaska	Permit (USFS)	1975	4	700
St. Paul	Alaska	North Pacific	Lease (NOAA)	1960	1	625
Tok	Alaska	Gulf of Alaska	Lease (State of Alaska)	1976-1977	4	700

Notes: USFS = U.S. Forest Service
NOAA = National Oceanic and Atmospheric Administration

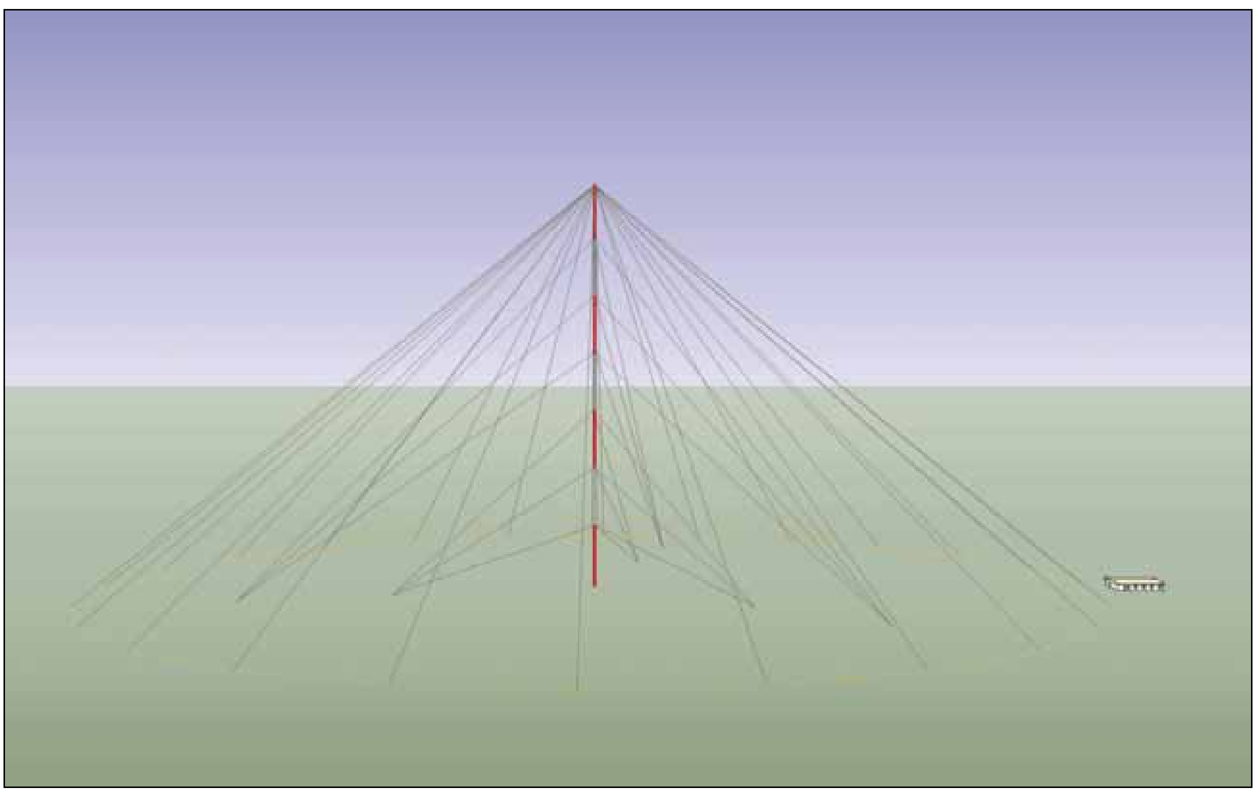

Figure 2-1. Illustration of a 700-foot LORAN–C Tower

Figure 2-2. Photograph of LORAN–C Station Carolina Beach, North Carolina

Figure 2-3. Photograph of LORAN–C Station Kodiak, Alaska

Federal Process for Disposal of Real Property

If the USCG determines that it no longer needs a property (such as a LORAN–C Station or monitoring site), it will first determine if other programs within the USCG or DHS have a need for the property. If not, the property is reported to be "excess" to the U.S. General Services Administration (GSA). GSA is authorized under the Federal Property and Administrative Services Act of 1949 (Property Act) to dispose of most real property that Federal agencies no longer need. Federal agencies—including the USCG—must report excess real property to the GSA Office of Property Disposal for disposal under the Property Act.

When disposing of Federal real property, GSA first offers "excess" property to other Federal agencies. Most Federal agencies must pay fair market value for the property. The needs of Federal agencies are considered a priority over all other uses. If no Federal agency wants a property, it is declared "surplus" and offered to the state, county, and city where the property is located. The local governments have a chance to acquire the property through negotiated sale at fair market value or through a public-benefit conveyance for specific uses including homeless, health, or correctional facilities; education, parks; law enforcement; emergency management; self-help housing; port facilities; airports; historic monuments; and wildlife conservation. If no agency, state or local government, or eligible nonprofit organization wants to acquire the property, GSA offers it to the general public through a sealed bid, public auction, written auction, or online auctions via the Internet.

Title 41 CFR Part 101-47.202 requires that each Report of Excess (ROE) to GSA include a statement indicating whether or not, during the time the property was owned by the United States, any hazardous substance activity took place on the property. If such activity took place, the "holding" agency (such as the USCG for LORAN–C stations and monitoring sites) must tell GSA the type, quantity, and time hazardous substances were stored and used on the property. The holding agency must also tell GSA of any cleanup that might be required.

Source: GSA undated.

Other USCG programs could acquire the LORAN station, tower, and monitoring site property for some other use. If no USCG or DHS program has a need for the property, it would be declared excess to the needs of the USCG following Federal guidelines on transfer of excess property.

The disposition of each LORAN–C Station would vary, ranging from transferring control or ownership of the property and its associated infrastructure, to returning the property to a natural state prior to its transfer.

Returning the property to a natural state would entail removing existing structures, testing for and removing any contaminated soils, regrading the property to natural contours, and reseeding or planting with natural vegetation. For example, under an existing agreement with the U.S. Fish and Wildlife Service (USFWS), the LSU property would be returned to a natural state. The LSU is adjacent to the Cape May National Wildlife Refuge. The LSU resides on approximately 120 acres at the southernmost portion of the former USCG EECEN, which was closed on August 1, 1997. LSU is on one of the barrier islands along the peninsular southern tip of New Jersey just north of Cape May. Similarly, the LORAN–C Station Jupiter is within the Jonathan Dickenson State Park, and under an agreement with the State of Florida the property would be returned to natural vegetation.

Similar to how former Omega radionavigation towers were demolished, it is anticipated that the dismantling of the LORAN towers would be accomplished by implosion or controlled demolition using several precise, staged explosions over a few seconds. It is anticipated that bulk explosives would be used to shear sections of supporting legs and anchor plates to permit the staged, controlled felling of the towers.

If the USCG LORAN–C Program was decommissioned, PNT services to U.S. civilian and military vessels and aircraft would be provided primarily by satellite-based GPS along with augmentations to GPS that increase its accuracy. As a backup to GPS, the NAS uses the following systems for air navigation: VHF VOR/DME, ILS and Aeronautical Nondirectional Beacons (NDB) for commercial purposes and Tactical Air Navigation (TACAN) for military purposes. These systems provide backup for landing aids, and in-flight navigation for FAA operations.

2.2.3 Automate, Secure, and Unstaff LORAN–C Stations

LORAN–C Station St. Paul

Under this alternative, the USCG would continue to operate the LORAN–C Program but reduce its management of the program. The USCG would secure and fully automate facilities in order to significantly reduce staffing and the operational costs. To the extent practical, the USCG would automate equipment; secure buildings to protect equipment, antenna, and guy wires; and reassign personnel. Station doors would be upgraded and windows would be enclosed. Chain-link fence with a top guard would be constructed around the transmitter building, antenna base, locations where antenna guides are anchored into the ground, emergency generators, and electrical distribution equipment. The LORAN–C stations would become LORAN sites operating unstaffed with preventive and corrective maintenance performed by contractor personnel. The LORAN–C Station Port Clarence would likely be moved to Nome because it is the oldest station and the most expensive to operate. To facilitate unstaffing, the feasibility of moving the LORAN–C Station Attu to Adak or Shemya could be studied. Under this alternative, the USCG would continue to modernize the LORAN–C system, as necessary (see **Section 1.3.1**). Although this alternative would not fully meet the USCG's purpose and need, it would result in a substantial reduction in USCG personnel assigned to the LORAN–C Program, and reduce operation costs. This is a viable alternative and will be evaluated in the PEIS. As a variation of this alternative, USCG could turn over operations of the LORAN–C stations to a private contractor managed by the USCG.

2.2.4 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency

Under this alternative, the USCG would end its management of the program. The USCG would continue to operate the LORAN–C Program until its transfer to another agency or DHS component, such as the NPPD. The LORAN–C signal would remain on the air but the USCG would begin to reduce staffing. This would allow for the reduction on operating costs for USCG in the short-term. Long-term benefits of transferring the program would allow USCG to reallocate all LORAN program costs. To the extent practical, the USCG would automate equipment; secure buildings; install fencing to protect equipment, antenna, and antenna guides; and reassign personnel. The LORAN–C stations would become LORAN sites operating unstaffed with preventive and corrective maintenance performed by off-site personnel. To facilitate unstaffing, LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. Under this alternative, until the Program is transferred the USCG would continue to modernize the LORAN–C system, as necessary (see **Section 1.3.1**). Although this alternative is outside of USCG control, it is a viable alternative and will be evaluated in the PEIS.

2.2.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to another Government Agency to Deploy eLORAN

LORAN–C Station Malone

Under this alternative the USCG would end its management of the program, the program would be transferred to another Government Agency, and that agency would modify, upgrade, and expand the LORAN–C system to eLORAN signal specifications. eLORAN is the next generation LORAN concept with sufficient capabilities to be considered a viable GPS back up from a multi-modal radionavigation perspective. The concept has been proven through research and field testing, and research shows eLORAN can meet the performance requirements for aviation nonprecision instrument approaches (i.e., 0.3 NMs horizontal) and maritime harbor entrance and approach (i.e., 10 to 20 meters) and provide a precise source of time and frequency for critical infrastructure (e.g., telecommunications, banking, and utilities systems).

The eLORAN system would be an independent, dissimilar complement to the GPS. It would allow users to retain the benefits of GPS precise PNT in the event of a GPS disruption. The performance capabilities of the current system, LORAN–C, is insufficient to backup GPS from a multi-modal radionavigation perspective. The estimated cost to achieve eLORAN capability nationwide is approximately $220 million. The time required to achieve a fully functional eLORAN system would be contingent upon funding.

eLORAN Signal. The principal difference between the eLORAN signal specification and the current LORAN–C signal specification would be the addition of the LORAN Data Channel (LDC). The LDC would convey corrections, warnings, and signal integrity information to the user's receiver via the LORAN transmission. The LDC would transmit the following:

- The identity of the station; an almanac of LORAN transmitting and differential monitor sites
- Absolute time based on the UTC scale; leap-second offsets between eLORAN system time and UTC
- Warnings of anomalous radio propagation conditions such as early skywaves, and warnings of signal failures in order to maximize the integrity of the system
- Official-use only messages that allow users to authenticate the transmissions
- Differential LORAN corrections, to maximize accuracy for maritime and timing users.

Transmitting Stations. To transmit the new eLORAN signal, modernization would need to be completed at all LORAN–C stations, as described in **Section 1.3.1**. eLORAN transmissions would be synchronized to UTC by a method independent of GPS and would be on a Time of Transmission (TOT) scheme to eliminate chain configurations. eLORAN transmitting sites would be secured and operate unstaffed.

LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. Two new LORAN transmitting stations in the Gulf of Mexico region and one new transmitting station in Southern California would be needed for complete eLORAN coverage in the southern CONUS (FAA 2004).

Control Centers and Monitoring Sites. LORAN transmitting stations would operate unattended. The signal would be controlled from a centralized control center such as NAVCEN. Monitoring sites in the eLORAN coverage area would be used to provide integrity for the user community. The receivers at these sites would monitor the eLORAN signal and provide real-time information to the control centers. Some of the monitoring sites would be used as reference stations to generate the data channel messages. Monitoring stations would be required at harbors that require entrance and approach accuracy (i.e., 10 to 20 meters), some large harbors might require multiple reference stations. Selected sites would also have at least one highly accurate clock for synchronization to UTC to provide time and frequency corrections for timing users. A monitoring network would be established to provide warnings for aviation users.

eLORAN Receivers. eLORAN receivers would operate in an "all-in-view" mode. That is, they would acquire and track many LORAN signals (i.e., the same way GPS receivers acquire and track multiple satellites) and employ them to make the most accurate and reliable position and timing measurements. The new receivers would decode the LDC messages and apply this information based on the user specific application. This information, coupled with the published Signal Propagation Corrections, would provide the user with a highly accurate PNT solution.

The eLORAN signal specifications and eLORAN receiver minimum operating performance standards have not been established. It is anticipated that the eLORAN signal specification would not preclude the continued use of legacy LORAN–C receivers. Legacy receivers would not benefit from the LDC or all-in-view signal capabilities of eLORAN. However, during the development of eLORAN signal specifications, unforeseen technical or other issues could arise that would make legacy receivers incompatible with the eLORAN signal.

2.3 Identification of the Preferred Alternative

CEQ's implementing regulation 40 CFR 1502.14(c) instructs EIS preparers to "Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference." At this point in the process, the USCG has identified two preferred alternatives:

1. Automate, Secure, and Unstaff, and Transfer management of the LORAN–C Program to another Government agency.
2. Automate, Secure, and Unstaff, and Transfer management of the LORAN–C Program to another Government agency to deploy an eLORAN system.

Implementation of either alternative could meet the USCG's purpose and need described in **Section 1.4**. The No Action Alternative, (i.e., continued USCG operation of the LORAN–C Program), and the alternative of decommissioning the LORAN–C program would not be consistent with the Presidents FY-2009 budget request. The alternative of unstaffing the LORAN–C sites would not meet the USCG's purpose and need.

2.4 Summary of the Comparison of Alternatives

Table 2-2 provides an overview of potential impacts anticipated under each of the alternatives considered, broken down by the resource area. **Section 4** of the PEIS evaluates the impacts.

Table 2-2. Summary of Anticipated Environmental Impacts by Alternative

Resource Area	No Action	Decommission the LORAN–C Program	Automate, Secure, and Unstaff the LORAN–C stations	Transfer Management of the LORAN–C Program	Transfer Management to Another Agency to Deploy eLORAN
Noise	No impacts would be expected.	Short-term negligible adverse impacts would be expected.	Short-term minor adverse and long-term beneficial impacts would be expected.	Short-term minor adverse and long-term beneficial impacts would be expected.	Short-term negligible to minor adverse impacts would be expected.
Air Quality	No impacts would be expected.	Short-term minor adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.
Earth Resources	No impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.	Short-term and Long-term negligible to minor adverse impacts would be expected
Water Resources	No impacts would be expected.	Short-term negligible to minor adverse impacts would be expected. Long-term beneficial impacts would be expected.	Short-term and long-term negligible to moderate adverse impacts would be expected.	Short-term and long-term negligible to moderate adverse impacts would be expected.	Short-term and long-term negligible to minor adverse impacts would be expected.
Biological Resources	No impacts would be expected to wetlands or vegetation. Continued minor to major adverse impacts on avian species and bats would continue.	Short-term negligible to minor adverse impacts would be expected. Short-term and long-term beneficial impacts would be expected.	Short-term and long-term negligible to moderate adverse impacts would be expected on avian species and bats.	Short-term and long-term negligible to moderate adverse impacts would be expected on avian species and bats.	Short-term and long-term negligible to moderate adverse impacts would be expected.

Resource Area	No Action	Decommission the LORAN–C Program	Automate, Secure, and Unstaff the LORAN–C stations	Transfer Management of the LORAN–C Program	Transfer Management to Another Agency to Deploy eLORAN
Cultural Resources	No impacts would be expected.	Short-term and long-term negligible to major adverse impacts would be expected depending on the site proximity to archeological resources, historic buildings or structures, or Traditional Cultural Properties.	Short-term and long-term negligible to major adverse impacts would be expected depending on the site proximity to archeological resources, historic buildings or structures, or Traditional Cultural Properties.	Short-term and long-term negligible to major adverse impacts would be expected depending on the site proximity to archeological resources, historic buildings or structures, or Traditional Cultural Properties.	Short-term and long-term negligible to major adverse impacts would be expected depending on the site proximity to archeological resources, historic buildings or structures, or Traditional Cultural Properties.
Visual Resources	Long-term adverse and beneficial impacts would continue.	Long-term minor to moderate adverse and beneficial impacts would be expected.	Short-term and long-term negligible adverse impacts would be expected.	Short-term and long-term negligible adverse impacts would be expected.	Short-term and long-term negligible adverse impacts would be expected.
Land Use	No impacts would be expected.	Short-term and long-term negligible to major adverse impacts would be expected.	Long-term negligible to minor adverse impacts would be expected.	Long-term negligible to minor adverse impacts would be expected.	Long-term negligible to minor adverse impacts would be expected.
Infrastructure	No impacts would be expected.	Short-term negligible adverse and beneficial impacts would be expected.	Short-term negligible adverse and beneficial impacts would be expected.	Short-term negligible adverse and beneficial impacts would be expected.	Short-term negligible adverse and beneficial impacts would be expected.
Hazardous Substances	No impacts would be expected.	Long-term adverse impacts would be expected.	Negligible adverse impacts would be expected.	Negligible adverse impacts would be expected.	Negligible adverse impacts would be expected.

Resource Area	No Action	Decommission the LORAN–C Program	Automate, Secure, and Unstaff the LORAN–C stations	Transfer Management of the LORAN–C Program	Transfer Management to Another Agency to Deploy eLORAN
Socioeconomics and Environmental Justice	No impacts would be expected.	Long-term negligible to minor adverse and beneficial impacts would be expected.	Long-term negligible to minor adverse impacts would be expected.	Long-term beneficial impacts would be expected.	Long-term beneficial impacts would be expected.
Transportation and Navigation	No impacts would be expected. However, this alternative is inconsistent with the Federal Radio-navigation Plan.	Long-term, negligible to minor adverse and short-term, minor to major impact impacts would be expected.	No impacts would be expected.	No impacts would be expected.	Minor to major beneficial impacts would be expected.

3. Affected Environment

3.1 Introduction

This section describes the existing environmental and socioeconomic conditions that would have the potential to be affected by each alternative for the future of the USCG LORAN–C program addressed in this PEIS. The information provided in this section also serves as a baseline from which to identify and evaluate potential impacts. In compliance with NEPA, CEQ guidelines, and USCG policy, the description of the affected environment focuses on those conditions and resource areas that are most likely to be subject to impacts. The affected environment is presented in 12 environmental and human resource areas.

The affected environment for the individual resource areas is presented by providing a definition of the resource, followed by a generalized description of the existing conditions that are most likely to be encountered. Site-specific impact assessments addressing the future of each LORAN–C Station is not practicable at the program development level (such as this PEIS) because specific site alternatives are unknown at this time. These assessments will be accomplished at a future date. Consequently, detailed site-specific baseline characterizations of existing conditions are not possible to provide in this PEIS.

As described in **Sections 2.2.3** and **2.2.4**, the LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving the LORAN–C Station Attu to Adak or Shemya could be studied. In addition, under the eLORAN alternative it is likely additional stations would be constructed. Three new sites in the Gulf Coast and Southern California would be needed for complete eLORAN coverage in the southern United States.

3.2 Noise

3.2.1 Definition of the Resource

Sound is defined as a particular auditory effect produced by a given source, for example the sound of rain on the roof. Sound is measured with instruments that record instantaneous sound levels in decibels (dB). A-weighted sound level measurements (dBA) are used to characterize sound levels that can be sensed by the human ear. "A-weighted" denotes the adjustment of the frequency content of a sound-producing event to represent the way in which the average human ear responds to the audible event. All sound levels presented in this PEIS are A-weighted.

Noise and sound share the same physical aspects, but noise is considered a disturbance while sound is defined as an auditory effect. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. Most people are exposed to sound levels of 50 to 55 dBA or higher on a daily basis.

Construction Sound Levels. Operation of equipment used for building construction, modification, and demolition work can generate sound levels that exceed ambient sound levels. A variety of sounds can come from trucks, graders, pavers, welders, and other construction processes. **Table 3-1** lists sound levels associated with common types of construction equipment. Operation of construction equipment usually exceeds the ambient sound levels by up to 30 to 35 dBA in a quiet suburban area.

Table 3-1. Predicted Sound Levels for Construction Equipment

Construction Category and Equipment	Predicted A-weighted Sound Levels at 50 feet (dBA)
Grading	
Bulldozer	87
Grader	85
Water Truck	88
Paving	
Paver	89
Roller	74
Demolition	
Loader	85
Haul Truck	88
Building Construction	
Generator Saw	81
Industrial Saw	83
Welder	74
Truck	80
Forklift	67
Crane	83

Source: COL 2001

3.2.2 Existing Conditions

The existing noise conditions for the affected environment vary based on the locations of each of the 24 LORAN–C stations; a detailed site-specific analysis of those conditions is not within the scope of this PEIS. However, LORAN–C system technology requires that transmitting stations be located in open areas to propagate a solid and continuous signal. To avoid electronic interference and reradiating LORAN–C signal by ungrounded metal, metal objects within the area of the tower are electrically bonded to the radial ground plane. Most LORAN–C stations are in rural areas where ambient noise levels are low, and LORAN–C stations are far enough away from high voltage power lines and tall metal structures that could interfere with signal strength.

The LORAN–C stations generate noise from routine station operations. LSU, and NAVCEN, and all stations that are on the power grid have backup power generators. The monitoring sites do not generate noise. The USCG has indicated that the LORAN towers themselves generate a “pulse” at times of high humidity. The “pulse” sounds like a very faint chirp and cannot be heard outside the immediate station area so it is unlikely that this “pulse” would be noticeable to any nearby populations. The guy wires of the towers also generate noise when high winds pass over them, but it is unlikely that this noise would affect any nearby populations.

The use of electric power generators at some of the LORAN–C stations could be a source of noise at some locations. CONUS stations and three of the six Alaskan stations (i.e., Kodiak, St. Paul, and Tok) obtain electric power from the commercial grid. LORAN–C Station Kodiak is equipped with two 500-kW backup generators and LORAN–C Station Tok is equipped with two 400-kW backup generators. St. Paul has used commercial power since 2003, but is equipped with an onsite generation plant. LORAN–C stations Attu and Shoal Cove each have three 500-kW diesel generators, and LORAN–C stations Port Clarence and Saint Paul each have three 510-kW diesel generators (USCG 1997). Due to the remote location of these stations, sensitive human noise receptors would not be significantly affected by noise produced by these generators. Noise impacts on sensitive wildlife species are discussed in **Section 4.6**.

3.3 Air Quality

3.3.1 Definition of the Resource

In accordance with Federal Clean Air Act (CAA) requirements, the air quality in a given region or area is measured by the concentration of various pollutants in the atmosphere. In response to the CAA, the U.S. Environmental Protection Agency (USEPA) developed National Ambient Air Quality Standards (NAAQS) for pollutants that have been determined to impact human health and the environment. **Table 3-2** presents the primary and secondary USEPA NAAQS (USEPA 2007a). Responsibility for ensuring compliance with NAAQS is delegated to state and local agencies. State and local agencies are required to develop State Implementation Plans (SIPs) that contain regulations and guidelines for meeting NAAQS and maintaining healthy ambient air.

USEPA classifies air quality by air quality control region (AQCR), or subareas of an AQCR, according to whether the concentrations of criteria pollutants in ambient air meet or exceed the primary or secondary NAAQS. A designation as a nonattainment area indicates that at least one criteria pollutant concentration exceeds the NAAQS. A designation as a maintenance area indicates that the area was previously in nonattainment but now meets NAAQS. All other areas are considered to be in attainment.

The CAA General Conformity Rule applies to actions located in nonattainment or maintenance areas and considers both direct and indirect air emissions. The rule applies only to Federal actions that are considered “regionally significant” or where the total emissions from the action meet or exceed the *de minimis* thresholds presented in 40 CFR 93.153. An action is regionally significant when the total nonattainment pollutant emissions exceed 10 percent of the AQCR’s total emissions inventory for that nonattainment pollutant. If a Federal action does not meet or exceed the *de minimis* thresholds and is not considered regionally significant, then a full Conformity Determination is not required.

3.3.2 Existing Conditions

Table 3-3 shows the USEPA attainment status for all criteria pollutants for each existing LORAN station. New LORAN–C stations could be constructed within either an attainment or nonattainment area or within the vicinity of a Class I area. Since it is not known if or where new sites would be located, impacts on air quality from the construction of new sites would be addressed in follow-on NEPA documentation, as necessary, to determine if station construction and operation would be in compliance with General Conformity, Title V, and PSD requirements. This determination would be based on USEPA air quality standards and coordinated with each site’s state and regional air pollution control agencies and air quality management district offices.

Table 3-2. National Ambient Air Quality Standards

Pollutant	Standard Value		Standard Type
CO			
8-hour Average [a]	9 ppm	(10 mg/m^3)	Primary and Secondary
1-hour Average [a]	35 ppm	(40 mg/m^3)	Primary
NO_2			
Annual Arithmetic Mean	0.053 ppm	(100 µg/m^3)	Primary and Secondary
O_3			
8-hour Average [b]	0.08 ppm	(157 µg/m^3)	Primary and Secondary
1-hour Average [c]	0.12 ppm	(240 µg/m^3)	Primary and Secondary
Pb			
Quarterly Average		1.5 µg/m^3	Primary and Secondary
PM_{10}			
Annual Arithmetic Mean [d]		50 µg/m^3	Primary and Secondary
24-hour Average [a]		150 µg/m^3	Primary and Secondary
$PM_{2.5}$			
Annual Arithmetic Mean [e]		15 µg/m^3	Primary and Secondary
24-hour Average [f]		35 µg/m^3	Primary and Secondary
SO_2			
Annual Arithmetic Mean	0.03 ppm	(80 µg/m^3)	Primary
24-hour Average [a]	0.14 ppm	(365 µg/m^3)	Primary
3-hour Average [a]	0.5 ppm	(1,300 µg/m^3)	Secondary

Source: USEPA 2007a

Notes: Parenthetical values are approximate equivalent concentrations.

[a] Not to be exceeded more than once per year.

[b] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

[c] (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1. (b) As of June 15, 2005, USEPA revoked the 1-hour ozone standard in all areas except the 14 8-hour ozone nonattainment Early Action Compact Areas.

[d] To attain this standard, the expected annual arithmetic mean PM_{10} concentration at each monitor within an area must not exceed 50 µg/m^3.

[e] To attain this standard, the 3-year average of the annual arithmetic mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

[f] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3.

Table 3-3. USCG LORAN–C Station Attainment Status

LORAN Station	State	County	Attainment Status
Attu	Alaska	Aleutian Islands	Unclassified/Attainment for all criteria pollutants
Baudette	Minnesota	Lake of the Woods	Unclassified/Attainment for all criteria pollutants
Boise City	Oklahoma	Cimarron	Unclassified/Attainment for all criteria pollutants
Caribou	Maine	Aroostook	Unclassified/Attainment for all criteria pollutants
Carolina Beach	North Carolina	New Hanover	Unclassified/Attainment for all criteria pollutants
Dana	Indiana	Vermillion	Moderate Maintenance Area for PM_{10} Unclassified/Attainment for all other criteria pollutants
Fallon	Nevada	Churchill	Unclassified/Attainment for all criteria pollutants
George	Washington	Grant	Unclassified/Attainment for all criteria pollutants
Gillette	Wyoming	Campbell	Unclassified/Attainment for all criteria pollutants
Grangeville	Louisiana	St. Helena	Unclassified/Attainment for all criteria pollutants
Havre	Montana	Hill	Unclassified/Attainment for all criteria pollutants
Jupiter	Florida	Martin	Unclassified/Attainment for all criteria pollutants
Kodiak	Alaska	Kodiak Island	Unclassified/Attainment for all criteria pollutants
Las Cruces	New Mexico	Dona Ana	Moderate Nonattainment Area for PM_{10} Unclassified/Attainment for all other criteria pollutants
LSU	New Jersey	Cape May	Moderate Nonattainment Area for 8-hour O_3 Unclassified/Attainment for all other criteria pollutants
Malone	Florida	Jackson	Unclassified/Attainment for all criteria pollutants
Middletown	California	Lake	Unclassified/Attainment for all criteria pollutants
Nantucket	Massachusetts	Nantucket	Moderate Nonattainment Area for 8-hour O_3 Unclassified/Attainment for all other criteria pollutants
Port Clarence	Alaska	Nome	Unclassified/Attainment for all criteria pollutants
Raymondville	Texas	Willacy	Unclassified/Attainment for all criteria pollutants
Searchlight	Nevada	Clark	Subpart 1 Nonattainment Area for 8-hour O_3 Serious Nonattainment Area for CO Serious Nonattainment Area for PM_{10} Unclassified/Attainment for all other criteria pollutants
Seneca	New York	Seneca	Unclassified/Attainment for all criteria pollutants
Shoal Cove (Ketchikan)	Alaska	Ketchikan Gateway	Unclassified/Attainment for all criteria pollutants
St. Paul	Alaska	Aleutians West	Unclassified/Attainment for all criteria pollutants
Tok	Alaska	Southeast Fairbanks	Unclassified/Attainment for all criteria pollutants

Source: USEPA 2007b

3.4 Earth Resources

3.4.1 Definition of the Resource

Earth resources are defined as the geology, soils, and topography that characterize an area. Geological resources consist of the surface and near-surface materials of the earth and the regional or local forces by which they have formed. These resources are typically described in terms of regional and local geology, mineral or paleontological resources (if applicable), and geologic hazards. Regional and local geologic resources comprise earth materials within a specified region and the forces that have shaped them. These include bedrock or sediment type and structure, unique geologic features, depositional or erosional environment, and age or history. Mineral and paleontological resources include usable geological materials that have some economic or academic value. Soil resources include the unconsolidated, terrestrial materials overlying the bedrock or parent material and are typically described in terms of their complex type, slope, and physical characteristics (i.e., strength, expansion potential, cohesion, and grain size). Topography consists of the geomorphic characteristics of the land or sea floor surface, including the change in vertical elevation of the earth's surface across a given area, relationship with adjacent land features, and geographic location.

Prime farmland is protected under the Farmland Protection Policy Act of 1981 (FPPA). The intent of the Act is to minimize the extent to which Federal programs contribute to the unnecessary or irreversible conversion of farmland to nonagricultural uses. The FPPA also ensures that Federal programs are administered in a manner that, to the extent practicable, will be compatible with private, state, and local government programs and policies to protect farmland. The Natural Resources Conservation Service (NRCS) is responsible for overseeing compliance with the FPPA and has developed the rules and regulations for implementation of the FPPA. The implementing procedures of the FPPA and NRCS programs require Federal agencies to evaluate the adverse effects (direct and indirect) of their activities on prime and unique farmland, as well as farmland of statewide and local importance, and to consider alternative actions that could avoid adverse effects. Determination of whether an area is considered prime or unique farmland and potential impacts associated with a proposed action are based on preparation of the farmland conversion impact rating form AD-1006 for areas where prime farmland soils occur and by applying criteria established at Section 658.5 of the FPPA (7 CFR 658, July 5, 1984).

Implementation of erosion and sediment controls and storm water best management practices (BMPs) during and following construction/demolition activities are typically required by state or local ordinances. Requirements vary by state and in some cases, by municipality. The USCG also has established storm water management guidelines in the *Draft Phase II Stormwater Management Guide* (Commandant Publication [COMDTPUB] 11300.3). The guide applies to construction disturbances between 1 and 5 acres. Section 402 of the Clean Water Act (CWA) also addresses storm water runoff from construction sites and requires Phase II National Pollutant Discharge Elimination System (NPDES) permits for disturbances between 1 and 5 acres, and Phase I permits for disturbances of more than 5 acres. **Section 3.5** (Water Resources) provides a more detailed discussion of Section 402 requirements.

3.4.2 Existing Conditions

Earth resources and associated features are not described in detail in this PEIS because of the broad geographic scope of the project. The characteristics of soils that develop in an area are the result of the geology, parent material, landscape position, climate, and age of the soil. Site-specific characterization is necessary to determine potential uses and limitations associated with soils. Examples of soil characteristics that can limit use include poor drainage, excessive wetness, excessive erodibility, the presence of shrink-swell clays, or the occurrence of prime farmland. Soil characteristics can preclude proposed uses, require the application of special engineering designs, or require coordination with Federal or state agencies. Topographic characteristics might limit use as a result of steep slopes and instability.

The existing geological, soil, and topographical conditions at individual LORAN sites for the most part have been disturbed or altered as a result of initial installation development. Site-specific characteristics associated with geology, soils, and topography would be addressed in follow-on NEPA documentation, as necessary, should the decommissioning of individual LORAN sites be the result of the alternative selected.

Earth resources and associated features are not described in detail for new LORAN sites because of the broad geographic scope of the project and because specific site locations have not been determined. Geologic characteristics and potential uses and limitations associated with the resource would vary depending on geographic location.

Site-specific characteristics associated with geology, soils, and topography would be addressed in follow-on NEPA documentation, as necessary, during the siting of eLORAN towers, structures, utilities, and associated infrastructure as the USCG determines where such equipment, structures, utilities, and associated infrastructure would be located.

3.5 Water Resources

3.5.1 Definition of the Resource

Water resources include surface water, groundwater, and floodplains. The term "waters of the United States" includes interstate and intrastate lakes, rivers, streams, and wetlands that are used for commerce, recreation, industry, sources of fish, and other purposes. Wetland resources are discussed in **Section 3.6.**

The CWA of 1977 is an amendment to the Federal Water Pollution Control Act of 1948 and Amendments (1972) (33 United States Code [U.S.C.] 1251–1387). The CWA requires states to establish water quality standards for waterbodies inside their borders and then identify waters not meeting the standards. USEPA has delegated permitting responsibilities to qualified states under Sections 401 and 402 of the CWA. Section 401 requires a permit for any activity (including construction and operation of facilities) that can result in any discharge into navigable waters. Section 402 authorizes the NPDES permitting program to regulate and enforce discharges into U.S. waters. The NPDES permitting program targets point-source outfalls associated with industrial wastewater and municipal sewage discharges. Storm water runoff is also regulated under NPDES to include storm water discharges from large construction projects, usually larger than 1 acre in size.

The Wild and Scenic Rivers Act (WSRA) of 1968 (16 U.S.C. 1271–1287), administered by the U.S. Department of the Interior (DOI), provides for a wild and scenic river system by recognizing the scenic, recreational, geologic, fish and wildlife, historic, cultural, or other values of wild and scenic rivers of the United States. Under the WSRA, Federal agencies are required to consider the potential national wild, scenic, and recreational river areas for the use and development of water and related land resources.

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. 1451 *et seq*) declares a national policy to preserve, protect, develop, and, where possible, restore or enhance the resources of the nation's coastal zone. Seven LORAN–C stations are in the Alaska or CONUS coastal zone. Applicability of the CZMA to land use is discussed in **Section 3.9**.

The Safe Drinking Water Act (SDWA) was originally passed in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources (i.e., rivers, lakes, reservoirs, springs, and groundwater wells). Any federally funded proposed project (including those that are partially federally funded) with the potential to contaminate a designated sole source aquifer is subject to USEPA review.

EO 11988, *Floodplain Management* (May 24, 1977), requires Federal agencies to determine whether a proposed action would occur within a floodplain and consider alternatives to avoid adverse effects and incompatible development in floodplains. EO 11988 directs Federal agencies to avoid floodplains unless the agency determines that there is no practicable alternative. The Federal Emergency Management Agency (FEMA) oversees and regulates floodplain management. Regulatory floodplains are delineated on FEMA Flood Insurance Rate Maps.

3.5.2 Existing Conditions

Site-specific characteristics associated with surface water, groundwater, and floodplains would be addressed in follow-on NEPA documentation, as necessary, if the USCG determines that new LORAN towers, structures, utilities, and associated infrastructure was needed and where they would be located.

Surface Water. For the purposes of this PEIS, surface water categories are divided into freshwater streams and rivers, freshwater lakes and reservoirs, estuaries and shorelines, and surface water quality. USEPA has identified beneficial uses for surface water under the CWA, including aquatic life support, fish consumption, shellfish harvesting, drinking water supply, primary contact recreation, secondary contact recreation, and agriculture. States set their own water quality standards to accomplish these beneficial uses.

Based on USEPA's *The Quality of Our Nation's Waters* (USEPA 2000a), types of pollutants vary nationwide, but the principal pollutants causing water impairments include nutrients, siltation, metals, and pathogens, all of which contribute to low levels of dissolved oxygen and other impairments. Major sources of pollutants include agriculture runoff, hydromodification, storm water runoff, municipal point sources, atmospheric deposition, and chemical leaks or discharges (USEPA 2000a).

Storm water runoff, which is a widespread problem affecting surface water quantity and quality, is generally considered a nonpoint source pollutant. However, it can be quantified as a point source when buildings or municipalities (including USCG Stations, Air Stations, or Integrated Support Commands) have storm water systems that collect, convey, and discharge at an outfall into waters of the United States. Facilities and municipalities with storm systems and construction sites are required to obtain an NPDES permit under the CWA. The USCG has Storm Water Management Guides for both Phase I and Phase II NPDES permits (COMDTPUB 11300.3 Phase I and Phase II). NPDES storm water permits are not intended to cover individual Federal buildings (unless a state determines that it requires an NPDES permit). Construction projects would require an NPDES construction permit if the area disturbed is greater than 1 acre (would require Phase II permit) or 5 acres (would require Phase I permit).

Groundwater. Groundwater is the subsurface water that fully saturates pores or cracks in soils and rock. It replenishes streams, rivers, and habitats and provides fresh water for irrigation, industry, and potable water consumption.

Floodplains. FEMA delineates the floodplain for 100- and 500-year flood events. The 100-year floodplain is the area that has a 1 percent chance of inundation by a flood event in a given year. The 500-year floodplain is the area that has a 0.2 percent change on inundation in a given year. Under EO 11988, Federal agencies are directed to avoid developing in the 100-year floodplain unless the agency can demonstrate that there is no practicable alternative.

Most LORAN–C stations are outside floodplains designated as either 100- or 500-year flood events. Examples of LORAN sites that occur in floodplains include the LSU in New Jersey and the LORAN Nantucket Station in Massachusetts, which are both in a 100-year floodplain. The siting of any new LORAN–C stations would be subject to EO 11988 and would be outside the floodplains unless the appropriate agency official can demonstrate that there is no practicable alternative.

3.6 Biological Resources

3.6.1 Definition of the Resource

Biological resources include native or naturalized vegetation and wildlife, and the habitats, such as forests, grasslands, wetlands, or aquatic resources in which they exist. Sensitive and protected biological resources include plant and animal species listed as threatened or endangered by the USFWS or a state.

Categories of biological resources evaluated in this PEIS include vegetation, wildlife, migratory birds and bats, threatened and endangered species, and wetlands. Neotropical migratory birds are an additional biological resource of concern due to potential impacts associated with towers. Wetlands are evaluated as a distinct habitat category because they are important natural systems that can provide diverse biologic and hydrologic functions such as water quality improvement, groundwater recharge and discharge, wildlife habitat provision, unique flora and fauna niche provision, pollution mitigation, nutrient cycling, storm water attenuation and storage, sediment detention, and erosion protection.

