SRI International

FINAL

EXPANDED SITE SURVEY / ENVIRONMENTAL ASSESSMENT REPORT

NATIONAL WEATHER SERVICE (NWS) NETWORK RADAR TO SERVE COASTAL WASHINGTON

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EXECUTIVE SUMMARY

The National Weather Service (NWS) proposes to install and operate an S-band Doppler, dual polarized weather radar in the Grays Harbor County area to improve analysis and prediction of strong winter storm systems that frequent the region. The NWS goals are to optimize radar coverage over areas not adequately served by the existing NWS radars in Seattle, Washington, and Portland, Oregon. Specifically, the radar will be sited to provide as much off-shore coverage as possible, while also covering the windward slopes of the Olympic Mountains, the Willapa Hills of southwest Washington, the Strait of Juan de Fuca, and the mouth of the Columbia River. The proposed radar would be similar to the Weather Surveillance Radar – 1988, Doppler and would be integrated into the NWS Radar Network.

In July 2009, SRI International prepared a Preliminary Site Survey report that identified 23 potential sites for the proposed radar in Grays Harbor County and adjacent northern Pacific County, because this area has the largest concentration of population and economic activity within the area of concern. Additionally, to effectively provide low-altitude coverage of the area not currently receiving network radar coverage, the proposed radar will have to be located in or very near Grays Harbor County.

The NWS selected three sites from the list of 23 original sites for further consideration. This Expanded Site Survey/Environmental Assessment report provides technical information on the three possible alternative sites for an NWS Network Radar to serve Coastal Washington. This report compares and describes in detail the alternative sites under consideration by the NWS, and recommends an operating frequency for the proposed radar. The three sites are termed Langley Hill, Ocean City, and Saddle Hill. Each of the three alternative sites was carefully evaluated against the following site selection criteria:

Property Size

(S1) Minimum site size is 210 feet (ft) × 210 ft

Radar Coverage

(R1) Coverage would extend over the area of concern (that is, area not covered by existing NWS Network Radars), Pacific Ocean, and windward slopes of the Olympic Mountains

(R2) High-value military assets and the Federal Aviation Administration's (FAA's) National Airspace System receive radar coverage

(R3) Terrain blockage of radar beam is minimized, particularly in weather approach directions of southwest through northwest

(R4) Radar beam is not blocked by trees (antenna should rise above nearby trees, accounting for future tree growth)

(R5) Structures (tall buildings, wind turbines) or terrain in vicinity will not cause excessive clutter returns

Infrastructure

(I1) Site is within short distance of suitable electric power (that is, three-phase 200-A 208Y/120V)

(I2) Site is served by commercial T-1 communication lines (or can receive T-1 service through minor line extensions)

(I3) Site is accessible by good condition all-weather roads

(I4) Construction access is not restricted by bridges or culverts with low weight capacity

Economic

(EC1) Sites on suitable government property are preferred over private land

(EC2) Site is available from a willing owner for purchase or 20 plus year lease

(EC3) Likelihood of substantial environmental contamination of the site by regulated materials or hazardous wastes is low

Environmental

(EV1) Radar would be compatible with nearby land uses and local zoning

(EV2) Radar structure would comply with FAA height restrictions at 14 Code of Federal Regulations Part 77

(EV3) Site is at least 3,000 ft from an airport surveillance radar or airport traffic control tower

(EV4) Site is sufficiently distant from radio transmitters or receivers to prevent electromagnetic interference

(EV5) Site is not eroded or geologically unstable

(EV6) Site is not within a 100-year floodplain or tsunami hazard zone

(EV7) Site does not contain federal-jurisdictional wetlands

(EV8) Construction of the radar will not cause significant conversion of farmland under the Farmland Protection Policy Act

(EV9) No taking of threatened or endangered species or destruction of critical habitat

(EV10) No significant effects on historic or traditional cultural properties

(EV11) No significant effects on scenic viewshed, such as a scenic highway, or wilderness area

(EV12) Not within one-quarter mile of a wild and scenic river

The results of the evaluation are shown in the table that follows.

ESS Findings for NWS Network Radar to Serve Coastal Washington

			Site Name		
			Langley Hill	Ocean City	Saddle Hill
Radar Siting Criteria	Property Size	S1	●	●	●
	Radar Coverage	R1	●	●	●
		R2	●	●	●
		R3	●	●	●
		R4	●	■	●
		R5	●	●	✕
	Infrastructure	I1	●	●	■
		I2	●	●	■
		I3	●	●	●
		I4	●	●	●
	Economic	EC1	✕	●	✕
		EC2	●	●	●
		EC3	●	■	●
	Environmental	EV1	●	●	●
		EV2	●	●	●
		EV3	●	●	●
		EV4	●	●	●
		EV5	●	●	●
		EV6	●	✕	●
		EV7	●	●	●
		EV8	●	●	●
		EV9	●	●	●
		EV10	●	●	●
		EV11	●	●	●
		EV12	●	●	●

Key:

● Meets Criterion

■ Partially Meets Criterion

✕ Does Not Meet Criterion

This report also includes an analysis of environmental impacts as required by National Oceanic and Atmospheric Administration Administrative Order 216-6. The environmental analysis determined that installation and operation of the proposed NWS Network Radar at any of the three alternative sites would not result in significant environmental impacts (see Section 7, Environmental Assessment of this report).