Biological resources are protected through Federal and state laws, regulations, programs, and EOs. Proposed activities must comply with criteria and requirements of regulations applicable to the potentially affected resources.

The Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq*.) mandates that all Federal agencies consider the potential effects of their actions on species listed as threatened or endangered. Section 7 (a)(4) of the ESA requires Federal agencies to confer with the USFWS or NMFS on any agency action which is likely to jeopardize the continued existence of any listed species (including plant species), or result in the destruction or adverse modification of designated critical habitat. If an agency determines that an action might adversely affect a federally listed species or its designated critical habitat, then preparation of a Biological Assessment is required. Formal consultation is initiated once the Biological Assessment is submitted to USFWS or NMFS. The USFWS or NMFS will prepare a Biological Opinion stating whether the action is likely to jeopardize the continued existence of a listed species or cause the destruction or adverse modification of critical habitat. The purpose of the process is to ensure avoidance and minimization of potential adverse impacts on a listed species, or its designated critical habitat.

The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the United States. Section 404 of the act regulates dredging and the placement of fill into waters of the United States, including wetlands. A permit is required from the USACE before conducting projects that will result in dredging or the placement of fill into wetlands or other waters of the United States. Permits for dredge or fill activities also require compliance with other applicable state and Federal regulations. Section 401 of the CWA provides authority for states to require that a water quality certification be obtained prior to issuance of a Section 404 permit. Section 402 of the CWA provides additional protection to surface water and aquatic biological resources from impacts associated with storm water runoff by requiring obtainment of a NPDES permit for various land development activities.

EO 11990, *Protection of Wetlands*, directs Federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands whenever there is a practicable alternative.

The Fish and Wildlife Conservation Act (16 U.S.C. 2901–2911; 94 Stat. 1322) authorizes financial and technical assistance to the states for the development, revision, and implementation of conservation plans and programs for nongame fish and wildlife. Federally sponsored projects are required to be in compliance with the provisions of developed conservation plans and programs.

The Migratory Bird Treaty Act (MBTA) of 1918, as amended, establishes that all migratory birds and their parts (including eggs, nests, and feathers) are fully protected. The act establishes a prohibition, unless permitted by regulations, to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess; offer for sale; sell; offer to purchase; purchase; deliver for shipment; ship; cause to be shipped; deliver for transportation; transport; cause to be transported; carry; or cause to be carried by any means whatever; receive for shipment, transportation, or carriage; or export, at any time, or in any manner, any migratory bird; or any part, nest, or egg of any such bird. The act also provides the Secretary of the Interior with authority to determine when any of the prohibited actions could be undertaken, and to adopt regulations for this purpose. Resident birds that do not migrate, such as quail, turkey, and pheasant, are managed solely through state fish and wildlife agencies, and are not protected under the MBTA (USFWS 2005).

The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) was passed to ensure that the Refuge System is managed as a national system of related lands, waters, and interests for the protection and conservation of the nation's wildlife resources. The National Wildlife Refuge System is the only network of Federal lands devoted specifically to wildlife and includes more than 500 refuges and thousands of waterfowl production areas across the United States. Many of the refuges are near the coast and provide habitat for migratory birds during their seasonal migrations. Activities that can affect the biological resources in a refuge must comply with a Special Use Permit based on a compatibility determination from the USFWS.

The Federal Communication Commission (FCC) regulations, established at Title 47, Chapter 1, Part 47, require the FAA to conduct an aeronautical study of the navigation air space (which begins at 200 feet and extends to 60,000 feet above the ground) to determine appropriate tower marking and lighting requirements to achieve safe air space when a tower is proposed for FCC registration. The FAA can vary marking and lighting recommendations when requested, provided that aviation safety is not compromised. For example, the FAA can recommend using red lights and painting instead of high-intensity white strobe lighting when a tower is located near a residential community. In all cases, safe aviation conditions around the tower are the FCC's primary concern and direct the marking and lighting requirements. Navigation air space, which starts at 200 feet above the ground, decreases in elevation in close proximity to airports, so the minimum height for required marking or lighting would decrease in these areas.

The USFWS, Office of Migratory Bird Management, which is the lead division for protection of migratory birds at the Federal level, established the Communication Tower Working Group. The purpose of the group, which is composed of government, industry, and academic groups, is to study and determine tower construction approaches that prevent bird strikes.

There are several independent migratory bird and habitat protection groups and programs (e.g., Partners In Flight, Audubon Society, and The Nature Conservancy) that focus on the preservation of migratory birds and their habitats. Most of the programs work together and usually involve state and Federal agencies with similar research and protection goals. EO 13186, *Responsibility of Federal Agencies to*

Protect Migratory Birds, requires each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement a Memorandum of Understanding (MOU) with the USFWS to promote the conservation of migratory bird populations.

3.6.2 Existing Conditions

Vegetation. Vegetation and associated habitats are not described in detail because of the programmatic nature of the analysis. Site-specific characterization of vegetation and associated habitats would be addressed in follow-on NEPA documentation, as necessary.

Vegetation potentially affected by the LORAN project would vary by location. A variety of plant communities are associated with steppe, desert, coastal, riverine, and aquatic habitats. Steppe and desert areas are characterized by low rainfall and strong temperature contrasts between the summer and winter and typically include sparse xerophytic shrub communities with a poorly developed herbaceous layer (Bailey 1995). There are several habitat characteristics and associated plant communities that are unique to coastal areas, some of which include sand dune and interdunal habitats, rocky intertidal habitats, coastal bluffs, and tidal and nontidal wetlands including mangrove habitats. Examples of vegetative communities and habitats associated with riverine systems include riparian forests, floodplain habitats including bottomland hardwood forests, riverine and palustrine wetlands, and scrub-shrub habitats. Submerged aquatic vegetation might be found in both marine and riverine habitats and emergent wetland vegetation can be found in both marine and freshwater wetland habitats.

Plant communities found in coastal environments and in association with riverine systems are important for wildlife habitat and for stabilizing shorelines and other coastal land forms frequently subjected to erosion. These plant communities are also important in maintaining the water quality of coastal and inland waters.

Wildlife. As with vegetation, it is not possible to describe in detail the species of wildlife or variability in wildlife habitat that might affect the occurrence, type, and abundance of species that could occur on or near an existing or proposed LORAN station. The potential for an area to provide and be used as wildlife habitat is based on several factors including topography, vegetative cover and type, water availability, aerial extent, connectedness, and interferences attributable to human activity. Site-specific characterization of wildlife habitat and associated species would be addressed in follow-on NEPA documentation.

Migratory Birds and Bats. There are 836 species of migratory birds that are identified and protected through the MBTA, as amended, or various other laws and acts implemented by the USFWS. Most migratory birds that occur in the United States fly south each fall from rather well-defined breeding grounds to their wintering grounds. Many species winter in habitats throughout the southeast, or farther south in Mexico, Central and South America, and the Caribbean. In the spring they return north to their breeding grounds, where young are produced and the cycle repeats (USFWS 2005).

Bats are the second most diverse order among mammals (after rodents) and there are an estimated 44 species in the United States and Canada. Four of these species plus two subspecies of a fifth species are federally protected, and at least 19 species are listed as Federal Species of Concern. North American bats are composed of four different families: Mormoopidae, Phyllostomidae, Vespertilionidae, and Molossidae (Bogan *et al.* undated).

Figure 3-1 shows the general locations of major migratory bird flyways in continental North America, and the proximity of LORAN–C stations to these major flyways. These migration routes are grouped into four major flyways that are generally recognized in North America: the Atlantic, the Mississippi, the Central, and the Pacific. Birds typically move along these routes between their breeding grounds in Canada and the northern United States, and their wintering grounds in Central and South America. Similar to migratory birds, migratory bats follow north and south routes that take advantage of prevailing winds and favorable topography to locations where food sources are more consistent. Indiana bats (*Myotis sodalis*) are one of the exceptions as telemetry research has shown that they move from hibernacula to summer ranges regardless of topography or other land features (Johnson and Strickland 2004).

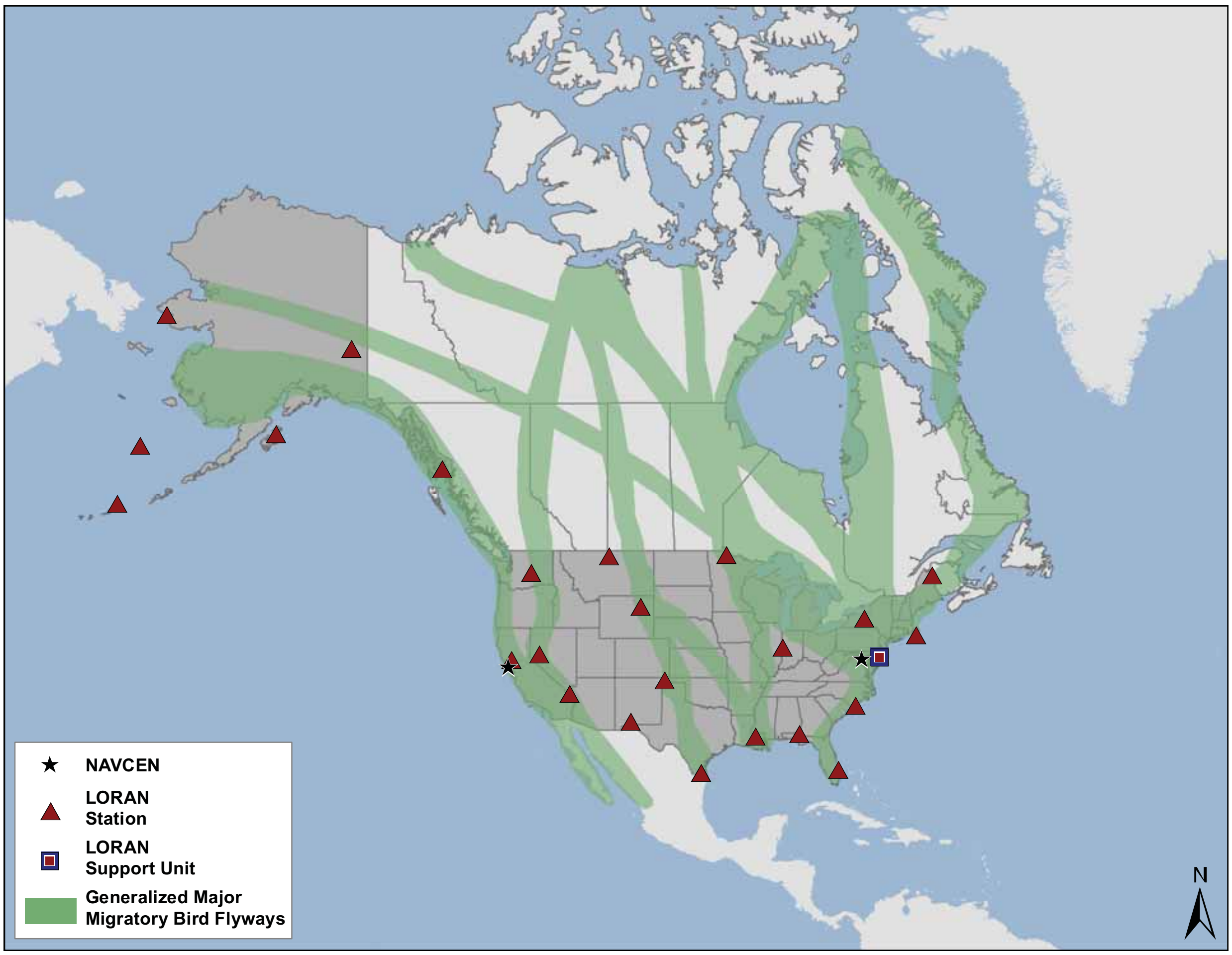

Figure 3-1. General Location of Migratory Bird Flyways in Continental North America

Migratory birds, and birds in general, are discussed in more detail due to the potential for adverse effects on avian species associated with tower structures. Birds are potentially directly impacted by loss due to collision with towers or other birds concentrating in the vicinity of lighted towers, or indirectly due to disruption of flight associated with tower lighting. Thrushes, vireos, and warblers seem to be the most vulnerable to collisions with towers. These songbirds breed in North America in the spring and summer and migrate to the southern United States, the Caribbean, or Latin America during the fall and winter. They generally migrate at night and appear to be most susceptible to collisions with lit towers on foggy, misty, low-cloud-ceiling nights during their migrations (Manville 2000).

Many studies have been conducted to try to determine why avian impacts occur at towers, the overall impact of avian collisions, and how to best mitigate the impacts (URS 2004). Woodlot Alternatives, Inc. (Woodlot 2005) conducted a review of available journal studies addressing avian mortality at communication towers in response to a Notice of Inquiry issued by the FCC. Based on review of the studies, it was determined that most tower collisions involve neotropical migratory birds and occur during spring and fall when the birds are migrating. Most strikes occur during the fall migrations. Weather might be the most important factor in more concentrated collisions with the highest rates occurring on cloudy and foggy nights with a low cloud ceiling (Woodlot 2005). The higher rate of collision might be due to the effects of lighting on a bird's ability to accurately navigate. When low cloud ceiling or foggy conditions occur, tower lights refract off water particles in the air, creating an illuminated area around the tower. Migrating flocks of birds can lose stellar cues for nocturnal migration in these conditions. The birds that enter the lighted area around the tower are reluctant to leave. Mortality occurs when the birds hit the tower structure, guy wires, the ground, or each other, as more and more passing birds become trapped in the lighted space (URS 2004). Navigation appears to be generally uncomplicated on clear nights, but some collisions with towers still occur.

Tower height plays a role in avian mortality, but the exact height threshold for increased effects has not been determined. Studies indicate that towers shorter than 400 to 500 feet do not pose as much of a risk to migrating birds as the taller towers (Woodlot 2005). The existing towers on the LORAN–C stations range from 625- to 700-foot-tall guyed transmission towers to the 1,350-foot Port Clarence LORAN–C Station tower which are at a height linked to avian mortality. For example, on October 8, 1981, 617 individuals of 9 species (including 586 blackpoll warblers [*Dendroica striata*]) were found dead at the 625-foot LORAN–C Station Jupiter tower in Martin County, Florida, and represented the largest reported kill of blackpoll warblers by collision with a structure. The blackpoll warbler is rarely represented in tower kills in Florida during the fall (e.g., 5 in 25 years at a tower in Leon County, 10 in 3 years at a tower in Orange County, 3 in 11 years at a structure in Brevard County). The only other reported large kill was 322 birds found at a structure in Brevard County on October 1964 (Trapp 1998).

Bat mortality involving collision with man-made structures such as towers, tall buildings, and powerlines is known to occur on a lesser scale than avian mortality with the exception of certain localized wind farms. These collisions typically involve migrating bats and not resident, breeding, or feeding bats, and it has been speculated that this is because the bats might not be using echolocation during migration to preserve energy (Johnson and Strickland 2004).

Threatened and Endangered Species. The ESA mandates that all Federal agencies consider the potential effects of their actions on listed threatened or endangered species or designated critical habitats. Individual states and territories also provide protection to species considered to be threatened or endangered within their jurisdictions. State and territorially listed species typically include the federally listed species known to occur in the region and additional species considered to be sensitive within the jurisdiction.

Desert, steppe, maritime, coastal, estuarine, and riverine ecosystems along with associated riparian and wetland systems have the potential to provide habitat, and in some cases critical habitat, for both Federal- and state-listed threatened or endangered species. Reduced impacts on Federal- or state-listed species could occur in association with the reclamation and restoration of habitat associated with the removal of towers or access roads and utility lines and, in the case of listed birds and bats, collision with towers. Site-specific evaluation of the potential occurrence of Federal- and state-listed threatened or endangered species or associated critical habitat would be conducted in follow-on NEPA documentation.

Examples of LORAN–C stations where Federal- and state-listed threatened or endangered species or associated critical habitat occur and have the potential to be affected by the Proposed Action include LORAN–C stations Jupiter, Searchlight, Nantucket, and the LSU.

LORAN–C Station Jupiter in Marin County, Florida, has several Federal or state threatened and endangered species or species of concern that have been documented to occur on site such as gopher tortoise (*Gopherus polyphemus*), eastern indigo snake (*Drymarchon corais couperi*), Florida scrub jay (*Aphelocoma coerulescens*), and Florida perforated reindeer lichen (*Cladonia perforata*). The Florida population of gopher tortoise is not federally listed, but is listed by the state of Florida as a species of special concern.

The LSU in Cape May County, New Jersey, has piping plover (*Charadrius melodus*) nesting areas onsite and LORAN–C Station Nantucket in Nantucket County, Massachusetts, is within 0.5 miles of a nesting area. The LSU in Cape May County, New Jersey, also has nesting populations of least tern (*Sterna antillarum*) on site (USCG 2003). The federally listed as threatened desert tortoise (*Gopherus aggassizi*) has the potential to occur on LORAN–C Station Searchlight in Clark County, Nevada.

Wetlands. Determination of the presence of wetlands is based on procedures prescribed in the USACE Wetlands Delineation Manual (USACE 1987). Wetlands, as defined in the Federal manual are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions (USACE 1987). Three criteria are used to determine the occurrence of jurisdictional wetlands: (1) hydric soils, (2) wetland hydrology, and (3) hydrophytic vegetation.

It is not practical at the programmatic level of assessment to describe in detail the type and extent of wetland habitats that could occur in the vicinity of each LORAN–C Station or monitoring site. In many cases the occurrence and extent of jurisdictional wetlands and other waters of the United States has not been determined, or a jurisdictional determination of their boundaries, where they do occur, has not been verified by the USACE or state, or it is not current. Site-specific characterization of proposed project sites would be necessary to determine the potential for the occurrence of wetlands in proximity to a proposed or existing LORAN site. Site-specific characterization to determine the presence of wetlands would be addressed in follow-on NEPA documentation, where determined to be necessary, to avoid or minimize potential adverse effects on wetlands or associated habitats.

Examples of LORAN–C stations on or adjacent to wetlands include LORAN–C stations Attu, Port Clarence, Shoal Cove, and Tok. LORAN–C stations Nantucket and Middletown have wetlands on site, and approximately 40 percent of the LSU site is covered by wetlands.

3.7 Cultural Resources

3.7.1 Definition of the Resource

Cultural resources can include archeological sites, structures, districts, or any other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or any other reason. Depending on their condition and historic use, such resources can provide insight into living conditions of previous existing civilizations, or might retain cultural and religious significance to modern groups. Typically, cultural resources are subdivided into archeological resources (prehistoric or historic sites where human activity has left physical evidence of that activity but no above-ground structures remain standing); architectural resources (buildings or other structures or groups of structures that are of historic or aesthetic significance); or resources of traditional, cultural, or religious significance to an American Indian tribe, or Native Hawaiian or Native Alaskan organization. Finally, traditional cultural properties (TCPs), as defined in National Register Bulletin 38, can include archeological resources, structures, neighborhoods, prominent topographic features, habitats, or areas where particular plants, animals, or minerals exist that any cultural group considers to be essential for the preservation of traditional cultural practices (NPS 1998).

Legal Authorities and Regulatory Programs

National Environmental Policy Act. NEPA instructs Federal agencies to assess the probable impacts of their actions on the "human environment" – defined as "the natural and physical environment and the relationship of people with that environment" (40 CFR 1508.1). Procedurally, Federal agencies conducting an analysis of impacts under NEPA must examine whether their actions are likely to have physical, visual, or other effects on any of the following:

- Districts, sites, buildings, structures, and objects that are included in the National Register of Historic Places (NRHP), or a state or local register of historic places
- A building or structure that is more than 50 years old
- A neighborhood or commercial area that might be important in the history or cultural of the community
- A neighborhood, industrial, or rural area that might be eligible for listing in the NRHP as a historic district
- A known or probable cemetery
- A rural landscape that might have cultural or aesthetic value
- A well-established rural community or rural land use
- A place of traditional cultural value in the eyes of a Native group (American Indian tribe, or Native Hawaiian, or Alaskan organization) or other community
- A known archeological site, or land identified by archeologists as having high potential to contain archeological resources
- An area identified by archeologists or through consultation with a Native group as having high potential to contain Native cultural items.

National Historic Preservation Act. The National Historic Preservation Act (NHPA) of 1966, as amended (Public Law 102-575, 16 U.S.C. 470), directs Federal agencies to make informed decisions about the administration of federally owned or controlled historic properties.

Section 106 of the NHPA (16 U.S.C. 470f), as codified under 36 CFR Part 800, requires Federal agencies to consider the effects of their undertakings on historic properties prior to implementation. The NHPA defines "historic property" as any prehistoric or historic district, site, building, or structure included or eligible for inclusion in, the NRHP, including related artifacts, records, and material remains. Traditional, religious, and cultural properties holding significance for American Indian tribes, Alaska Native, and Native Hawaiian organizations can also be considered NRHP eligible.

In general, undertakings that have the potential to affect historic properties are those that involve modifications to land or buildings/structures, including everything from construction, grading, excavation, maintenance, rehabilitation, and renovation, to the sale or lease of a historic property.

At the heart of the Section 106 review process is the assessment of effects on historic properties and avoidance or minimization of effects that are adverse. Although it is possible to make general statements regarding potential effects associated with the various alternatives discussed in this PEIS, the USCG would need to consult with the relevant State Historic Preservation Office (SHPO) and representatives of the appropriate federally recognized American Indian tribes, Native Hawaiian, or Native Alaskan organizations with respect to the siting of specific shore-based locations. Depending upon the complexity of the issues involved, a Section 106 review can require a minimum of 30 days to get concurrence on a "no effect" determination from the SHPO to 6 to 12 months to negotiate an MOA and complete mitigation measures.

Native American Graves Protection and Repatriation Act. The Native American Graves Protection and Repatriation Act (NAGPRA) places affirmative duties on Federal agencies to protect, inventory, and rightfully dispose of Native American cultural items, both those in existing collections and those that might be discovered in the future. The purpose of NAGPRA is to ensure the protection and rightful disposition of Native American cultural items found on Federal or Native American lands in the Federal government's possession or control.

Human remains or cultural items subject to NAGPRA discovered as a result of a USCG or USCG-authorized activity, such as the construction of new facilities or removal of existing LORAN–C structures and equipment discussed in this PEIS, are to be handled in the manner described in the "inadvertent discovery" procedures found at Section 3 (d) of NAGPRA.

3.7.2 Existing Conditions

Archeological Resources. The archeological resources or issues associated with most LORAN–C stations are unknown, as most of the existing LORAN–C stations were constructed prior to implementation of Federal or state requirements for archeological survey in advance of construction projects. For a few LORAN–C stations, information regarding the archeological potential of the immediate area of the station is sufficient to indicate a high potential for archeological resources. LORAN–C Station Attu, for example, lies within the Attu Battlefield and U.S. Army and Navy Airfields National Historic Landmark (NHL).

LORAN–C Station Attu also lies near the former village of Attu and is connected to the village by several transportation routes. The land around the station, therefore, is considered to have high sensitivity for prehistoric and historic archeological resources. Similarly, LORAN–C Station Nantucket has a moderate to high potential for archeological resources due to its proximity to the historic Siasconset Village and location within the ancestral homeland of the Wampanoag Nation.

For all LORAN–C stations, the Area of Potential Effect (APE) includes the footprint of the tower, ground-plane, and associated buildings, as well as any land areas that would need to be disturbed as part of remediation actions or to install fences or other hardening mechanisms should the personnel at the stations be removed. Within this footprint, the surface and subsurface was disturbed to varying depths to install the ground-plane and tower footings. For example, the ground-plane at LORAN–C Station St. Paul was installed at the ground surface to a depth of 24 inches. At other LORAN–C stations, ground-planes were installed to a maximum depth of 36 inches. Areas between the trenches might retain some integrity, with disturbance from heavy equipment limited to the upper few inches of the ground surface.

Beyond the LORAN–C station footprint, the potential for intact archeological resources increases. The archeological potential at USCG-owned LORAN–C stations, which often include considerable acreage beyond the footprint, can range from low to high, depending on variables such as previous land uses, proximity to water and other subsistence-related resources, soil type, and vegetation. LORAN monitoring sites, which typically consist of a temporary hut on a concrete slab and a small antenna, have a small footprint and, therefore, are likely to have a lower potential for archeological resources. An assessment of known resources and field surveys, as appropriate, would be conducted in follow-on NEPA documentation, as necessary.

As described in **Section 2.2.5**, up to three new LORAN transmitting sites might be constructed, LORAN–C Station Port Clarence would likely move to Nome, and relocation of LORAN–C Station Attu could be considered to facilitate station unstaffing. In general, archeological resources in areas selected to host new LORAN sites would include the same range of resources noted above for lands associated with existing LORAN–C stations.

Construction of new LORAN sites in coastal areas, along inland waterways, on the floodplains or terraces of major rivers, or at high elevation locales such as bluffs or ridgelines that provide good visibility has a high likelihood of impacting archeological resources, as these areas were attractive locations for settlement throughout history. The archeological potential of any given APE would need to be determined through research and, if warranted, fieldwork.

Historic Buildings and Structures. LORAN–C stations Attu and Nantucket and LORAN monitoring site Spruce Cape exist within historic districts or NHLs. Although the LORAN station/LORAN monitoring site buildings and structures do not represent contributing elements to these districts or landmarks, alterations to these facilities would need to be reviewed within the context of the surrounding resource. In general, only a few of the buildings or structures within the LORAN–C system have reached 50 years in age and most have not been evaluated for NRHP eligibility. The six Alaska LORAN–C stations were evaluated under Criteria Consideration G (i.e., resources less than 50 years old) in 1997; but were determined not eligible due to a lack of significant Cold War military association. These facilities will be re-evaluated in follow-on NEPA documentation, as necessary, or by the USCG as they are reaching the 50-year age mark.

Historic buildings and structures in the vicinity of existing and potential LORAN–C stations and LORAN monitoring sites, whose viewsheds would contain the towers, wires, and buildings, could include private residences, hotels, commercial buildings, canneries, shipyards, coastal fortifications, piers, ports, wharves, power plants, seawalls, jetties, bridges or causeways at the confluences of major rivers or between islands, locks and dams, lighthouses, and other navigation aids some of which are protected by bulwarks or other barriers, historic districts (i.e., local, regional, or national), and NHLs. Many of these types of resources are eligible for, or listed on, the NRHP and state registers of historic places. These resources are protected by both Federal and state laws. The presence of historic buildings, structures, districts, and landscapes within the APE for a new LORAN–C Station would need to be determined in advance of construction, through research, consultation with the appropriate SHPO, and survey efforts.

Resources of Traditional, Religious, or Cultural Significance to Native American Tribes. The habitation patterns of Native peoples (American Indian tribes and Native Alaskan organizations) have long focused on coastal areas and inland waterways, and on high points within a landscape that allow good visibility for hunting or defense. Native people used, and in some instances still use, the resources found there for a variety of traditional and sacred activities. Most Native peoples are reluctant to identify such locations to outsiders, but resources of traditional, cultural, or religious significance to Native peoples are common throughout the regions where LORAN–C stations and LORAN monitoring sites currently exist.

The APE for resources of traditional, religious, or cultural significance to Native American tribes, Native Alaskan groups, or indigenous peoples of the Caribbean is similar to that noted for historic buildings. It includes both the physical footprint of the LORAN station, as well as the surrounding setting and viewshed. Construction of new towers in coastal areas, along inland waterways, or on the floodplains or terraces of major rivers has a high likelihood of impacting properties of traditional, cultural, or religious significance, as these areas were attractive locations for traditional and ceremonial use throughout history. The presence/absence of properties of traditional, cultural, or religious significance would need to be determined through consultation with federally recognized Native American tribes or Native Alaskan organizations. Such consultation would need to be initiated on a government-to-government basis by the USCG, as early as possible in the planning stage for any specific potential site. In the case of traditional cultural places important to another ethnic group, the USCG should consult with the appropriate SHPO and local historic commission to determine the presence/absence and significance of any such resources within the project APE.

3.8 Visual Resources

3.8.1 Definition of the Resource

Visual resources are defined as the natural and man-made features that give a particular setting or area its aesthetic qualities. These features define the landscape character of an area and form the overall impression that an observer receives of that area. Evaluating the aesthetic qualities of an area is a subjective process because the value that an observer places on a specific feature varies depending on his or her perspective. For example, an engineer might appreciate the span of a bridge or causeway, while a geologist might appreciate the exposure of a particular sequence of strata in a road cut. In general, a feature observed within a landscape can be considered as "characteristic" (or character-defining) if it is inherent to the composition and function of the landscape. This is particularly true if the landscape or area in question is part of a scenic byway, a state or national scenic river, a state or national park, a state or national recreation area, a state or national landmark, a national seashore, or a cultural landscape. Landscapes do change over time, so the assessment of the environmental impacts of a proposed action on a given landscape or area must be made relative to the "characteristic" features currently composing the landscape or area.

Visual resources can include both man-made and natural features. In urban settings, man-made features dominate the landscape; while in rural settings, natural features dominate. Examples of natural visual resources that might occur along coastal areas and inland waterways would include landforms such as beaches, marshes, estuaries, wetlands, coastal cliffs, dunes, islands, water channels, spits, floodplains, terraces, tributary streams, channel islands, bars, cut-off loops in meander systems, deltas, beaver dams and bird nests, and native vegetation on those landforms. Within more urban settings, natural features might include parks and other green spaces, or waterfalls and ponds associated with milling operations. Examples of man-made features within dominantly natural landscapes might include farmsteads (houses and outbuildings), bridges, causeways, jetties, ports, wharves, piers, paths, lighthouses, canals, docks, and historic forts or fortifications (intact or in ruins).

Legal Authorities and Regulatory Programs

In addition to assessment of effects under NEPA, impacts on visual resources such as landscapes would need to be reviewed under Section 106 of the NHPA if the landscape is a cultural or historic landscape, or part of an NHL. As noted in National Park Service Preservation Brief 36, *Protecting Cultural Landscapes*, a cultural landscape is defined as "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values." A historic landscape can include "residential gardens and community parks, scenic highways, rural communities, institutional grounds, cemeteries, battlefields and zoological gardens; and are composed of a number of character-defining features which, individually or collectively contribute to the landscape's physical appearance as they have evolved over time."

Similarly, potential visual impacts on battlefields would need to be assessed under the American Battlefield Protection Act of 1996 (Public Law 104-333; 16 U.S.C. 469k); visual impacts on scenic byways would need to be assessed under the National Scenic Byways Program (Public Law 105-178; 23 U.S.C. 162) and appropriate state laws regarding state-designated scenic byways; and visual impacts on scenic rivers would need to be assessed under the Wild and Scenic Rivers Act and appropriate state laws regarding state-designated scenic rivers. Impacts on the visual resources within state and national parks, including national seashores and national marine preserves, would need to be assessed in consultation with the National Park Service.

3.8.2 Existing Conditions

It is not possible to describe in detail the broad geographic scope for visual resources as assessed in this PEIS. Most LORAN–C stations were constructed in remote landscapes with low topographic relief to allow for unobstructed, distant LORAN signal transmission. Each LORAN tower is most likely the tallest structure in the area. In clear weather conditions, the towers are clearly visible for miles around. At night, the towers are very well lit. Each LORAN–C Station potentially produces an adverse impact on the local visual landscape. However, some of the existing LORAN towers have become important parts of the landscape. For instance, some people consider the Port Clarence LORAN tower a significant landmark and orientation device in an otherwise featureless landscape. It is especially important in a region that relies heavily on VFR aviation for transportation, or for people who frequently navigate during winter when other common landmarks are obscured by snow (USCG 2004).

Construction of new towers has a high likelihood of impacting visual resources. Impacts on site-specific visual resources would be addressed in follow-on NEPA documentation, as necessary. Siting of new towers should be coordinated through public comment, and with state and Federal agencies, as appropriate, depending on the nature of the visual resource being impacted (e.g., coordination with National Park Service for national parks, national landmarks, cultural landscapes, national seashores).

3.9 Land Use

3.9.1 Definition of the Resource

The term "land use" refers to real property classifications that indicate either natural conditions or the types of human activity occurring or permitted on a parcel. In many cases, land use descriptions are codified in local zoning laws. There is, however, no nationally recognized convention or uniform terminology for describing land use categories. As a result, the meanings of various land use descriptions, "labels," and definitions vary among jurisdictions.

The main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent property parcels or areas. Compatibility among land uses fosters the societal interest of obtaining the highest and best uses of real property. The Proposed Action and alternatives are evaluated for their potential to affect the project sites and adjacent land uses. The foremost factor affecting land use for each alternative is compliance with current applicable land use or zoning regulations. Relevant factors include matters such as existing land use at the project sites, the types of land uses on adjacent properties and their proximity to a proposed action, the possible future uses of the project sites, and the permanence of the change in land use.

General Land Use Categories. The following general land use categories have been identified as occurring on or adjacent to existing LORAN–C transmitting sites and monitoring stations, and would likely be consistent with locations chosen for any future LORAN–C stations: undeveloped land, agricultural lands, low-density residential and rural areas, military installations, coastal lands, and recreational areas. Of these designated land uses, Coastal Zone Management (CZM) sensitive areas, and recreational lands are of particular interest because of potential land use conflicts with the siting of new LORAN–C stations.

Recreation. Recreational resources are both natural and human-made lands designated by Federal, state, and local planning entities to offer visitors and residents diverse opportunities to enjoy leisure activities. Recreational resources are those places or amenities set aside as parklands, beaches, trails (hiking, skiing, bicycling, equestrian), recreation fields, sport or recreational venues, open spaces, aesthetically pleasing landscapes, and a variety of other locales. National, state, and local jurisdictions typically have designated land areas with defined boundaries for recreation. Other less-structured activities—for example, hunting or cross-country skiing—are performed in broad, less-defined locales. A recreational setting might consist of natural or human-made landscapes and can vary in size from a roadside monument to a multimillion-acre wilderness area.

Coastal Zone Management. Coastal zones are areas along the coastlines of oceans and lakes in the United States that are regulated by state or local management plans. The CZMA was enacted in 1972 to encourage coastal states, Great Lake states, and U.S. territories and Commonwealths to develop comprehensive programs to manage and balance competing uses of and impacts on coastal resources.

Activities conducted within the coastal zone are required to be consistent with the enforceable policies and mechanisms of the state or U.S. territory CZM program. Section 307 of the CZMA, as amended, requires that proposed Federal activities affecting a state or territory's coastal zone be consistent, to the maximum extent practicable, with the federally approved CZM program. Compliance with applicable state and Federal regulatory programs constitutes consistency with the policies of a state or territory CZM program.

On January 5, 2006, NOAA published a final rule in the *Federal Register* revising certain sections of the CZMA Federal consistency regulations. Federal consistency is the CZMA requirement that Federal agency activities that have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone (also referred to as coastal uses or resources and coastal effects) must be consistent to the maximum extent practicable with the enforceable policies of a coastal state's or territory's federally approved CZM program. Federal agency activities are activities and development projects performed by a Federal agency, or a contractor for the benefit of a Federal agency (NOAA 2006). In addition, USCG COMDTINST M16475.1D specifies that all USCG activities within or outside the coastal zone that affect any land or water use or natural resource within the coastal zone shall be carried out in a manner that is consistent to the maximum extent practicable with the enforceable policies of approved state and U.S. territory CZM programs.

Coastal Barriers. Coastal barriers are unique land forms that provide protection for diverse aquatic habitats and serve as the mainland's first line of defense against the impacts of severe coastal storms and erosion. Located at the interface of land and sea, the dominant physical factors responsible for shaping coastal land forms are tidal range, wave energy, and sediment supply from rivers and older, pre-existing coastal sand bodies. Relative changes in local sea level also profoundly affect coastal barrier diversity (USFWS 2006).

The Coastal Barrier Resources Act (CBRA) of 1982, (Public Law 97–348 96 Stat. 1653; 16 U.S.C. 3501 *et seq.*), established the John H. Chafee Coastal Barrier Resources System (CBRS), composing undeveloped coastal barriers along the Atlantic, Gulf, and Great Lakes coasts. The CBRA encourages the conservation of hurricane-prone, biologically rich coastal barriers by restricting Federal expenditures that encourage development, such as Federal flood insurance through the National Flood Insurance Program. Approximately 3.1 million acres of land and associated aquatic habitat are part of the CBRS (USFWS 2006).

3.9.2 Existing Conditions

The space requirement for a LORAN–C Station varies greatly. For example, LORAN–C Station St. Paul is situated on 74 acres, and the LORAN–C Station Port Clarence spans more than 2,500 acres. The average of all stations is about 160 acres.

Several land use considerations were taken into account in the planning and implementation of the LORAN–C chains. Because the LORAN–C radionavigation technology uses ground waves to transmit the signals, background noise, ground cover, land space, and site-specific geology are key components in determining the best available location for a LORAN–C station. LORAN–C stations need to be located in areas of good visibility in order to propagate a solid and continuous signal. In coastal areas, locations that provide little or no signal pollution include inland waterways, floodplains, and terraces. The best upland locations for signal propagation include bluffs and ridgelines. LORAN–C stations must also be far enough away from high voltage power lines and tall metal structures that could interfere with signal strength. Therefore, most LORAN–C stations are in rural areas where surrounding land use is agricultural, recreation, or wilderness (USCG 1973). Cropland, grassland pasture, and range account for most of the land used for agricultural purposes, but land used for agricultural purposes also includes forest land used for grazing and land in farmsteads, farm roads, and farm lanes.

Over the years, land use surrounding some LORAN–C stations and monitoring sites has changed. This development has occurred more frequently in coastal areas such as near LORAN–C stations Nantucket and Jupiter. Some LORAN–C stations are located within or adjacent to recreational resources. Recreational resources include designated areas such as national and state parks, national and state recreation areas, national seashores, national monuments, national historic sites, state beaches, and state fishing areas. Other recreational resources include regional, county, and municipal parks and recreation areas used by the local populace. Potential concerns in these areas include increases in traffic and noise, alteration of scenic quality, increased access from the installation of new roadways, and conversion of land uses to non-recreational uses, both individually and cumulatively.

Seven LORAN–C stations are in coastal areas along the east coast of the Continental United States and in Alaska. Although Federal lands are not considered part of the coastal zone, the consistency requirement applies to activities on Federal lands that have the potential to impact coastal zone resources outside those lands. The USCG would coordinate with the applicable state or U.S. territory CZM program for each LORAN–C Station located in a coastal area. The LSU is on a coastal barrier island north of Cape May, New Jersey.

Although no specific location has been identified, any new station would be located in undeveloped or rural areas offering little or no signal pollution. These areas could include highland areas such as bluffs or ridgelines or coastal areas including inland waterways, floodplains, and coastal barriers. Site-specific evaluation of land use compatibility would be addressed in follow-on NEPA documentation, as necessary.

3.10 Infrastructure

3.10.1 Definition of the Resource

Infrastructure consists of the systems and physical structures that assist or enable a population in a specified area to function. Infrastructure is wholly human-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as "urban" or developed. Infrastructure for the LORAN–C stations and monitoring sites includes the buildings, other physical structures, road networks, and land improvements, as well as the various infrastructure and utilities supporting a location that are required for LORAN site personnel to work and in some cases to live on site. Utilities include electricity and communications, potable and wastewater systems, and solid waste.

Solid waste management services are available in nearly all developed areas within the continental United States; however, these services might not be readily available in undeveloped settings. Solid waste management is regulated under Subtitle D of the Resource Conservation and Recovery Act (RCRA), as implemented by requirements specified in 40 CFR Parts 240 through 244, 257, and 258; and other applicable Federal regulations. In general, these regulations establish procedures for the handling, storage, collection, and disposal of solid waste; recordkeeping and reporting; and pollution prevention.

3.10.2 Existing Conditions

The existing LORAN–C stations were constructed in the period between 1960 and 1991. The infrastructure needs are similar for all LORAN–C stations, but remote stations such as Attu, Port Clarence, Shoal Cove, and St. Paul are designed and operated as self-sufficient communities, including generating their own electric power (USCG 2001a). However, in 2003, St. Paul converted to have its electrical power come from service associated with the City of St. Paul. All LORAN–C stations include a transmission tower, a transmission building with an HVAC system, backup generators, access roads and parking, and connections to available utilities. The remote stations without access to utilities also have housing and dining facilities, water treatment plants, wastewater systems, landfills, power plants, and large fuel tanks.

LORAN–C stations require a 3-phase, 300-kilovolt electrical utility transformer to operate. Redundant power is provided by two, 400-kW generators and associated fuel tanks which supply uninterruptible backup power. Communications are provided generally by line-of-site microwave technology equipment. Power and communications, where available, are provided by commercial providers. This allows for remote monitoring of LORAN–C stations (USCG 2001a).

It is assumed that solid waste is managed offsite at LORAN–C stations located in communities where these services are commercially available. Remote locations, such as LORAN–C Station Attu, operate and manage a small municipal solid waste landfill that would take household waste, such as commercial solid waste, nonhazardous sludge, small quantity generator waste, and industrial solid waste (USEPA undated). However, Construction and Demolition (C&D) waste generated from specific construction, renovation, and maintenance projects associated with the Proposed Action would be the responsibility of the contractor doing the work. Contractors are required to comply with Federal, state, local, and USCG regulations for the collection and disposal of solid wastes. Some of this material can be recycled or reused, or otherwise diverted from landfills. All nonrecyclable C&D waste is collected in a dumpster until removal. C&D waste contaminated with hazardous waste, asbestos-containing material (ACM), lead-based paint (LBP), or other undesirable components of potential waste streams is managed in accordance with Commandant Instructions Manual (CIM) 16478.1B, *Hazardous Waste Management Manual*. In addition, the remote LORAN–C stations in Alaska operate landfills (USCG 2001a).

Transportation networks and access from such networks to the LORAN–C stations vary widely. Transportation networks and access to the sites are provided by publicly maintained roads and commercial airports where available. However, access to remotely located LORAN–C stations is available through chartered aircraft, or by vessel.

Any new sites would require access to electric power, water and waste water, and communications systems. Although no specific locations have been identified, the presence or absence of required infrastructure is an important consideration in selecting sites for proposed construction. Having to construct, initiate, or contract such work to support site operations can greatly impact estimated project construction and operation costs. It is assumed that the USCG would locate new sites in areas where the road system is publicly maintained, and power and communications utilities are commercially available.

3.11 Hazardous Substances

3.11.1 Definition of the Resource

Hazardous material is defined as any substance with physical properties of ignitability, corrosivity, reactivity, or toxicity that could cause an increase in mortality, serious irreversible illness, and incapacitating reversible illness, or that might pose a substantial threat to human health or the environment. In addition to being a threat to humans, the improper release of hazardous materials and wastes can threaten the health and well being of wildlife species, botanical habitats, soil systems, and water resources. Hazardous waste is defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that pose a substantial present or potential hazard to human health or the environment. In the event of release of hazardous materials or wastes, the extent of contamination varies based on type of soil, topography, and water resources.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and Toxic Substances Control Act (TSCA), define hazardous materials. The Solid Waste Disposal Act, as amended by RCRA, which was further amended by the Hazardous and Solid Waste Amendment (HSWA), defines hazardous wastes. In general, both hazardous materials and wastes include substances that, because of their quantity; concentration; or physical, chemical, or infectious characteristics, could present substantial danger to public health or welfare or the environment should they be released or otherwise improperly managed.

Special hazards are those substances that might pose a risk to human health, but are not regulated as contaminants under the hazardous waste statutes described above. Included in this category are ACM, radon, LBP, and polychlorinated biphenyls (PCBs). The presence of special hazards or controls over them might affect, or be affected by, a proposed action. Information on special hazards describing their locations, quantities, and condition assists in determining the significance of a proposed action.

3.11.2 Existing Conditions

This section outlines groups of hazardous or toxic materials and wastes that are likely present at some of the LORAN–C stations. LORAN–C stations that are manned on a full-time basis purchase, store, use, and dispose of greater volumes of hazardous materials and waste than unmanned stations. Site-specific evaluation of the presence and treatment of hazardous or toxic materials and wastes would be addressed in follow-on NEPA documentation, as necessary.

PCBs. PCBs were generally used as cooling and insulating fluids for industrial transformers and capacitors until their use was banned in the 1970s. All transformers, electronics equipment, and light ballasts installed before the 1970s are assumed to contain PCBs. Some newer or refurbished transformers might still contain trace amounts of PCBs. USEPA and the U.S. Department of Health and Human Services have classified PCBs as probable human carcinogens, and regulate the disposal of PCB oils and equipment.

ACMs. Buildings constructed prior to the early 1980s might contain asbestos. ACMs exist in a variety of forms and can be found in floor tiles, floor tile mastic, roofing materials, joint compound used between two pieces of wallboard, some wallboard thermal system insulation, and boiler gaskets. If asbestos is disturbed, fibers can become friable. Common sense measures, such as avoiding damage to walls, keeps the fibers from becoming airborne and hazardous. The ACMs are removed in conjunction with other building renovation and alteration projects. Asbestos is regulated by USEPA with the authority promulgated under the Occupational Safety and Health Administration (OSHA), 29 U.S.C. 669, *et seq.* Section 112 of the CAA regulates emissions of asbestos fibers to ambient air.

LBP. Buildings and equipment constructed before 1978 might contain LBP. The Federal government banned the use of LBP after that time because of its known health effects. LBP can produce lead dust in the air, and leach into the soil and cause water quality problems. The Residential Lead-Based Paint Hazard Reduction Act of 1992, Subtitle B, Section 408 (commonly called Title X), passed by Congress on October 28, 1992, regulates the use and disposal of LBP on Federal facilities. Federal agencies are required to comply with applicable Federal, state, and local laws relating to LBP activities and hazards. CMI 16478.1B provides the direction for lead and other metal-based paint management at USCG facilities. This policy incorporates by reference the requirements of 29 CFR 1910.120, 29 CFR Part 1926, 40 CFR 50.12, 40 CFR Parts 240 through 280, the CAA, and other applicable Federal regulations. Additionally, the policy requires USCG facilities to identify, evaluate, manage, and abate LBP hazards.

Petroleum, Oil, and Lubricants. This group of materials includes a wide range of petroleum products such as gasoline, diesel, home heating oil, motor oil, antifreeze, cutting oil, hydraulic oil, windshield wiper fluid and other lubricants that are found in any maintenance shop, power plant, or in a machining workshop. It is expected that small amounts of these materials would be at each LORAN–C Station for minor repairs and adjustments to electronic equipment, buildings, and other equipment. These materials are managed for human health and safety under 29 CFR Part 1910, and by state regulations. Federal regulations also require permits for the handling, transportation, use, and disposal of this group of materials.

Aboveground Storage Tanks (ASTs) and Underground Storage Tanks (USTs). Diesel, gasoline, and heating fuels are commonly stored in either ASTs or USTs. Most stations have some stored fuel to operate backup generators in instances when commercial power is interrupted. Remote stations operate tank farms with several ASTs. For example, LORAN–C Station Attu has fifteen ASTs with a total capacity of 325,000 gallons (USCG 2001a). Bulk storage tanks are managed under 40 CFR Part 112 which includes minimum requirements for safe operation, inspections, and spill prevention.

Pesticides and Herbicides. As defined by the USEPA, a pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. This refers to herbicides, fungicides, and various substances used as plant regulators, defoliants, or desiccants.

Common household pesticides include cockroach sprays; rat and rodent poisons; kitchen, bath, and laundry disinfectants; weed killers; and insect repellants.

Other Hazardous Wastes. Batteries, waste paints, chlorinated and nonchlorinated solvents, waste fuel and waste oil, and solids and liquids from spill cleanups are managed for safe handling and fire prevention under 40 CFR Part 264.

Site Remediation at LORAN–C stations. LORAN–C stations Port Clarence, Attu, Shoal Cove, and Saint Paul have had both small and large fuel spills, leaks, and releases. There have been numerous spills due to overfilling, and releases have resulted from damaged underground pipelines. Estimated releases at these stations have ranged from 18,000 gallons to 70,000 gallons, and have resulted in impacts on soil and water quality (USCG 2001a). The USCG continues to monitor cleanup activities at each site.

3.12 Socioeconomics and Environmental Justice

3.12.1 Definition of the Resource

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly characteristics of population and economic activity. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these fundamental socioeconomic indicators are typically accompanied by changes in other components, such as housing availability and the provision of public services. Specific demographic characteristics are used to define and weigh effects on socioeconomics and environmental justice. These characteristics usually include income, unemployment rate, local employment by industry type, population, and percentage of minority residents.

As noted in **Section 1.6**, local demographic and economic effects associated with the disposition or reuse of individual LORAN–C stations or construction of new LORAN sites would be evaluated in subsequent site-specific NEPA documentation. In addition to potential impacts near each station, current users of the LORAN–C system might be affected by changes in the system. Current LORAN–C users have invested in equipment, training, and data recordation. LORAN–C data would need to be converted to GPS should the LORAN–C system be decommissioned or substantially altered. Verifiable information on the number of current LORAN–C users is not readily available; however potential impacts on this population are addressed to the extent possible in this PEIS.

There is an EO that pertains specifically to environmental justice. On February 11, 1994, President Clinton issued EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. USCG policy contained in COMDTINST 5810.3, *Coast Guard Environmental Justice Strategy*, directs the USCG to "conduct its programs, policies and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color or national origin."

For the purposes of this PEIS, low-income areas are defined as areas where the proportion of residents living below the poverty level is substantially higher than surrounding areas. In 2005 (latest data available), the poverty threshold for a family of four with two children was $19,806; the median family income nationwide was $55,832 (U.S. Census Bureau 2005, U.S. Census Bureau 2006). Unemployment rates vary widely. As of July 2007, the national unemployment rate stood at 4.6 percent, but varied from

2.4 percent in Hawai‘i and Idaho to 7.2 percent in Michigan (BLS 2007). The Census Bureau also tracks employment by type of industry, including manufacturing, agriculture, education, and various service industries. Employment by industry type also varies widely and reflects the area's business and economy.

Rural areas are defined as areas with fewer than 2,500 people as defined in the 2000 Census (U.S. Census Bureau 2000a). For this PEIS and to ensure compliance with EO 12898 and COMDTINST 5810.3, an area would be evaluated for environmental justice impacts if the percentage of minorities was more than 50 percent of the total population or was appreciably higher than the county or municipal average, or if per capita income was appreciably lower than the county or municipal average. These detailed evaluations would be undertaken as a part of site-specific evaluations of socioeconomic and environmental justice impacts in follow-on NEPA documentation, as necessary. This PEIS identifies the relative income levels, poverty status, and minority populations of the affected communities.

3.12.2 Existing Conditions

LORAN–C Station Communities. It is not possible to describe in detail in this PEIS the entire range of affected environments around each LORAN–C Station or possible location of a new LORAN site due to the broad geographic scope being considered. Many LORAN–C stations are in remote locations away from local populations or commercial centers. LORAN–C stations St. Paul, Port Clarence, Shoal Cove, and Attu are in very isolated locations and are only accessible by boat and aircraft (USCG 2001a). Exceptions include LORAN–C stations near the cities of Las Cruces, New Mexico and Gillette, Wyoming. The number of employees at each station varies by location. The Port Clarence Station requires 24 full-time operational personnel who live at the station (USCG 2004), while the Kodiak and Tok Stations are maintained daily by 7 USCG personnel (USCG 2006). In aggregate, a total of 301 personnel are employed as a part of the LORAN mission at various stations, USCG Headquarters, NAVCEN East and West, and LSU.

Tables 3-4 and **3-5** show summary demographic and economic characteristics of the cities, towns, or unincorporated county areas near the 24 LORAN–C stations, as reported in the 2000 Census. As indicated in **Table 3-4**, the population of the potentially affected communities ranges from Attu—where the only population is the LORAN–C Station staff—to fairly large cities, such as Las Cruces, New Mexico and Gillette, Wyoming. Communities with significant minority populations include Las Cruces and Raymondville, Texas, which have a high proportion of Hispanic residents, and Grangeville, Louisiana, which is nearly two-thirds African American.

Table 3-5 summarizes the employment and income levels of the potentially affected communities. There is a wide disparity in both the size of the local economies and the welfare of the residents. The median household income ranges from $19,729 in Raymondville, Texas, to more than $50,000 in four communities. The percent of the population living in households below the federally defined poverty level also varies widely, with two communities, George, Washington and Raymondville, Texas, having more than 30 percent of their population living below the poverty level.

Table 3-4. General Demographic Characteristics of Communities Nearest to LORAN–C stations

LORAN Station (closest populated area)	Total Population	Ethnic Communities Located in Population Centers			Households
		White	African American	Hispanic or Latino	
Attu, Alaska	20	18	0	5	0
Baudette, Minnesota	1,104	1,038	6	8	490
Boise City, Oklahoma	1,483	1,211	3	312	610
Caribou, Maine	8,312	7,998	24	38	3,517
Carolina Beach, North Carolina	4,701	4,557	56	36	2,296
Dana, Indiana	662	646	4	11	252
Fallon, Nevada	7,536	6,128	154	745	3,004
George, Washington	528	423	0	318	141
Gillette, Wyoming	19,646	18,762	39	774	7,390
Grangeville, Louisiana	1,978	716	1,251	16	708
Havre, Montana	9,621	8,378	11	142	4,015
Jupiter, Florida	39,328	37,307	480	2,881	16,945
Kodiak, Alaska	6,334	2,939	44	541	1,996
Las Cruces, New Mexico	74,267	51,248	1,738	38,421	29,184
LSU (Cape May), New Jersey	4,043	3,684	212	153	1,821
Malone, Florida	2,007	1,019	873	143	311
Middletown, California	1,020	854	4	233	392
Nantucket, Massachusetts	3,830	3,164	472	67	1,525
Port Clarence, Alaska	21	19	1	1	0
Raymondville, Texas	9,733	6,804	381	8,432	2,514
Searchlight, Nevada	576	547	4	21	315
Seneca Falls, New York	6,861	6,616	50	81	2,870
Shoal Cove (Ketchikan), Alaska	7,922	5,340	59	268	3,197
St. Paul, Alaska	532	69	0	0	177
Tok, Alaska	1,393	1,087	2	29	534

Source: U.S. Census Bureau 2000f

Note: People who identify their ethnicity as Hispanic or Latino may be of any race or multiple races on the Census. Therefore, the sum of people in each ethnic community does not necessarily equal the total population.

Table 3-5. Selected Economic Characteristics of Communities Nearest to LORAN–C stations

LORAN–C Station Locations (closest city)	Civilian Employment	Civilian Unemployment Rate	Military Employment	LORAN Employees	Median Household Income	Individuals Below Poverty Level	Individuals Below Poverty Level (%)
Attu, Alaska	0	NA	20	20	NA	0	0.0
Baudette, Minnesota	454	4.0	4	4	31,281	95	9.1
Boise City, Oklahoma	661	2.1	2	4	30,071	278	19.1
Caribou, Maine	3,704	5.2	31	4	29,485	1,013	12.4
Carolina Beach, North Carolina	2,712	3.1	0	4	37,662	439	9.4
Dana, Indiana	270	1.5	2	5	34,750	65	9.9
Fallon, Nevada	3,464	4.5	147	5	35,935	914	12.6
George, Washington	180	25.9	0	5	21,181	184	36.2
Gillette, Wyoming	10,494	4.5	0	4	46,521	1,534	7.9
Grangeville, Louisiana	684	12.5	0	4	23,846	464	23.7
Havre, Montana	4,440	9.3	7	5	29,944	1,631	17.5
Jupiter, Florida	19,152	3.3	19	4	54,945	1,885	4.8
Kodiak, Alaska	3,053	5.0	106	6	55,142	446	7.4
Las Cruces, New Mexico	31,866	8.4	136	5	30,375	16,793	23.3
LSU (Cape May), New Jersey	1,363	8.8	491	(54-CG) (6-Contractor)	33,462	336	9.1
Malone, Florida	297	7.5	0	4	28,611	74	10.8
Middletown, California	446	13.6	0	5	35,278	245	20.9

LORAN–C Station Locations (closest city)	Civilian Employment	Civilian Unemployment Rate	Military Employment	LORAN Employees	Median Household Income	Individuals Below Poverty Level	Individuals Below Poverty Level (%)
Nantucket, Massachusetts	2,164	6.5	44	4	52,893	346	9.1
Port Clarence, Alaska	0	NA	21	24	NA	0	0.0
Raymondville, Texas	2,678	14.9	10	4	19,729	3,120	36.2
Searchlight, Nevada	365	19.6	0	5	24,407	112	14.6
Seneca Falls, New York	3,211	6.4	5	4	36,543	780	11.3
Shoal Cove (Ketchikan), Alaska	3,888	8.2	86	14	45,802	586	7.6
St. Paul, Alaska	227	15.0	31	15	50,750	66	11.9
Tok, Alaska	506	18.0	12	7	37,941	146	10.5

Source: U.S. Census Bureau 2000f

Note: NA = not available

Site-specific socioeconomic impacts would be addressed in follow-on NEPA documentation, as necessary. Site-specific socioeconomic data would be compared to county, state, or national levels. Employment data such as unemployment rates and types of jobs by industry or trade can provide key insights into socioeconomic conditions that might be affected by a Proposed Action. Data on personal income in a region can be used to compare the before and after effects of any jobs created or lost as a result of a proposed action or alternatives. Data on industrial, commercial, or other sector's growth provides information about the economic health of a region. In appropriate cases, data on expenditures associated with each alternative help to identify the relative importance of each alternative in terms of its monetary contribution to an area and job creation. Site-specific, follow-on NEPA analysis would also identify local demographics such as population levels, and changes to population levels, for a region. Demographics data would also be obtained to characterize a region in terms of race, ethnicity, poverty status, educational attainment level, and other broad indicators.

LORAN–C Users. The current number of LORAN–C system users is unknown. Maritime and aviation users are two known user groups, but there are important non-navigational applications in meteorology, telecommunications, and scientific research. The actual number of users cannot be determined, but estimates were developed for some categories in a July 17, 1998, congressionally mandated analysis, *An Assessment of the Proposed Phase Out of the LORAN–C Navigation System* (DOT 1998). Although it has been nearly 10 years since that study was conducted, many of the estimates made then are still valid (or can be logically adjusted) and there has been no comparable study conducted since then. Therefore, that study provides the basis for describing the existing conditions with respect to current LORAN–C system users.

The DOT study estimated that in 1998 there were between 600,000 and 1 million maritime users of LORAN–C and 83,000 aviation users, largely general aviation aircraft. Since the discontinuation of LORAN–C would impact navigation users not already equipped with GPS or another alternative system, the study assumes a range of such users—from a low of 60 percent without dual systems to a high of 80 percent. The study combined these estimates along with low, medium, and high estimates of other parameters, such as a total number of users and the cost of replacement equipment, to estimate a range of impacts in terms of total costs to the users of replacing the equipment. The medium assumptions were deemed most likely and were used in the summary conclusions. It is important to note that the analysis was limited to the impact on those who would in effect be forced to buy new equipment to maintain the same level of service. It did not factor in whether new equipment could provide a higher level of service, or that many users might have voluntarily upgraded their equipment or changed systems irrespective of the decision regarding LORAN–C.

It is likely that since the time of the DOT study in 1988, the number of users solely dependent on the LORAN–C signal for navigation has declined. The size of both the recreational boat and general aviation fleets has remained relatively unchanged since 1998. According to the DOT's *National Transportation Statistics 2006,* the number of recreational boats increased less than 2.0 percent between 1998 and 2004, while the general aviation fleet increased 7.2 percent in the same timeframe (BTS 2006). Furthermore, little or no new LORAN–C receivers have been available for mass market sale in recent years, while the sale of GPS systems, some specifically designed for maritime use, has soared. An industry consulting firm, Canalys, reports the shipments of portable navigation devices in the United States increased from 0.78 million in 2005 to 2.87 million in 2006 (Canalys 2007). Therefore, this PEIS will assume that, at most, the number of affected maritime and aviation users is the figure estimated as the low end in the DOT study—360,000 maritime users and 49,800 aviation users.

DOT also estimated that the number of users of the LORAN–C signal in the fields of meteorology and telecommunications was only 3.2 percent of the total estimated number of users. Communications providers use the LORAN–C frequency signals for multiple levels of redundancy and diversity in their networks, and the number of communications end users that use LORAN–C for timing might be several million (Sprint Nextel 2007).

3.13 Transportation and Navigation

3.13.1 Definition of the Resource

Transportation and navigation systems are essential elements of the social and commercial fabric of the nation. The free flow of goods between locations and the free travel of individuals has been a hallmark of the United States since the founding of the nation and remains a fundamental right protected by the Constitution.

Several Federal agencies have roles in ensuring the efficiency, reliability, and safety of the air, ground, and maritime transportation in the United States and its coastal waters. Among these are the DOT, including the FAA and the Maritime Administration, and the DHS. The DOT consists of the Office of the Secretary and 11 individual Operating Administrations, including the FAA (DOT 2007a). The DOT's primary mission is to ensure a fast, safe, efficient, accessible, and convenient transportation system (DOT 2007b). The FAA is responsible for providing a safe, efficient aerospace system, regulating civil aviation, and developing and operating a system of air traffic control and navigation for both civil and military aircraft (FAA 2005a, FAA 2005b). The FAA maintains and operates visual and electronic aids to navigation, and ensures their reliability. The Maritime Administration's mission in part is to improve and strengthen the U.S. marine transportation system, including infrastructure, industry, and labor, to meet the economic and security needs of the Nation. Maritime Administration programs promote the development and maintenance of an adequate, well-balanced United States merchant marine fleet, sufficient to carry the Nation's domestic waterborne commerce and a substantial portion of its waterborne foreign commerce, and capable of service as a naval and military auxiliary in time of war or national emergency (Lombardi *et al.* undated).

The DHS is tasked with ensuring a safe and secure homeland (DHS 2007). The USCG is one of 28 components of DHS. Following the Federal reorganization in 2003, USCG became the leader of the Maritime Homeland Security (MHLS) but its underlying authorities to establish, maintain, and operate aids to navigation remains in full effect (14 U.S.C. Section 81) (DOD *et al.* 2005).

The transportation system in the U.S. includes railroads, highways, aviation corridors and airports, shipping lanes and harbors, and the directional safety system infrastructures that allow each of these segments to work. This evaluation focuses on the radionavigation system components of these systems. Refer to **Section 3.10** for a discussion of transportation infrastructure.

3.13.2 Existing Conditions

The U.S. radionavigation system, as discussed in **Section 1.3**, enables and encourages safe transportation and commerce within the United States in the most cost-effective manner possible. Many factors are considered in determining the optimum mix of these systems, including operational, technical, economic, and institutional needs; radio frequency spectrum allocation; needs of national defense; and international agreements.

The FAA is responsible for the development and implementation of radionavigation systems to ensure safe and efficient air navigation (includes civil and military aviation) and operate aids to air navigation required by international treaties (DOD *et al.* 2005).

As discussed in **Section 1.3.2**, the USCG is charged with establishing, maintaining, and operating aids to navigation to ensure safe and efficient marine navigation (USCG 2002, DOD *et al.* 2005). As stated in 14 U.S.C. Section 81, the USCG will establish, maintain, and operate aids to maritime and air navigation required to serve the needs of the armed forces or of the commerce of the United States.

The FRP is the official source of radionavigation policy and planning for the Federal government. The federally operated radionavigation systems are sometimes used in conjunction with one another or with other systems. Selecting the combination of systems is a complex task since user requirements vary widely and change with time. All users (civilian and military) require services that are safe and efficient but the military has more stringent requirements. The goal is to provide radionavigation services to the public in the most cost-effective manner possible (DOD and DOT 2001, DOD *et al.* 2005).

The 2005 FRP states that the Federal government will continue to operate the LORAN–C system in the short term while evaluating the long-term need for the system. This evaluation consists of determining the potential technical capability of eLORAN and a cost-benefit analysis of developing and operating eLORAN. The DOT and FAA have determined that an eLORAN system could be technically capable of supporting nonprecision approach operations for aviation users and harbor entrance and approach operations for maritime users (DOD *et al.* 2005). However, the 2005 FRP also states that "[w]ith respect to aviation, the FAA has determined that sufficient alternative navigational aids exist in the event of a loss of GPS-based services, and therefore Loran is not needed as a back-up navigation aid for aviation users….With respect to maritime safety, the USCG has determined that sufficient backups are in place to support safe maritime navigation in the event of a loss of GPS-based services, and therefore Loran is not needed as a back-up navigational aid for maritime safety" (DOD *et al.* 2005).

A 1998 survey conducted for DOT estimated that there were between 600,000 and 1 million maritime users of the LORAN–C system (DOT 1998). Due to continued uncertainty over establishing a national policy designating LORAN–C as a multi-modal backup to GPS, it is believed that there are now substantially fewer maritime users of LORAN–C for maritime navigation. However, the current number of LORAN–C users for maritime navigation is unknown.

In addition to maritime positioning uses of the LORAN–C signal, others use the LORAN–C signal for precise time signatures and location information. These users vary from telecommunications to banking. Communications providers also use the LORAN–C frequency signals for multiple levels of redundancy and diversity in their networks (Sprint Nextel 2007). There is no verifiable number of users of the LORAN–C signal for timing; however, the number of communications end users that use the LORAN–C signal for timing might be several million.

4. Environmental Consequences

4.1 Introduction

This section presents an analysis of the potential direct and indirect impacts each alternative would have on the affected environment as characterized in **Section 3**. Impact characteristics include (1) duration (i.e., short-term, long-term), (2) mechanism (i.e., direct, indirect), (3) magnitude (i.e., classifications ranging from negligible to major), and (4) whether an impact is adverse or beneficial. Direct impacts are caused by an action and occur at the same time and place. Indirect impacts are caused by an action and are felt later in time or farther removed in distance, but are still reasonably foreseeable. Cumulative effects are analyzed in **Section 5**. As applicable, a framework for establishing whether an impact would be negligible, minor, moderate, or major is provided for each resource. Impact analyses and the criteria upon which impact determinations are made also consider two critical NEPA-based factors:

- *Context* – where an impact can be localized or more widespread (e.g., regional). While the definition of the term "local" (or localized) can vary by resource, it can be broadly defined as one that occurs within an established regulatory limit (e.g., the boundary of a wetland). "Regional" impacts are broadly defined as those that occur on the order of 100 km (62 mi) or more from the source.
- *Intensity* – where an impact is determined through consideration of several factors, including whether an alternative might have an adverse impact on the unique characteristics of an area (e.g., historical resources, ecologically critical areas), public health or safety, or endangered or threatened species or designated critical habitat. Impacts are also considered in terms of their potential for violation of Federal, state, or local environmental law; their controversial nature; the degree of uncertainty or unknown effects, or unique or unknown risks; if there are precedent-setting effects; and their cumulative impact.

4.2 Noise

This noise impact analysis evaluates potential changes to the existing noise environment and impacts on sensitive noise receptors from each alternative. The programmatic level evaluation used in this PEIS will also provide a framework for subsequent site-specific analysis, as necessary. Beneficial impacts would occur if sound levels (as measured in dBA) were reduced or if fewer sensitive noise receptors were exposed to unacceptable sound levels. An alternative would have an adverse impact if one or more of the following occurs:

- Violation of state or local noise ordinances, limits, or standards, or applicable land use compatibility guidelines (minor to major depending on violation)
- Substantial increase in sound levels or increase in people or sensitive biological resources exposed to unacceptable sound levels (minor to major depending on extent of change).

4.2.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics), as necessary. Implementation of the No Action Alternative would result in no impact on the existing noise environment.

4.2.2 Decommission Program and Terminate Signal Alternative

Under this alternative, the USCG LORAN–C signal would be terminated. All USCG LORAN–C stations, monitoring sites, and the LSU would be decommissioned. LORAN documents and equipment would be removed, and USCG personnel would be reassigned. **Table 2-1** contains a list of USCG LORAN–C stations, monitoring sites, and other facilities that would be decommissioned under this alternative. See **Section 2.2** for a list of the components included in a typical LORAN station. It is anticipated that these are the components that would be involved in the decommissioning process.

The disposal of each LORAN–C Station would range from transferring control or ownership of the property with such infrastructure as buildings, roads, piers, and airstrips intact, to returning the property to a natural state prior to its transfer. Returning the property to a natural state would entail removing existing structures (including the towers), testing for and removing any contaminated soils, regrading to natural contours, and reseeding with natural vegetation.

The impact on the ambient noise environment would vary based on the location, size, and amount of infrastructure and towers present at each LORAN station. Impacts from demolition activities would vary from direct, short-term negligible to adverse depending on a station's proximity to noise-sensitive species or populations.

Noise from demolition activities would vary depending on the type of demolition being performed, the location of the towers and/or structures, and the distance from the source of the noise. With the exception of tower demolition, demolition activities would have temporary minor adverse impacts on noise. Demolition usually involves the use of more than one piece of equipment simultaneously (e.g., loader and haul truck); refer to **Table 3-1** for the average noise generated from construction equipment. To predict how demolition activities would impact sensitive noise receptors, noise from probable demolition activities was estimated. The cumulative noise from a loader and haul truck can be estimated to determine the total impact of construction noise from demolition at a given distance. As stated in **Section 3.2.2**, LORAN–C system technology requires that transmitting stations be located in open areas to propagate a solid and continuous signal. It is therefore unlikely that sensitive noise receptors would be within 1,000 feet of the station. Expected demolition noise levels would be as follows:

- Remaining USCG staff and any other individuals at the station (50 feet from demolition activities) would experience noise levels of approximately 90 dBA.
- Sensitive noise receptors 1,000 feet from demolition activities would experience noise levels of approximately 64 dBA.
- Sensitive noise receptors 2,000 feet from demolition activities would experience noise levels of approximately 58 dBA.

Therefore, noise generation of up to 90 dBA would occur at each site for a few days or weeks during normal working hours (i.e., approximately 7:00 am to 5:00 pm, depending on local ordinances) while demolition was accomplished.

As discussed in **Section 2.2.2**, it is anticipated that LORAN towers may be demolished by implosion using bulk explosives in several precise, staged explosions over a few seconds. The noise generated by the explosions would depend on the amount of explosives used and the numbers of towers being destroyed at any one time (note that six LORAN–C stations have four towers each). A common type of plastic explosive that could be used is C-4. Approximate noise levels for the detonation of C-4 were estimated using the BNOISE2 computer model. The BNOISE2 model calculates and displays blast noise exposure contours resulting from specified operations involving large guns and explosive charges (USCHPPM undated). A 1.25-pound block of military-grade M112 C-4 plastic explosive would generate a 110 to 128 dBA noise level at a distance of approximately 330 feet. It is anticipated that more than one block of C-4 would be required to demolish a LORAN tower. This noise level would be a direct temporary (i.e., lasting only a few seconds) minor to major adverse impact on the noise environment, depending on the proximity of sensitive wildlife species.

Some noise associated with equipment servicing ongoing operations would be eliminated with the demolition of LORAN–C stations, and this would be a beneficial effect. As mentioned in **Section 3.2,** three LORAN–C stations in Alaska generate their own electric power and have onsite water and waste water facilities. The LORAN towers also generate a "pulse" at times of high humidity, and high winds generate noise when they pass over the tower's guy wires. Decommissioning of the stations, elimination of vehicle noise, and removal of this equipment would have a minor, beneficial impact on sensitive noise receptors.

4.2.3 Automate, Secure, and Unstaff Stations Alternative

Under this alternative, the LORAN–C signal would remain on the air but the USCG would reduce staffing. As discussed in **Section 2.2.3**, the USCG would automate equipment; secure buildings to protect equipment, antenna, and antenna guides; and reassign personnel. The LORAN–C stations would become LORAN sites operating unstaffed with preventive and corrective maintenance performed by contractor personnel. Under this alternative, the USCG would continue to modernize the LORAN–C system as necessary (see **Section 1.2.3**).

Direct and indirect, short-term minor adverse effects and long-term beneficial impacts would be anticipated under this alternative, depending on the location of the station. The process of securing the buildings and installing fencing would have direct minor short-term adverse effects on ambient noise levels from the use of construction equipment. The noise generated would be temporary and would be isolated to normal working hours.

As described in **Section 2.2.5**, LORAN–C station Port Clarence would likely move to Nome, and relocation of LORAN–C station Attu would be considered to facilitate station unstaffing. Impacts on the noise environment resulting from construction of these stations could range from negligible to adverse depending on the locations chosen. A detailed noise analysis would be performed once a location for these new sites is selected. To avoid electronic interference and reradiating the LORAN–C signal by ungrounded metal, all metal objects within the area of the tower would be electrically bonded to the radial ground plane (FAA 2004).

Noise from construction activities (i.e., building, grading, and paving) was estimated to predict how construction of a new LORAN–C Station would impact noise-sensitive receptors at a given distance. Construction activities would involve the use of multiple pieces of equipment simultaneously. Building construction (as shown in **Table 3-1**) involves the use of an industrial and generator saw, a welder, at least one truck, and occasionally a forklift or crane. Construction noise was estimated to be as follows:

- Noise levels generated by grading work would be estimated at 92 dBA at 50 feet, 66 dBA at 1,000 feet, and 60 dBA at 2,000 feet.
- Noise levels generated by paving work would be estimated at 89 dBA at 50 feet, 63 dBA at 1,000 feet, and 57 dBA at 2,000 feet.

- Noise levels generated by building construction would be estimated at 85 dBA at 50 feet, 59 dBA at 1,000 feet, and 53 dBA at 2,000 feet.

Therefore noise generation of up to 92 dBA would occur for a few days or weeks during normal working hours (approximately 7:00 am to 5:00 pm, depending on local ordinances) during construction activities.

A variation of this alternative would involve LORAN–C operations being turned over to a private contractor under USCG management. There would be no increase in noise from contractor activities compared to current USCG vehicle traffic. It is unlikely that additional contractor personnel would be required as compared to the existing number of USCG staff, therefore it is anticipated that there would be no change to existing noise levels from proposed changes in vehicle traffic. An indirect, minor, beneficial long-term effect on noise would occur from fewer vehicles traveling to the site.

4.2.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

The impacts associated with this alternative are anticipated to be the same as the Automate, Secure, and Unstaff Stations Alternative (see **Section 4.2.3**).

4.2.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

Transmitting Stations. As discussed in **Section 1.3.1,** modernization is required to deploy eLORAN. Since modernization activities would be primarily inside the transmission building, only short-term, negligible to minor adverse effects on noise would occur, similar to the No Action Alternative. Only LORAN–C stations Attu, Port Clarence, Tok, and Shoal Cove require modernization. These stations require substantial building construction. However, civil engineering support throughout all LORAN stations, particularly the stations in Alaska would require significant recapitalization to sustain the system into the future.

As described in **Section 2.2.5,** up to three new LORAN transmitting sites might be constructed, LORAN–C Station Port Clarence would likely move to Nome, and relocation of LORAN–C Station Attu would be considered to facilitate station unstaffing. Impacts on the noise environment resulting from construction of these stations could range from negligible to adverse depending on the locations chosen. Estimated construction noise levels are given in **Section 4.2.3**. A detailed noise analysis would be performed once a location for these new sites is selected. To avoid electronic interference and reradiating the LORAN–C signal by ungrounded metal, all metal objects within the area of the tower would be electrically bonded to the radial ground plane.

Control Centers and Monitoring Sites. Under this alternative eLORAN transmitting stations would operate unattended. This would result in a beneficial long-term effect on the noise environment due to reduced vehicle traffic, which would be similar to the impacts on noise under the *Automate, Secure, Unstaff, and Transfer Management of Program Alternative*. The signal would be controlled from a centralized control center other than the NAVCEN. A control center for the other agency would be established.

Monitoring stations would be required at harbors where accuracy is necessary for vessel entrance and approach; some large harbors might require multiple reference stations. The purpose of the monitoring stations would be to ensure that the signal is being transmitted. Due to the small size of these monitoring stations it is anticipated that the noise generated by their construction would have a negligible impact on the sound environment, especially since construction would be temporary. The locations where these stations would be required are not yet known and a more detailed analysis would be addressed in follow-on NEPA documentation, as necessary.

4.3 Air Quality

The environmental consequences on local and regional air quality conditions near a proposed Federal action are determined based upon the increases in regulated pollutant emissions compared to existing conditions and ambient air quality. Specifically, the impact in NAAQS attainment areas would be considered significant if the net increases in pollutant emissions from the Federal action would result in any one of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Expose sensitive receptors to substantially increased pollutant concentrations
- Represent an increase of 10 percent or more in an affected AQCR emissions inventory
- Exceed any Evaluation Criteria established by a SIP.

Effects on air quality in NAAQS nonattainment areas are considered significant if the net changes in project-related pollutant emissions result in any of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Increase the frequency or severity of a violation of any ambient air quality standard
- Delay the attainment of any standard or other milestone contained in the SIP.

With respect to the General Conformity Rule, effects on air quality would be considered significant if the proposed Federal action would result in an increase of a nonattainment or maintenance area's emissions inventory by 10 percent or more for one or more nonattainment pollutants, or if such emissions exceed *de minimis* threshold levels established in 40 CFR 93.153(b) for individual nonattainment pollutants or for pollutants for which the area has been redesignated as a maintenance area.

The *de minimis* threshold emissions rates were established by USEPA in the General Conformity Rule to focus analysis requirements on those Federal actions with the potential to have significant air quality effects. **Table 4-1** presents these thresholds, by regulated pollutant. These *de minimis* thresholds are similar, in most cases, to the definitions for major stationary sources of criteria and precursors to criteria pollutants under the CAA's New Source Review Program (CAA Title I). As shown in **Table 4-1**, *de minimis* thresholds vary depending on the severity of the nonattainment area classification.

In addition to the *de minimis* emissions thresholds, Federal PSD regulations define air pollutant emissions to be significant if the source is within 10 kilometers of any Class I area, and emissions would cause an increase in the concentration of any regulated pollutant in the Class I area of 1 $\mu g/m^3$ or more (40 CFR 52.21(b)(23)(iii)).

4.3.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. Modernization of LORAN–C equipment necessary to keep the system operational would continue. Implementation of the No Action Alternative would have no adverse impacts on air quality.