The NWS distributed the draft report to interested members of the public and government agencies for review, and accepted comments on the draft report during an official comment period with a duration of 31 days running from March 15, 2010 through April 16, 2010. The NWS responses to all pertinent comments received during the official comment period are provided in Section 8, Community Involvement of this report. The NWS will make a decision whether to install the proposed radar and at which site after this final report is issued.

CONTENTS

EXECUTIVE SUMMARY i
FIGURES ix
TABLES xiii
CHART xiii
ABBREVIATIONS xv

1 BACKGROUND AND INTRODUCTION 1
1.1 Objectives and Scope of Report 1
1.2 Description of Proposed NWS Network Radar 1
1.3 Selection of Alternative Sites 7
2 DESCRIPTION OF ALTERNATIVE SITES CONSIDERED IN THIS REPORT 9
2.1 Langley Hill Site 9
2.1.1 General Description and Current Use 9
2.1.2 Location, Coordinates, and Elevation 9
2.1.3 Size, Ownership, and Availability 9
2.1.4 Roads and Utilities 9
2.1.5 Zoning and Future Development Plans 15
2.1.6 Soils and Topography 15
2.1.7 Geologic Hazards 15
2.1.8 Long-Lead Time Items 15
2.2 Ocean City Site 15
2.2.1 General Description and Current Use 15
2.2.2 Location, Coordinates, and Elevation 20
2.2.3 Size, Ownership, and Availability 20
2.2.4 Roads and Utilities 20
2.2.5 Zoning and Future Development Plans 20
2.2.6 Soils and Topography 20
2.2.7 Geologic Hazards 20
2.2.8 Long-Lead Time Items 21
2.3 Saddle Hill Site 21
2.3.1 General Description and Current Use 21
2.3.2 Location, Coordinates, and Elevation 21
2.3.3 Size, Ownership, and Availability 21
2.3.4 Roads and Utilities 21
2.3.5 Zoning and Future Development Plans 26
2.3.6 Soils and Topography 26
2.3.7 Geologic Hazards 26
2.3.8 Long-Lead Time Items 26
3 RADAR COVERAGE 27
3.1 Weather Approach Directions 27
3.2 Langley Hill Site 27
3.3 Ocean City Site 29
3.4 Saddle Hill Site 30
3.5 Wind Turbines 36

3.6 Comparison of Coverage Provided by each Site 37
4 RADAR TOWER HEIGHT 43
4.1 Langley Hill Site 43
4.2 Ocean City Site 43
4.3 Saddle Hill Site 43
5 FREQUENCY ASSIGNMENT 45
6 FEDERAL AVIATION ADMINISTRATION AIR SPACE COMPLIANCE 49
6.1 Federal Aviation Regulation at 14 CFR Part 77 49
6.2 Langley Hill Site 49
6.3 Ocean City Site 49
6.4 Saddle Hill Site 50
6.5 FAA Form 7460-1 50
7 ENVIRONMENTAL ASSESSMENT 55
7.1 Purpose and Need 55
7.2 Description of Alternative Actions 56
7.3 Environmental Setting, Consequences, and Mitigation 56
7.3.1 Land Use, Zoning, and Coastal Zone Management 56
7.3.2 Geology, Soils, and Seismic/Tsunami Hazards 59
7.3.3 Drainage and Water Quality 68
7.3.4 Transportation 70
7.3.5 Air Quality 71
7.3.6 Floodplains 74
7.3.7 Wetlands 78
7.3.8 Biological Resources/Protected Species 78
7.3.9 Cultural and Historic Resources 87
7.3.10 Environmental Justice/ Socioeconomic Impacts 96
7.3.11 Farmlands 98
7.3.12 Energy Consumption 99
7.3.13 Visual/Light Emissions 100
7.3.14 Radio Frequency Effects 103
7.3.15 Solid and Hazardous Waste 105
7.3.16 Wild and Scenic Rivers 106
7.3.17 Cumulative Impacts 107
7.4 No Action Alternative 108
7.5 EA Findings 109
8 COMMUNITY INVOLVEMENT 111
8.1 Public Review of Draft ESS/EA 111
8.2 Responses to Comments 112
9 OVERALL FINDINGS 117
10 LIST OF PREPARERS 119
11 AGENCIES AND PERSONS CONTACTED 121
12 REFERENCES 123

APPENDICES

A. Correspondence and Background Materials A-1
B. Report Distribution B-1
C. Comments Received on Draft ESS/EA C-1

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FIGURES

1 Existing National Weather Service Network Radar Coverage and Coastal Washington Area of Concern 2

2(a) Photograph of Typical NWS Network Radar Site 4

2(b) Standard NWS Network Radar Site Layout 5

2(c) Standard NWS Network Radar Site Configuration 6

3 Alternative Sites Selected by NWS for Further Consideration 8

4(a) Location Map – Langley Hill Site for NWS Network Radar to Serve Coastal Washington 10