Table 4-1. Conformity *de minimis* Emissions Thresholds per Year

Pollutant	Status	Classification	*de minimis* Limit (tpy)
O_3 (measured as NO_x or VOCs)	Nonattainment	Extreme	10
		Severe	25
		Serious	50
		Moderate/marginal (inside ozone transport region)	50 (VOCs)/100 (NO_x)
		All others	100
	Maintenance	Inside ozone transport region	50 (VOCs)/100 (NO_x)
		Outside ozone transport region	100
CO	Nonattainment/ maintenance	All	100
$PM_{10/2.5}$	Nonattainment/ maintenance	Serious	70
		Moderate	100
		Not Applicable	100
SO_2	Nonattainment/ maintenance	Not Applicable	100
NO_x	Nonattainment/ maintenance	Not Applicable	100

Source: 40 CFR 93.153

4.3.2 Decommission Program and Terminate Signal Alternative

Short-term minor adverse effects would be expected as a result of the demolition of the tower, ground-plane copper radials, transmitter building, associated facilities, and monitoring sites. Demolition activities would also result in emissions of criteria pollutants as combustion products from construction equipment. These emissions would be temporary. The emissions factors and estimates were generated based on guidance provided in USEPA AP-42, Volume II, *Mobile Sources*. Fugitive dust emissions for various construction activities were calculated using emissions factors and assumptions published in USEPA's publication AP-42, Section 11.9.

For purposes of this analysis, the project duration and affected project site area that would be disturbed (presented in **Section 2**) was used to estimate fugitive dust and all other criteria pollutant emissions. The emissions presented in **Table 4-2** include the estimated annual PM_{10} emissions associated with decommissioning and demolishing LORAN–C stations by Calendar Year (CY). These emissions would produce slightly elevated short-term PM_{10} ambient air concentrations. However, the effects would be temporary, and would fall off rapidly with distance from each site.

Table 4-2. Total Emissions for the Decommission Program and Terminate Signal Alternative

Description	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_x (tpy)	PM_{10} (tpy)
Construction Equipment Emissions	0.162	0.026	0.216	0.003	0.005
Demolition Fugitive Dust Emissions	0.000	0.000	0.000	0.000	7.091
Total Emissions	**0.162**	**0.026**	**0.216**	**0.003**	**7.096**

Specific information describing the types of equipment required for demolition, the hours the equipment is operated, and the operating conditions would vary widely from project to project. For purposes of analysis, these parameters were estimated using established methodologies and experience with similar types of construction and demolition projects. Combustion by-product emissions from construction equipment exhausts were estimated using USEPA's AP-42 emissions factors for heavy-duty, diesel-powered construction equipment. Emissions factors, calculations, and estimates of emissions for the Decommission the Program and Terminate the Signal Alternative are shown in detail in **Appendix C**.

4.3.3 Automate, Secure, and Unstaff Stations Alternative

Short-term minor adverse effects on air quality would be expected from construction to secure LORAN–C stations and construct security fencing. Construction activities would also result in emissions of criteria pollutants as combustion products from construction equipment. These emissions would be of a temporary nature. The emissions factors and estimates were generated based on guidance provided in USEPA AP-42, Volume II, *Mobile Sources*. Fugitive dust emissions for various construction activities were calculated using emissions factors and assumptions published in USEPA's AP-42 Section 11.9.

The emissions presented in **Table 4-3** include the estimated annual construction PM_{10} emissions associated with securing each station. These emissions would produce slightly elevated short-term PM_{10} ambient air concentrations. However, the effects would be temporary, and would fall off rapidly with distance from each site.

Table 4-3. Total Emissions for the Automate, Secure, and Unstaff Stations Alternative per Year

Description	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_x (tpy)	PM_{10} (tpy)
Construction Combustion Emissions	0.0002	0.00003	0.0002	0.000003	0.00001
Construction Fugitive Dust Emissions	0.000	0.000	0.000	0.000	0.0703
Total Emissions	**0.0002**	**0.00003**	**0.0002**	**0.000003**	**0.0703**

The types of construction equipment required for a specific task, the hours the equipment is operated, and the operating conditions vary widely from project to project. For the purposes of this analysis, these parameters were estimated using established methodologies for construction and experience with similar types of projects. Combustion by-product emissions from construction equipment exhausts were estimated using USEPA's AP-42 emissions factors for heavy-duty, diesel-powered construction equipment.

The construction emissions presented in **Table 4-3** include the estimated annual emissions from construction equipment exhaust. As with fugitive dust emissions, combustion emissions would produce slightly elevated air pollutant concentrations. However, the effects would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term effects.

No LORAN–C Station would be classified as a major emissions source. As discussed previously, site-specific analysis would be completed for each new site and conformity would be analyzed at that time. However, based on emissions estimates presented in **Table 4-3**, emissions from construction activities would be well below *de minimis* air quality thresholds. As shown in **Table 4-3**, no significant impacts on regional or local air quality would occur. Emissions factors, calculations, and estimates of emissions are shown in detail in **Appendix C**.

As discussed in **Section 2.2.3**, LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. Minor, short-term adverse effects would occur from constructing new sites due to construction equipment emissions and land disturbance. Construction activities would result in impacts on regional air quality, primarily from site-disturbing activities and the operation of construction equipment.

Construction activities would generate total suspended particulate and PM_{10} emissions as fugitive dust from ground-disturbing activities (e.g., grading, trenching, soil piles) and from the combustion of fuels that power construction equipment. Fugitive dust emissions would be greatest during the initial site preparation activities and would vary from day to day depending on the construction phase, level of activity, and prevailing weather conditions. The quantity of uncontrolled fugitive dust emissions from a construction site is proportional to the area of land being worked and the level of construction activity. Approximately 7.97 acres of land would be disturbed for each transmission site and access road. For the purposes of this analysis, it was estimated that between 21 and 84 acres could be disturbed to install the ground plane radials, depending on the construction technique and depth the radials would be buried.

For the purposes of this analysis, the project duration and affected project site area that would be disturbed (presented in **Section 2**) was used to estimate fugitive dust and all other criteria pollutant emissions. The construction emissions presented in **Tables 4-4** and **4-5** include the estimated annual construction PM_{10} emissions associated with constructing new sites. Because the amount of land that would be disturbed by installing the 120 copper radials would vary per site, both low (21 acres) and high (72 acres) estimates of disturbance were used to estimate potential fugitive dust emissions from the construction of new LORAN–C stations (see **Tables 4-4** and **4-5**). These emissions would produce slightly elevated short-term PM_{10} ambient air concentrations. However, the effects would be temporary, and would fall off rapidly with distance from the construction site.

Table 4-4. Total Construction Emissions Associated with a New LORAN Site (Low Estimate)

Description	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_x (tpy)	PM_{10} (tpy)
Construction Combustion Emissions	3.197	0.566	3.733	0.066	0.107
Station Construction Fugitive Dust Emissions	0.000	0.000	0.000	0.000	28.743
Total Emissions	**3.197**	**0.566**	**3.733**	**0.066**	**28.850**

Table 4-5. Total Construction Emissions Associated with a New LORAN Site (High Estimate)

Description	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_x (tpy)	PM_{10} (tpy)
Construction Combustion Emissions	25.476	3.887	29.760	0.512	0.855
Station Construction Fugitive Dust Emissions	0.000	0.000	0.000	0.000	91.320
Total Emissions	**25.476**	**3.887**	**29.760**	**0.512**	**92.175**

The construction emissions presented in **Tables 4-4** and **4-5** include the estimated annual emissions from construction equipment exhaust associated with constructing new sites. As with fugitive dust emissions, combustion emissions would produce slightly elevated air pollutant concentrations. However, the effects would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term effects.

Since the exact locations of the three new LORAN transmitting sites are unknown at this time, a proposed site might be within a nonattainment area. Each LORAN–C Station would not be classified as a major emissions source. As discussed previously, site-specific analysis would be completed for each site and conformity will be analyzed at that time. However, based on emissions estimates as presented in **Tables 4-4** and **4-5**, emissions from construction activities and operation of the station would be below *de minimis* air quality thresholds. The only possible exception to this would be the high estimate in a PM_{10} serious nonattainment area. If a new LORAN–C Station were to be built in a PM_{10} serious nonattainment area, the USCG would modify installation or implement additional BMPs to reduce PM_{10} emissions. As shown in **Tables 4-4** and **4-5**, no significant impacts on regional or local air quality would result from constructing a new station. Emissions factors, calculations, and estimates of emissions are shown in detail in **Appendix C**.

Based on emissions using the assumptions discussed in **Section 2**, demolition or construction and operation of each USCG LORAN–C Station would be well below criteria pollutant emissions thresholds and would be well below 10 percent of an area's total emissions for each pollutant. For each USCG LORAN station, the USCG would coordinate with the appropriate AQCR to determine whether an air quality permit is required for any backup generators if they are required.

4.3.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

Emissions from this alternative would be the same as the Automate, Secure, and Unstaff Stations Alternative presented in **Table 4-3**. As discussed previously, site-specific analysis would be completed for the construction of each new LORAN station. However, based on emissions estimates presented in **Table 4-3**, emissions from construction activities would be well below *de minimis* air quality thresholds. No significant impacts on regional or local air quality would occur.

4.3.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

Short-term minor adverse effects would be expected from construction emissions and land disturbance as a result of constructing new sites. Construction activities would result in impacts on regional air quality, primarily from site-disturbing activities and operation of construction equipment. As described in **Section 2.2.5**, up to three new LORAN transmitting sites might be constructed, LORAN–C Station Port Clarence would likely move to Nome, and relocation of LORAN–C Station Attu would be considered to facilitate station unstaffing. Impacts from constructing new sites would be similar to impacts discussed under the Automate, Secure, and Unstaff Stations Alternative, but would be more extensive since more stations might be constructed under this alternative. Emissions from construction of each station would be the same as those presented in **Tables 4-4** and **4-5**.

4.4 Earth Resources

The following thresholds for impacts were used to assess the magnitude of effects on earth resources:

- Negligible adverse effects would result in a change to a natural physical resource, but the change would be small, localized, and of little consequence. Adverse effects on adjacent resources resulting from erosion and sedimentation would be small, localized, and of little consequence.
- Minor adverse effects would result in a change to a natural physical resource, but the change would be small, localized, and of little consequence. Adverse effects on adjacent resources resulting from erosion and sedimentation would be small, localized, and of little consequence.
- Moderate adverse effects would result in a change to a natural physical resource; the change would be measurable. Adverse effects on adjacent resources resulting from erosion and sedimentation would be measurable.
- Significant adverse effects would result in a noticeable change to a natural physical resource; the change would be measurable and result in a severely adverse or major effect. Adverse effects on adjacent resources resulting from erosion and sedimentation would be severe.

4.4.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. The USCG would continue to modernize the LORAN–C system (e.g., converting all equipment to solid-state electronics) as necessary. Implementation of the No Action Alternative would have no adverse impacts on earth resources.

4.4.2 Decommission Program and Terminate Signal Alternative

Negligible beneficial and adverse effects on earth resources would be expected. Decommissioning the program and terminating the signal would involve removal of the existing towers and stations, in some cases returning the site to a natural state. Returning the property to a natural state would entail removing existing structures, testing for and removing any contaminated soils, regrading to natural contours, and reseeding with natural vegetation. The disturbance that could occur during demolition would occur at locations where effects on geologic resources, such as blasting of the surface bedrock to grade for tower placement or access road development, occurred previously during the construction of the towers, facilities, utilities, and infrastructure.

Short-term negligible direct adverse effects on soils would be expected as a result of the demolition of towers and facilities under this alternative. Demolition activities would be expected to directly affect the soils as a result of excavation and compaction of the existing soils. However, the soils were disturbed during the construction of the towers, facilities, utilities, and infrastructure. Additional short-term minor direct adverse effects could occur as a result of erosion and associated sedimentation during demolition, especially in areas where vegetative cover was removed. The USCG would ensure that the demolition contractor coordinates with the state or USEPA to obtain the appropriate NPDES permit in accordance with the CWA and COMDTPUB 11300.3 (Phase I and Phase II), *Storm Water Management Guide*. A Phase I NPDES permit is required for all projects that would disturb 5 acres or more. A Phase II NPDES permit is required for all projects that would disturb between 1 and 5 acres. Basic compliance with either a Phase I or II NPDES permit would include (1) developing site-specific BMPs, (2) implementing BMPs, and (3) satisfying reporting and recordkeeping requirements. The demolition contractor would also be required to use the site-specific Storm Water Pollution Prevention Plan (SWPPP) to ensure that storm water runoff from the demolition site is minimized. If a Phase I or II NPDES permit is not required, the USCG would still implement a SWPPP that identifies BMPs to minimize any potentially adverse effects as a result of demolition. Implementation of erosion and sediment control and storm water BMPs, both during and after demolition, that are consistent with NPDES Phase I or II permit requirements, the installation SWPPP, and other applicable codes and ordinances would minimize the potential for adverse effects resulting from erosion and transport of sediments in storm water runoff.

BMPs would be implemented in conjunction with all demolition projects to limit potential effects resulting from demolition activities. Fugitive dust from demolition activities would be minimized by watering and soil stockpiling, which would reduce the total amount of soil exposed to potential suspension and wind erosion. Implementation of standard erosion-control practices (e.g., silt fencing, sediment traps, application of water sprays, phased demolition, and prompt revegetation of disturbed areas) would also reduce potential effects related to soil erosion and associated sedimentation.

No effects on natural microtopography would be expected. Decommissioning activities would occur at locations where natural microtopography would have been previously disturbed by tower, access road, and utility line development.

No effects on prime farmland or farmland of statewide importance would be expected. The LORAN sites have been previously disturbed, so these soils do not meet the definition of prime farmland. In addition, tower and associated support facility removal would potentially increase the area available to farmland related uses.

4.4.3 Automate, Secure, and Unstaff Stations Alternative

Negligible effects on earth resources would be expected at locations where installation and fencing would be necessary to secure a station prior to its transfer. Negligible indirect adverse impacts on adjacent habitats could also result from the deposition of soils eroded from disturbed areas. Properly designed erosion and sediment control and storm water management practices would be implemented during fence installation, consistent with state and USCG requirements and guidelines, to minimize potential adverse impacts.

As discussed in **Section 2.2.3**, LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. The USCG would have some flexibility in the exact siting of new LORAN towers and would seek to avoid impacts on earth resources to the greatest extent possible. Negligible adverse impacts on geologic resources could occur at locations where bedrock is at the surface and blasting would be necessary to grade for tower and associated structures placement or access road development. Geologic resources could affect the placement of towers or access roads due to the occurrence of bedrock at the surface, or as a result of structural instability. In most cases, it is expected that project design and engineering practices could be implemented to mitigate geologic limitations to site development.

Long-term negligible to minor adverse impacts on soils would be expected as a result of grading, excavation, placement of fill, compaction, mixing, or augmentation necessary to accommodate towers and associated structures, access roads, and utility line development. Additional impacts on soils could occur as a result of erosion, if properly designed erosion and sediment controls and storm water management practices are not implemented during site development. Minor adverse impacts on adjacent habitats could also result from the deposition of soils eroded from the development site during construction. As described in **Section 4.4.2**, properly designed erosion and sediment control and storm water management practices would be implemented, consistent with state and USCG requirements and guidelines, to minimize potential adverse impacts. Management of storm water on the construction sites would minimize the potential for increased soil erosion associated with runoff from the site.

Soil characteristics (e.g., excessive erodibility, instability, shrink swell clays) could limit the suitability of a site for development. In most cases, it is expected that project design and engineering practices could be implemented to mitigate soil-related limitations to site development.

Long-term negligible adverse impacts on natural microtopography could occur on previously undisturbed sites as a result of excavation, grading, or filling necessary to accommodate tower, access road, and utility line development. Topography could limit the suitability of a site for tower placement in areas where there are high variations in relief which could limit the line of sight to the tower.

The USCG has some flexibility in the siting of the new towers and would seek to minimize potential adverse impacts on earth resources. In addition, the USCG would coordinate with the applicable agencies to obtain any permits determined to be necessary based on the final tower and access road locations. Site-specific tiered NEPA analysis would be conducted, as determined to be necessary, at new tower sites once the location of the site is determined.

4.4.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

Impacts on earth resources from this alternative would be the same as under the Automate, Secure, and Unstaff Stations Alternative.

4.4.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

Short-term and long-term negligible to minor adverse impacts on earth resources would be expected. As described in **Section 2.2.5,** up to three new LORAN transmitting sites might be constructed, LORAN–C Station Port Clarence would likely move to Nome, and relocation of LORAN–C Station Attu would be considered to facilitate station unstaffing. The agency implementing this alternative would have some flexibility in the exact siting of eLORAN towers and would seek to avoid impacts on earth resources to the greatest extent possible. Negligible adverse impacts on geologic resources could occur at locations where bedrock is at the surface and blasting would be necessary to grade for tower and associated structures placement or access road development. Geologic resources could affect the placement of towers or access roads due to the occurrence of bedrock at the surface, or as a result of structural instability. In most cases, it is expected that project design and engineering practices could be implemented to mitigate geologic limitations to site development.

Long-term negligible to minor adverse impacts on soils would be expected as a result of grading, excavation, placement of fill, compaction, mixing, or augmentation necessary to accommodate towers and associated structures, access roads, and utility line development. Additional impacts on soils could occur as a result of erosion, if properly designed erosion and sediment controls and storm water management practices are not implemented during site development. Minor adverse impacts on adjacent habitats could also result from the deposition of soils eroded from the development site during construction. As described in **Section 4.2.2**, properly designed erosion and sediment control and storm water management practices would be implemented, consistent with state and applicable agency requirements and guidelines, to minimize potential adverse impacts. Management of storm water on the construction sites would minimize the potential for increased soil erosion associated with runoff from the site.

Soil characteristics (e.g., excessive erodibility, instability, shrink swell clays) could limit the suitability of a site for development. In most cases, it is expected that project design and engineering practices could be implemented to mitigate soil-related limitations to site development.

Long-term negligible adverse impacts on natural microtopography could occur on previously undisturbed sites as a result of excavation, grading, or filling necessary to accommodate tower, access road, and utility line development. Topography could limit the suitability of a site for tower placement in areas where there are high variations in relief which could limit the line of sight to the tower.

Negligible impacts on prime or unique farmland would be expected at locations where it was determined to occur. Determination of the occurrence of prime farmland would be based on the presence of prime farmland soils in combination with other site-specific characteristics. The placement of a tower, access road, and utility line on a site designated as prime or unique farmland would not be expected to limit the future use of the site as farmland.

The agency implementing this alternative would have some flexibility in the siting of the new towers and would seek to minimize potential adverse impacts on earth resources. In addition, the agency implementing this alternative would coordinate with the applicable agencies to obtain any permits determined to be necessary based on the final tower and access road locations. Site-specific tiered NEPA analysis would be conducted, as determined to be necessary, at new tower sites once the location of the site is determined.

4.5 Water Resources

Evaluation criteria for effects on water resources are based on water availability, quality, and use; existence of floodplains; and associated regulations. A proposed action would result in adverse effects on water resources if it does one or more of the following:

- Violates a Federal, state, or local law or regulation adopted to protect water resources (major)
- Causes irreparable harm to human health, aquatic life, or beneficial uses of aquatic ecosystems (major)
- Degrades surface water or groundwater quality (minor to major depending on extent of degradation)
- Alters surface runoff resulting in flooding, or places a structure within a 100-year floodplain (minor to major depending on extent of change)
- Reduces water availability or supply to existing users (minor to major depending on extent of change).

4.5.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics) as necessary. Implementation of the No Action Alternative would have no adverse impacts on water resources.

4.5.2 Decommission Program and Terminate Signal Alternative

Surface Water and Groundwater. Short-term minor direct adverse effects on groundwater and surface water would be expected as a result of demolition activities associated with the Proposed Action. Long-term minor indirect beneficial effects on groundwater and surface water quality would be expected as a result of the decrease of impervious surfaces following demolition and restoration to a natural state. The removal of impervious surfaces and the revegetation of these sites would reduce runoff and allow water to infiltrate into natural surfaces increasing shallow groundwater recharge over time.

Demolition-Related Effects. The Decommission Program and Terminate Signal Alternative would be expected to result in short-term minor direct adverse effects on surface water resources and negligible to minor adverse effects on groundwater resources as a result of demolition activities. Demolition activities could directly result in increased sediment runoff into streams, lakes, estuaries, or the ocean. Increased sediment loads increase water turbidity and temperature, and decrease the overall habitat quality for aquatic life.

The USCG would ensure that the demolition contractor would coordinate with the state or USEPA to obtain the appropriate NPDES permit in accordance with the CWA and COMDTPUB 11300.3 (Phase I and Phase II), *Storm Water Management Guide*. A Phase I NPDES permit would be required for all projects that disturb 5 acres or more. A Phase II NPDES permit would be required for all projects that disturb between 1 and 5 acres. Basic compliance with either a Phase I or II NPDES permit would include (1) developing site-specific BMPs, (2) implementing BMPs, and (3) satisfying reporting and recordkeeping requirements. The demolition contractor would also be required to use the site-specific SWPPP to ensure that storm water runoff from the construction site is minimized. If a Phase I or II NPDES permit is not required, the USCG would still implement a SWPPP that identifies BMPs to minimize any potentially adverse effects as a result of demolition.

There would be a minor potential for spills or leaks from demolition equipment. Spills or leaks would likely result in negligible to minor adverse effects on surface water or groundwater resources. Surface waters or areas that have karst terrain would be more susceptible to adverse effects in the event of a spill or leak. Demolition contractors would be responsible for ensuring that equipment is in good operating order to reduce the potential for leaks, and would develop a SPCC Plan to ensure that the potential for dangerous chemical spills would be minimized by providing appropriate procedures to contain and clean up spills if they occur. The demolition contractor would also be expected to practice good housekeeping measures to reduce the quantity of potentially hazardous chemicals needed, and ensure they are handled and used properly. In the event that a spill occurs, it would not be likely to have a major effect on surface water quality or groundwater quality.

The use of staging areas would result in short-term negligible adverse effects. It is not expected that staging areas would be cleared, graded, or permanently altered, though minor soil disturbance could occur as a result of vehicle traffic. Vehicles also have the potential for fuel leaks, but contractors would be required to practice good housekeeping practices. Overall, short-term adverse effects as a result of using staging areas would be negligible.

The USCG would obtain any demolition-related permits required by the CWA and other state laws and regulations. Demolition activities would not be likely to result in violations of other Federal regulations, such as the SDWA.

Restoration-Related Effects. This alternative would have long-term minor indirect beneficial effects on groundwater and surface water quality as a result of the decrease of impervious surfaces following demolition and restoration to a natural state. Post-demolition areas would be revegetated with appropriate vegetation to reduce soil erosion and potential transport into waterbodies. The removal of impervious surfaces and the revegetation of these sites would reduce runoff and allow water to infiltrate natural surfaces resulting in increased shallow groundwater recharge of underlying aquifers over time. For example, removal of impervious surfaces adjacent to a stream or over karst terrain would reduce the potential to introduce contaminants directly into surface water or groundwater resources, and could also decrease the potential for flash flooding downstream. The removal of electrical transformers and fuel storage facilities associated with the LORAN–C stations would remove the potential to introduce contamination into surface water or groundwater. Detailed analysis would be conducted in follow-on NEPA documentation, as necessary.

Floodplains. This alternative would have long-term minor direct beneficial effects on LORAN sites that occur in floodplains, such as the LSU which is in a 50- and 100-year floodplain, and the LORAN Nantucket Station in Nantucket County, Massachusetts, which is in a 100-year floodplain. Removal of the towers, facilities, utilities, and infrastructure in floodplains would (1) eliminate the hazard and the risk of floodplain loss; (2) minimize the effect of floods on human safety, health, and welfare; and (3) restore and preserve natural and beneficial floodplain values (COMDTINST M16475.ID). Detailed analysis would be conducted in follow-on NEPA documentation, as necessary.

4.5.3 Automate, Secure, and Unstaff Stations Alternative

Surface Water and Groundwater. Negligible effects on surface water and groundwater resources would be expected to occur from the installation of fencing at existing stations. Potential impacts from erosion and sedimentation of surface water resources would be minimized by properly designed erosion and sediment controls and storm water management practices, consistent with state and USCG requirements and guidelines.

As described in **Section 2.2.5**, up to three new LORAN transmitting sites might be constructed, LORAN–C Station Port Clarence would likely move to Nome, and relocation of LORAN–C Station Attu would be considered to facilitate station unstaffing. The USCG would have some flexibility in the exact siting of new LORAN towers and would seek to avoid impacts on water resources to the greatest extent possible. The USCG would obtain any necessary permits in accordance with the CWA and state regulations.

<u>Construction-Related Impacts.</u> The construction of new sites would result in short-term negligible to moderate adverse impacts on surface water and groundwater resources. Construction activities could result in increased sediment runoff into streams, lakes, estuaries, or the ocean. Increased sediment loads increase water turbidity and temperature, and decrease the overall habitat quality for aquatic life. The magnitude of adverse impacts would depend on the specific location and the construction requirements of each location. If roads and necessary utilities exist at a specific site, then only the tower and prefabricated equipment building would be constructed.

Construction of the tower and equipment building would be expected to result in negligible adverse impacts from construction activities alone, but the additional roads and utilities that might be required could result in minor to moderate adverse impacts depending on site-specific soil conditions, topography (see **Section 4.4.2** for discussion of geologic conditions), and surface waterbodies. For example, in areas where there are many small tributaries, adverse impacts from road and utilities construction would be more expensive than station construction.

No long-term impacts would be expected as a result of utilities trenching. If trenching is required, disturbed areas would be revegetated with appropriate vegetation to reduce soil erosion and potential transport into waterbodies.

The USCG would preferentially choose sites to minimize adverse construction impacts to the greatest extent possible. As described in **Section 4.5.2**, the USCG would ensure that the construction contractor has coordinated with the state or USEPA to obtain the appropriate NPDES construction permit in accordance with the CWA and COMDTPUB 11300.3 (Phase I and Phase II), *Storm Water Management Guide*. A Phase I NPDES permit would be required for construction disturbing 5 acres or more. There would be minor potential for spills or leaks from construction equipment. Spills or leaks would likely result in negligible to minor adverse impacts on surface water or groundwater resources. The use of staging areas would result in short-term negligible adverse impacts. It is not expected that staging areas would be cleared, graded, or permanently altered, though minor soil disturbance could occur as a result of vehicle traffic.

The USCG would preferentially choose tower locations to minimize adverse impacts on water resources to the greatest extent possible. The USCG would obtain any construction-related permits required by the CWA and other state laws and regulations. Construction activities would not be likely to result in violations of other Federal regulations, such as the SDWA.

Operations-Related Impacts. Long-term negligible to minor adverse impacts would be expected on surface water and groundwater resources associated with the operation of new sites. The USCG would have some flexibility in the exact siting of new LORAN–C stations and would seek to avoid impacts on water resources to the greatest extent possible. The USCG would obtain any necessary permits in accordance with the CWA and state regulations.

The construction of a new site would result in the creation of permanent impervious surfaces. The creation of impervious surfaces could increase the quantity of storm water runoff, decrease storm water quality, and reduce the amount of groundwater that infiltrates underlying aquifers. Most sites would likely only require the tower and equipment building to be permanently impervious, which would have a negligible adverse impact. It is anticipated that gravel roads would be used when new roads would need to be constructed. The length of road needed at any one site is also variable. The construction of 2 miles of road would create approximately 5 acres of semipervious surface, depending on the material used. The impact magnitude of this amount of semipervious surface would be negligible to minor, depending on the site-specific location. For example, construction of 2 miles of road adjacent to a stream or over karst terrain would have the potential to introduce contaminants directly into surface water or groundwater resources, as well as increase the potential for flash flooding downstream. At most sites, these kinds of impacts would be negligible.

At some locations, the creation of roads could result in minor hydromodification of stream channels, such as culverting or hardened stream crossings. These kinds of modification could result in minor to moderate adverse impacts, such as increased potential for flooding. The magnitude of the impact would depend on the site-specific location. The USCG would avoid hydromodification to the greatest extent possible. If hydromodification is required, the USCG would coordinate and obtain permits with the USACE or other applicable Federal or state agencies.

Each new LORAN site would require a backup generator, most likely powered by diesel or liquid propane. Storage of fuels on site has the potential to introduce contamination into surface water or groundwater. Should the tank be above ground, it would have appropriate spill-containment to protect surface water and groundwater resources in the event of a spill. Overall, the potential that a spill or leak would occur is minor, and the amount of fuel on site would not be sufficient to cause widespread contamination.

New sites would not increase the demand for potable water since each site would stand alone and would not be staffed by the USCG or contractors, so there would be no impact on water availability or supply from surface water or groundwater resources. Operations would have little potential to violate other Federal regulations, such as the SDWA.

Floodplains. The USCG would avoid siting new LORAN sites in the 100-year floodplain in accordance with EO 11988 and COMDTINST M16475.ID. If the 100-year floodplain cannot be avoided, it is USCG policy to modify proposals to (1) reduce the hazard and the risk of floodplain loss; (2) minimize the impact of floods on human safety, health, and welfare; and (3) restore and preserve the natural and beneficial floodplain values (COMDTINST M16475.ID). If any part of a new tower station were to be sited within the 100-year floodplain, the USCG would evaluate the potential impact and initiate public and agency involvement during the site-specific NEPA process prior to any actions occurring.

4.5.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

Surface Water and Groundwater. Impacts on surface water and ground water would be the same as the Automate, Secure, and Unstaff Stations Alternative.

Floodplains. Impacts on floodplains would be the same as the Automate, Secure, and Unstaff Stations Alternative.

4.5.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

Surface Water and Groundwater. Short-term and long-term negligible to minor adverse impacts on surface water and groundwater resources would be expected. As described in **Section 2.2.5,** up to three new LORAN transmitting sites might be constructed, LORAN–C Station Port Clarence would likely move to Nome, and relocation of LORAN–C Station Attu would be considered to facilitate station unstaffing. Impacts from constructing new sites would be similar to impacts discussed under the Automate, Secure, and Unstaff Stations Alternative, but would be more extensive since more stations might be constructed under this alternative. A more detailed analysis will be addressed in follow-on NEPA documentation, as necessary. The most significant impact of this alternative would be from the construction of up to three new LORAN transmitting sites. The agency implementing this alternative would have some flexibility in the exact siting of new LORAN towers and would seek to avoid impacts on water resources to the greatest extent possible. The agency implementing this alternative would obtain any necessary permits in accordance with the CWA and state regulations.

4.6 Biological Resources

The following evaluation criteria were used to determine the magnitude of effects on vegetation, wildlife, wildlife habitat, and wetlands. Separate evaluation criteria were used to evaluate effects on threatened and endangered species:

- Negligible adverse effects would result if there were no observable or measurable effects on native vegetation or wildlife, or sensitive or unique wildlife habitats. Effects would be of short duration and well within natural fluctuations. Effects on wetlands would not be detectable. Effects would result in no measurable or perceptible changes in wetland plant community size, integrity, or continuity.
- Minor adverse effects would be detectable, but they would not be expected to be outside the natural range of variability. Effects on native plants would be measurable or perceptible, but would affect a small area. The viability of the plant community would not be affected and the community, if left alone, would recover. Population numbers, population structure, genetic variability, and other demographic factors for wildlife species might have small, short-term changes, but long-term characteristics would remain stable and viable. Occasional responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, or other factors affecting population levels. Key ecosystem processes might have short-term disruptions that would be within natural variation. Sufficient habitat would remain functional to maintain the system and viability of all species. Effects on wetlands would be measurable or perceptible but localized within a small area. The overall viability of the wetland plant community would not be affected and, if left alone, would recover.
- Moderate adverse effects on vegetation would result if a change would occur over a relatively large area in the native plant community that would be readily measurable in terms of abundance, distribution, quantity, or quality. Effects on native wildlife species, their habitats, or the natural processes sustaining them would be detectable, and they could be outside the natural range of variability for short periods of time. Population numbers, population structure, genetic variability, and other demographic factors for species might have short-term changes, but would be expected to rebound to pre-effect numbers and to remain stable and viable in the long term. Frequent responses to disturbance by some individuals would be expected, with some negative effects on feeding, reproduction, or other factors affecting short-term population levels. Key ecosystem processes might have short-term disruptions that would be outside natural variation. Sufficient habitat would remain functional to maintain viability of all native species. Effects on wetlands would be measurable or perceptible and would result in a loss of wetland habitat. Effects would cause a change in the plant community (e.g., abundance, distribution, quantity, or quality); however, the effect would remain localized.
- Significant adverse effects on native plant communities would entail a substantial change in vegetation community types over a large area. Adverse effects on native species, their habitats, or the natural processes sustaining them would be detectable, and they would be expected to be outside the natural range of variability for long periods of time, or be permanent. Population numbers, population structure, genetic variability, and other demographic factors for species might have large, short-term declines, with long-term population numbers significantly depressed. Frequent responses to disturbance by some individuals would be expected, with negative effects on feeding, reproduction, or other factors resulting in a long-term decrease in population levels. Breeding colonies of native species might relocate to other areas. Key ecosystem processes might be disrupted in the long term or permanently. Loss of habitat might affect the viability of the ecosystem for some native species. Effects on wetlands would be substantial and permanent and would result in complete alteration of wetland habitats. Effects on the plant community would be substantial, highly noticeable, and permanent. Mitigation would be required to offset effects.

Effects on threatened and endangered species were classified using the following terminology, as defined under the ESA:

- No effect – would occur if there would be no impact on a listed species or designated critical habitat.
- Might affect/not likely to adversely affect – effects on special status species are discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated) or completely beneficial.
- Might affect/likely to adversely affect – an adverse effect on a listed species occurs as a direct or indirect result of an alternative and the effect is either not discountable or completely beneficial.
- Likely to jeopardize proposed species/adversely modify proposed critical habitat – if the USCG or USFWS identified situations in which actions could jeopardize the continued existence of a listed species or adversely modify critical habitat to a species within or outside of the project area.

4.6.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics) as necessary. No effects on vegetation or wetlands would be expected from the No Action Alternative. Long-term minor to major adverse effects on wildlife and threatened and endangered species—particularly avian and bat mortality from tower collisions—would continue to occur.

4.6.2 Decommission Program and Terminate Signal Alternative

Short-term negligible to minor direct and indirect adverse effects would be expected as a result of demolition-related activities. Short-term and long-term, direct and indirect, beneficial effects would be expected as a result of restoration of sites to a natural state. The following describes anticipated effects on vegetation, wildlife, threatened and endangered species, and wetlands.

Vegetation. Short-term negligible to minor direct and indirect adverse effects on vegetation would be expected as a result of demolition-related activities. The removal of existing utilities would disturb existing vegetation in these areas.

Removal and disturbance of vegetation in the areas of buried utilities has the potential to introduce and spread exotic invasive species. Spread of exotic invasive species in this area could result from disturbance which could allow aggressive invasives to become established from seed stock on the site or in adjacent habitats. Invasive species could also be introduced on demolition equipment brought to the site from other locations. Likewise exotic invasive species occurring at these locations could be spread to offsite locations if equipment was not properly cleaned before leaving the site. The establishment and spread of *Phragmites australis* is of particular concern in coastal areas where it can aggressively take over areas previously characterized by native vegetation following disturbance. Similarly, Russian thistle (*Salsola tragus*) is a common invasive species in the Mojave Desert and would need to be addressed in any vegetation plan for LORAN–C Station Searchlight. EO 13112, *Invasive Species*, directs all government agencies to review projects to ensure that no increase in the spread of invasive plant species occurs from demolition activities. The USCG would comply with the guidelines in the EO to minimize potential for the spread of exotic invasive species associated with the removal of the towers, building structures and buried utilities.

Short-term and long-term minor indirect adverse effects on wetland or aquatic vegetation in proximity to demolition areas could occur if water quality was degraded as a result of erosion and sedimentation and storm water runoff from the site during demolition. Erosion and sediment control and storm water management practices consistent with USCG guidelines and state requirements would be implemented during demolition to minimize potential adverse effects on wetland and aquatic vegetation. Spill contingency plans and management practices would be developed and, when necessary, implemented to minimize potential effects on aquatic resources resulting from leakage of equipment and potential chemical or fuel spills during demolition.

Short-term and long-term direct and indirect beneficial effects on vegetation would be expected as a result of restoration of sites to a natural state. Following demolition and removal of structures, the stations would be replanted with native vegetation. EO 13112, *Invasive Species*, directs all government agencies to review projects to ensure that no increase in the spread of invasive plant species occurs. The USCG would comply with the guidelines in the EO to minimize potential for the spread of exotic invasive species associated with the restoration of sites to their natural state. In addition, the USCG would coordinate with the applicable agencies to obtain Special Use Permits or other permits determined to be necessary.

Wildlife. Short-term negligible to minor direct and indirect adverse effects on wildlife would be expected as a result of demolition-related activities. Demolition and removal of towers, facilities, utilities, and associated infrastructure could result in the disturbance of wildlife that use the stations and surrounding lands. The degree of disturbance to wildlife would vary depending on the characteristics of the location. Demolition and removal activities in proximity to a forested habitat, wetlands, or other sensitive habitats would be expected to have a greater potential for short-term adverse effects on wildlife that might use these adjacent habitats. Demolition and removal activities would likely result in mortality of some less mobile fauna such as reptiles, amphibians, and small mammals. Most wildlife would be expected to temporarily relocate from areas immediately surrounding the demolition or removal area. Ability to relocate would be affected by availability of suitable adjacent habitats and connectedness to these habitats. Some species would be expected to move back into the area following the completion of demolition and removal activities.

Noise from demolition activities would result in short-term direct and indirect minor adverse effects on wildlife. Dismantling of LORAN towers would likely be accomplished using explosives. The size and noise generated by the explosion would vary, depending on the amount explosives used and numbers of tower destroyed at a given time. A 1.25-pound block of military explosive would generate noise levels of 110 to 128 dBA at a distance of 100 meters (see **Section 4.2.2**). The size and type of explosives and the timing of the explosions are currently unknown. A sudden increase in noise can cause behavioral changes, disorientation, and hearing loss in wildlife species. Predictors of wildlife response to noise include noise type (i.e., continuous or intermittent), prior experience with noise, proximity to a noise source, stage in the breeding cycle, activity, age, and sex composition. Prior experience with noise is the most important factor in the response of wildlife to noise, because wildlife can become accustomed (or habituate) to the noise. Most of the LORAN towers are located in remote areas with low ambient noise levels. Noise (e.g., pyrotechnics, firearms) could also be intentionally used prior to the explosion to disperse most animals from the area (Larkin undated). Impacts on specific species at each LORAN–C Station and the LSU would be described in greater detail in follow-on NEPA documentation.

Short-term and long-term direct and indirect beneficial effects on wildlife would be expected as a result of restoration of sites to a natural state. Wildlife common to the area prior to development would be expected to recolonize the area once it was returned to its predevelopment condition.

Short-term and long-term negligible to minor indirect adverse effects on aquatic species and their habitats could occur if water quality was degraded as a result of erosion and sedimentation and increased storm water runoff during demolition activities. Erosion and sediment control and storm water management practices consistent with USCG guidelines and state requirements would be implemented during demolition to minimize potential adverse effects on aquatic resources. Spill contingency plans and management practices would be developed and, when necessary, implemented to minimize potential effects on aquatic resources resulting from leakage of equipment and potential chemical or fuel spills during demolition. Detailed analysis would be conducted in follow-on NEPA documents, as necessary.

Short-term and long-term direct and indirect beneficial effects would be expected to aquatic species and their habitats as a result of restoration of sites to a natural state.

Migratory Birds and Bats. Short-term negligible to major direct and indirect beneficial effects on migratory birds and bats would be expected as a result of removing the towers and associated guy wires, and the restoration of sites to a predevelopment condition.

Most migratory birds fly at a height of about 2,000 to 3,000 feet above sea level, with some species flying at levels down to about 500 feet above sea level. Birds also might fly at lower altitudes during inclement weather or low visibility conditions (URS 2004). Based on the altitudes known for migrating birds, most fly at elevations well above the height of the LORAN towers. These flight elevations do not account for birds landing or taking off from breeding and feeding habitat when there would be an increased potential for injury or mortality due to collision with tower structures.