4(b) Aerial Photograph – Langley Hill Site for NWS Network Radar to Serve Coastal Washington 11

4(c) Site Photographs – Langley Hill Site for NWS Network Radar to Serve Coastal Washington 12

5(a) Location Map – Ocean City Site for NWS Network Radar to Serve Coastal Washington 16

5(b) Aerial Photograph – Ocean City Site for NWS Network Radar to Serve Coastal Washington 17

5(c) Site Photographs – Ocean City Site for NWS Network Radar to Serve Coastal Washington 18

6(a) Location Map – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington 22

6(b) Aerial Photograph – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington 23

6(c) Site Photographs – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington 24

7 Estimated Radar Coverage at 2,000, 4,000, and 10,000 ft Above Site Level from Langley Hill Site (30 m tower) 28

8(a) Estimated Radar Coverage at 2,000, 4,000, and 10,000 ft Above Site Level from Ocean City Site (20 m tower) 31

8(b) Estimated Radar Coverage at 2,000, 4,000, and 10,000 ft Above Site Level from Ocean City Site (30 m tower) 32

9(a) Estimated Radar Coverage at 2,000, 4,000, and 10,000 ft Above Site Level from Saddle Hill Site (20 m tower) 34

9(b) Estimated Radar Coverage at 2,000, 4,000, and 10,000 ft Above Site Level from Saddle Hill Site (30 m tower) 35

10 Estimated Coverage at 2,000 ft Above Site Level from Alternative NWS Network Radar Sites (30 m tower) 38

11 Estimated Coverage at 4,000 ft Above Site Level from Alternative NWS Network Radar Sites (30 m tower) 39

12 Estimated Coverage at 10,000 ft Above Site Level from Alternative NWS Network Radar Sites (30 m tower) 40

13(a) FAR, 14 CFR Part 77.23(a)(2) Standards for Determining Obstructions Analysis for Copalis State Airport – Langley Hill Site for NWS Network Radar to Serve Coastal Washington 51

13(b) FAR, 14 CFR Part 77.23(a)(2) Standards for Determining Obstructions Analysis for Hogan's Corner Airport – Ocean City Site for NWS Network Radar to Serve Coastal Washington 52

13(c) FAR, 14 CFR Part 77.23(a)(2) Standards for Determining Obstructions Analysis for Copalis State Airport – Ocean City Site for NWS Network Radar to Serve Coastal Washington 53

13(d) FAR, 14 CFR Part 77.23(a)(2) Standards for Determining Obstructions Analysis for Hogan's Corner Airport – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington 54

14(a) Soil Survey Map – Langley Hill Site for NWS Network Radar to Serve Coastal Washington 61

14(b) Soil Survey Map – Ocean City Site for NWS Network Radar to Serve Coastal Washington 62

14(c) Soil Survey Map – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington 63

15 Tsunami Hazard Zones – Ocean City Site for NWS Network Radar to Serve Coastal Washington 66

16(a) FEMA Floodplain Map – Langley Hill Site for NWS Network Radar to Serve Coastal Washington 75

16(b) FEMA Floodplain Map – Ocean City Site for NWS Network Radar to Serve Coastal Washington 76

16(c) FEMA Floodplain Map – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington 77

17(a) USFWS National Wetlands Inventory Map – Langley Hill Site for NWS Network Radar to Serve Coastal Washington 79

17(b) USFWS National Wetlands Inventory Map – Ocean City Site for NWS Network Radar to Serve Coastal Washington 80

17(c) USFWS National Wetlands Inventory Map – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington 81

18 Historic Sites Listed on National Register of Historic Places and Washington Heritage Register in Vicinity of Alternative Radar Sites 89

19 Area of Potential Effect – Langley Hill Site for NWS Network Radar to Serve Coastal Washington 91

20 Area of Potential Effect – Ocean City Site for NWS Network Radar to Serve Coastal Washington 92

21(a) Area of Potential Effect Shown on Topographic Map – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington 94

21(b) Area of Potential Effect Shown on Aerial Photograph – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington 95

22 Alternative Sites Selected by the NWS for Further Consideration and State Route 109 Scenic Byway..... 101

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TABLES

ESS Findings for NWS Network Radar to Serve Coastal Washington iii

1. Coverage Area in Square Miles by Site and Tower Height 41
2. Transmitters of Concern with Operating Frequencies between 2,650 and 3,050 MHz Listed on the GMF 46
3. NWS Network Radars that Would Adjoin the Radar to Serve Coastal Washington 47
4. Total Emissions of Criteria Pollutants during Construction of NWS Network Radar 73
5. Threatened and Endangered Species that May Occur in Grays Harbor County 82
6. USFWS's Voluntary Interim Guidelines for Minimizing Potential Collision Hazards to Migratory Birds as Applied to the Proposed NWS Network Radar to Serve Coastal Washington 83
7. Comments on Draft ESS/EA Received by NWS during Official Comment Period 111
8. Site Selection Findings for NWS Network Radar to Serve Coastal Washington 118

CHART

Chart 1. Census Data for Census Tract 2 and Grays Harbor County, Washington 96

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ABBREVIATIONS

°F	degrees Fahrenheit
AGL	above ground level
ANSI	American National Standards Institute
APE	area of potential effects
ARP	Airport Reference Point
ASL	above site level
AST	above-ground storage tank
ASTM	American Society of Testing and Materials
BMP	best management practice
CASA	Center for Adaptive Sensing of the Atmosphere
CFR	Code of Federal Regulations
CGP	Construction General Permit
CO	carbon monoxide
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act (of 1972)
DAHP	Department of Archaeology and Historic Preservation
dB	decibel(s)
DNS	determination of non significance
DoA	Department of Agriculture
DoD	Department of Defense
E.O.	Executive Order
EA	Environmental Assessment
EDDA	environmental due diligence audit
EMC	electromagnetic compatibility
EMI	electromagnetic interference
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESS	Expanded Site Survey
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FEMA	Federal Emergency Management Agency

FOGH	Friends of Grays Harbor
FPPA	Farmland Protection Policy Act
ft	foot, feet
GDP	gross domestic product
GIS	geographic information systems
GMF	Government Master File
HERO	Hazards of Electromagnetic Radiation to Ordnance
IEEE	Institute of Electrical and Electronics Engineers
km	kilometers
kW	kilowatt(s)
LOS	line of sight
m	meter(s)
MBTA	Migratory Bird Treaty Act (of 1918)
MHz	megahertz
mi	mile(s)
MPE	maximum permissible exposure
MSL	mean sea level
mW/cm^2	milliwatts per square centimeter
mya	million years ago
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act (of 1966)
nmi	nautical mile(s)
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOC	notice of completion
NOI	notice of intent
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination Systems
NRAO	National Radio Astronomy Observatory

NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NTIA	National Telecommunications and Information Administration
NWS	National Weather Service
O_3	ozone
ORCAA	Olympic Region Clean Air Agency
PM	particulate matter
PSS	Preliminary Site Survey
PUD	Public Utility District
RACON	radar transponder beacon
RF	radio frequency
S.R.	State Route
SEPA	State Environmental Policy Act
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
sq mi	square mile(s)
SWPPP	Storm Water Pollution Prevention Plan
TPMS	Transition Power Maintenance System
U.S.	United States
USAF	U.S. Air Force
USC	U.S. Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WHR	Washington Heritage Register
WSDOT	Washington State Department of Transportation
WSR-88D	Weather Surveillance Radar – 1988, Doppler

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1 BACKGROUND AND INTRODUCTION

1.1 OBJECTIVES AND SCOPE OF REPORT

This Expanded Site Survey/Environmental Assessment (ESS/EA) report provides technical information on possible alternative sites for a National Weather Service (NWS) Network Radar to serve Coastal Washington. This report describes in detail the alternative sites under consideration by the NWS and compares the alternative sites in terms of

- site size and availability,
- radar coverage,
- feasibility and costs of site development,
- tower height,
- compliance with Federal Aviation Administration (FAA) air space regulations, and
- environmental impacts.

The report also recommends an operating frequency for the proposed radar. This report meets requirements contained in National Oceanic and Atmospheric Administration (NOAA) Administrative Order (NAO) 216-6: *Environmental Review Procedures for Implementing the National Environmental Policy Act* [NOAA, 1999]. A Notice of Availability (NOA) for the Draft EA was published in *The Daily World* of Aberdeen, Washington, on March 15, 2010 (see affidavit of publication in Appendix A). NWS distributed the draft report to interested members of the public and government agencies for review and comment during an official 31-day comment period beginning March 15, 2010 and ending April 16, 2010. Comments on the Draft ESS/EA are reprinted in Appendix C to this report. NWS responses to pertinent comments on the Draft ESS/EA report received during the official comment period are contained in Section 8, Community Involvement of this report. After completion of the environmental review process, the NWS will decide whether to install the proposed radar at one of the alternative sites analyzed in this report, or take no action. The NWS decision will be announced to all interested parties.

1.2 DESCRIPTION OF PROPOSED NWS NETWORK RADAR

The NWS of the Department of Commerce, Air Force of the Department of Defense (DoD), and FAA of the Department of Transportation operate a nationwide network of Doppler meteorological radars, known as Next Generation Weather Radars or Weather Surveillance Radar – 1988, Doppler (WSR-88D). WSR-88D collects data on weather conditions and provides critical inputs to forecasters. The network was installed in the late 1980s and 1990s and has proved to be extremely useful. Two existing network radars serve the Seattle, Washington, and Portland, Oregon, metropolitan areas—the largest population centers of the Pacific Northwest. Due to topographic blockage and the distance from the two radars, approximately 1,990 square miles (sq mi) of Coastal Washington does not receive radar coverage below 10,000 feet (ft) above site level (ASL). This area is known as an area of concern and is shown in Figure 1. The existing NWS Network also leaves uncovered a large section of the Pacific Ocean adjacent to Coastal Washington and the windward slopes of the Olympic Mountains.