Studies indicate that most adverse effects on birds resulting from collision occur during foggy or low cloud conditions at lighted towers. Towers with guy wires likely increase potential for adverse effects under these conditions.

There are numerous variables including tower height and design, lighting, seasons, adjacent land features, and migration patterns that affect the potential for adverse effects on migratory birds at tower locations. These variables are key factors affecting avian navigation and the potential for tower collisions. The degree and mechanisms of influence either alone or in combination are not clear.

As shown in **Figure 3-1**, approximately 10 LORAN–C stations are within a major migratory bird flyway. Beneficial effects on migratory birds and bats would be expected as a result of the elimination of the risk of collision with the towers and guy wires, and from eliminating adverse effects on bird navigation in association with poor visibility and tower lighting.

Noise associated with tower demolition would result in short-term direct and indirect minor adverse effects on migratory birds and bats. The size and noise generated by the explosion would vary, depending on the amount of explosives used and numbers of towers destroyed at a given time. The size and type of explosives and the timing of the explosions are currently unknown. A sudden increase in noise can cause behavioral changes, disorientation, and hearing loss in wildlife species. Predictors of wildlife response to noise include noise type (i.e., continuous or intermittent), prior experience with noise, proximity to a noise source, stage in the breeding cycle, activity, age, and sex composition. Prior experience with noise is the most important factor in the response of wildlife to noise, because wildlife can become accustomed (or habituate) to the noise. Many LORAN towers are located in areas that would be considered important nesting areas for migratory bird species. These areas are in remote locations with low ambient noise levels. If decommissioning occurred during nesting seasons, birds could be flushed from their nests temporarily or permanently. Noise (e.g., pyrotechnics, firearms) could also be intentionally used prior to the explosion to disperse most migratory birds from the area to reduce long-lasting impacts such as permanent displacement from nests and hearing loss (Larkin undated). Impacts on specific species at each LORAN–C Station would be described in greater detail in follow-on NEPA documentation.

Threatened or Endangered Species. A determination of whether demolition-related activities would be likely to adversely affect a federally listed threatened or endangered species would be determined based on correspondence with USFWS on a site-specific basis. The determination of potential adverse effects on state-listed species would also be on a site-specific basis. The USFWS currently lists 937 vertebrates, 192 invertebrates, 715 flowering plants, and 33 nonflowering plants as threatened or endangered in the United States and its territories (USFWS 2007). Additional species are protected at the state level. Determination of the potential for the occurrence of a Federal- or state-listed species at a LORAN–C Station would be determined based on location of the LORAN–C Station and associated infrastructure, correspondence with USFWS or applicable state agency, and the conduct of surveys where determined to be necessary. If it is determined that there is potential for adverse effects on a threatened or endangered species, the USCG would coordinate with the USFWS or the applicable state agency to ensure minimization of any potential adverse effects.

Several LORAN–C stations are known to have documented or potential occurrences of federally or state-listed threatened or endangered species, or critical habitat. These LORAN–C stations where Federal- and state-listed threatened or endangered species or associated critical habitat occur and have the potential to be affected by the demolition-related activities include Jupiter, Nantucket, and Searchlight; and the LSU (see **Section 3.6**).

Noise associated with tower demolition activities would result in short-term direct and indirect minor adverse effects on threatened and endangered animal species. As with migratory birds and bats discussed above, a sudden increase in noise can cause behavioral changes, disorientation, and hearing loss in wildlife species. Predictors of wildlife response to noise include noise type (i.e., continuous or intermittent), prior experience with noise, proximity to a noise source, stage in the breeding cycle, activity, age, and sex composition. Prior experience with noise is the most important factor in the response of wildlife to noise, because wildlife can become accustomed (or habituate) to the noise. Many LORAN towers are located in areas that would be considered important nesting areas for threatened and endangered bird species or important habitat for other mammalian, amphibian, or reptilian species. These areas are in remote locations with low ambient noise levels. Slower moving species such as the gopher tortoise and indigo snake could be relocated prior to decommissioning to reduce effect. Noise (e.g., pyrotechnics, firearms) could also be intentionally used prior to the explosion to disperse other threatened and endangered species from the area to reduce long-lasting impacts such as permanent displacement from nests and hearing loss (Larkin undated). Impacts on specific species at each LORAN–C Station would be described in greater detail in follow-on NEPA documentation. The USCG would coordinate with the USFWS prior to all decommissioning activities to ensure the impacts on threatened and endangered species would be minimized.

Short-term and long-term, direct and indirect beneficial effects would be expected on threatened and endangered species as a result of the restoration of sites to a natural or predevelopment state. Threatened and endangered species that might have frequented the surrounding area prior to development could recolonize the area once it has been returned to its natural state.

Potential beneficial effects resulting from decommissioning LORAN–C Station Jupiter include beneficial effects on gopher tortoise, eastern indigo snake, Florida scrub jay, and Florida perforated reindeer lichen. Restoration of the LORAN Jupiter site to a natural state could include creation of suitable habitat, population recruitment, and the elimination of direct mortality and unintentional harassment by contact with LORAN–C Station staff and their privately owned vehicles (POVs).

Similarly, beneficial effects on piping plover and least tern would result from the restoration of the LSU and LORAN–C Station Nantucket due to creation of additional nesting and foraging habitat, population recruitment, and the elimination of unintentional harassment by contact with LORAN–C Station staff and their POVs. Similar beneficial effects on desert tortoise would be expected.

Wetlands. Demolition-related activities at locations where tower structures or related infrastructure are located within or immediately adjacent to wetlands could result in impacts from excavation or inadvertent placement of fill necessary to remove the structures. Prior to conducting demolition activities in these areas, a jurisdictional determination of the extent of the wetland would be obtained and coordination with USACE and applicable state agencies would be conducted to ensure minimization of potential impacts. All required Federal and state wetland and water quality permits would be obtained prior to conducting demolition activities. In some cases, demolition activities could be limited within wetland habitats to avoid potential for adverse effects.

Short-term negligible indirect adverse effects on wetland habitats occurring in proximity to tower sites, facilities, utilities, or associated infrastructure could occur if water quality was degraded as a result of erosion and sedimentation and storm water runoff during demolition-related activities. Erosion and sediment control and storm water management practices consistent with USCG guidelines and state requirements would be implemented to minimize potential adverse effects on wetland habitats. Spill contingency plans and management practices would be developed and, when necessary, implemented to minimize potential effects on wetland habitats resulting from leakage of equipment and potential chemical or fuel spills during demolition-related activities. Additional follow-on NEPA analysis would be conducted. The analysis would further evaluate potential effects on wetlands at site-specific locations.

It is the goal and intent of the USCG, consistent with EO 11990, to avoid adverse effects on wetlands, to proactively manage for wetlands during the demolition and removal process and to mitigate potential effects through avoidance. Impacts on wetlands would be minimized through avoidance and by implementing BMPs (as described under **Section 4.5.2**, Water Resources) to reduce potential for adverse effects on adjacent wetland habitats. A current jurisdictional wetlands determination would likely be necessary prior to conducting activities that could affect wetlands or other waters of the United States.

As discussed in **Section 3.6**, several LORAN sites are known to occur in or adjacent to wetlands. Long-term, direct and indirect, beneficial effects would be expected on wetlands as a result of the restoration of sites to a natural state.

4.6.3 Automate, Secure, and Unstaff Stations Alternative

Automating, securing, and unstaffing stations would have negligible effects on vegetation and wetlands from the installation of fencing. It is assumed that native vegetation would have been previously disturbed by installation of the ground plane. Impacts could occur as a result of vegetation removal along fence alignments and as a result of erosion and consequent transfer of sediments to adjacent wetlands if properly designed erosion and sediment controls and storm water management practices are not implemented during fence installation. Properly designed erosion and sediment controls and storm water management practices would be implemented, consistent with state and USCG requirements and guidelines, to minimize potential adverse impacts.

No new adverse effects on wildlife and threatened and endangered species would be expected from automating, securing, and unstaffing stations except for the cumulative effects of continued avian and bat mortality associated with collision with the existing towers. Depending on the magnitude of fencing required to secure each site, impacts on wildlife and threatened and endangered species could occur as a result of impounding wildlife within the fence or as a result of habitat fragmentation. There is potential that over time impacts could involve threatened or endangered species. Potential effects similar to those discussed in **Section 4.6.5** under Migratory Birds and Bats would be expected as a result of automating the existing stations and maintaining current tower locations.

As discussed in **Section 2.2.3**, LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. The USCG would have some flexibility in the exact siting of LORAN towers and would seek to avoid impacts on biological resources to the greatest extent possible. Potential impacts on biological resources from the construction of new sites is discussed below.

Vegetation. Short-term and long-term, minor to moderate adverse impacts on vegetation would be expected. For any new site, development would result in disturbance to accommodate tower and support buildings, access road, and utility line development. Potential adverse impacts on vegetation associated with site development would vary depending on the characteristics of the site and would result from direct long-term impacts associated with removal, or indirect short- and long-term impacts associated with damage to species during, or as a result of, site development. New site placement in an urbanized environment would be expected to have less potential for adverse impacts on native vegetation than placement in an undeveloped naturally vegetated area. Development in active agricultural plots would result in minimal impacts on natural vegetation. Development in fields, successional habitats, or fallow agricultural land would be expected to impact vegetation characterized by herbaceous species, shrubs, and young tree species. Development in forested habitats would result in direct removal of trees and associated understory vegetation necessary to accommodate the development footprint. Indirect damage to trees and understory vegetation would also be expected to occur as a result of damage to root systems, soil compaction, and landscape modification associated with site development.

Removal and disturbance of vegetation to accommodate site development has the potential to introduce and spread exotic invasive species. Spread of exotic invasive species in the area of new sites could result from disturbance which could allow aggressive invasive species to become established. Invasive species could also be introduced from construction equipment. There is also the risk spreading exotic invasive species to offsite locations through construction equipment after the construction of new sites. The establishment and spread of *Phragmites australis* is of particular concern in coastal areas where it can aggressively take over areas previously characterized by native vegetation. EO 13112, *Invasive Species*, directs all government agencies to review projects to ensure that no increase in the spread of invasive plant species occurs from construction activities. The USCG would comply with the guidelines in the EO to minimize potential for the spread of exotic invasive species associated with the development of new LORAN sites.

Wildlife. Short-term and long-term minor adverse impacts on wildlife would be expected. Construction of new LORAN sites would result in disturbance to accommodate tower and equipment buildings, access road, and utility line development at each new tower location. Potential adverse impacts on wildlife associated with site development would vary depending on the characteristics of the new site. Placement of a new site in an urbanized environment would be expected to have less potential for adverse impacts on wildlife than placement in an undeveloped area. Placement of a new LORAN site in a forested habitat, or in proximity to wetlands or other sensitive habitats would be expected to have a greater potential for short-term and long-term adverse impacts on wildlife that might use the habitats. An undetermined amount of wildlife habitat could be permanently lost as a result of site development and road construction associated with the construction and operation of new towers. Construction activities would likely result in mortality of some less-mobile fauna such as reptiles, amphibians, and small mammals. Most wildlife would be expected to relocate from areas within or immediately surrounding the construction area. Ability to relocate would be limited by suitable adjacent habitats. Some species would be expected to move back into the area following the completion of construction. Mortality of some species would be expected over time as a result of collision with vehicles following the completion of development.

Following the completion of site development, adverse impacts on species sensitive to disturbance could result from noise generated by climate control (heating and air conditioning) equipment associated with the new sites. This reoccurring temporary noise disturbance would be minor. Species sensitive to the disturbance would be expected to move away from the equipment.

Short-term and long-term minor to moderate adverse impacts on aquatic species and their habitats could occur if water quality degraded as a result of erosion and sedimentation from storm water runoff. Erosion and sediment control and storm water management practices consistent with USGC guidelines and state requirements would be implemented both during construction and operation of the new sites to minimize potential adverse impacts on aquatic resources. Spill contingency plans and management practices would be developed and, when necessary, implemented to minimize potential impacts on aquatic resources resulting from leakage of equipment and potential chemical or fuel spills during site development.

The USCG has some flexibility in the development of new sites and would seek to avoid sensitive and protected wildlife areas such as National Wildlife Preserves and wetland habitats. In addition, the USCG would coordinate with the applicable agencies to obtain Special Use Permits or other permits determined to be necessary based on the final LORAN site and access road locations. Site-specific tiered NEPA analysis would be conducted as necessary at new LORAN sites once the location is determined.

Migratory Birds and Bats. Long-term minor to moderate adverse impacts on migratory birds and bats would be expected from construction of new LORAN sites. Impacts on migratory birds and bats would be expected as a result of collision, poor visibility and tower lighting. The probability of collision is difficult to determine because of the range of variables that affect the potential for collision, and the lack of conclusive data regarding the causes of collision.

Most migratory birds fly at a height of about 2,000 to 3,000 feet above sea level, with some species flying at levels down to about 500 feet above sea level. Birds also might fly at lower altitudes during inclement weather or low visibility conditions (URS 2004). Based on the altitudes known for migrating birds, most fly at elevations well above the height of LORAN towers. These flight elevations do not account for birds landing or taking off from breeding and feeding habitat resulting in an increased potential for injury or mortality due to collision.

Studies indicate that most adverse impacts on birds result from collision during foggy or low cloud conditions. Towers using guy wires would likely increase potential for adverse impacts under these conditions. Potential impacts on birds would be expected to be greater during foggy or low cloud conditions.

There are numerous variables including tower height and design, lighting, seasons, adjacent land features, and migration patterns, that would affect the potential for adverse impacts on migratory birds and bats at new sites. These variables are key factors affecting avian and bat navigation and the potential for tower collisions. The degree and mechanisms of influence either alone or in combination are not clear. Site-specific characteristics would also be expected to affect the potential for, and level of, adverse impacts. Site-specific characterization of potential impacts would be determined based on the individual tower locations.

EO 13186 requires Federal agencies taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement a MOU with the USFWS to promote the conservation of migratory bird populations. The USCG currently has a MOU with USFWS that addresses new tower locations associated with the National Distress and Response System Modernization Project (NDRSMP), also known as Rescue 21. The MOU addresses site- and structure-specific issues that could affect migratory birds. In addition, the USCG, to the extent practicable, would implement guidelines and BMPs established in the Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommission (USFWS 2000) to reduce potential for adverse impacts on birds at new tower locations.

Threatened or Endangered Species. A determination of whether the construction or operation of a new site is likely to adversely affect a federally, or state-listed threatened or endangered species would be determined in consultation with USFWS on a site-specific basis. The USFWS currently lists 937 vertebrates, 192 invertebrates, 715 flowering plants, and 33 non-flowering plants as threatened or endangered in the United States and its territories (USFWS 2007). Additional species are protected at the state level. Correspondence with USFWS or applicable state agencies, and field surveys would be determined based on the proposed location of the tower and associated access roads and utilities. If it is determined that there is potential for adverse impacts on a threatened or endangered species, the USCG would coordinate with the USFWS or the applicable state agencies to ensure minimization of any potential adverse impacts.

Wetlands. Short-term and long-term negligible to minor adverse impacts on wetlands could occur as a result of constructing new LORAN sites. Impacts on wetlands associated with construction and operation would be avoided and minimized to the maximum extent practicable. It is the goal and intent of USCG, consistent with EO 11990, to avoid adverse impacts on wetlands and to proactively manage for wetlands during the environmental planning process to mitigate potential impacts through avoidance. If it was determined that possible encroachment might occur and could not be avoided, correspondence with USACE and applicable state agencies would be conducted to determine if jurisdictional wetlands would be impacted, and to establish appropriate mitigation to minimize adverse effects. All required Federal and state wetland and water quality permits would be obtained prior to any development activities.

Short-term and long-term minor adverse impacts on wetland or aquatic vegetation in proximity to new sites would be expected if water quality was degraded as a result of erosion and sedimentation and storm water runoff. Erosion and sediment control and storm water management practices would be implemented to minimize potential adverse impacts on wetland and aquatic vegetation. Spill contingency plans and BMPs would be developed and implemented to minimize potential impacts on aquatic resources resulting from construction equipment.

As mentioned, the USCG has some flexibility in the siting of the new towers and would seek to avoid sensitive and unique habitats and vegetation. In addition, the USCG would coordinate with the applicable agencies to obtain Special Use Permits or other permits determined to be necessary. The location of new sites, associated access roads, and utility lines has not been determined. Detailed analysis would be conducted in follow-on NEPA documents, as necessary, once locations have been determined. The analysis would evaluate potential impacts on wetlands based on specific project design and location.

4.6.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

Effects from this alternative on biological resources would be the same as the Automate, Secure, and Unstaff Stations Alternative.

4.6.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

Short-term and long-term, negligible to moderate adverse impacts would be expected. As described in **Section 2.2.5,** up to three new LORAN transmitting sites might be constructed, LORAN–C Station Port Clarence would likely move to Nome, and relocation of LORAN–C Station Attu would be considered to facilitate station unstaffing. Impacts from constructing new sites would be similar to impacts discussed under the Automate, Secure and Unstaff Stations Alternative, but would be more extensive since more stations might be constructed under this alternative. If this alternative would be adopted, the implementing agency would conduct a detailed analysis on migratory birds, bats, and other sensitive species. The most significant impact of this alternative would be on migratory birds and bats from the construction of up to three new towers. The agency implementing this alternative would have some flexibility in the exact siting of LORAN towers and would seek to avoid impacts on biological resources to the greatest extent possible.

4.7 Cultural Resources

As noted in the discussion of legal authorities in **Section 3.7.3**, Federal agencies are required to consider the impacts of their actions on cultural resources under a variety of laws, depending on the nature of the resource being impacted. NEPA requires that Federal agencies determine whether their proposed actions would have significant impact on the human environment, including a range of cultural resources. Review of Federal actions under the NHPA, which should be conducted concurrent with NEPA review, requires Federal agencies to take into account the impacts of their actions or undertakings on historic properties. NAGPRA and the Archeological Resources Protection Act provide guidance on how to conduct resource identification efforts on Federal lands and how to consult with American Indian, Native Hawaiian, or Native Alaskan stakeholders in the event that Federal actions result in the discovery of human remains or items of cultural patrimony.

Evaluation of cultural resources is defined in terms of compliance with the NHPA, including the following:

- Destruction or alteration of all or a contributing part of any NRHP-eligible resource without mitigation of the adverse effect through prior consultation with the SHPO/Tribal Historic Preservation Office (THPO) or affected American Indian tribe, or Native Hawaiian or Native Alaskan organization
- Isolation of an eligible or listed resource from its surrounding environment
- Introduction of a visual, audible, or atmospheric element that is out of character with an eligible or listed resource, or that would alter its setting
- Neglect and subsequent deterioration of an NRHP-eligible or listed resource
- Disturbance of properties with traditional, cultural, or religious significance to American Indian tribes, or Native Hawaiian or Native Alaskan organizations.

4.7.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics) as necessary. The No Action Alternative would not involve activities that have the potential to impact archeological resources, or resources of traditional, religious, or cultural significance to Native American tribes. As the buildings and structures within the LORAN–C system reach 50 years in age, however, there is the potential that they will be determined eligible for listing in the NRHP, at which point, the USCG would need to consult with the appropriate SHPOs regarding actions that would result in alterations to character-defining features of the buildings or demolition of buildings and structures.

4.7.2 Decommission Program and Terminate Signal Alternative

Archeological Resources. Removal of LORAN–C towers, buildings, and associated infrastructure would involve ground disturbance that has the potential to impact archeological resources. In most instances the ground disturbance would be limited to previously disturbed areas of the property (e.g., existing building footprints, existing utility trenches, and existing trenches for the ground plane where the ground plane has been buried). In those instances where previously undisturbed ground would be disturbed, the USCG would need to consult with the appropriate SHPO and interested Native American tribes or Alaskan Native organizations to determine the need for archeological survey prior to the removal action. Impacts can range from no impact, if archeological resources are absent within the areas being disturbed, to short-term minor adverse if the archeological resources present within the areas being disturbed are either ephemeral in nature or have been previously disturbed, to long-term major and adverse if significant archeological resources are present. Mitigation measures such as avoidance of archeological resources, or archeological monitoring during demolition could reduce the level of adverse impacts on archeological resources. Data recovery of archeological resource information can mitigate the long-term impact of an action; however, data recovery excavations have been determined to represent an adverse effect on historic properties under Section 106 of the NHPA because excavation inherently destroys the resource.

Similarly, transfer of an historic property out of Federal control would constitute an adverse impact on historic properties, including archeological resources. Should any archeological sites exist on the property, or if the property has not been surveyed for archeological sites, the USCG would need to consult with the appropriate SHPO and interested Native American tribes or Alaskan Native organization to determine the need for archeological surveys or evaluations prior to the transfer. Mitigation measures such as transfer of the property with appropriate covenants for protection of historic properties could reduce the level of adverse impacts on archeological resources.

Historic Buildings and Structures. In 1998, when the USCG evaluated the Alaska LORAN–C stations for NRHP eligibility, they were determined not eligible for listing under Criteria Consideration G due to what was seen as a lack of significant Cold War era associations. As the buildings and structures within the LORAN–C system reach 50 years of age, there is a high probability that they will be considered eligible for listing on the NRHP based on local or regional significance, or as representatives of the LORAN–C technology (see discussion below). If the buildings and structures are determined eligible for listing on the NRHP, demolition of these resources or their transfer out of Federal ownership would represent an adverse effect under Section 106 of the NHPA. Depending on the eligibility of individual stations and on the significance of the LORAN–C system as a whole, therefore, impacts could range from no impact if buildings and structures are determined not eligible for listing in the NRHP, to long-term major and adverse if resources are individually eligible or eligible as part of a multiple property nomination. Mitigation measures such as expanding the historic context for LORAN–C stations in Alaska to cover the entire LORAN–C system in the United States, documentation of the buildings and structures within the LORAN–C system to Historic American Building Survey (HABS) standards, or transfer of the property with appropriate covenants for the protection of historic properties could reduce the level of adverse impacts on historic buildings and structures.

Resources of Traditional, Religious or Cultural Significance to Native American Tribes. As noted above, removal of some elements of the LORAN–C infrastructure is likely to result in ground disturbance to some previously undisturbed acreage and, therefore, has the potential to impact archeological sites or other physical remains of traditional, religious, or cultural significance to Native American tribes. In those instances where previously undisturbed ground would be disturbed, the USCG would need to consult with interested Native American tribes or Alaskan Native organizations to determine the potential for resources of interest to the tribes prior to the removal action. Impacts can range from no impact if resources of interest to Native American tribes are absent within the areas being disturbed, to short-term minor adverse if the resources present within the areas being disturbed are either ephemeral in nature or have been previously disturbed, to long-term major and adverse if significant resources are present. Removal of the towers and their associated infrastructure could have a direct beneficial impact on resources of traditional, religious, or cultural significance to Native American tribes, as it removes a visually intrusive element from the natural landscape.

As noted previously, transfer of an historic property out of Federal control constitutes an adverse effect on historic properties under Section 106 of the NHPA. Transfer of property directly to a federally recognized Native American tribe or Alaskan Native entity, using a fee simple arrangement, would not require a deed of covenant to protect historic properties; however, some SHPOs might request complete survey, evaluation, or documentation of known resources prior to the transfer taking place.

Eligibility of LORAN–C Technology. Despite the previous finding that the Alaskan LORAN–C stations did not have significant Cold War associations that would make them eligible under Criteria Consideration G, the associations of the LORAN–C system as a whole require further research and evaluation. The LORAN–C system did not completely replace the LORAN–A system until 1980; however, portions of the LORAN–C system were in operation from the early 1960s. USCG ships involved in the Vietnam War used LORAN–C, as did U.S. Air Force planes and aircraft carriers, and one of the "Commander Lion" chain of LORAN–C stations in Korea and Vietnam may have been overrun by the North Vietnamese. The U.S. Navy used LORAN–C to communicate with and track submarines throughout the Cold War era, and the DOD used the system to transmit several classified signals. Internationally, the LORAN–C network in the Mediterranean was built explicitly for U.S. military use.

In 1975, NASA used the timing capabilities of LORAN–C to dock the Apollo and Soyuz spacecraft during the Apollo-Soyuz Test Project, and NASA switched from use of LORAN–A to LORAN–C for timing of ground missions as soon as each successive LORAN–C network went online. The greater accuracy and range of the LORAN–C for timing also led to early FAA use of the LORAN–C signal over LORAN–A. Completion of the mid-continent LORAN–C chain allowed for the first coast-to-coast flights by smaller commercial aircraft, and enabled use of LORAN–C by commercial shipping within the Great Lakes. LORAN–C also represents the first iteration of LORAN to be used by small commercial and private recreational users.

Finally, the design and engineering of the LORAN–C towers may also be considered significant achievements. The 1350-foot towers, like the one at LORAN–C Station Port Clarence, represent some of the tallest free-standing antenna in the country and the design parameter that would allow the tower to essentially screw itself into the ground should the guy wires break loose may be unique. The SLT and TLP arrays (4 towers) used for the LORAN–C stations constructed between 1972 and 1976 are the only antenna arrays of their type in existence, and could be considered significant under both Criteria Consideration G and Criterion C.

Therefore, there is a high probability that the LORAN–C system has sufficient associations with significant events and technologies to be considered eligible for listing on the NRHP. Impacts resulting from program decommissioning could range from no impact if evaluation of the system found it to be not eligible for listing in the NRHP, to long-term major and adverse if resources are individually eligible or eligible as part of a multiple property nomination. The USCG would facilitate both the evaluation process and implementation of any necessary mitigation measures by pursuing a Program Comment on the LORAN–C system components with the Advisory Council on Historic Preservation and the National Council of State Historic Preservation Officers.

4.7.3 Automate, Secure, and Unstaff Stations Alternative

Under this alternative, stations would continue to be modernized and recapitalized, and stations would be "hardened" for increased security as described in **Section 2.2.3**. As noted under **Section 4.7.1**, the impacts associated with recapitalization will be analyzed under follow-on NEPA documents specific to the stations being modernized. The proposed hardening actions include moderate amounts of ground disturbance for the construction of the fences and associated utilities, and impacts to buildings as a result of the need to fill in window openings. As discussed in **Section 2.2.3**, LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. The construction of new sites has the potential to impact archeological resources; historic buildings and structures; and resources of traditional, religious, or cultural significance to Native American tribes.

Archeological Resources. Construction of fences and associated utilities at existing LORAN–C stations would occur primarily in areas that have been previously disturbed by construction; however, as noted in **Section 3.7**, these areas are considered to retain low to moderate potential for preservation of archeological deposits. Impacts from "hardening" actions, therefore, could range from no impact if archeological resources are absent within the areas being disturbed; to short-term minor adverse if the archeological resources present within the areas being disturbed are either ephemeral in nature or have been previously disturbed, to long-term major and adverse if significant archeological resources are present.

Depending on the location of the proposed LORAN sites at Nome and Adak or Shemya, short-term and long-term negligible to major adverse impacts would be expected. Because construction of new sites can involve substantial ground disturbance (grading and excavation), implementation of this alternative has the potential to impact either previously recorded or unrecorded archeological resources within the footprint of the new site. Impacts can range from no impact if archeological resources are absent within the areas being disturbed; to short-term minor adverse if the archeological resources present within the areas being disturbed are either ephemeral in nature or have been previously disturbed, to long-term major and adverse if significant archeological resources are present. Since the USCG would have some flexibility in the exact siting of new sites, the USCG could avoid archeological resources or monitor for archeological resources during construction to reduce the level of adverse impacts. Data recovery of archeological resource information can mitigate the long-term impact of an action; however, data recovery excavations have been determined to represent an adverse effect on historic properties under Section 106 of the NHPA because excavation inherently destroys the resource.

Site-specific evaluation of cultural resources would be addressed in follow-on NEPA documentation, as necessary. This site-specific evaluation would include consultation with the appropriate SHPO/THPO or affected Native American, Native Hawaiian, or Native Alaskan groups in advance of construction to determine whether previously recorded archeological resources exist within the construction APE.

Historic Buildings and Structures. As noted in **Section 4.7.2,** as the buildings and structures within the LORAN–C system reach 50 years of age, there is a high probability that they will be considered eligible for listing on the NRHP based on local or regional significance, or as components of a nationally significant technology (see discussion below). If the buildings and structures are determined eligible for listing on the NRHP, modification of the buildings or the viewshed within the station complex could represent an adverse effect under Section 106 of the NHPA. Depending on the eligibility of individual stations and on the significance of the LORAN–C system as a whole, therefore, impacts could range from no impact if buildings and structures are determined not eligible for listing in the NRHP, to long-term major and adverse if resources are individually eligible or eligible as part of a multiple property nomination and the modifications were seen as non-reversible. Mitigation measures such as expanding the historic context for LORAN–C stations in Alaska to cover the entire LORAN–C system in the United States, documentation of the buildings and structures within the LORAN–C system to HABS standards, or transfer of the property with appropriate covenants for the protection of historic properties could reduce the level of adverse impacts on historic buildings and structures.

Depending on the location of the new sites, long-term negligible to major indirect adverse impacts would be expected. Because it would not involve changes to existing buildings or structures, construction of new LORAN sites would only have a direct impact on historic buildings or structures if construction required demolition of historic structures. Since the USCG would have some flexibility in the exact siting of new sites and towers, the USCG could avoid adverse affects on historic resources. Construction of a new site within the viewshed of a historic building, structure, or district could have an indirect impact, as the tower would visually affect the historic resource and its setting. For example, a tower constructed in a location where no physical features taller than the tower (e.g., mature trees or existing structures like water towers) are present would result in the introduction of a visual element not already present in the setting of the historic building, structure, or district. The degree to which the new site would have a visual effect on historic buildings, structures, or districts would depend upon the type of historic setting, existing visual clutter, height of the tower in relation to the height of existing features, topography, and vegetation.

As part of the process used to select new LORAN sites, the USCG would consult with the SHPO and local historic commissions, as appropriate, to determine whether the proposed site lies within the viewshed of any previously recorded or potential historic building, structure, or district. Where possible, impacts could be avoided by selecting a site that is not within the viewshed of a historic building, structure, or district. If visual impacts cannot be avoided, the USCG can consult with the SHPO and local historic commissions to discuss ways to mitigate the impacts. Mitigation options might include emplacing vegetation between the site and the historic building, structure, or district to help provide a visual screen; documentation of the historic building, structure, or district per the standards outlined by the HABS, or reconfiguring the height or style of the tower to limit the visual impact.

Resources of Traditional, Religious, or Cultural Significance to Native American Tribes. As noted above, construction of security fences and associated utilities has the potential to impact archeological sites or other physical remains of traditional, religious, or cultural significance to Native American tribes. In those instances where previously undisturbed ground would be disturbed, as part of site-specific NEPA analysis, the USCG would consult with interested Native American tribes or Alaskan Native organizations to determine the potential for resources of interest to the tribes prior to the removal action. Impacts can range from no impact if resources of interest to Native American tribes are absent within the areas being disturbed, to short-term minor adverse if the resources present within the areas being disturbed are either ephemeral in nature or have been previously disturbed, to long-term major and adverse if significant resources are present.

Depending on the location of the new LORAN–C stations, long-term negligible to major direct and indirect adverse impacts would be expected. Because construction of new LORAN sites can involve substantial ground disturbance (grading and excavation), implementation of this alternative has the potential to both directly and indirectly impact resources of traditional, religious, or cultural significance to Native American tribes. Direct impacts would occur if construction activity destroyed or damaged resources. Indirect impacts would occur if the construction of new site intruded into the viewshed of this type of resource, or resulted in restricted access to significant resources. Since the USCG would have some flexibility in the exact siting of new sites and towers, the USCG could avoid adverse effects on these resources.

As part of the process used to select new LORAN sites, the USCG would communicate with the appropriate SHPO/THPO, Native American tribes, Native Hawaiian or Native Alaskan organizations, and other interested parties to determine whether the proposed LORAN site intersects the physical location or lies within the viewshed of any resource considered to have traditional, religious, or cultural significance to a particular group. Where possible, impacts could be avoided by selecting a new site that does not intersect or lie near this category of resource. If impacts cannot be avoided, the USCG can consult with the THPO, representatives of Native American tribes, Native Alaskan organizations, and other interested parties to discuss ways to mitigate the impacts. Mitigation options to reduce the adverse visual impacts could include the range of options presented for mitigation of visual impacts on historic buildings, structures, or districts described above.

4.7.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

Assuming that the LORAN–C Program would be transferred to another agency, impacts from this alternative on cultural resources would be the same as the Automate, Secure, and Unstaff Stations Alternative. As noted previously, transfer of an historic property out of Federal control constitutes an adverse effect on historic properties under Section 106 of the NHPA. Transfer of property directly to a federally recognized Native American tribe or Alaskan Native entity, using a fee simple arrangement, would not require a deed of covenant to protect historic properties; however, some SHPOs might request complete survey, evaluation, or documentation of known resources prior to the transfer taking place.

4.7.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

Impacts associated with securing the LORAN–C stations would be the same as under the Automate, Secure, and Unstaff Stations, and the Automate, Secure, Unstaff, and Transfer Management of Program Alternatives. As described in **Section 2.2.5**, up to three new LORAN transmitting sites might be constructed in the Gulf Coast and Southern California to improve aviation coverage, and LORAN–C stations Port Clarence and Attu might be relocated to facilitate station unstaffing. Impacts on cultural resources from construction of new sites would be similar to impacts discussed under the Automate, Secure, and Unstaff Stations Alternative, but would be more extensive since more stations might be constructed under this alternative. A more detailed analysis will be addressed in follow-on NEPA documentation, as necessary.

4.8 Visual Resources

Impacts on visual resources can be short-term or long-term, depending on whether the impact is related to the construction activity rather than the feature being constructed. The Bureau of Land Management (BLM) has developed a set of thresholds to assess the significance of impacts on visual resources. While only LORAN–C stations Fallon and Las Cruces are on land managed by the BLM, the following thresholds provide useful criteria for this analysis:

- Minor, not adverse effects would result if the change to the existing environment would generally be overlooked by an observer.
- Minor adverse effects would result if the change to the existing environment would not attract the attention of a casual observer; however, the change would be noticed if pointed out by another observer.
- Significant adverse effects would result if the change to the existing environment demands the attention of the casual observer or dominates the view such that it becomes the primary focus of the observer.

4.8.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics) as necessary. Long-term adverse impacts on visual resources from the LORAN towers would continue. Some of the existing LORAN towers have become an important part of the local visual landscape (see **Section 3.8.2**). Any benefit derived from using a LORAN tower as a landmark or orientation device would continue.

4.8.2 Decommission Program and Terminate Signal Alternative

Long-term beneficial and adverse impacts would be expected. The towers can typically be seen for miles around and are well-lit at night. In most areas of the United States, removal of the LORAN–C towers would result in long-term beneficial impacts on visual resources. In some areas of the United States, the LORAN towers are used as important landmarks and navigation devices. Indirect adverse impacts on visual resources could result from removal of the towers until such time that the people using the tower as a navigation aid become accustomed to the absence of the tower.

4.8.3 Automate, Secure, and Unstaff Stations Alternative

Negligible adverse impacts on visual resources would be expected from construction of new fence and activities to secure the transmitter stations. The relocation of LORAN–C Station Port Clarence to Nome and LORAN–C Station Attu to Adak or Shemya would have short-term and long-term minor to moderate impacts on visual resources due to the clearing and grading of land for new sites, the construction of infrastructure for new sites (access road, utility corridor, and staging areas), and the construction of the sites (tower and equipment building). Permanent features that might create a permanent contrast with the existing environment would include the 700-foot tall tower, the access road, the fenced perimeter of the site, and the building housing the generator and electronics. If overhead transmission lines are required for power or communication (as opposed to buried lines), these lines would also represent a long-term adverse impact on visual resources. In clear weather conditions, the 700-foot tall towers would be clearly visible for miles around. At night, the towers would be very well lit.

As noted in the discussion of thresholds for impacts on visual resources, the short-term impacts on visual resources resulting from construction activities and the long-term impacts resulting from the placement of potentially contrasting visual features into the existing landscape can range from minor to major, and from non adverse to adverse depending on the degree of contrast that the change represents relative to the existing landscape. The USCG can avoid or minimize impacts on visual resources through careful selection of proposed sites for the new LORAN sites that have existing roads and utility corridors that could be used to service the site.

4.8.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

Impacts from this alternative would be similar to the Automate, Secure, and Unstaff Stations Alternative.

4.8.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

As described in **Section 2.2.5**, up to three new LORAN transmitting sites might be constructed in the Gulf Coast and Southern California to improve aviation coverage, and LORAN–C stations Port Clarence and Attu might be relocated to facilitate station unstaffing. Impacts from constructing new sites would be similar to impacts discussed under the Automate, Secure and Unstaff Stations Alternative, but would be more extensive since more sites might be constructed under this alternative.

Potential sources of impacts on visual resources under this alternative include clearing and grading of land, the construction of new infrastructure (access road, utility corridor, and staging areas), and the construction of the LORAN sites (tower and equipment building). Permanent features that might create a permanent contrast with the existing environment would include the 700-foot tall tower, the access road, the fenced perimeter of the site, and the building housing the generator and electronics. If overhead transmission lines are required for power or communication (as opposed to buried lines), these lines would also represent a long-term adverse impact on visual resources. In clear weather conditions, the 700-foot tall towers would be clearly visible for miles around. At night, the towers would be very well lit.

As noted in the discussion of thresholds for impacts on visual resources, the short-term impacts on visual resources resulting from construction activities and the long-term impacts resulting from the placement of potentially contrasting visual features into the existing landscape can range from minor to major, and from non adverse to adverse depending on the degree of contrast that the change represents relative to the existing landscape. The agency could avoid or minimize impacts on visual resources through careful selection of proposed sites for the new LORAN–C stations and monitoring sites that have existing roads and utility corridors that could be used to service the site.

4.9 Land Use

Evaluation of impacts on land use is based on the compatibility of a proposed action with the land use or zoning on a site or nearby properties. As discussed in **Section 3.9**, this PEIS evaluates impacts of each alternative on general land use categories, recreation, and CZM sensitive areas. Evaluation criteria for land use are as follows:

- Consistency with existing land use plans or policies, including CZM
- Conflict with planning criteria established to ensure the safety and protection of human life, property, or resources

- Interference with access to coastal recreational shorelines or waterways, or degradation of recreational values
- Loss or displacement of an important recreational resource, such as impairment of recreational fishing activities and other water-dependent uses.

4.9.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics) as necessary. There would be no change in land use and, therefore, no impacts on land use under the No Action Alternative.

4.9.2 Decommission Program and Terminate Signal Alternative

Decommissioning of the LORAN–C Program would result in a range of potential land use changes and impacts on land use. The disposition of each LORAN–C station is unknown at this time. LORAN properties might be transferred to other USCG programs with all infrastructure in place (little or no change in land use), leased property would be returned to the property owner (negligible to major depending on future land use), the property would be returned to its natural state (negligible to major depending on adjacent land use), or the property could be declared excess and sold (negligible to major depending on future land use). Disposing of Federal real property is discussed in **Section 2.2.2**. Possible future uses of LORAN–C stations and monitoring sites would be limited to activities that are in compliance with applicable land use or zoning regulations. Site-specific evaluation of land use would be addressed in follow-on NEPA documentation, as necessary.

4.9.3 Automate, Secure, and Unstaff Stations Alternative

There would be no impact on land use from automating, securing, and unstaffing stations. As discussed in **Section 2.2.3**, LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. The following considers the construction of these new LORAN–C stations on general land use categories, recreation, and CZM.

General Land Use Categories. Constructing new sites could result in long-term minor adverse impacts on land use. The severity of the impact would vary depending on the need for rezoning to accommodate the tower, ground-plane, and transmission building. The USCG might be required to obtain a permit or zoning variance based on local height restrictions and ordinances. Short-term minor adverse impacts would occur from construction and use of staging areas during the construction period for each new site. Impacts on land use would vary depending on potential changes in land use, the amount of time the tower would exist, and the land use of adjacent properties.

The USCG would adhere to local zoning laws and ordinances to lessen impacts on land use conditions of areas affected. Impacts on residential areas could include incompatibility between adjacent land uses and conflicts with existing land use laws. Areas of medium to high density would have the most restrictions on construction of a new site. For example, height restrictions in an area could limit the placement of a new tower in a particular medium- to high-density area. Future development of land use plans and changes in land use laws that govern an area could be incompatible with actual existing land uses and, therefore, could lead to adverse impacts on land use.

Long-term minor adverse impacts would be expected on commercial and industrial lands. The impacts would be minor because new sites cannot be located near high-voltage power lines as they interfere with the radionavigation signal.

Short-term and long-term minor adverse impacts would be expected on military lands. The placement of a new LORAN site on an installation could have minor long-term impacts on the installation if land use were altered to accommodate a new site. Impacts would vary based on the location of the tower and transmission building. The USCG would have some flexibility in the exact siting of new site and would seek to avoid changes to land use or adverse impacts on land use to the greatest extent possible.

Recreation. There are several potential sources of long-term minor adverse impacts on recreational areas under this alternative, including the clearing and grading of land for a new site and infrastructure (access road, utility corridor, and staging areas), and the construction of the tower and equipment building. The USCG can avoid or minimize impacts on recreation through selection of new sites that are not used for recreational areas or are not located near recreational areas. The USCG would avoid, to the extent practicable, public parks, recreation lands, or wildlife and waterfowl refuges.

Coastal Zone Management. Long-term minor adverse impacts would be expected from constructing a LORAN site in a coastal zone. In accordance with the CZMA and COMDTINST M16475.1D, the USCG is required to carry out a proposed project in accordance with a state or U.S. territory's approved CZM plan if a project is within a designated CZM area. The USCG would need to determine if a proposed site is within the jurisdiction of a state or U.S. territory CZM program as the USCG determines where such equipment would be located. Proper coordination with the applicable state or U.S. territory CZM program would occur at that time. Depending on the specific CZM plan, the construction of a new LORAN site would most likely require a consistency determination to ensure that the proposed activity would be consistent with the CZM plan. Detailed analysis would be conducted in follow-on NEPA documentation, as necessary. Each site-specific NEPA document would include information concerning the CZM plan consistency of the new site and mitigation measures, as appropriate.

4.9.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

Impacts on land use would be the same as under the Automate, Secure, and Unstaff Stations Alternative.

4.9.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

As described in **Section 2.2.5**, up to three new LORAN transmitting sites might be constructed, LORAN–C Station Port Clarence would likely move to Nome, and relocation of LORAN–C Station Attu would be considered to facilitate station unstaffing. Impacts from constructing new sites would be similar to impacts discussed under the Automate, Secure, and Unstaff Stations Alternative, but would be more extensive since more stations might be constructed under this alternative. A more detailed analysis will be addressed in follow-on NEPA documentation, as necessary. The most significant impact of this alternative would be from the construction of up to three new LORAN transmitting sites; those impacts are discussed below. The agency implementing this alternative would have some flexibility in the exact siting of new LORAN sites and would seek to avoid impacts on land use to the greatest extent possible. The agency would adhere to local zoning laws and ordinances to lessen impacts on land use conditions of areas affected.

4.10 Infrastructure

Impacts on infrastructure are evaluated based on their potential for disruption or improvement of existing levels of service, and potential demands that would exceed existing utility capacities. Impacts might arise from changes to Level of Service (LOS) on local roads or changes in daily or peak-hour traffic volumes, and electric power consumption from the new LORAN sites. In considering the basis for evaluating the significance of impacts on solid waste, several factors are considered. These factors include evaluating the degree to which the proposed alternatives could affect the existing solid waste management and capacity landfill. An effect might be considered adverse if a proposed action exceeded the capacity of a utility.

4.10.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics) as necessary. No adverse impacts on infrastructure would be expected. Modernization of transmitter equipment to solid state transmitters would reduce the electrical demand.

4.10.2 Decommission Program and Terminate Signal Alternative

Utilities. Short-term minor adverse impacts would be expected. Utility service would be discontinued in locations where commercial power and communications systems are in place. It is assumed that utilities would remain in use in remote locations where USCG has developed power and communications and now shares them with other users. There could be minor short-term adverse impacts on utility quality and availability during the decommissioning of remote LORAN–C stations during the removal of equipment if activities result in actual damage to a utility system or the transfer of a utility requires an interruption of surrounding service. Care would be taken to avoid existing utility lines shared with other users. LORAN–C stations Tok and St. Paul are the largest users of electric power for the local utility. Terminating the LORAN signal and decommissioning the program might have a major, adverse impact on the local utility.

Solid Waste. Short-term minor adverse impacts would be expected. It is estimated that the footprint of the buildings at each LORAN–C Station is approximately 6,000 $ft^{2.}$ According to estimates by the USEPA approximately 570,000 cubic feet of demolition waste would be generated during demolition activities. (USEPA 2007) The severity of impacts on solid waste would depend on the proximity of a permitted C&D facility, its existing capacity, and ability to accept the debris from LORAN–C Station demolition. Solid waste generated from decommissioning activities would consist of building materials such as solid pieces of concrete, metals (tower, guy wires, conduit, piping, and wiring), and lumber. Contractors would be required to recycle waste to the greatest extent possible as part of USCG policy, and any recycled waste would be diverted from landfills. Demolition could also produce contaminated waste such as ACM, LBP, or PCBs. These types of wastes are discussed in **Section 4.11.**

Transportation Network. Decommissioning of facilities could result in short-term impacts on local or regional roadway traffic. Such impacts might include road closures or delays resulting from the movement of demolition equipment and vehicles. In the event there is the potential for adverse impacts on traffic, the USCG would endeavor to eliminate or reduce impacts by implementing the following measures: storing vehicles and equipment onsite during demolition, posting appropriate signage on affected roadways, and providing timely notification of potential roadway closures to area residents through local law enforcement agencies. Generally, traffic levels on rural roads are relatively low (i.e., little or no congestion).

4.10.3 Automate, Secure, and Unstaff Stations Alternative

Negligible beneficial and adverse impacts on infrastructure would be expected from automating, securing, and unstaffing LORAN–C stations. Stations that could be operated unmanned, would either reduce or completely discontinue solid waste collection and disposal services. Traffic levels on rural roads are relatively low (i.e., little or no congestion). It is expected that most modernized LORAN–C stations would not be continually occupied. Maintenance-related visits would be infrequent and involve a small number of people. Therefore, vehicular traffic into and out of any existing site associated with this project would be minimal. Minimal traffic would also be expected at potential unused or undeveloped sites. It is anticipated that the unstaffed operation and maintenance of the automated LORAN–C stations would result in lower traffic in the surrounding area.

As discussed in **Section 2.2.3**, LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. The following considers the impact of constructing these new LORAN sites on infrastructure.

Utilities. LORAN–C system technology requires that transmitting stations be located in open, relatively flat areas, and away from high voltage power lines and tall metal structures that might interfere with signal strength. Therefore, most LORAN–C stations are in rural areas. Construction of a new LORAN–C Station might require additional construction to bring utilities to a site. Care would be taken to avoid damaging existing utility lines and the USCG would coordinate with local and regional utility service providers to avoid unnecessary damage or interruptions.

Solid Waste. New LORAN–C stations would be automated, so no solid waste collection and disposal services would be required. However, some amount of C&D waste would be generated during construction activities that would require disposal. Minor short-term adverse impacts would result from C&D waste produced during construction, producing a minor adverse affect on solid waste depending on existing C&D landfill capacity. C&D waste generated from the proposed construction activities would consist of building materials such as concrete, metals (conduit, piping, and wiring), and lumber. Contractors would be required to recycle C&D waste to the greatest extent possible as part of USCG policy, and any recycled C&D waste would be diverted from landfills.

Transportation Network. Construction of new LORAN–C stations and access roads could result in short-term adverse impacts on local or regional roadway traffic. Such impacts might include road closures or delays resulting from the movement of construction equipment and vehicles. In the event there is the potential for adverse impacts that significantly affect the environment, the USCG would endeavor to eliminate or reduce impacts by implementing the following measures: storing construction vehicles and equipment on site during construction, posting appropriate signage on affected roadways, and providing timely notification of potential roadway closures to area residents.

Generally, traffic levels on rural roads are relatively low (i.e., little or no congestion). Since new LORAN–C stations would not be staffed, maintenance-related visits would be infrequent and involve a small number of workers. Therefore, vehicular traffic into and out LORAN sites would be minimal.

4.10.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

Impacts on infrastructure would be the same as the Automate, Secure, and Unstaff Stations Alternatives.

4.10.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

As described in **Section 2.2.5**, up to three new LORAN transmitting sites might be constructed, LORAN–C Station Port Clarence would likely move to Nome, and relocation of LORAN–C Station Attu would be considered to facilitate station unstaffing. Impacts from constructing new sites would be similar to impacts discussed under the Automate, Secure, and Unstaff Stations Alternative, but would be more extensive since more stations might be constructed under this alternative. A more detailed analysis will be addressed in follow-on NEPA documentation, as necessary. The most significant potential impact of this alternative would be from the need for electric power. The agency implementing this alternative would have some flexibility in the exact siting of new LORAN sites and would seek to avoid adverse impacts on the local electric power grid.

4.11 Hazardous Substances

Impacts on hazardous materials and waste management would be considered major if a Federal action resulted in noncompliance with applicable Federal regulations, or increased the amounts generated or procured beyond current USCG waste management procedures and capabilities. Impacts on pollution prevention would be considered major if the Federal action resulted in worker, resident, or visitor exposure to these materials, or if the action generated quantities of these materials beyond the capability of current management procedures. The Federal and USCG regulations that regulate the purchase, transport, use, and removal of hazardous materials and wastes that might be found at LORAN–C stations or monitoring sites are discussed below.

PCBs. CIM 16478.2, *The Procurement, Handling and Disposal of Polychlorinated Biphenyls (PCBs)*, prescribes policies, responsibilities, and procedures for the use and disposal of PCBs and equipment that contain PCBs owned, controlled and serviced by the USCG. This instruction incorporates by reference applicable requirements of the TSCA 15 U.S.C. 2601, and the Polychlorinated Biphenyls Approved PCB Disposal Facilities 44 FR 66989, 21 November 1979.

Asbestos-Containing Materials. CIM 16478.1B and CIM 6260.16A, *Asbestos Exposure Control Manual,* provides the direction for asbestos management at USCG facilities. These instructions incorporate by reference applicable requirements of 29 CFR Part 669 *et seq.*, 29 CFR 1910.1025, 29 CFR 1926.58, 40 CFR 61.3.80, Section 112 of the CAA, and other applicable CMIs and DOD Directives. Asbestos is regulated by USEPA with the authority promulgated under OSHA, 29 U.S.C. 669, *et seq*. Section 112 of the CAA regulates emissions of asbestos fibers to ambient air. USEPA policy is to leave asbestos in place if disturbance or removal could pose a health threat.

Lead-Based Paint. The Residential Lead-Based Paint Hazard Reduction Act of 1992, Subtitle B, Section 408 (commonly called Title X), passed by Congress on October 28, 1992, regulates the use and disposal of LBP on Federal facilities. Federal agencies are required to comply with applicable Federal, state, and local laws relating to LBP activities and hazards. CMI 16478.1B provides the direction for lead and other metal-based paint management at USCG facilities. This policy incorporates by reference the requirements of 29 CFR 1910.120, 29 CFR Part 1926, 40 CFR 50.12, 40 CFR Parts 240 through 280, the CAA, and other applicable Federal regulations. Additionally, the policy requires USCG facilities to identify, evaluate, manage, and abate LBP hazards.

Petroleum, Oil, and Lubricants. CIM 16478.1B, *Hazardous Waste Management Manual*, establishes policies and prescribes responsibilities and procedures for USCG compliance with RCRA and associated regulations found in 40 CFR 260–281, 40 CFR 122–124, and 49 CFR 171–177. It applies to all USCG personnel who authorize, procure, issue, use, or dispose of hazardous materials, and to those who manage, monitor, or track any of those activities. This manual also ensures proper management and disposal of hazardous wastes generated by USCG facilities. In addition, the responsibilities of conditionally exempt, small- and large-quantity generators are addressed in detail.

AST and USTs. CIM 5090.9, *Storage Tank Management Manual,* prescribes policies and procedures, and provides basic guidance for compliance with storage tank regulations at all applicable USCG shore activities. This policy includes by reference, compliance with the HSWA of 1984 to the Solid Waste Disposal Act (SWDA) of 1965, and RCRA. It also complies with the CWA of 1977 as amended. The CWA regulates discharges of pollutants into all waters of the United States. It is applicable to emergency discharges as well as releases during normal operations. Facilities that could cause substantial harm to the environment if they have a release shall prepare facility response plans which identify personnel and equipment available to respond to a worst case discharge of oil. Planning for emergency spills and releases under the CWA is incorporated in the SPCC Plan. The USEPA UST regulations are found in 40 CFR 280. The regulations applicable to SPCC plans are found in 40 CFR 112.3, and the regulations applicable to facility response plans are found in both 40 CFR 112.20 and 33 CFR 154 Subpart F.

Pesticides and Herbicides. CIM 5090.3, *Natural Resources Management*, provides guidance on the USCG natural resources policy regarding compliance with the natural resources management requirements of Federal and state statutes such as the CWA, the ESA, the Marine Mammal Protection Act, the CZMA, and NEPA (Chapters 1 and 2). Chapter 3 of the CIM provides guidance for USCG shore unit personnel in the implementation of that policy through coordination with the servicing MLC for the optional preparation of Natural Resources Management Plans. The policy outlines the application of pesticides and herbicides at onshore facilities.

Routine Hazardous Wastes. CIM 16478.1B, *Hazardous Waste Management Manual*, establishes policies and prescribes responsibilities and procedures for USCG compliance with RCRA and associated regulations found in 40 CFR 260–281, 40 CFR 122–124, and 49 CFR 171–177. It applies to all USCG personnel who authorize, procure, issue, use, or dispose of hazardous materials, and to those who manage, monitor, or track any of those activities. This manual also ensures proper management and disposal of hazardous wastes generated by USCG facilities. In addition, the responsibilities of conditionally exempt, small- and large-quantity generators are addressed in detail. Paint and paint waste are also managed through CIM 1000.11 (series) and the Safety and Occupational Health Manual, and CIM 100.47

4.11.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics) as necessary. No adverse impacts would be expected. LORAN–C stations and monitoring sites would continue to operate under existing Federal regulations and USCG policies.

4.11.2 Decommission Program and Terminate Signal Alternative

Decommissioning of the LORAN–C Program would result in a range of potential future uses for each LORAN station; however, the disposition of each LORAN–C Station is unknown at this time. Long-term beneficial and adverse effects might occur. LORAN properties might be transferred to other USCG programs with all infrastructure in place (little or no generation of hazardous substances), leased property would be returned to the property owner (negligible to major depending on the amount of site remediation required and future station use), the property would be returned to its natural state (minor to major depending on the extent of site remediation required), or the property could be declared excess and sold (minor to major depending on the extent of site remediation required). Disposing of Federal real property is discussed in **Section 2.2.2**. Site-specific evaluation would be addressed in follow-on NEPA documentation, as necessary.

Long-term beneficial impacts would occur from site remediation prior to the transfer of properties from USCG control. Site investigation and remediation for each LORAN–C Station would depend on the construction date, type of equipment, and the location of the station. Newer stations have been designed to operate unmanned, and have been located in areas where public utility services can be utilized to the extent possible. Unmanned stations would likely house diesel fuel as a redundant power supply. At these locations site investigation activities might include soil, surface water, and groundwater sampling and testing in suspected or known fuel spill areas. Site remediation could include soil excavation and onsite or offsite treatment as well as groundwater treatment. Site remediation at remote stations like Attu, Alaska might require greater amounts of cleanup. Remote stations run industrial plants to produce utilities such as potable water, waste water treatment facilities, and power generation facilities. It is anticipated that site remediation efforts would be greater because of the larger amount of products on site and the greater use of bulk fuel storage. Leaking underground storage tanks and piping would be emptied and removed or closed in place. Sites that include landfills would require records review, if available, and/or soil and groundwater sampling to determine the types of wastes disposed off, and whether landfill leach has impacted any shallow aquifers.

Former DOD sites where Munitions and Explosives of Concern (MEC) are likely would have to be investigated following the CERCLA Preliminary Assessment/Site Inspection (PA/SI) procedures. Due to the nature of MEC, UXO avoidance and non-intrusive investigation methods (e.g., geophysical) would likely be required. Remediation of sites containing MEC may range from land use controls to excavation and detonation in place of UXO.

Building demolition would require asbestos and lead based paint surveys prior to deconstruction activities. The presence of friable asbestos containing materials would likely require asbestos removal prior to demolition.

It is also possible that site remediation might not be immediately funded which could lead to the deterioration of the properties and result in short- and long-term adverse affects.

4.11.3 Automate, Secure, and Unstaff Stations Alternative

Negligible impacts on hazardous materials would be expected from automating, securing, and unstaffing LORAN–C stations. It is expected that most modernized LORAN–C stations would not be continually occupied. Maintenance-related visits would be infrequent.

As discussed in **Section 2.2.3**, LORAN–C Station Port Clarence would likely be moved to Nome, and the feasibility of moving LORAN–C Station Attu to Adak or Shemya could be studied. The use of hazardous materials and generation of hazardous wastes during construction and operation of proposed LORAN sites would have minor adverse impacts on hazardous substances.

Relevant hazardous materials would include batteries, paint, diesel fuel, and oil. Products containing hazardous materials would be procured and used during the proposed construction. It is anticipated that the quantity of products containing hazardous materials used during construction would be minimal and their use would be of short duration. Contractors would be responsible for the management of hazardous materials, which would be handled in accordance with Federal and state regulations. Therefore, only minor adverse impacts from hazardous materials usage would be expected.

It is anticipated that the quantity of hazardous wastes generated from proposed construction and operational activities would be negligible. During the operation of new sites, standard maintenance would occur. This would include routine maintenance and upkeep of the site (e.g., repairing and replacement of system components) so that mission and operational requirements are met. Routine maintenance would include servicing, cleaning, and repairing electronic equipment within the transmission building and tower equipment. In addition, regular maintenance of the backup generators would require changing oil and filters. Contractors would be responsible for the transportation and disposal of hazardous wastes, which would be handled in accordance with Federal and state regulations.

4.11.4 Automate, Secure, Unstaff, and Transfer Management Program Alternative

Impacts on infrastructure would be the same as the Automate, Secure, and Unstaff Stations Alternatives.

4.11.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

As described in **Section 2.2.5**, up to three new LORAN transmitting sites might be constructed, LORAN–C Station Port Clarence would likely move to Nome, and relocation of LORAN–C Station Attu would be considered to facilitate station unstaffing. The use and disposal of hazardous materials from constructing new sites would be similar to impacts discussed under the Automate, Secure, and Unstaff Stations Alternative, but would be more extensive since more stations might be constructed under this alternative. A more detailed analysis will be addressed in follow-on NEPA documentation, as necessary.

4.12 Socioeconomics and Environmental Justice

For the purposes of this PEIS, impacts on socioeconomic and environmental justice from each alternative are considered first at the program level. The analysis also considers the range of potential impacts on each LORAN station, monitoring site, and other facilities, and provides a framework for subsequent site-specific analysis, as necessary. Construction/demolition and operational impacts are assessed in terms of direct impacts on the local economy (i.e., hiring of construction workers) and indirect impacts (i.e., purchase of goods and services, personal spending by construction workers). The magnitude of potential impacts can vary greatly, depending on the location of a proposed action. For example, implementation of an action that creates 10 employment positions might go unnoticed in an urban area, but could have considerable impacts in a rural region. The following evaluation criteria were used to assess the impacts of each alternative on socioeconomics and environmental justice:

- Economic costs of system operation and use

- Impacts on present users of LORAN–C who might need to discard existing equipment and purchase new, albeit possibly better, equipment
- Disproportionate adverse impacts on minority populations or low-income populations (minor to major depending on the magnitude and severity of the impact).

4.12.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. No impacts on socioeconomics or environmental justice would be expected. The USCG would continue to budget $34.5 million annually for operating and maintaining the existing LORAN–C system (DHS 2008). The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics) as necessary. The cost of modernization of LORAN transmitting equipment at the Alaska LORAN–C stations would be approximately $50 million (FY 2009). This estimate does not include costs associated with recapitalization of existing infrastructure at the LORAN–C stations such as electrical generators, fuel farms, and runways.

4.12.2 Decommission the Program and Terminate Signal Alternative

Socioeconomics. Long-term beneficial and adverse impacts would be expected from this alternative. Long-term beneficial impacts would result from approximately $34.5 million in annual USCG budget savings. The USCG estimates it would cost approximately $135 million (FY 2009) to decommission the LORAN–C Program (which would include removing hazardous materials, equipment, towers and building and returning sites to natural conditions, if necessary). This cost estimate does not include potential environmental remediation that may be required.

Decommissioning of the LORAN–C program would have direct adverse impacts on the communities around some LORAN–C Stations and the LSU from the loss of jobs, and on manufacturers of LORAN–C equipment from loss of contracts for replacement equipment. The USCG would lose approximately 300 LORAN program billets nationwide. The staff of LSU comprises 60 of those lost billets and represents approximately 3 percent of the civilian and military jobs in the Cape May area. However, jobs at the LSU are relatively high paying and the loss would be somewhat higher to the community. The combined annual salaries of the LSU staff are estimated to be approximately $3.5 million. In addition, each job at the LSU indirectly supports additional jobs within companies that supply goods and services to the program at an estimated value of $2 million per year. Therefore, the direct and indirect loss of jobs would be about $5.5 million to the community around the LSU. This alternative would also have a direct adverse impact on manufacturers of LORAN–C modernization equipment. The cost of modernization of LORAN transmitting equipment at the Alaska LORAN–C stations would be approximately $50 million (FY 2009). If the LORAN–C Program was decommissioned, these benefits to the manufacturers would not be realized.

The cost of decommissioning a LORAN–C station would vary depending on location. Costs from tower decommissioning would be slightly higher in rural areas because construction workers and equipment would have to travel farther, and might have higher indirect costs (e.g., temporary housing). These costs would have short-term, minimal beneficial impacts on local employment and the local economy. Decommissioning the LORAN–C Program and closing the LORAN–C stations would result in long-term, minor adverse impacts on local communities around each LORAN station. As noted in **Section 4.10.2**, LORAN–C stations Tok and Saint Paul are the largest users of electric power for the local utility. Terminating the LORAN signal and decommissioning the program might have a major, adverse impact on the local utility. The reassignment of USCG personnel would eliminate their minor contribution to the local economy. The removal of a LORAN–C Station is unlikely to change an area's population or population trends. In remote locations, the decommissioning of the LORAN–C stations could result in minor adverse impacts on the local economy or residents from the decline of customers.

Decommissioning LORAN–C would cause existing users to replace or upgrade their existing equipment if they had not already done so. The DOT study estimated the low end of this cost to be $161 million for maritime users and $58 million for aviation users, which, as noted in **Section 3**, is considered to be a high estimate today. This is an average impact of $534 for each affected user. In addition there were "most likely" costs of $12 million for the meteorological community (all Federal entities) and $3 million for the telecommunications industry (DOT 1998). This would be a moderate, adverse impact although perhaps offset by a higher level of service and additional features.

While the $3 million is a minor cost given the size of the telecommunications industry, the industry's expressed concern is not with the cost, but with the perception that LORAN–C is a valuable back-up for GPS and that combined or redundant systems provide the best and most secure system for precision timing. However, as noted in **Section 3.13.2**, the 2005 FRP states that both the FAA and USCG have determined that sufficient alternative navigational aids exist in the event of a loss of GPS-based services, and therefore the LORAN–C system is no longer needed for aviation or maritime safety.

As discussed in **Section 4.13**, disruption of transportation or navigation has been assessed by multiple Federal agencies and they concluded that the GPS systems that are the principal systems that support transportation and navigation are adequately backed up by other available systems and LORAN–C is not needed as an additional backup.

Another potential socioeconomic cost would be the potential loss of a precise timing and frequency reference for various sectors, such as Banking and Finance, Telecommunications, Emergency Services, and Utilities. Precise time and frequency reference uses range from time stamps on transactions to precise timing of signals to maximize capacity of telecommunications networks and utilities. Currently, many systems use GPS as a timing reference with a series of backup capabilities, procedures, and techniques in place in the event GPS signals are lost.

Environmental Justice. As shown in **Tables 3-4** and **3-5**, the communities of George, Washington, and Raymondville, Texas, have a substantial portion of their residents (30 percent or more) living below the poverty level. The communities of George, Washington, Grangeville, Louisiana, Malone, Florida, and Middletown, California, have minority populations (e.g., African-American, Hispanic or Latino, or American Indian and Alaska Native) substantially (10 percent or more) above their respective county populations. However, few communities are expected to be adversely affected by closure of the existing stations and no adverse impacts on environmental justice would be expected. The potential for disproportionate adverse environmental impacts would be further evaluated in site-specific NEPA evaluations.

4.12.3 Automate, Secure, and Unstaff Stations Alternative

Socioeconomics. Long-term, negligible to minor adverse impacts on local communities near the LORAN–C stations would be expected under this alternative from automating the stations and reassigning personnel. The reassignment of USCG personnel would eliminate their contribution to the local economy, resulting in a negligible adverse impact. The removal of a LORAN–C Station is unlikely to change an area's population or population trends. The USCG would continue to spend approximately $34 million on LORAN–C operation and maintenance costs annually (USCG 2001b). In addition, the USCG would continue to modernize the LORAN–C system, as necessary, at an estimated cost approximately $50 million (FY 2009). This estimate does not include costs associated with recapitalization of existing infrastructure at the LORAN–C stations such as electrical generators, fuel farms, and runways.

Short-term, minor beneficial impacts on socioeconomics would be expected for the duration of construction activities to modernize the LORAN–C stations. With automation, the long-term impacts on any given community would be similar to decommissioning. Automation costs would have minimal impacts on local employment and the local economy. There would be no change in the level of service to, or additional costs incurred by, existing users of the LORAN–C system.

Environmental Justice. No impacts on environmental justice would be expected as result of automating, securing, and unstaffing LORAN–C stations. As discussed in Section 2.2.3 a small number of LORAN–C stations might be moved. Construction and operation of new stations has the potential for environmental justice concerns if there would be disproportionately high and adverse impacts on low-income or minority populations. The potential for disproportionate adverse environmental impacts would be further evaluated in site-specific NEPA evaluations.

4.12.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

Socioeconomics. Long-term beneficial impacts would be expected from the approximate $34.5 million in annual USCG budget savings following the completed transfer of the LORAN–C Program. Under this alternative, the USCG would continue to modernize the LORAN–C system as necessary, resulting in short-term minor beneficial impacts to the local economies of the LORAN–C stations. The cost of modernization of LORAN transmitting equipment at the Alaska LORAN–C stations would be approximately $50 million (FY 2009). This estimate does not include costs associated with recapitalization of existing infrastructure at the LORAN–C stations such as electrical generators, fuel farms, and runways. Short-term minor beneficial impacts on socioeconomics would be expected for the duration of construction activities to modernize the LORAN–C stations. With automation, the long-term impacts on any given community would be similar to decommissioning. There would be no change in the level of service to, or additional costs incurred by, existing users of the LORAN–C system.

Environmental Justice. No impacts on environmental justice would be expected as result of transferring the LORAN–C Program to another Federal agency. Construction and operation of new stations has the potential for environmental justice concerns if there would be disproportionately high and adverse impacts on low-income or minority populations. The potential for disproportionate adverse environmental impacts would be further evaluated in site-specific NEPA evaluations.

4.12.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

Socioeconomics. Long-term, minor to major adverse and beneficial impacts on socioeconomics would be expected as a result of converting the signal to eLORAN. Under this alternative, the LORAN–C system would be modified, upgraded, and expanded to eLORAN signal specifications. The time required to achieve a fully functional eLORAN system is contingent upon funding. To transmit the eLORAN signal, modernization must be completed at all LORAN–C stations. The USCG estimates the cost of a system to transmit the eLORAN signal would be approximately $220 million (FY 2009) spread over several years. This estimate includes upgrades to existing LORAN–C equipment, new LORAN equipment, and short-term infrastructure improvements necessary to continue operations. Long-term, minor to moderate beneficial impacts would be realized by manufacturers of eLORAN receivers. Short-term, minor beneficial impacts on socioeconomics would be expected for the duration of construction activities to modernize the LORAN–C stations. In addition, three new sites might be needed for complete eLORAN coverage. Short-term beneficial impacts on the local economy would be expected where these three stations would be constructed. To the extent that eLORAN–C stations are automated the impacts in a given community would be similar to decommissioning.

Some LORAN–C users would incur additional costs from conversion to eLORAN due to the likely relocation of LORAN–C Station Port Clarence, and possible relocation of LORAN–C Station Attu. The LORAN–C system is dependent upon the precise transmission of the LORAN–C signal from a fixed location. Movement of those LORAN–C stations might make legacy LORAN–C incorrectly fix positions. While investment in newer equipment would result in higher quality service, this PEIS anticipates that legacy LORAN–C receivers would still function under an eLORAN system.

Environmental Justice. No impacts on environmental justice would be expected as result of converting the signal to eLORAN. Construction and operation of new stations has the potential for environmental justice concerns if there would be disproportionately high and adverse impacts on low-income or minority populations. The potential for disproportionate adverse environmental impacts would be further evaluated in site-specific NEPA evaluations.

4.13 Transportation and Navigation

The following effect thresholds were used to assess the magnitude of impacts on transportation:

- Major adverse effects if an alternative was inconsistent with the FRP or caused long-term disruption to the Federal Radionavigation System
- Major adverse effects if FAA or USCG regulations were violated
- Adverse effects on users would result if the safety of transportation was degraded or if commercial interests were impacted in ways that would decrease efficiency or increase costs. The impacts could be minor to major depending on the number of users affected and the magnitude of the impact.

4.13.1 No Action Alternative

Under the No Action Alternative the LORAN–C signal would continue to transmit and the LORAN–C Program operations would remain as they currently are with no changes in staffing. The USCG would continue to modernize the LORAN–C system (such as converting all equipment to solid-state electronics) as necessary. No impacts on transportation and navigation systems would be expected. No impacts would occur to the FRP, the Federal Radionavigation System, or LORAN–C users from this alternative. However, as discussed in **Section 3.13.2**, the 2005 FRP states that the Federal government will continue to operate the LORAN–C system in the short term while evaluating the long-term need for the system. The 2005 FRP also states that both the FAA and USCG have determined that sufficient alternative navigational aids exist in the event of a loss of GPS-based services, and therefore the LORAN–C system is no longer needed for aviation or maritime safety. Therefore, this alternative would be inconsistent with the FRP.

4.13.2 Decommission Program and Terminate Signal Alternative

Long-term, negligible to minor adverse impacts to the Federal Radionavigation System would occur from decommissioning the LORAN–C Program and terminating the LORAN–C signal. If the LORAN–C signal was terminated, it is anticipated that current LORAN–C users would use GPS for navigation. GPS is capable of providing the same or higher level of accuracy as the LORAN–C system. GPS is vulnerable to interferences and outages (DOD *et al.* 2005) and could be vulnerable to intentional disruptions (DOT 2001).

Decommissioning of the LORAN–C Program and termination of the LORAN–C signal would have a short-term, minor to major impact on current LORAN–C system users until they converted to GPS or another navigation system. The cost of a new fixed-mount GPS system ranges from approximately $500 for units for smaller boats to approximately $4,000 for larger units (West Marine 2007).

There has been considerable discussion of the need for LORAN–C as a backup navigation system to GPS to minimize the impacts to transportation and navigation that could result from short- or long-term disruptions of GPS. As previously discussed, both the FAA and USCG have determined that sufficient backup capability exists without LORAN–C, but there are studies that have concluded that LORAN–C would provide a more robust, reliable backup, in addition to providing other services not provided by GPS (Lombardi *et al.* undated). It is not within the scope of this EIS to resolve the technical issues related to the specific safety, reliability, and commercial issues that are being discussed. Since the potential impacts would be secondary effects that might result if the GPS signals were disrupted for long periods of time, and the back-up systems identified by FAA and USCG failed to provide all the safety, reliability and commercial information identified by LORAN–C users, it would be speculative to assign an environmental impact to this potential issue.

4.13.3 Automate, Secure, and Unstaff Stations Alternative

No impacts would be expected as a result of automating, securing, and unstaffing the LORAN–C stations. Under this Alternative, the USCG would continue to modernize and operate the LORAN–C Program but the LORAN–C stations would be automated and personnel would be reassigned, as appropriate.

4.13.4 Automate, Secure, Unstaff, and Transfer Management of Program Alternative

No impacts would be expected following the completed transfer of the LORAN–C Program to another Federal agency. Under this alternative, the USCG would continue to modernize the LORAN–C system as necessary, resulting in short-term minor beneficial impacts on the local economies of the LORAN–C stations.

4.13.5 Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System

Minor to major beneficial impacts on the Federal Radionavigation System would be expected from converting the LORAN–C signal to eLORAN. eLORAN would represent an increase in accuracy and performance compared to the current LORAN–C system.

Under this alternative the LORAN–C system would be modified, upgraded, and expanded to eLORAN signal specifications. Current LORAN–C users could potentially benefit from the addition of the LDC and the provision of a back-up to GPS. It is anticipated that LORAN–C receivers could still receive the eLORAN signal but would not be able to use the LDC. It would also allow users to retain the benefits of GPS precise PNT in the event of a GPS disruption. Companies might begin manufacturing a joint GPS-eLORAN receiver. Since the eLORAN signal would not have the same line-of-sight restrictions as GPS receivers, a joint GPS-eLORAN receiver has the potential for improved performance compared to current GPS receivers.

5. Cumulative and Other Impacts

5.1 Introduction

A discussion of the potential cumulative impacts of a proposed action and alternatives is required by NEPA and agency-implementing regulations. The CEQ defines cumulative impacts as the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). Informed decisionmaking can be served through consideration of cumulative impacts.

Cumulative impacts analysis captures the impacts that result from a proposed action, in combination with the combined impacts of other similar past, present, or reasonably foreseeable future actions, regardless of the entity that implements them. Cumulative impacts are considered in time and geographic contexts. In the case of this analysis, the relevant timeframe context includes the implementation and operational phases of the Proposed Action. The geographic context is the large geographic area being considered. As discussed in **Section 1.2.5**, the Proposed Action involves a large geographic area, spanning coastal areas and selected inland waterways, as well as offshore locations, in essentially the entire United States plus other strategic locations. Given this large geographic area of potential impacts, the potential impacts from constructing individual towers becomes diluted.

When applying the concept of cumulative impacts to a programmatic analysis, some additional consideration must be given to existing uncertainty associated with specific locations that will be selected in the future for the installation of the Automatic Identification System (AIS) equipment and associated infrastructure development, as applicable. In addition, the concept of "reasonably foreseeable" has been defined as "sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision." *City of Shoreacres v. Waterworth*, 420 F.3d 440 (5th Cir. 2005), quoting *Sierra Club v. Marsh*, 976 F.2d 763, 767 (1st Cir. 1992). This interpretation of "reasonably foreseeable" should be carried forward in assessing cumulative impacts in the context of this programmatic analysis. The reasonably foreseeable standard has an important role in constraining cumulative impact analysis to a discussion of impacts that are more likely than not, as opposed to impacts that are only speculative.

In part to accommodate the issues of uncertainty, the PEIS incorporates the concept of "tiering." CEQ encourages the use of tiering "to eliminate repetitive discussions of the same issues and focus on issues ripe for decisions at each level of environmental review" (40 CFR 1502.20). Tiering is applied to environmental documentation of general matters and broad concepts (e.g., national programs or policy statements) with subsequent site-specific actions intended to be addressed by subsequent narrower site-specific environmental analyses (e.g., an EA of a tower construction project identified some time in the future). Such subsequent environmental analyses are intended to incorporate the PEIS by reference and concentrate solely on the site-specific issues then ripe for analysis (40 CFR 1508.28).

Given the wide geographic separation of locations affected by the alternatives for the future of the USCG LORAN–C Program (see **Section 2.2**), cumulative impact assessment is particularly relevant to the site-specific environmental documentation that would be tiered off of this PEIS. However, some generalizations can be formulated and are presented below.

5.2 Reasonably Foreseeable Future Actions

5.2.1 Other USCG Programs

Within the USCG, cumulative impacts would be assessed within the context of how implementation of alternatives on the future of the USCG LORAN–C Program combine with other existing or developing USCG data transmission/collection and tower program impacts to produce an additive effect. Relevant USCG programs are summarized below.

National Distress and Response System Modernization Project (Rescue 21). The National Distress and Response System (NDRS), the USCG's short range VHF-FM radio system, consists of approximately 300 remotely controlled VHF radios and antenna high-level sites located throughout the terrestrial regions of the CONUS (including the Great Lakes and all major inland bays and waterways), Alaska, Hawai'i, the Caribbean, and Guam. The NDRS forms the backbone of the USCG's Short Range Communication System. It uses VHF-FM radios to provide two-way voice communications coverage in coastal areas and navigable inland waterways where commercial or recreational traffic exists. The primary mission of the NDRS is to provide the USCG with a means to monitor the international VHF-FM distress frequency and to coordinate search and rescue response operations. Its secondary mission is to provide command and control communications for virtually all USCG missions.

The NDRS was established more than 30 years ago. While this system has served the USCG well over the years, it consists of out-of-date and nonstandard equipment with many limitations. Modernization of the NDRS was Congressionally mandated by the *Department of Transportation and Related Agencies Appropriations Bill, 2002.* To address the limitations of the NDRS, the USCG has implemented a recapitalization program entitled Rescue 21. When finished, Rescue 21 will replace a wide range of aging, obsolete radio communications equipment including the following:

- Consoles at all USCG Activities, Sectors, Stations, and Marine Safety Offices (about 270 facilities)
- All remote transceiver sites (antenna towers), as well as the network connecting them to the facilities above
- Approximately 3,000 portable radios
- Outfit of USCG smallboats with robust and upgraded communications suite.

Rescue 21 will provide the United States with a 21st century maritime command, control, and communications (C3) system that encompasses the entire United States. By replacing outdated technology with a fully integrated C3 system that improves interoperability, Rescue 21 will protect mariners and help defend the nation's coasts (USCG 2007b).

NDGPS. The purpose of the NDGPS is to provide accurate positioning and location information to travelers, emergency response units, and other customers. The system provides 1- to 3-meter navigation accuracy. This will improve collision notification systems, enable cooperative vehicle-highway collision-avoidance systems, and provide more accurate in-vehicle route guidance systems.