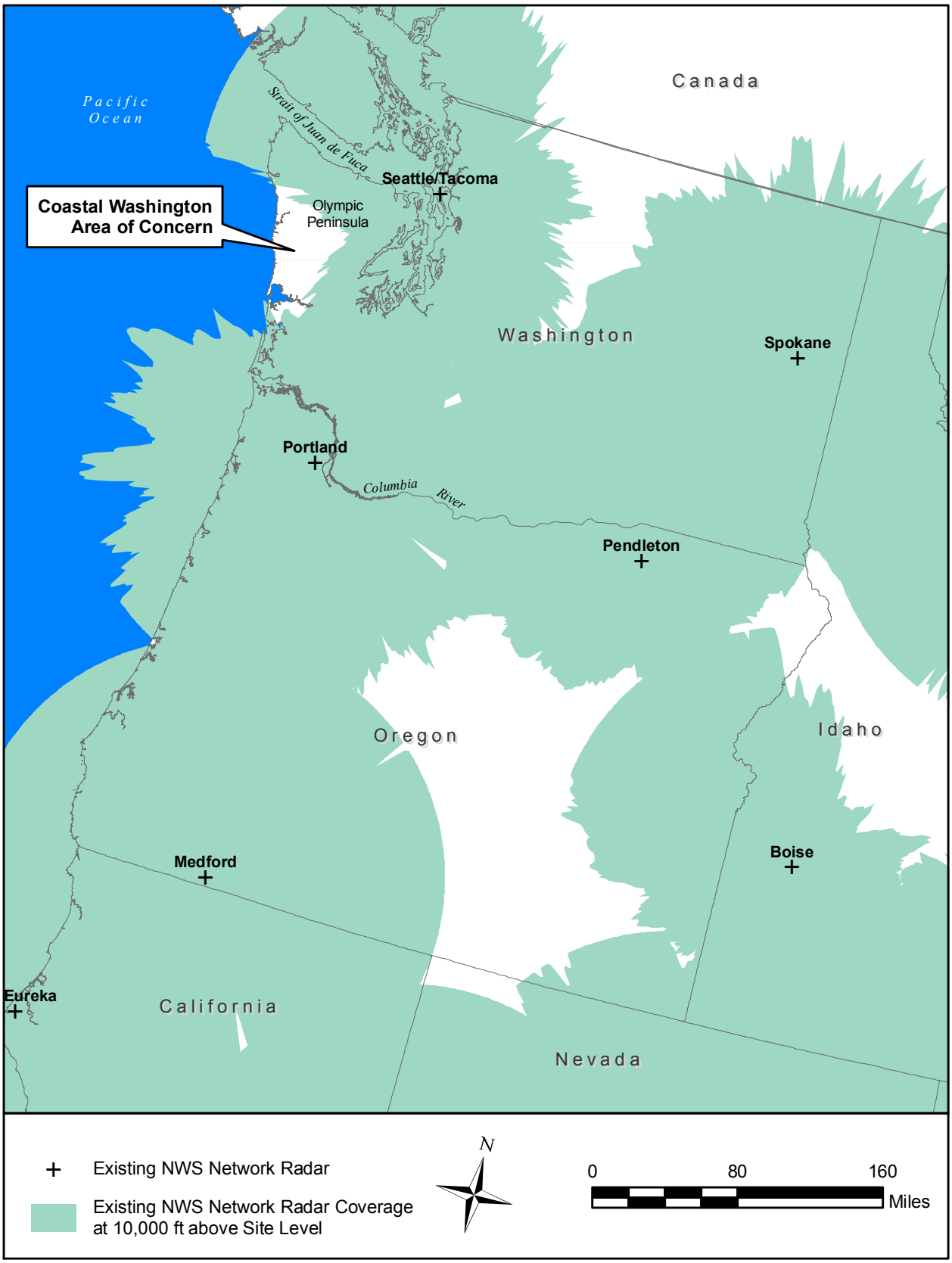

FIGURE 1 EXISTING NATIONAL WEATHER SERVICE NETWORK RADAR COVERAGE AND COASTAL WASHINGTON AREA OF CONCERN

NWS proposes to install and operate a new radar to provide improved radar coverage of the Coastal Washington area in support of meteorological forecasting and severe weather warnings. In addition to eliminating the existing gap in NWS Network Radar coverage, the proposed radar would provide coverage over the Pacific Ocean a considerable distance from the shoreline of Washington State, thereby improving the ability of NWS to forecast movement and intensity of storms approaching the coast of Washington. The radar would also improve quantitative precipitation estimates over the mountains and hills of western Washington, which will assist in prediction of flood events on local rivers and streams. The proposed radar must be compatible with the existing WSR-88D Network to allow integration of data collected by the radar into the NWS's highly sophisticated computerized weather data processing systems. In addition, the proposed radar would be similar to the 155 existing WSR-88Ds in the nationwide network (and four DoD remote overseas radars) to achieve efficiencies in operation and maintenance procedures. Thus, the proposed radar would be an NWS Network Radar.