The USCG is a key member of the seven-agency partnership for the DOT's NDGPS expansion initiative. The USCG brings its expertise in building, operating, and maintaining NDGPS sites to the partnership. The other members of the project are the U.S. Air Force, the Federal Railroad Administration, the USACE, the Federal Highway Administration, the National Oceanic and Atmospheric Administration (NOAA), the Office of the Secretary of the DOT, and the most recently appointed sponsor for the project is the Research and Innovative Technology Administration. The NDGPS expansion project has been placed on hold pending congressional review of future project funding. To date, there are 37 operational NDGPS sites. Two sites are ready for construction, and are expected to be online before December 2007 (NAVCEN 2007).

Ports and Waterways Safety Systems (PAWSS). PAWSS is a major acquisition project to build new Vessel Traffic Service (VTS) where necessary and replace existing systems. It is also a process that reaches out to port stakeholders to comprehensively assess safety and identify needed corrective actions. The PAWSS VTS project is a national transportation system that collects, processes, and disseminates information on the marine operating environment and maritime vessel traffic in major U.S. ports and waterways. The PAWSS VTS mission is monitoring and assessing vessel movements within a Vessel Traffic Service Area, exchanging information regarding vessel movements with vessel and shore-based personnel, and providing advisories to vessel masters. Other USCG missions are supported through the exchange of information with appropriate USCG units. A major goal of the PAWSS VTS is to use AIS and other technologies that enable information gathering and dissemination in ways that add no additional operational burden to the mariner (USCG 2005).

Nationwide Automatic Identification System (NAIS). The USCG was given rulemaking authority to implement AIS requirements under the Maritime Transportation Security Act of 2002. The NAIS Final EIS was published in October 2006, and the ROD was published on November 6, 2006. The proposed implementation of the NAIS project would provide the USCG with the capability to receive and distribute information from shipboard AIS equipment and transmit information to AIS-equipped vessels to enhance Maritime Domain Awareness. The project would provide detection and identification of vessels carrying AIS equipment approaching or operating in the maritime domain where little or no vessel tracking currently exists. The USCG will implement the NAIS through building towers and installing AIS equipment at new sites, collocating AIS with existing communications towers and equipment, or a combination of both.

5.2.2 Other Communications Towers

Communications towers, such as cellular telephone transmission towers, have proliferated in recent years and can be seen in business parks, industrial areas, neighborhoods, shopping malls, and along rural highways. Towers follow major highways and are found in cities, suburbs, and towns across America. While towers are seen everywhere today, cellular companies are under pressure to expand their networks' geographical boundaries due to increasing demand for wireless communications coverage (Wikle 2002).

This proliferation of antennas is the result of an increasing demand for wireless services and new technology (Tuesley 1999). In the United States, demand for wireless service translated into approximately 1,950,000 subscribers in 2005 (CTIA 2005). There was an approximate 85 percent increase in the number of cellular telephone service subscribers in the United States between 1995 and 2005. In 2001, the Cellular Telecommunications Industry Association (CTIA) reported that there were approximately 128,000 cellular telephone communications towers installed throughout the United States (CTIA 2005, Wikle 2002). In June 2005, the CTIA reported that this number had grown to approximately 178,025 cellular telephone communications towers (CTIA 2005), which is a 20 percent increase since 2001.

Tower-based USCG programs have experienced significant changes in the ratios of originally proposed collocations to new tower builds because of the lack of availability of suitable sites in the required locations, lack of tower space at the height required to achieve coverage goals, and other technical issues. The USCG preferentially colocates its tower-based systems with existing towers, where operationally feasible. The USCG only constructs new towers to fill gaps in coverage. Furthermore, most USCG-constructed towers are less than 200 feet tall in accordance with USFWS tower guidance policies.

5.3 Cumulative Impact Analysis by Resource Area

Cumulative impacts assessment is relevant to all resource categories analyzed in **Section 4** of this PEIS. However, assessing cumulative impacts for many resource areas on a regional or national basis for the future of the USCG LORAN–C Program would be purely speculative at the PEIS level. Therefore, the following cumulative impacts discussion of individual resource categories is focused solely on those categories that were identified as having likelihood for potential cumulative impacts. Any mitigation measures would be identified and addressed in the site-specific environmental documentation that will be prepared in follow-on environmental studies, as required, that would complement the analysis in this PEIS.

Biological Resources. Within this category, there is particular concern with respect to potential cumulative impacts of communications towers on migratory birds. A detailed discussion of the potential impacts on migratory birds from the potential construction of additional LORAN–C stations under the Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System is presented in **Section 4.6.5**. According to a USFWS representative, "The Service believes that the large number of towers that already exist probably does constitute a cumulative impact on migratory birds, and with the proliferation of towers that is expected over the next decade or so, that impact is going to increase exponentially. The Service feels that cumulative impacts are already significant and are probably going to become more significant …" (Willis 1999).

On a national basis, any new impacts on migratory birds due to potential construction of additional LORAN–C stations under the could likewise be considered as a cumulative impact when viewed in context of the thousands of towers across the United States that cause similar impacts (USFWS 2000). On a regional basis, the potential construction of additional LORAN–C stations could have additional cumulative impacts on particular species or groups of species where the proposed LORAN–C station would be within particular flyways. For example, a new LORAN tower within a particular flyway could have direct adverse impacts on a certain species of bird using that flyway.

Mitigation of cumulative impacts on migratory birds would be accomplished by those means identified in **Section 4.6.2** relating to tower height, lighting, type of structure, or site location, among other factors.

Cultural Resources. A detailed discussion of the potential impacts on cultural resources from the proposed implementation alternatives for the future of the LORAN Program is presented in **Section 4.7**. With respect to cumulative cultural resources impacts, it is unlikely that a small number of additional LORAN–C stations and monitoring sites under the Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System would cumulatively impact any single cultural resource. This conclusion is based upon the fact that the LORAN–C stations and monitoring sites would be constructed within a broad geographic area. No other cumulative impacts are considered likely as a result of the alternatives discussed in this PEIS.

Visual Resources. A discussion of the broad issues associated with visual resources and impacts from communications towers is presented in **Sections 3.9** and **4.9**. If visual impacts from the potential construction of additional LORAN–C stations under the Automate, Secure, Unstaff, and Transfer Management of the LORAN–C Program to Another Government Agency to Deploy an eLORAN System are identified at multiple sites, the potential for significant cumulative visual impacts would increase. Because LORAN towers cannot be built in proximity to other communication towers, cumulative visual impacts would not be expected to result in a discrete area.

5.4 The Relationship Between Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity and Irreversible or Irretrievable Commitment of Resources

NEPA regulations require that the relationship between short-term use of the environment and the impacts such use might have on the maintenance and enhancement of long-term productivity of the affected environment be addressed. Impacts that narrow the range of beneficial uses of the environment are of particular concern. Such impacts can arise from the possibility that choosing one development option reduces future flexibility in pursuing other options, or from the possibility that giving over a parcel of land or other resource to a certain use eliminates the possibility of other uses being performed at the site.

NEPA regulations also require an analysis of irreversible or irretrievable impacts resulting from implementation of proposed actions or alternatives. Resources that are irreversibly or irretrievably committed to a project are those that are typically used on a long-term basis that cannot be recovered. These resources are irretrievable in that they would be used for one project when they could have been used for other purposes. Another impact that falls under the category of irretrievable commitment of resources is the destruction of natural resources that could limit the range of potential uses of the particular resource.

The future of the USCG LORAN–C Program would require commitment of nonrenewable resources both for construction and long-term operations and maintenance. These resources include water, energy, lumber, sand and gravel, and metals. Use of these resources would represent an incremental effect on the regional consumption of these commodities. The potential construction associated with the future of the LORAN Program alternatives is described in **Section 2.2.** Such construction would commit work-force time for construction, engineering, environmental review and compliance, operation, and maintenance. All of these activities represent commitments of resources that could have been applied to projects other than the LORAN Program. The following is a discussion of the irreversible and irretrievable commitments of resources by resource area.

There would be no irreversible or irretrievable commitment of resources with respect to noise, air quality, visual resources, land use, hazardous substances, socioeconomic resources (other than labor discussed above), or environmental justice. Where any potential irreversible or irretrievable commitments of resources are identified, they would only apply to the potential construction described in **Section 2.2.**

Earth Resources. Commitment of an area of land for the potential construction associated with the future of the LORAN Program would be permanent and would therefore result in an irretrievable commitment of earth resources. **Sections 3.4** and **4.4** present a detailed discussion of the earth resources potentially affected by the Proposed Action. Any effect implementation of the Proposed Action has on the earth resources would be an irreversible or irretrievable commitment of resources.

Water Resources. Commitment of an area of land for the potential construction associated with the future of the LORAN Program could have permanent impacts on water resources, depending on the location of the site. **Sections 3.5** and **4.5** present a detailed discussion of the water resources potentially affected by the Proposed Action and alternatives. Any impact implementation of the Proposed Action has on water resources, including use of water as a resource for construction, would be an irreversible or irretrievable commitment of resources.

Biological Resources. **Sections 3.6, 4.6,** and **5.3** discuss the potential impacts of tower structures on migratory birds. Any birds killed at LORAN towers and resulting impacts on bird populations would be an irreversible or irretrievable commitment of resources. Any impacts on other biological resources would likely be localized and incremental, although permanent.

Cultural Resources. Ground-disturbing activities associated with the potential construction associated with the future of the LORAN Program would have the potential to result in irretrievable commitment of archeological resources if present. Any visual impacts on historic buildings and structures through implementation of the Proposed Action or alternatives would be considered permanent, although it is possible that such impacts could be reversed should a site be abandoned and the tower and associated ancillary facilities and appurtenances removed.

Infrastructure. Energy consumed and waste generated and disposed of as a result of the potential construction associated with the future of the LORAN Program would be permanent, in that consumed energy through construction or operation of a facility would not be replaced and space used in solid waste management facilities for disposal of material associated with project implementation or operations would not be reversed. Transportation and drainage-related resources changed in some way through the implementation of the Proposed Action or future operations would be permanent.

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APPENDIX A

APPLICABLE LAWS AND EXECUTIVE ORDERS

Applicable Laws and Executive Orders [1]

Title, Citation	Summary
Archeological and Historical Preservation Act, 16 United States Code (U.S.C.) 469	Protects and preserves historical and archeological data. Requires Federal agencies to identify and recover data from archeological sites threatened by a proposed action(s).
Clean Air Act, 42 U.S.C. 7401–7671q, as amended	Establishes Federal standards for air pollutants. Prevents significant deterioration in areas of the country where air quality fails to meet Federal standards.
Clean Water Act, 33 U.S.C. 1251–1387 (also known as the Federal Water Pollution Control Act)	Comprehensively restores and maintains the chemical, physical, and biological integrity of the nation's waters. Implemented and enforced by the U.S. Environmental Protection Agency (USEPA).
Coastal Barrier Resources Act, 16 U.S.C. 3501–3510	Discourages coastal barrier island degradation by prohibiting direct or indirect Federal financial funds (including flood insurance) for development, except for emergency life-saving activities.
Coastal Zone Management Act of 1972, 16 U.S.C. 1451–1464	Establishes a policy to preserve, protect, develop, and, where possible, restore and enhance the resources of the nation's coastal zone. Encourages and assists states in developing and implementing coastal zone management programs.
Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601–9675 (also known as "Superfund")	Provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and cleanup of inactive hazardous substances disposal sites. Establishes a fund financed by hazardous waste generators to support cleanup and response actions.
Endangered Species Act of 1973, 16 U.S.C. 1531–1543, as amended	Protects threatened, endangered, and candidate species of fish, wildlife, and plants and their designated critical habitats. Prohibits Federal action that jeopardizes the continued existence of endangered or threatened species. Requires consultation with U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries and a biological assessment when such species are present in an area affected by government activities.
Fish and Wildlife Coordination Act, 16 U.S.C. 661–667e, as amended	Authorizes the Secretaries of the Interior and Commerce to provide assistance to and cooperate with Federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife. The 1946 amendments require consultation with the USFWS and the state fish and wildlife agencies involving any waterbodies that are proposed or authorized, permitted, or licensed to be impounded, diverted, or otherwise controlled or modified by any agency under a Federal permit or license.

Title, Citation	Summary
Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1801–1883, as amended	Establishes regional fisheries councils that set fishing quotas and restrictions in U.S. waters. Requires Federal agencies to consult with NOAA Fisheries on all actions (authorized, funded, or undertaken) that might adversely affect essential fish habitat.
Marine Mammal Protection Act of 1972, 16 U.S.C. 1361–1389, 1401–1407, 1538, 4107	Establishes a moratorium on the taking and importation of marine mammals. Prohibits harassing, hunting, capturing, collecting, or killing of marine mammals or attempting such actions. Requires permits for taking marine mammals. Requires consultations with USFWS and NOAA Fisheries if impacts on marine mammals are possible.
Marine Protection, Research, and Sanctuaries Act of 1972, 33 U.S.C. 1401–1445	Regulates dumping of materials into ocean waters. Provides a permitting process to control ocean dumping of dredged materials. Establishes the marine sanctuaries program.
Maritime Transportation Security Act of 2002, Public Law (P. L.) 107-295	Designed to protect the nation's ports and waterways from a terrorist attack. Requires vessels and port facilities to conduct vulnerability assessments and develop security plans that could include passenger, vehicle, and baggage screening procedures; security patrols; establishing restricted areas; personnel identification procedures; access control measures; and installation of surveillance equipment. Mandates regulations for AIS carriage requirements for certain vessels.
Migratory Bird Treaty Act, 16 U.S.C. 703–712	Implements treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Unless otherwise permitted by regulations, the Act makes it unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to sell, barter, purchase, or deliver; or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not. The Act also makes it unlawful to ship, transport or carry from one state, territory, or district to another, or through a foreign country, any bird, part, nest, or egg that was captured, killed, taken, shipped, transported, or carried contrary to the laws from where it was obtained; and import from Canada any bird, part, nest, or egg obtained contrary to the laws of the province from which it was obtained. The U.S. Department of the Interior has authority to arrest, with or without a warrant, a person violating the Act.
National Environmental Policy Act of 1969, 42 U.S.C. 4321–4370e, as amended	Requires Federal agencies to use a systematic approach when assessing environmental impacts of government activities. Proposes an interdisciplinary approach in a decisionmaking process designed to identify unacceptable or unnecessary impacts to the environment.

Title, Citation	Summary
National Historic Preservation Act, 16 U.S.C. 470–470x-6	Requires Federal agencies to consider the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object eligible for inclusion, or listed in the National Register of Historic Places (NRHP). Provides for the nomination, identification (through NRHP listing), and protection of significant historical and cultural properties.
National Marine Sanctuaries Act, 16 U.S.C. 1431 *et seq.*	Authorizes the Secretary of Commerce to designate national marine sanctuaries based on statutory criteria and stipulated factors to be considered by the Secretary as a basis for designation. Stipulates consultation requirements with various Federal agencies, Congressional committees, state agencies, and regional fishery councils.
Noise Control Act of 1972, 42 U.S.C. 4901–4918	Establishes a national policy to promote an environment free from noise that jeopardizes health and welfare. Authorizes the establishment of Federal noise emissions standards and provides relevant information to the public.
Nonindigenous Aquatic Nuisance Prevention Control Act of 1990, 16 U.S.C. 4701–4751	Establishes aquatic nuisance species.
Northwest Atlantic Fisheries Convention Act of 1995, 16 U.S.C. 5601–5610	Implements provisions of international conventions and establishes regulatory framework.
Occupational Safety and Health Act of 1970, 29 U.S.C. 651–678	Establishes standards to protect workers, including standards on industrial safety, noise, and health standards.
Outer Continental Shelf Lands Act of 1953, 43 U.S.C. 1331–1356, as amended	Defines the Outer Continental Shelf as all submerged lands lying seaward of state coastal waters that are 3 miles offshore. Delegates leasing authority to the Secretary of the Interior to promulgate regulations in an effort to reduce waste and conserve natural resources.
Port and Waterways Safety Act, 33 U.S.C. 1221–1232	Sets boat operating and towing safety requirements and establishes enforcement provisions. Authorizes the U.S. Coast Guard (USCG) to establish vessel traffic service/separation schemes for ports, harbors, and other waters subject to congested vessel traffic.
Resource Conservation and Recovery Act, 42 U.S.C. 6901–6992k	Establishes requirements for safely managing and disposing of solid and hazardous waste and underground storage tanks.

Title, Citation	Summary
Executive Order (EO) 11988, *Floodplain Management*, May 24, 1977	Directs agencies to consider alternatives to avoid adverse effects and incompatible development in floodplains. An agency may locate a facility in a floodplain if the head of the agency finds there is no practicable alternative. If it is found there is no practicable alternative, the agency must minimize potential harm to the floodplain, and circulate a notice explaining why the action is to be located in the floodplain prior to taking action. Finally, new construction in a floodplain must apply accepted floodproofing and flood protection to include elevating structures above the base flood level rather than filling in land.
EO 11990, *Protection of Wetlands*, May 24, 1977	Directs agencies to consider alternatives to avoid adverse effects and incompatible development in wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland and the proposed construction incorporates all possible measures to limit harm to the wetland. Agencies should use economic and environmental data, agency mission statements, and any other pertinent information when deciding whether or not to build in wetlands. EO 11990 directs each agency to provide for early public review of plans for construction in wetlands.
EO 12372, *Intergovernmental Review of Federal Programs*, July 14, 1982, 47 Federal Register (FR) 30959 (6/16/82), as supplemented	Requires Federal agencies to consult with state and local governments when proposed Federal financial assistance or direct Federal development impacts interstate metropolitan urban centers or other interstate areas.
EO 12898, *Environmental Justice,* February 11, 1994, 59 FR 7629 (2/16/94), as amended	Requires certain Federal agencies, to the greatest extent practicable permitted by law, to make environmental justice part of their missions by identifying and addressing disproportionately high and adverse health or environmental effects on minority and low-income populations.
EO 13089, *Coral Reef Protection*, June 11 1998, 64 FR 232 (12/3/99)	Mandates that all Federal agencies whose actions might affect U.S. coral reef ecosystems (1) identify their actions that might affect U.S. coral reef ecosystems; (2) use their programs and authorities to protect and enhance the conditions of such ecosystems; and (3) to the extent permitted by law, ensure that any actions they authorize, fund, or carry out will not degrade the conditions of such ecosystems. Federal agencies shall, subject to the availability of appropriations, provide for the implementation of measures needed to research, monitor, manage, and restore affected ecosystems, including measures reducing impacts from pollution, sedimentation, and fishing.

Title, Citation	Summary
EO 13148, *Greening the Government Through Leadership in Environmental Management*, April 21, 2000, 65 FR 24595 (4/26/00)	Designates the head of each Federal agency to ensure that all necessary actions are taken to integrate environmental accountability into agency day-to-day decisionmaking and long-term planning processes, across all agency missions, activities, and functions. Establishes goals for environmental management, environmental compliance, right-to-know (informing the public and their workers of possible sources of pollution resulting from facility operations) and pollution prevention, and similar matters.
EO 13175*, Consultation and Coordination with Indian Tribal Governments,* November 6, 2000, 65 FR 67249 (11/09/00)	Requires Federal agencies to establish an accountable process that ensures meaningful and timely input from tribal officials in developing policies that have tribal implications.
EO 13186*, Responsibilities of Federal Agencies to Protect Migratory Birds,* January 10, 2001, 66 FR 3853 (1/17/01)	Requires each agency to ensure that environmental analyses of Federal actions (required by the National Environmental Policy Act or other established environmental review processes) evaluate the effects of actions and agency plans on migratory birds, emphasizing species of concern. Agencies must support the conservation intent of migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities, and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions. The EO provides broad guidelines on conservation responsibilities and requires the development of more detailed guidance in a Memorandum of Understanding (MOU). The EO is coordinated and implemented by the USFWS. The MOU will outline how Federal agencies will promote conservation of migratory birds. The EO requires the support of various conservation planning efforts already in progress; incorporation of bird conservation considerations into agency planning, including NEPA analyses; and reporting annually on the level of take of migratory birds.
EO 11593, *Protection and Enhancement of the Cultural Environment*, May 13, 1971, 36 FR 8921 (5/15/71)	Requires all Federal agencies to locate, identify, and record all cultural resources, including significant archeological, historical, or architectural sites.

Note: [1] This table only reflects those laws and EOs that might reasonably be expected to apply to the Proposed Action and alternatives.

Other laws and EOs that are relevant include, but are not limited to:

- Abandoned Shipwreck Act, 43 U.S.C. 2102, *et seq.*
- American Indian Religious Freedom Act, 42 U.S.C. 1996, *et seq.*
- Antiquities Act, 16 U.S.C. 433, *et seq.*; Archeological Resources Protection Act, 16 U.S.C. 470 aa-ll, *et seq.*
- Architectural Barriers Act, 42 U.S.C. 4151, *et seq.*
- Community Environmental Response Facilitation Act, 42 U.S.C. 9620, *et seq.*
- Department of Transportation Act, P.L. 89-670, 49 U.S.C. 303, Section 4(f), *et seq.*
- Emergency Planning and Community Right-to-Know Act, 42 U.S.C. 11001–11050, *et seq.*
- Environmental Quality Improvement Act, P.L. 98-581, 42 U.S.C. 4371, *et seq.*
- Farmlands Protection Policy Act, P.L. 97-98, 7 U.S.C. 4201, *et seq.*
- Federal Insecticide, Fungicide, and Rodenticide Act, P.L. 86-139, 7 U.S.C. 135, *et seq.*
- Federal Records Act, 44 U.S.C. 2101–3324, *et seq.*
- Fish and Wildlife Act of 1956, P.L. 85-888, 16 U.S.C. 742, *et seq.*
- Flood Disaster Protection Act, 42 U.S.C. 4001, *et seq.*
- Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001, *et seq.*
- Pollution Prevention Act of 1990, 42 U.S.C. 13101-13109, *et seq.*
- Safe Drinking Water Act, P.L. 93-523, 42, U.S.C. 201, *et seq.*
- Toxic Substances Control Act, 7 U.S.C. 136, *et seq.*
- Wild and Scenic Rivers Act, P.L. 90-542, 16 U.S.C. 1271, *et seq.*
- EO 12902, *Energy Efficiency and Water Conservation at Federal Facilities*, March 8, 1994, 59 FR 11463
- EO 12114, *Environmental Effects Abroad of Major Federal Actions*, January 9, 1979, 44 FR 1957
- EO 12088, *Federal Compliance with Pollution Control Standards*, 43 FR 47707, October 13, 1978, as amended by EO 12580, January 23, 1987, and revoked (in part) by EO 13148, April 21, 2000
- EO 13132, *Federalism*, August 4, 1999, 64 FR 43255
- EO 13007, *Historic Sites Act*, May 24, 1996, 16 U.S.C. 46, *et seq*.; Indian Sacred Sites, 61 FR 26771
- EO 13112, *Invasive Species*, February 3, 1999, 64 FR 6183, as amended by EO 13286, February 28, 2003, 68 FR 10619
- EO 13158, *Marine Protected Areas*, May 26, 2000, 65 FR 2490
- EO 11514, *Protection and Enhancement of Environmental Quality*, March 5, 1970, 35 FR 4247, as amended by EO 11541, July 1,1970, 35 FR 10737 and EO 11991, May 24, 1977, 42 FR 26967

- EO 13045, *Protection of Children from Environmental Health and Safety Risks*, 62 FR 19885, April 21, 1997, as amended by EO 13229, October 9, 2001, 66 FR 52013 and EO 13296, April 18, 2003, 68 FR 19931
- EO 12962, *Recreational Fisheries*, June 7, 1995, 60 FR 307695
- EO 13123, Greening the Government Through Efficient Energy Management, June 3, 1999, 64 FR 30851

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APPENDIX B

NOI, NEWSPAPER ANNOUNCEMENT, INTERESTED PARTY LETTER, MAILING LIST

DEPARTMENT OF HOMELAND SECURITY

Coast Guard

[USCG 2007–28460]

Long Range Aids to Navigation (LORAN–C) Program; Preparation of Programmatic Environmental Impact Statement

AGENCY: Coast Guard, DHS.

ACTION: Notice of intent, notice of public meeting, and request for public comments.

SUMMARY: The U.S. Coast Guard (USCG) announces that it intends to prepare a Programmatic Environmental Impact Statement (PEIS) on the Future of the Long Range Aids to Navigation (LORAN) Program. The current system (LORAN–C) is a low frequency hyperbolic radionavigation system approved for use in the U.S. Coastal Confluence Zone (CCZ) and as a supplemental air navigation aid. LORAN–C provides navigation, location, and timing services for both civil and military air, land, and marine users in the CONUS and Alaska. The PEIS will evaluate the environmental effects of alternative futures for the LORAN–C Program, and aid the USCG in its decision on whether to terminate or continue to operate and invest in the LORAN–C system.

Publication of this notice begins a scoping process that will identify and determine the scope of environmental issues to be addressed in the PEIS. This notice requests public participation in the scoping process, establishes a public comment period, and provides information on how to participate.

DATES: Public meetings will be held August 15, 21 and 23, 2007, in Washington, DC, Juneau, AK, and Seattle, WA, respectively. Each meeting will consist of an informational open house from 4:30 p.m. to 6 p.m. and a public scoping meeting from 6 p.m. to 8 p.m. The public meetings may end later than the stated time, depending on the number of persons wishing to speak. Comments and related material must reach the docket on or before August 31, 2007.

ADDRESSES: The Washington, DC meeting will be held at:

Ronald Reagan Building and International Trade Center 1300 Pennsylvania Avenue, NW., Washington, DC 20004, 202–312–1426.

The Seattle meeting will be held at: Seattle Hilton, 1301 Sixth Avenue, Seattle, WA 98101, (206) 695–6060.

The Juneau meeting will be held at: Centennial Hall Convention Center, 101 Egan Drive, Juneau, AK 99801, (907) 586–5283.

All meeting spaces will be wheelchair-accessible. You do not need to attend the meetings in order to comment. You may submit comments, identified by docket number USCG 2007–28460, to the Docket Management Facility at the U.S. Department of Transportation (DOT). To avoid duplication, please use only one of the following methods:

(1) Electronically through the Web site for the Docket Management System, at: *http://dms.dot.gov.*

(2) By mail to the Docket Management Facility, U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue, SE., Washington, DC 20590.

(3) By fax to the Docket Management Facility at (202) 493–2251.

(4) By delivery to Room W12–140, West Building, Ground Floor, 1200 New Jersey Avenue, SE., Washington, DC, from 9 a.m. to 5 p.m., Monday through Friday, except Federal holidays. The telephone number is (202) 366–9329.

(5) By the Federal eRulemaking Portal at: *http://www.regulations.gov/.*

The Docket Management Facility maintains the public docket for this notice. Comments and material received from the public will become part of this docket and will be available for inspection or copying at the Docket Management Facility (M–30), U.S. Department of Transportation, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue, SE., Washington, DC 20590, from 9 a.m. to 5 p.m., Monday through Friday, except Federal holidays. This docket may also be found on the Internet at: *http://dms.dot.gov.*

Comments and related material must reach the Docket Management Facility by August 31, 2007.

FOR FURTHER INFORMATION CONTACT: If you have questions on this notice, please call or e-mail LT Michael Herring, LORAN–C Program Manager, at (202) 372–1561, or *Michael.L.Herring@uscg.mil,* respectively. If you have questions about viewing or submitting material to the docket, please call Renee V. Wright, Program Manager, Docket Operations, Office of Information Services, Office of the Assistant Secretary for Administration, Office of the Secretary, at (202) 366–9826.

SUPPLEMENTARY INFORMATION:

Request for Comments

The USCG requests public comments and other relevant information on environmental issues related to the future of the LORAN–C Program. The scheduled public meetings are not the only opportunity you have to comment. In addition to or instead of providing comments at the meeting, you can submit comments to the Docket Management Facility during the public comment period (see **DATES**). The USCG will consider all comments and materials received during the comment period.

On January 8, 2007, the USCG published a request for comments on the need to continue to operate or invest in the North American LORAN–C radionavigation system (72 **Federal Register** 796). To avoid duplication and resubmission of comments, all comments previously submitted under docket USCG 2006–24685 will be considered during the LORAN–C PEIS scoping process.

All comments received will be posted, without change, to: *http://dms.dot.gov* and will include any personal information you have provided. The USCG has an agreement with the DOT to use the Docket Management Facility. Please see DOT's ''Privacy Act'' paragraph below.

Submitting comments: If you submit a comment, please include your name and address, and identify the docket number for this notice (USCG 2007–28460). You may submit your comments by electronic means, mail, fax, or delivery to the Docket Management Facility at the address under ADDRESSES; but please submit your comments by only one means. If you submit comments by mail or delivery, submit them in an unbound format, no larger than 8½ by 11 inches, suitable for copying and electronic filing. If you submit comments by mail and would like to confirm that they reached the Facility, please enclose a stamped, self-addressed postcard or envelope.

Viewing comments and documents: To view comments, go to: *http://dms.dot.gov* at any time, click on ''Simple Search,'' enter the last five digits of the docket number (28460), and click on ''Search.'' You may also visit the Docket Management Facility in the west building, Ground Floor, Room W12–140 located at 1200 New Jersey Avenue, SE., Washington, DC 20590. Docket contents are available for public inspection and copying, at this address, in room W12–140, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The Facility's telephone is 202–366–9329, its fax is 202–493–2251, and its Web site for electronic submissions or for electronic access to docket contents is: *http://dms.dot.gov.*

Privacy Act: Anyone can search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review the DOT's Privacy Act Statement in the **Federal Register** published on April 11, 2000 (65 FR 19477), or you may visit *http://dms.dot.gov.*

Public Meeting and Open House

The USCG invites you to learn about the PEIS on the Future of the LORAN–C Program at an informational open house, and to identify and comment on environmental issues related to the proposed action and alternatives at a public meeting. Your comments will help the USCG identify and refine the scope of the environmental issues to be addressed in the PEIS.

In order to allow everyone a chance to speak at the public meeting, the USCG may limit speaker time, or extend the meeting hours, or both. When you rise to speak, you must identify yourself, and any organization you represent, by name. Your remarks will be recorded or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of or in addition to speaking. Written material must include your name and address, and will be included in the public docket. Comments given at a public meeting and written comments submitted to the docket will receive full and equal consideration.

The public meeting locations are wheelchair-accessible. If you plan to attend an open house or public meeting and need special assistance such as sign language interpretation or other reasonable accommodation, please notify the USCG (see **FOR FURTHER INFORMATION CONTACT**) at least 3 business days in advance. Include your contact information as well as information about your specific needs.

Background and Purpose

LORAN is a radionavigation system first developed during World War II and operated by the USCG. The current system (LORAN–C) is a low frequency hyperbolic radionavigation system approved for use in the CCZ and as a supplemental air navigation aid. LORAN–C provides navigation, location, and timing services for both civil and military air, land, and marine users in the Contiguous United States (CONUS) and Alaska. The USCG operates 18 CONUS LORAN Stations, 6 Alaska LORAN Stations, and 24 monitor sites. The system is controlled remotely from Alexandria, VA and Petaluma, CA. Nationwide system operation is based on links between ''chains'' of stations; therefore, decisions made on any one station may potentially impact multiple stations or chains, necessitating an overall LORAN system decision rather than a segmented approach.

The PEIS will evaluate the environmental effects of alternatives regarding the LORAN–C Program to aid the USCG in its decision of whether further investment in modernizing and improving LORAN–C is in the public interest.

The PEIS on the Future of the LORAN–C Program will be a program-level document that will provide USCG with high-level analysis of the potential impacts on the human environment from the alternatives for the future of the LORAN–C Program. The USCG is the lead agency for determining the scope of this review and has determined that a PEIS will best meet its needs. The PEIS will comply with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations in 40 CFR parts 1500–1508, Department of Homeland Security (DHS) Management Directive 5100.1 (*Environmental Planning Program*), and Coast Guard Commandant Instruction (COMDTINST) M16475.1D (*National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts*). The geographic scope of the LORAN–C PEIS is those areas covered by the radionavigation system. Should the USCG decide to end its involvement with LORAN–C, the analysis provided in the PEIS will enable the USCG to prepare tiered documents on the disposition of each LORAN Station and monitoring station.

Proposed Action and Alternatives

The PEIS will address the following four alternatives to represent the range of possible management options for the future of the USCG LORAN–C Program:

(1) *Decommission the USCG LORAN–C Program and Terminate North American LORAN–C Signal*. Under this alternative, all USCG LORAN–C signals would be terminated at one time. All USCG LORAN Stations would be decommissioned; LORAN artifacts, documents and equipment (i.e., towers and related infrastructure) would be removed; and USCG personnel would be reassigned. LORAN Station property would be declared excess to the needs of the USCG following Federal guidelines on transfer of excess property. The disposition of each LORAN Station would range from transferring ownership of the property with such infrastructure as buildings, roads, piers, and airstrips intact, to returning the property to a natural state prior to its transfer.

(2) *Transfer Management of the LORAN–C Program to another government agency*. Under this alternative, the USCG would continue to operate the LORAN–C Program until the transfer to another Agency.

(3) *Automate, Secure, and Unstaff LORAN Stations*. Under this alternative, the USCG would continue to operate the LORAN–C Program. The LORAN–C signal would remain on the air but the USCG would reduce staffing. To the extent practical, the USCG would automate equipment; secure buildings and fencing to protect equipment, antenna, and antenna guides; and reassign personnel. The LORAN Stations would become LORAN Sites operating unstaffed with preventive and corrective maintenance performed by contractor personnel.

(4) *No Action Alternative*. The LORAN–C signal would remain on air, and LORAN–C operations would remain as they currently are with no change in staffing. Maintenance and modernization of equipment would continue to keep the signal operating.

The PEIS will serve as a top tier environmental analysis of program-level changes. This notice of intent is required by 40 CFR 1508.22, and briefly describes the proposed action and possible alternatives and our proposed scoping process. The PEIS will provide a general level of analysis of environmental impacts on the 24 LORAN Stations, 24 Monitoring Sites, and the LORAN Support Unit (LSU) since the disposition of each facility is not currently known. The PEIS will also discuss the No Action Alternative as required under NEPA. You can address any questions about the proposed action, the scoping process, or the PEIS to the USCG LORAN–C Program Office (see **FOR FURTHER INFORMATION CONTACT**).

Scoping Process

Public scoping is an early and open process for identifying and determining the scope of issues to be addressed in the PEIS. Scoping begins with this notice, continues through the public comment period (see DATES), and ends when the USCG has completed the following actions:

- Invites the participation of Federal, State, and local agencies, any affected Indian tribe and other interested persons;
- Determines the actions, alternatives, and impacts described in 40 CFR 1508.25;
- Identifies and eliminates from detailed study those issues that are not significant or that have been covered elsewhere;
- Identifies other relevant environmental review and consultation requirements on the future of the LORAN–C Program;
- Indicates the relationship between timing of the environmental review and other aspects of the proposed action; and
- At its discretion, exercises the options provided in 40 CFR 1501.7(b).

Once the scoping process is complete, the USCG will prepare a draft PEIS, and will publish a **Federal Register** notice announcing its public availability. (If you want that notice to be sent to you, please contact the USCG Project Office point-of-contact identified in **FOR FURTHER INFORMATION CONTACT**.) You will have an opportunity to review and comment on the draft PEIS. Additionally, the USCG anticipates holding public meetings in approximately December 2007 to present the draft PEIS and receive public comments regarding that document. The USCG will subsequently consider all comments received and then prepare the final PEIS. As with the draft PEIS, the USCG will announce the availability of the final PEIS and once again give interested parties an opportunity for review and comment.

Dated: June 26, 2007.

Brian M. Salerno,

Rear Admiral USCG, Assistant Commandant, Policy and Planning (CG–5).

[FR Doc. 07–3475 Filed 7–12–07; 3:13 pm]

BILLING CODE 4910–15–P

Notice of Intent and Informational Open House and Public Meeting
Programmatic Environmental Impact Statement (PEIS) on the Future of the U.S. Coast Guard (USCG) Long Range Aids to Navigation (LORAN–C) Program

The USCG announces that it intends to prepare a PEIS as part of the environmental planning process for the LORAN–C Program. The current system (LORAN–C) is a low frequency hyperbolic radionavigation system approved for use in the U.S. Coastal Confluence Zone and as a supplemental air navigation aid. LORAN–C provides navigation, location, and timing services for both civil and military air, land and marine users in the Continental U.S. and Alaska.

The USCG is in the scoping period that precedes preparation of the PEIS, and invites public comment on environmental issues related to the future of the LORAN–C Program. Public meetings will be held on August 15, 21, and 23 in Washington, DC, Juneau, AK, and Seattle, WA, respectively. The Washington, DC meeting will be held at the Ronald Reagan Building and International Trade Center, the Seattle, WA meeting will be held at the Seattle Hilton, and the Juneau, AK meeting will be held at the Centennial Hall Convention Center. Please refer to the project Web site at http://www.uscg-e2M.com/LoranPEIS/ for more details on the meeting times and locations.

You may also submit comments identified by docket number **USCG-2007-28460** to the Docket Management Facility at the U.S. DOT. Comments and related material must reach the docket on or before August 31, 2007.

Please use only one of the following methods:
(1) Web Site: http://dms.dot.gov.
(2) Mail: Docket Management Facility, U.S. DOT, West Building, Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE, Washington, DC 20590.
(3) Fax: 202-493-2251.
(4) Delivery: Room W12-140 on the Ground Floor of the West Building, 1200 New Jersey Avenue, SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The telephone number is 202-366-9329.
(5) Federal eRulemaking Portal: http://www.regulations.gov.

The PEIS as well as material received from the public will become part of the docket and will be available for inspection or copying at the address specified as (4), above. You may also view this docket on the Internet at http://dms.dot.gov. If you have questions on this notice, please call LT Michael Herring, at (202) 372-1561, or e-mail Michael.L.Herring@uscg.mil.

Note: Copies of the transcripts for the public meetings are available in a public docket accessible at *http://dms.dot.gov* under docket number USCG-2007-28460.

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United States Coast Guard

Commandant
United States Coast Guard

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Michael.L.Herring@USCG.mil

16562
JUL 17 2007

Dear Interested Party:

The United States Coast Guard (USCG) is announcing its intent to prepare a Programmatic Environmental Impact Statement (PEIS) on the Future of the Long Range Aids to Navigation (LORAN–C) Program (see Enclosure 1). Preparation of the PEIS is being conducted in accordance with the National Environmental Policy Act (NEPA) of 1969 [Section 102(2)(c) and its implementing regulations (40 Code of Federal Regulations Parts 1500–1508)], Department of Homeland Security (DHS) Management Directive 5100.1 (*Environmental Planning Program*), and USCG Commandant's Instruction M16475.1D (*National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts*).

LORAN is a radionavigation system first developed during World War II and operated by the USCG. The current system (LORAN–C) is a low frequency hyperbolic radionavigation system approved for use in the U.S. Coastal Confluence Zone (CCZ) and as a supplemental air navigation aid. LORAN-C provides navigation, location, and timing services for both civil and military air, land, and marine users in the continental United States (CONUS) and Alaska.