Figure 2 contains a photograph of a typical NWS Network Radar site, standard site layout, and standard site configuration. The radar would consist of a rotating dish antenna within a fiberglass radome mounted on a steel lattice tower. Three masonry shelters housing electronics equipment, a standby generator, and a Transition Power Maintenance System (TPMS) would be located at the base of the tower. A chain-link fence would surround the tower and shelters. The area within the fence and the access road would be surfaced with crushed rock. The radar facility would require road access, electric power, and telecommunications data link to the Weather Forecast Office in Seattle, Washington. The radar would be equipped with a TPMS and a standby generator capable of providing power during loss of primary power. The construction process would consist of site clearing and preparation, soil grading, foundation installation, steel erection, shelter placement, electronic equipment installation, interior and exterior finishing, utility line connection, parking area surfacing, and fence installation. After construction of the facility, the radar would be subject to initial checkout and testing. When NWS is satisfied that the radar operates properly, it will commission the radar into the nationwide network. The radar facility would be automated and unstaffed; therefore, no water or wastewater service would be required. Technicians would visit the facility periodically for maintenance and repair purposes.

FIGURE 2(a) PHOTOGRAPH OF TYPICAL NWS NETWORK RADAR SITE

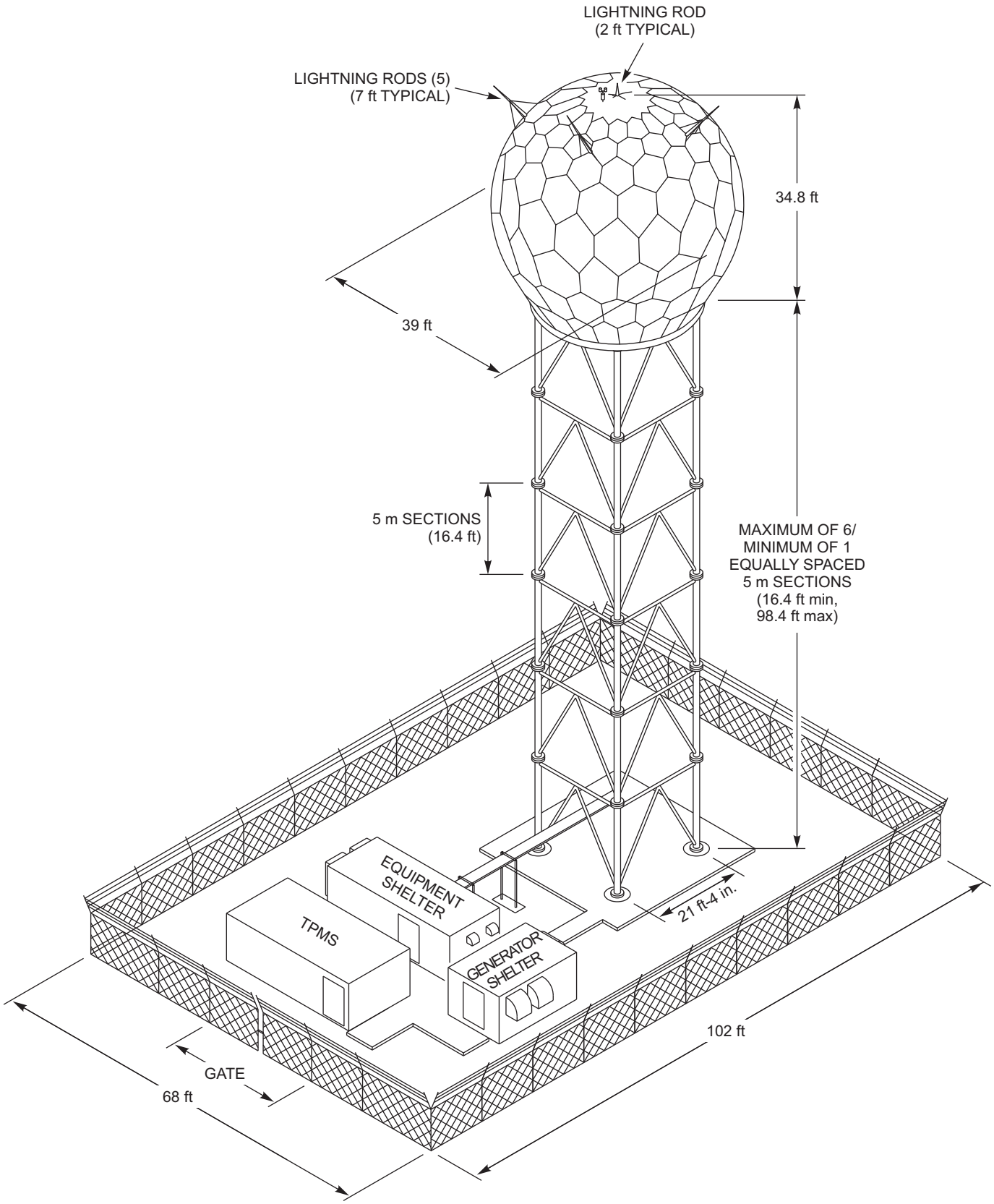

FIGURE 2(b) STANDARD NWS NETWORK RADAR SITE LAYOUT

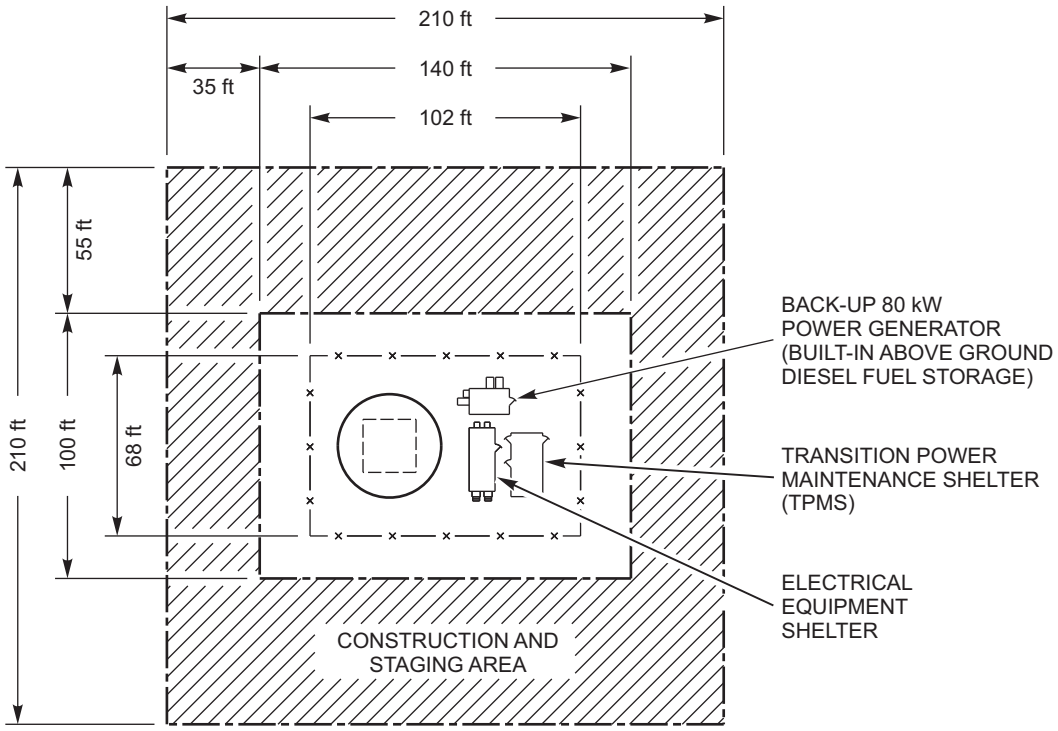

FIGURE 2(c) STANDARD NWS NETWORK RADAR SITE CONFIGURATION

1.3 SELECTION OF ALTERNATIVE SITES

In July 2009, NWS issued a Preliminary Site Survey (PSS) report titled *Preliminary Site Survey, National Weather Service Network Radar to Serve Coastal Washington*. That report examined 23 alternative site locations for the proposed radar in Grays Harbor County and adjacent northern Pacific County, because this area has the largest concentration of population and economic activity within the area of concern. Additionally, to effectively provide low-altitude coverage of the area not currently receiving network radar coverage, the proposed radar will have to be located in or very near Grays Harbor County. Based on the information contained in that report, the NWS selected the following three most advantageous sites for further consideration (see Figure 3):

- Langley Hill Site, Grays Harbor County, Washington
- Ocean City Site, Grays Harbor County, Washington
- Saddle Hill Site, Grays Harbor County, Washington

This report provides additional detailed analysis of those three sites.