The government is considering the need to continue to operate and invest in the North American LORAN–C radionavigation system. The USCG is the lead agency for this evaluation and has determined that a PEIS will best meet its needs. The PEIS will address the following four alternatives to represent the range of possible management options for the future of the USCG LORAN–C Program:

(1) <u>Decommission the USCG LORAN–C Program and Terminate North American LORAN–C Signal</u>. Under this alternative, all USCG LORAN–C signals would be terminated at one time. All USCG LORAN Stations would be decommissioned; LORAN artifacts, documents and equipment (i.e., towers and related infrastructure) would be removed; and USCG personnel would be reassigned. LORAN Station property would be declared excess to the needs of the USCG following Federal guidelines on transfer of excess property. The disposition of each LORAN Station would range from transferring ownership of the property with such infrastructure as buildings, roads, piers, and airstrips intact, to returning the property to a natural state prior to its transfer.

(2) <u>Transfer Management of the LORAN–C Program to another government agency</u>. Under this alternative, the USCG would continue to operate the LORAN–C Program until the transfer to another Agency.

(3) <u>Automate, Secure, and Unstaff LORAN Stations</u>. Under this alternative, the USCG would continue to operate the LORAN–C Program. The LORAN–C signal would remain on the air, but the USCG would reduce staffing. To the extent practical, the USCG would automate equipment; secure buildings and fencing to protect equipment, antenna, and antenna guides;

and reassign personnel. The LORAN Stations would become LORAN Sites operating un-staffed with preventive and corrective maintenance performed by contractor personnel.

(4) No Action Alternative. The LORAN–C signal would remain on air, and LORAN–C operations would remain as they currently are with no change in staffing. Maintenance and modernization of equipment would continue to keep the signal operating.

We would like to hear from the public and encourage you to submit comments and related materials. We will consider comments and related materials received by the dates published in the Notice of Intent (Enclosure 1). Comments may be submitted to Department of Transportation's Docket Management Facility. Please refer to the Notice of Intent (Enclosure 1) for detailed instructions for submitting comments. In choosing from these means, please give due regard to the continuing difficulties and delays associated with delivery of mail through the U.S. Postal Service to Federal facilities.

On January 8, 2007, the USCG published a request for comments on the need to continue to operate or invest in the North American LORAN–C Radionavigation System (72 Federal Register 796). To avoid duplication and resubmission of comments, all comments previously submitted under docket USCG 2006-24685 will be considered during the LORAN–C PEIS scoping process.

We invite the public to an informational open house and scoping meeting to be held in Washington, DC; Juneau, AK; and Seattle, WA. Each meeting will consist of an informational open house from 4:30 p.m. to 6:00 p.m. and a public scoping meeting from 6:00 p.m. to 8:00 p.m. Please refer to the Notice of Intent (Enclosure 1) for additional details and dates concerning the meetings.

The PEIS as well as comments and associated materials received from the public will become part of the public docket and will be available for inspection or copying at the Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE, Washington, DC between 9 a.m. and 5 p.m., Monday through Friday, except for Federal holidays. You can view this docket, including comments, on the Internet at <*http://dms.dot.gov*>.

If you have any questions, feel free to contact LT Michael Herring at (202) 372-1561 or Michael.L.Herring@uscg.mil.

Sincerely,

W. A. MUILENBURG
Captain, U.S. Coast Guard
Acting Director of Waterways Management

Enclosure: (1) Notice of Intent, as published in the *Federal Register*

Apendix A
USCG LORAN-C Program Dear Interested Party Mailing List

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APPENDIX C

AIR QUALITY EMISSIONS CALCULATIONS

Air Quality Emission Calculations

Summary	Summarizes total emissions by calendar year.
Combustion	Estimates emissions from non-road equipment exhaust as well as painting.
Fugitive	Estimates fine particulate emissions from earthmoving, vehicle traffic, and windblown dust
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions
Alt1	Decommission the USCG LORAN–C Program and terminate the North American LORAN–C Signal
Alt2	Transfer management of the LORAN–C Program to another Government agency
Alt3	Automate, secure, and unstaff LORAN stations
Alt4	Convert Signal to Enhanced LORAN (eLORAN), secure and unstaff LORAN stations

Air Quality Emission Calculations

Air Quality Emissions from Proposed Action

Alt1

	NO_x (ton)	VOC (ton)	CO (ton)	SO_2 (ton)	PM_{10} (ton)
Construction Combustion	0.162	0.026	0.216	0.003	0.005
Construction Fugitive Dust	0.000	0.000	0.000	0.000	7.091
TOTAL Alt1	0.162	0.026	0.216	0.003	7.096

Air Quality Emissions from Proposed Action

Alt2 and Alt3

	NO_x (ton)	VOC (ton)	CO (ton)	SO_2 (ton)	PM_{10} (ton)
Construction Combustion	0.0002	0.00003	0.0002	0.000003	0.00001
Construction Fugitive Dust	0.000	0.000	0.000	0.000	0.0703
TOTAL Alt2 and Alt3	0.0002	0.00003	0.0002	0.000003	0.0703

Air Quality Emissions from Proposed Action

Alt4Low

	NO_x (ton)	VOC (ton)	CO (ton)	SO_2 (ton)	PM_{10} (ton)
Construction Combustion	3.197	0.566	3.733	0.066	0.107
Construction Fugitive Dust	0.000	0.000	0.000	0.000	28.743
TOTAL Alt4Low	3.197	0.566	3.733	0.066	28.850

Air Quality Emissions from Proposed Action

Alt4High

	NO_x (ton)	VOC (ton)	CO (ton)	SO_2 (ton)	PM_{10} (ton)
Construction Combustion	25.476	3.887	29.760	0.512	0.855
Construction Fugitive Dust	0.000	0.000	0.000	0.000	91.320
TOTAL Alt4High	25.476	3.887	29.760	0.512	92.175

Construction Combustion Emissions for Decommission the USCG LORAN–C Program and terminate the North American LORAN–C Signal

Combustion Emissions of VOC, NO_x, SO_2, CO and PM_{10} Due to Construction

Includes:

1	Demolish Tower	7,000 ft^2
2	Demolish copper radials	240,000 ft^2
3	Demolish Transmitter Building	5,000 ft^2
4	Demolish Monitoring Site Facility	100 ft^2

Assumptions:
Tower is 700 feet tall built on a 100ft2 concrete pad.
Land disturbance for each copper radial is 1,000 ft long by 2 ft wide. There are 120 copper radials per site.

Total Building Construction Area:	0 ft^2	(None)
Total Demolished Area:	12,100 ft^2	(1, 3, and 4)
Total Paved Area:	0 ft^2	(None)
Total Disturbed Area:	252,100 ft^2	(1-4)
Construction Duration:	1.0 year(s)	
Annual Construction Activity:	230 days/yr	

Emission Factors Used for Construction Equipment

Reference: Guide to Air Quality Assessment, SMAQMD, 2004

Emission factors are taken from Table 3-2. Assumptions regarding the type and number of equipment are from Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Bulldozer	1	29.40	3.66	25.09	0.59	1.17
Motor Grader	1	10.22	1.76	14.98	0.20	0.28
Water Truck	1	20.89	3.60	30.62	0.42	0.58
Total per 10 acres of activity	3	60.51	9.02	70.69	1.21	2.03

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Paver	1	7.93	1.37	11.62	0.16	0.22
Roller	1	5.01	0.86	7.34	0.10	0.14
Total per 10 acres of activity	2	12.94	2.23	18.96	0.26	0.36

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Loader	1	7.86	1.35	11.52	0.16	0.22
Haul Truck	1	20.89	3.60	30.62	0.42	0.58
Total per 10 acres of activity	2	28.75	4.95	42.14	0.58	0.80

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Stationary						
Generator Set	1	11.83	1.47	10.09	0.24	0.47
Industrial Saw	1	17.02	2.12	14.52	0.34	0.68
Welder	1	4.48	0.56	3.83	0.09	0.18
Mobile (non-road)						
Truck	1	20.89	3.60	30.62	0.84	0.58
Forklift	1	4.57	0.79	6.70	0.18	0.13
Crane	1	8.37	1.44	12.27	0.33	0.23
Total per 10 acres of activity	6	67.16	9.98	78.03	2.02	2.27

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Air Compressor	1	6.83	0.85	5.82	0.14	0.27
Total per 10 acres of activity	1	6.83	0.85	5.82	0.14	0.27

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activitiy, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.

b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC.

c) The SMAQMD 2004 reference does not provide SO_2 emission factors. For this worksheet, SO_2 emissions have been estimated based on approximate fuel use rate for diesel equipment and the assumption of 500 ppm sulfur diesel fuel. For the average of the equipment fleet, the resulting SO_2 factor was found to be approximately 0.04 times the NOx emission factor for the mobile equipment (based upon 2002 USAF IERA "Air Emissions Inventory Guidance") and 0.02 times the NOx emission factor for all other equipment (based on AP-42, Table 3.4-1)

d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	SMAQMD Emission Factors (lb/day)				
		NO_x	VOC	CO	SO_2**	PM_{10}
Grading Equipment	1	35.020	5.220	40.911	0.700	1.175
Paving Equipment	1	0.000	0.000	0.000	0.000	0.000
Demolition Equipment	1	0.799	0.138	1.171	0.016	0.022
Building Construction	1	0.000	0.000	0.000	0.000	0.000
Air Compressor for Architectural Coating	1	0.000	0.000	0.000	0.000	0.000
Architectural Coating**			0.000			

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 ac*((total disturbed area/43560)/10))*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	252,100	5.79	4	(from "Alt1 Grading" worksheet)
Paving:	0	0.00	0	
Demolition:	12,100	0.28	230	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per the SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}
Grading Equipment	140.08	20.88	163.65	2.80	4.70
Paving	-	-	-	-	-
Demolition	183.68	31.63	269.23	3.67	5.11
Building Construction	-	-	-	-	-
Architectural Coatings	-	-	-	-	-
Total Emissions (lbs):	**323.76**	**52.51**	**432.87**	**6.48**	**9.81**

Results: Total Project Annual Emission Rates

	NO_x	VOC	CO	SO_2	PM_{10}
Total Project Emissions (lbs)	323.76	52.51	432.87	6.48	9.81
Total Project Emissions (tons)	0.162	0.026	0.216	0.003	0.005

Construction Fugitive Dust Emissions for Decommission the USCG LORAN–C Program and terminate the North American LORAN–C Signal

Calculation of PM_{10} Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	5.79	acres/yr	(From "Alt1 Combustion" worksheet)
Grading days/yr:	3.23	days/yr	(From "Alt1 Grading worksheet)
Exposed days/yr:	90	assumed days/yr graded area is exposed	
Grading Hours/day:	8	hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)	
Soil percent silt, s:	8.5	%	(mean silt content; expected range: 0.56 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	50	%	(http://www.cpc.noaa.gov/products/soilmst/w.shtml)
Annual rainfall days, p:	140	days/yr rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1, Ave. range from 40-240 days/yr on U.S. coastline)	
Wind speed > 12 mph %, I:	20	%	Average national windspeed
Fraction of TSP, J:	0.5	per California Environmental Quality Act (CEQA) Air Quality Handbook, SCAQMD, 1993, p. A9-99	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	8	ft	
Qty construction vehicles:	3.00	vehicles	(From "Alt1 Grading worksheet)
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)
PM_{10} Adjustment Factor k	1.5	lb/VMT	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
PM_{10} Adjustment Factor a	0.9	(dimensionless)	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
PM_{10} Adjustment Factor b	0.45	(dimensionless)	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
Mean Vehicle Weight W	40	tons	assumed for aggregate trucks

TSP - Total Suspended Particulate
VMT - Vehicle Miles Traveled

Emissions Due to Soil Disturbance Activities

Operation Parameters (Calculated from User Inputs)

Grading duration per acre	4.5 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	15 VMT/day	
Construction VMT per acre	8.4 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-1, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-1,
Vehicle Traffic (unpaved roads)	$[(k(s/12)^{a}\,(W/3)^{b})]\ \ [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 10/98 and Section 13.2 dated 12/03

Calculation of PM_{10} Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	0.08 lbs/hr	4.5 hr/acre	0.40 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.80 lbs/acre
Vehicle Traffic (unpaved roads)	2.17 lbs/VMT	8.4 VMT/acre	18.30 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: California Environmental Quality Act (CEQA) Air Quality Handbook, SCAQMD, 1993.

Soil Piles EF = 1.7(s/1.5)[(365 - p)/235](I/15)(J) = (s)(365 - p)(I)(J)/(3110.2941), p. A9-99.

Soil Piles EF = 6.1 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)
Soil Piles EF = 0.61 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM_{10} Emissions

Source	Emission Factor		Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	0.40	lbs/acre	5.79	NA	2	0.001
Grading	0.80	lbs/acre	5.79	NA	5	0.002
Vehicle Traffic	18.30	lbs/acre	5.79	NA	106	0.053
Erosion of Soil Piles	0.61	lbs/acre/day	5.79	90	318	0.159
Erosion of Graded Surface	26.40	lbs/acre/day	5.79	90	13,751	6.875
TOTAL					14,181	7.09

Soil Disturbance EF: 19.50 lbs/acre
Wind Erosion EF: 27.01 lbs/acre/day

Back calculate to get EF: 758.05 lbs/acre/grading day

Construction (Grading) Schedule for Decommission the USCG LORAN–C Program and terminate the North American LORAN–C Signal

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 5.79 acres/yr (from "Alt1 Combustion" Worksheet)
Qty Equipment: 3.00 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	5.79	0.72
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	5.79	2.83
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	2.89	2.92
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	2.89	1.20
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	5.79	2.03
TOTAL								9.70

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 9.70
Qty Equipment: 3.00
Grading days/yr: 3.23

Construction Combustion Emissions for Transfer management of the LORAN–C Program to another Government agency and Automate, secure, and unstaff LORAN stations

Combustion Emissions of VOC, NO_x, SO_2, CO and PM_{10} Due to Construction

Includes:

1 Construct Perimter Fence for Tower 2,500 ft^2

Assumptions:
Approximately 500 linear feet of fencing would be required per site.
Land disturbance would be 5 feet wide to install the perimeter fencing.

Total Building Construction Area:	0 ft^2	(None)
Total Demolished Area:	0 ft^2	(None)
Total Paved Area:	0 ft^2	(None)
Total Disturbed Area:	2,500 ft^2	(1)
Construction Duration:	1.0 year(s)	
Annual Construction Activity:	230 days/yr	

Emission Factors Used for Construction Equipment

Reference: Guide to Air Quality Assessment, SMAQMD, 2004

Emission factors are taken from Table 3-2. Assumptions regarding the type and number of equipment are from Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Bulldozer	1	29.40	3.66	25.09	0.59	1.17
Motor Grader	1	10.22	1.76	14.98	0.20	0.28
Water Truck	1	20.89	3.60	30.62	0.42	0.58
Total per 10 acres of activity	3	60.51	9.02	70.69	1.21	2.03

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Paver	1	7.93	1.37	11.62	0.16	0.22
Roller	1	5.01	0.86	7.34	0.10	0.14
Total per 10 acres of activity	2	12.94	2.23	18.96	0.26	0.36

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Loader	1	7.86	1.35	11.52	0.16	0.22
Haul Truck	1	20.89	3.60	30.62	0.42	0.58
Total per 10 acres of activity	2	28.75	4.95	42.14	0.58	0.80

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Stationary						
Generator Set	1	11.83	1.47	10.09	0.24	0.47
Industrial Saw	1	17.02	2.12	14.52	0.34	0.68
Welder	1	4.48	0.56	3.83	0.09	0.18
Mobile (non-road)						
Truck	1	20.89	3.60	30.62	0.84	0.58
Forklift	1	4.57	0.79	6.70	0.18	0.13
Crane	1	8.37	1.44	12.27	0.33	0.23
Total per 10 acres of activity	6	67.16	9.98	78.03	2.02	2.27

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Air Compressor	1	6.83	0.85	5.82	0.14	0.27
Total per 10 acres of activity	1	6.83	0.85	5.82	0.14	0.27

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activitiy, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC.
c) The SMAQMD 2004 reference does not provide SO_2 emission factors. For this worksheet, SO_2 emissions have been estimated based on approximate fuel use rate for diesel equipment and the assumption of 500 ppm sulfur diesel fuel. For the average of the equipment fleet, the resulting SO_2 factor was found to be approximately 0.04 times the NOx emission factor for the mobile equipment (based upon 2002 USAF IERA "Air Emissions Inventory Guidance") and 0.02 times the NOx emission factor for all other equipment (based on AP-42, Table 3.4-1)
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	SMAQMD Emission Factors (lb/day)				
		NO_x	VOC	CO	SO_2**	PM_{10}
Grading Equipment	1	0.347	0.052	0.406	0.007	0.012
Paving Equipment	1	0.000	0.000	0.000	0.000	0.000
Demolition Equipment	1	0.000	0.000	0.000	0.000	0.000
Building Construction	1	0.000	0.000	0.000	0.000	0.000
Air Compressor for Architectural Coating	1	0.000	0.000	0.000	0.000	0.000
Architectural Coating**			0.000			

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 ac*((total disturbed area/43560)/10))*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	2,500	0.06	1	(from "Al2-3 Grading" worksheet)
Paving:	0	0.00	0	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per the SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition.
The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}
Grading Equipment	0.35	0.05	0.41	0.01	0.01
Paving	-	-	-	-	-
Demolition	-	-	-	-	-
Building Construction	-	-	-	-	-
Architectural Coatings	-	-	-	-	-
Total Emissions (lbs):	**0.35**	**0.05**	**0.41**	**0.01**	**0.01**

Results: Total Project Annual Emission Rates

	NO_x	VOC	CO	SO_2	PM_{10}
Total Project Emissions (lbs)	0.35	0.05	0.41	0.01	0.01
Total Project Emissions (tons)	0.0002	0.00003	0.0002	0.000003	0.00001

Construction Fugitive Dust Emissions for Transfer management of the LORAN–C Program to another Government agency

Calculation of PM_{10} Emissions Due to Site Preparation (Uncontrolled).

<u>User Input Parameters / Assumptions</u>

Acres graded per year:	0.06	acres/yr	(From "Alt2-3 Combustion" worksheet)
Grading days/yr:	0.03	days/yr	(From "Alt2-3 Grading worksheet)
Exposed days/yr:	90	assumed days/yr graded area is exposed	
Grading Hours/day:	8	hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)	
Soil percent silt, s:	8.5	%	(mean silt content; expected range: 0.56 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	50	%	(http://www.cpc.noaa.gov/products/soilmst/w.shtml)
Annual rainfall days, p:	140	days/yr rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1, Ave. range from 40-240 days/yr on U.S. coastline)	
Wind speed > 12 mph %, I:	20	%	Average national windspeed
Fraction of TSP, J:	0.5	per California Environmental Quality Act (CEQA) Air Quality Handbook, SCAQMD, 1993, p. A9-99	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	8	ft	
Qty construction vehicles:	3.00	vehicles	(From "Alt2-3 Grading worksheet)
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)
PM_{10} Adjustment Factor k	1.5	lb/VMT	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
PM_{10} Adjustment Factor a	0.9	(dimensionless)	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
PM_{10} Adjustment Factor b	0.45	(dimensionless)	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
Mean Vehicle Weight W	40	tons	assumed for aggregate trucks

TSP - Total Suspended Particulate
VMT - Vehicle Miles Traveled

Emissions Due to Soil Disturbance Activities

Operation Parameters (Calculated from User Inputs)

Grading duration per acre	4.5 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	15 VMT/day	
Construction VMT per acre	8.4 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-1, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-1,
Vehicle Traffic (unpaved roads)	$[(k(s/12)^{a}\,(W/3)^{b})]\ [(365\text{-}P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 10/98 and Section 13.2 dated 12/03

Calculation of PM_{10} Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	0.08 lbs/hr	4.5 hr/acre	0.40 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.80 lbs/acre
Vehicle Traffic (unpaved roads)	2.17 lbs/VMT	8.4 VMT/acre	18.30 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: California Environmental Quality Act (CEQA) Air Quality Handbook, SCAQMD, 1993.

Soil Piles EF = 1.7(s/1.5)[(365 - p)/235](I/15)(J) = (s)(365 - p)(I)(J)/(3110.2941), p. A9-99.

Soil Piles EF = 6.1 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)
Soil Piles EF = 0.61 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM_{10} Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	0.40 lbs/acre	0.06	NA	0	0.000
Grading	0.80 lbs/acre	0.06	NA	0	0.000
Vehicle Traffic	18.30 lbs/acre	0.06	NA	1	0.001
Erosion of Soil Piles	0.61 lbs/acre/day	0.06	90	3	0.002
Erosion of Graded Surface	26.40 lbs/acre/day	0.06	90	136	0.068
TOTAL				141	0.07

Soil Disturbance EF: 19.50 lbs/acre
Wind Erosion EF: 27.01 lbs/acre/day

Back calculate to get EF: 76,441.84 lbs/acre/grading day

Construction (Grading) Schedule for Transfer management of the LORAN–C Program to another Government agency and Automate, secure, and unstaff LORAN stations

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.06 acres/yr (from "Alt2-3 Combustion" Worksheet)
Qty Equipment: 3.00 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.06	0.01
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	0.06	0.03
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	0.03	0.03
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	0.03	0.01
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	0.06	0.02
TOTAL								0.10

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.10
Qty Equipment: 3.00
Grading days/yr: 0.03

Construction Combustion Emissions for Convert Signal to Enhanced LORAN (eLORAN), secure and unstaff LORAN stations

Combustion Emissions of VOC, NO_x, SO_2, CO and PM_{10} Due to Construction

Includes:

1	Construct Tower	7,000 ft²
2	Install Copper Radials	914,760 ft²
3	Construct Transmitter Building	5,000 ft²
4	Construct Monitoring Site Facility	100 ft²
5	Construct Access Road	79,200 ft²
6	Install Utilities to Site	15,840 ft²

Assumptions:

Tower is 700 feet tall built on a 100ft² concrete pad.
Land disturbance for installing the 120 copper radials would be approximately 21 acres.
Access road would be 1 mile long by 15 ft wide. Road would be graded and covered with gravel.
Trench for utilities to the site would be 1 mile long by 3 ft wide.

Total Building Construction Area:	12,100 ft²	(1, 3, and 4)
Total Demolished Area:	0 ft²	(None)
Total Paved Area:	0 ft²	(None)
Total Disturbed Area:	1,021,900 ft²	(1-6)
Construction Duration:	1.0 year(s)	
Annual Construction Activity:	230 days/yr	

Emission Factors Used for Construction Equipment

Reference: Guide to Air Quality Assessment, SMAQMD, 2004

Emission factors are taken from Table 3-2. Assumptions regarding the type and number of equipment are from Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Bulldozer	1	29.40	3.66	25.09	0.59	1.17
Motor Grader	1	10.22	1.76	14.98	0.20	0.28
Water Truck	1	20.89	3.60	30.62	0.42	0.58
Total per 10 acres of activity	3	60.51	9.02	70.69	1.21	2.03

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Paver	1	7.93	1.37	11.62	0.16	0.22
Roller	1	5.01	0.86	7.34	0.10	0.14
Total per 10 acres of activity	2	12.94	2.23	18.96	0.26	0.36

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Loader	1	7.86	1.35	11.52	0.16	0.22
Haul Truck	1	20.89	3.60	30.62	0.42	0.58
Total per 10 acres of activity	2	28.75	4.95	42.14	0.58	0.80

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Stationary						
Generator Set	1	11.83	1.47	10.09	0.24	0.47
Industrial Saw	1	17.02	2.12	14.52	0.34	0.68
Welder	1	4.48	0.56	3.83	0.09	0.18
Mobile (non-road)						
Truck	1	20.89	3.60	30.62	0.84	0.58
Forklift	1	4.57	0.79	6.70	0.18	0.13
Crane	1	8.37	1.44	12.27	0.33	0.23
Total per 10 acres of activity	6	67.16	9.98	78.03	2.02	2.27

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Air Compressor	1	6.83	0.85	5.82	0.14	0.27
Total per 10 acres of activity	1	6.83	0.85	5.82	0.14	0.27

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activitiy, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC.
c) The SMAQMD 2004 reference does not provide SO_2 emission factors. For this worksheet, SO_2 emissions have been estimated based on approximate fuel use rate for diesel equipment and the assumption of 500 ppm sulfur diesel fuel. For the average of the equipment fleet, the resulting SO_2 factor was found to be approximately 0.04 times the NOx emission factor for the mobile equipment (based upon 2002 USAF IERA "Air Emissions Inventory Guidance") and 0.02 times the NOx emission factor for all other equipment (based on AP-42, Table 3.4-1)
d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	SMAQMD Emission Factors (lb/day)				
		NO_x	VOC	CO	SO_2**	PM_{10}
Grading Equipment	3	425.862	63.482	497.508	8.517	14.287
Paving Equipment	1	0.000	0.000	0.000	0.000	0.000
Demolition Equipment	1	0.000	0.000	0.000	0.000	0.000
Building Construction	1	1.866	0.277	2.168	0.056	0.063
Air Compressor for Architectural Coating	1	0.190	0.024	0.162	0.004	0.008
Architectural Coating**			8.965			

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project
**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994
Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 ac*((total disturbed area/43560)/10))*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	1,021,900	23.46	14	(from "Alt4Low Grading" worksheet)
Paving:	0	0.00	0	
Demolition:	0	0.00	230	
Building Construction:	12,100	0.28	230	
Architectural Coating	12,100	0.28	20	(per the SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}
Grading Equipment	5,962.07	888.74	6,965.11	119.24	200.02
Paving	-	-	-	-	-
Demolition	-	-	-	-	-
Building Construction	429.08	63.76	498.53	12.90	14.50
Architectural Coatings	3.79	179.77	3.23	0.08	0.15
Total Emissions (lbs):	**6,394.94**	**1,132.28**	**7,466.87**	**132.22**	**214.67**

Results: Total Project Annual Emission Rates

	NO_x	VOC	CO	SO_2	PM_{10}
Total Project Emissions (lbs)	6,394.94	1,132.28	7,466.87	132.22	214.67
Total Project Emissions (tons)	3.197	0.566	3.733	0.066	0.107

Construction Fugitive Dust Emissions for Convert Signal to Enhanced LORAN (eLORAN), secure and unstaff LORAN stations

Calculation of PM_{10} Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	23.46	acres/yr	(From "Alt4Low Combustion" worksheet)
Grading days/yr:	13.10	days/yr	(From "Alt4Low Grading worksheet)
Exposed days/yr:	90	assumed days/yr graded area is exposed	
Grading Hours/day:	8	hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)	
Soil percent silt, s:	8.5	%	(mean silt content; expected range: 0.56 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	50	%	(http://www.cpc.noaa.gov/products/soilmst/w.shtml)
Annual rainfall days, p:	140	days/yr rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1, Ave. range from 40-240 days/yr on U.S. coastline)	
Wind speed > 12 mph %, I:	20	%	Average national windspeed
Fraction of TSP, J:	0.5	per California Environmental Quality Act (CEQA) Air Quality Handbook, SCAQMD, 1993, p. A9-99	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	8	ft	
Qty construction vehicles:	3.00	vehicles	(From "Alt4Low Grading worksheet)
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)
PM_{10} Adjustment Factor k	1.5	lb/VMT	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
PM_{10} Adjustment Factor a	0.9	(dimensionless)	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
PM_{10} Adjustment Factor b	0.45	(dimensionless)	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
Mean Vehicle Weight W	40	tons	assumed for aggregate trucks

TSP - Total Suspended Particulate
VMT - Vehicle Miles Traveled

Emissions Due to Soil Disturbance Activities

Operation Parameters (Calculated from User Inputs)

Grading duration per acre	4.5 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	15 VMT/day	
Construction VMT per acre	8.4 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-1, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-1,
Vehicle Traffic (unpaved roads)	$[(k(s/12)^{a} (W/3)^{b})]\ [(365\text{-}P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 10/98 and Section 13.2 dated 12/03

Calculation of PM_{10} Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	0.08 lbs/hr	4.5 hr/acre	0.40 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.80 lbs/acre
Vehicle Traffic (unpaved roads)	2.17 lbs/VMT	8.4 VMT/acre	18.30 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: California Environmental Quality Act (CEQA) Air Quality Handbook, SCAQMD, 1993.

Soil Piles EF = 1.7(s/1.5)[(365 - p)/235](I/15)(J) = (s)(365 - p)(I)(J)/(3110.2941), p. A9-99.

Soil Piles EF = 6.1 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)
Soil Piles EF = 0.61 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM_{10} Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	0.40 lbs/acre	23.46	NA	9	0.005
Grading	0.80 lbs/acre	23.46	NA	19	0.009
Vehicle Traffic	18.30 lbs/acre	23.46	NA	429	0.215
Erosion of Soil Piles	0.61 lbs/acre/day	23.46	90	1,288	0.644
Erosion of Graded Surface	26.40 lbs/acre/day	23.46	90	55,740	27.870
TOTAL				57,485	28.74

Soil Disturbance EF: 19.50 lbs/acre
Wind Erosion EF: 27.01 lbs/acre/day

Back calculate to get EF: 187.01 lbs/acre/grading day

Construction (Grading) Schedule for Convert Signal to Enhanced LORAN (eLORAN), secure and unstaff LORAN stations

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 23.46 acres/yr (from "Alt4Low Combustion" Worksheet)

Qty Equipment: 3.00 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.

Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	23.46	2.93
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	23.46	11.47
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	11.73	11.83
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	11.73	4.85
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	23.46	8.23
TOTAL								39.31

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 39.31
Qty Equipment: 3.00
Grading days/yr: 13.10

Construction Combustion Emissions for Convert Signal to Enhanced LORAN (eLORAN), secure and unstaff LORAN stations

Combustion Emissions of VOC, NO_x, SO_2, CO and PM_{10} Due to Construction

Includes:

1	Construct Tower	7,000 ft^2
2	Install Copper Radials	3,140,000 ft^2
3	Construct Transmitter Building	5,000 ft^2
4	Construct Monitoring Site Facility	100 ft^2
5	Construct Access Road	79,200 ft^2
6	Install Utilities to Site	15,840 ft^2

Assumptions:

Tower is 700 feet tall built on a 100ft^2 concrete pad.
Land disturbance for installing the 120 copper radials would be approximately 72 acres.
Access road would be 1 mile long by 15 ft wide. Road would be graded and covered with gravel.
Trench for utilities to the site would be 1 mile long by 3 ft wide.

Total Building Construction Area:	12,100 ft^2	(1, 3, and 4)
Total Demolished Area:	0 ft^2	(None)
Total Paved Area:	0 ft^2	(None)
Total Disturbed Area:	3,247,140 ft^2	(1-6)
Construction Duration:	1.0 year(s)	
Annual Construction Activity:	230 days/yr	

Emission Factors Used for Construction Equipment

Reference: Guide to Air Quality Assessment, SMAQMD, 2004

Emission factors are taken from Table 3-2. Assumptions regarding the type and number of equipment are from Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Bulldozer	1	29.40	3.66	25.09	0.59	1.17
Motor Grader	1	10.22	1.76	14.98	0.20	0.28
Water Truck	1	20.89	3.60	30.62	0.42	0.58
Total per 10 acres of activity	3	60.51	9.02	70.69	1.21	2.03

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Paver	1	7.93	1.37	11.62	0.16	0.22
Roller	1	5.01	0.86	7.34	0.10	0.14
Total per 10 acres of activity	2	12.94	2.23	18.96	0.26	0.36

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Loader	1	7.86	1.35	11.52	0.16	0.22
Haul Truck	1	20.89	3.60	30.62	0.42	0.58
Total per 10 acres of activity	2	28.75	4.95	42.14	0.58	0.80

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Stationary						
Generator Set	1	11.83	1.47	10.09	0.24	0.47
Industrial Saw	1	17.02	2.12	14.52	0.34	0.68
Welder	1	4.48	0.56	3.83	0.09	0.18
Mobile (non-road)						
Truck	1	20.89	3.60	30.62	0.84	0.58
Forklift	1	4.57	0.79	6.70	0.18	0.13
Crane	1	8.37	1.44	12.27	0.33	0.23
Total per 10 acres of activity	6	67.16	9.98	78.03	2.02	2.27

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)
Air Compressor	1	6.83	0.85	5.82	0.14	0.27
Total per 10 acres of activity	1	6.83	0.85	5.82	0.14	0.27

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activitiy, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.

b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC.

c) The SMAQMD 2004 reference does not provide SO_2 emission factors. For this worksheet, SO_2 emissions have been estimated based on approximate fuel use rate for diesel equipment and the assumption of 500 ppm sulfur diesel fuel. For the average of the equipment fleet, the resulting SO_2 factor was found to be approximately 0.04 times the NOx emission factor for the mobile equipment (based upon 2002 USAF IERA "Air Emissions Inventory Guidance") and 0.02 times the NOx emission factor for all other equipment (based on AP-42, Table 3.4-1)

d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	SMAQMD Emission Factors (lb/day)				
		NO_x	VOC	CO	SO_2**	PM_{10}
Grading Equipment	8	3608.530	537.910	4215.617	72.171	121.060
Paving Equipment	1	0.000	0.000	0.000	0.000	0.000
Demolition Equipment	1	0.000	0.000	0.000	0.000	0.000
Building Construction	1	1.866	0.277	2.168	0.056	0.063
Air Compressor for Architectural Coating	1	0.190	0.024	0.162	0.004	0.008
Architectural Coating**			8.965			

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 ac*((total disturbed area/43560)/10))*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	3,247,140	74.54	14	(from "Alt4High Grading" worksheet)
Paving:	0	0.00	0	
Demolition:	0	0.00	230	
Building Construction:	12,100	0.28	230	
Architectural Coating	12,100	0.28	20	(per the SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}
Grading Equipment	50,519.42	7,530.74	59,018.63	1,010.39	1,694.83
Paving	-	-	-	-	-
Demolition	-	-	-	-	-
Building Construction	429.08	63.76	498.53	12.90	14.50
Architectural Coatings	3.79	179.77	3.23	0.08	0.15
Total Emissions (lbs):	**50,952.29**	**7,774.27**	**59,520.39**	**1,023.37**	**1,709.49**

Results: Total Project Annual Emission Rates

	NO_x	VOC	CO	SO_2	PM_{10}
Total Project Emissions (lbs)	50,952.29	7,774.27	59,520.39	1,023.37	1,709.49
Total Project Emissions (tons)	25.476	3.887	29.760	0.512	0.855

Construction Fugitive Dust Emissions for Convert Signal to Enhanced LORAN (eLORAN), secure and unstaff LORAN stations

Calculation of PM_{10} Emissions Due to Site Preparation (Uncontrolled).

<u>User Input Parameters / Assumptions</u>

Acres graded per year:	74.54	acres/yr	(From "Alt4High Combustion" worksheet)
Grading days/yr:	13.96	days/yr	(From "Alt4High Grading worksheet)
Exposed days/yr:	90	assumed days/yr graded area is exposed	
Grading Hours/day:	8	hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)	
Soil percent silt, s:	8.5	%	(mean silt content; expected range: 0.56 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	50	%	(http://www.cpc.noaa.gov/products/soilmst/w.shtml)
Annual rainfall days, p:	140	days/yr rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1, Ave. range from 40-240 days/yr on U.S. coastline)	
Wind speed > 12 mph %, I:	20	%	Average national windspeed
Fraction of TSP, J:	0.5	per California Environmental Quality Act (CEQA) Air Quality Handbook, SCAQMD, 1993, p. A9-99	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	8	ft	
Qty construction vehicles:	8.95	vehicles	(From "Alt4High Grading worksheet)
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)
PM_{10} Adjustment Factor k	1.5	lb/VMT	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
PM_{10} Adjustment Factor a	0.9	(dimensionless)	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
PM_{10} Adjustment Factor b	0.45	(dimensionless)	(AP-42 Table 13.2.2-2 12/03 for PM_{10} for unpaved roads)
Mean Vehicle Weight W	40	tons	assumed for aggregate trucks

TSP - Total Suspended Particulate
VMT - Vehicle Miles Traveled

Emissions Due to Soil Disturbance Activities

Operation Parameters (Calculated from User Inputs)

Grading duration per acre	1.5 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	45 VMT/day	
Construction VMT per acre	8.4 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-1, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-1,
Vehicle Traffic (unpaved roads)	$[(k(s/12)^a (W/3)^b)]\ [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 10/98 and Section 13.2 dated 12/03

Calculation of PM_{10} Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	0.08 lbs/hr	1.5 hr/acre	0.10 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.80 lbs/acre
Vehicle Traffic (unpaved roads)	2.17 lbs/VMT	8.4 VMT/acre	18.30 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: California Environmental Quality Act (CEQA) Air Quality Handbook, SCAQMD, 1993.

Soil Piles EF = 1.7(s/1.5)[(365 - p)/235](I/15)(J) = (s)(365 - p)(I)(J)/(3110.2941), p. A9-99.

Soil Piles EF = 6.1 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)
Soil Piles EF = 0.61 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM_{10} Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	0.10 lbs/acre	74.54	NA	7	0.004
Grading	0.80 lbs/acre	74.54	NA	60	0.030
Vehicle Traffic	18.30 lbs/acre	74.54	NA	1,364	0.682
Erosion of Soil Piles	0.61 lbs/acre/day	74.54	90	4,092	2.046
Erosion of Graded Surface	26.40 lbs/acre/day	74.54	90	177,117	88.558
TOTAL				182,640	91.32

Soil Disturbance EF: 19.20 lbs/acre
Wind Erosion EF: 27.01 lbs/acre/day

Back calculate to get EF: 175.46 lbs/acre/grading day

Construction (Grading) Schedule for Convert Signal to Enhanced LORAN (eLORAN), secure and unstaff LORAN stations

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 74.54 acres/yr (from "Alt4High Combustion" Worksheet)
Qty Equipment: 8.95 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	74.54	9.32
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	74.54	36.44
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	37.27	37.58
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	37.27	15.42
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	74.54	26.14
TOTAL								124.91

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 124.91
Qty Equipment: 8.95
Grading days/yr: 13.96

← *continued from inside front cover*

NDB	Nondirectional Beacons
NDGPS	National Differential Global Positioning System
NDRS	National Distress and Response System
NDRSMP	National Distress and Response System Modernization Project
NEPA	National Environmental Policy Act
NHL	National Historical Landmark
NHPA	National Historic Preservation Act of 1969
NIS	Navigation Information Service
NM	nautical mile
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPPD	National Protections and Programs Directorate
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSR	New Source Review
O_3	ozone
OSHA	Occupational Safety and Health Administration
PAWSS	Ports and Waterways Safety System
Pb	lead
PCB	polychlorinated biphenyl
PEIS	Programmatic Environmental Impact Statement
$PM_{2.5/10}$	Particulate matter less than or equal to 2.5 or 10 microns in diameter
PNT	positioning, navigation, and timing
POV	privately owned vehicles
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROE	Report of Excess
SAR	search and rescue
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SPDES	State Pollutant Discharge Elimination System
SWDA	Safe Drinking Water Act
SWPPP	Storm Water Pollution Prevention Plan
TACAN	Tactical Air Navigation
TCP	traditional cultural property
THPO	Tribal Historic Preservation Office
TISCOM	Telecommunications and Information Systems Command
TOT	time of transmission
tpy	tons per year
TSCA	Toxic Substances Control Act
U.S.C.	United States Code
UPS	Uninterruptible Power Supplies
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
UTC	Coordinated Universal Time
VFR	visual flight rules
VHF	very high frequency
VOC	volatile organic compound
VOR/DME	Very High Frequency Omnidirectional Range/Distance Measuring Equipment
VTS	Vessel Traffic Service
WAAS	Wide Area Augmentation System
WSRA	Wild and Scenic Rivers Act