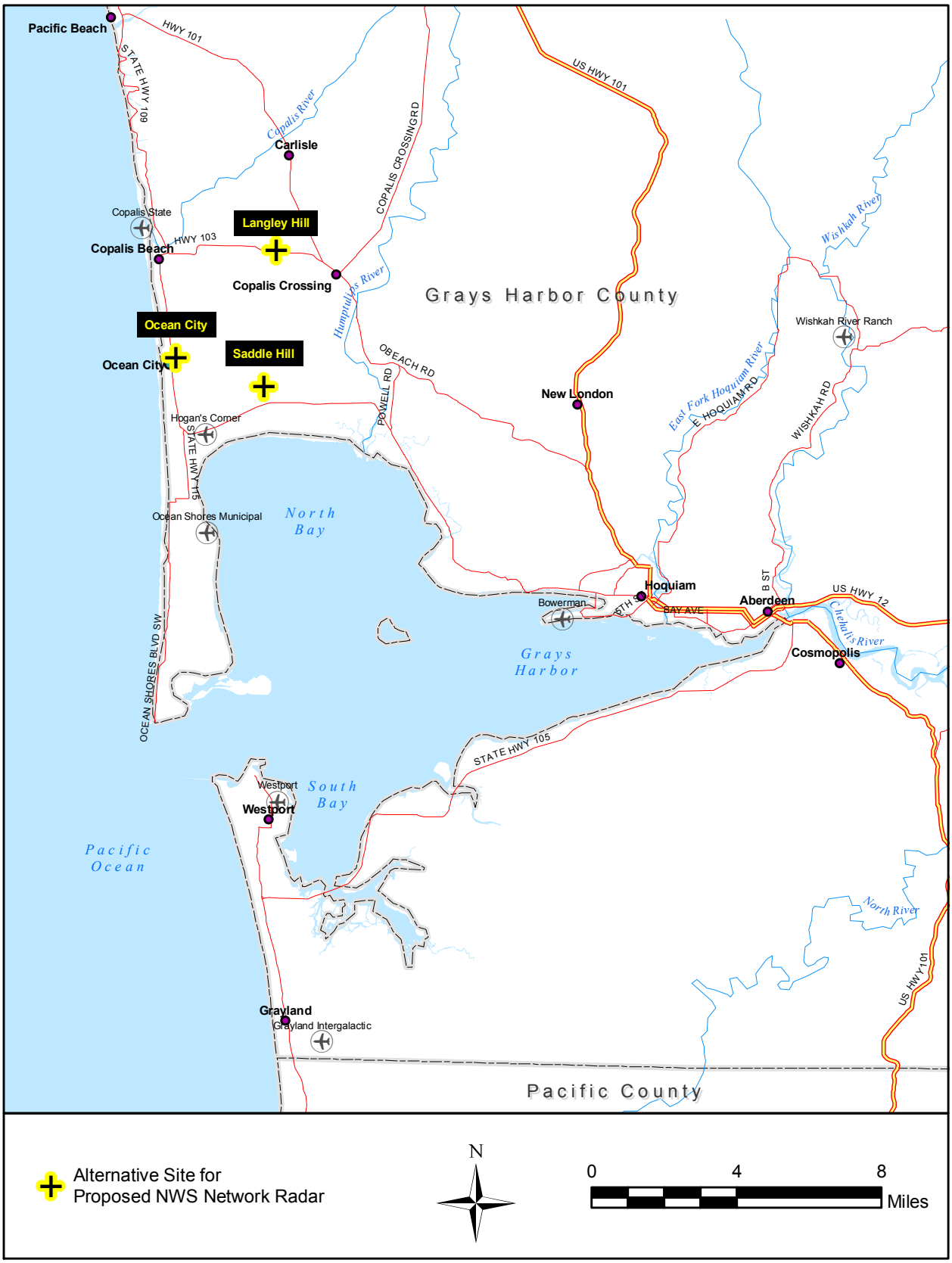

FIGURE 3 ALTERNATIVE SITES SELECTED BY NWS FOR FURTHER CONSIDERATION

2 DESCRIPTION OF ALTERNATIVE SITES CONSIDERED IN THIS REPORT

2.1 LANGLEY HILL SITE

2.1.1 General Description and Current Use

The Langley Hill Site is a forested hilltop adjacent to Copalis Beach Road in unincorporated Grays Harbor County. The site is part of a 265.5-acre parcel owned by a land management company and used for timber production. The site was clear cut in 1986 and is currently vegetated with Western hemlock and spruce forest. The owner plans to harvest timber from the property in 2021. The site is at elevation 240 ft mean sea level (MSL), approximately 3.0 miles (mi) east of the community of Copalis Beach, and approximately 3.4 mi east of the Pacific Ocean shoreline. Ocean Shores is approximately 8 mi to the south and Hoquiam is approximately 14 mi to the southeast. Figure 4 contains a location map, aerial photograph, and ground-level photographs of the Langley Hill Site and vicinity.

2.1.2 Location, Coordinates, and Elevation

The Langley Hill Site is located in unincorporated Grays Harbor County, in the southwest one-fourth of Section 19, Township 19 north, Range 11 west, Willamette Baseline and Meridian. Site coordinates (that is, latitude/longitude) are 47º 07' 0.5" N / 124º 06' 22.5" W [NAD (North American Datum) 83]. Site elevation is approximately 240 ft above MSL.

2.1.3 Size, Ownership, and Availability

The Langley Hill Site is managed by Green Crow Management Services, which manages a number of timber properties in the area. The property is of sufficient size to accommodate the proposed NWS Network Radar, an access drive, and a utility easement. This site is available for lease or purchase by NWS for purposes of installing and operating an NWS Network Radar [Walsh, 2009].

2.1.4 Roads and Utilities

The Langley Hill Site is located approximately 500 ft north of Copalis Beach Road, a two-lane paved road maintained by Grays Harbor County. The site is accessible via an unimproved logging road that connects to Copalis Beach Road at a gated entrance. The existing logging road would be graded, cleared of overgrown vegetation, and surfaced with gravel to allow radar construction, and operation of the radar. Approximately 1,400 ft of existing private road would be upgraded. Electric power and telecommunication lines would be extended to this site from existing pole-mounted lines located on the south shoulder of Copalis Beach Road. The power and telecommunication lines would be installed underground within a roughly 500 ft long utility easement located between Copalis Beach Road and the site. NWS will complete a *Request to Turn on Power* form (see Appendix A) and submit it to the Grays Harbor Public Utility District (PUD) to extend power to the site [Wesley, 2009].

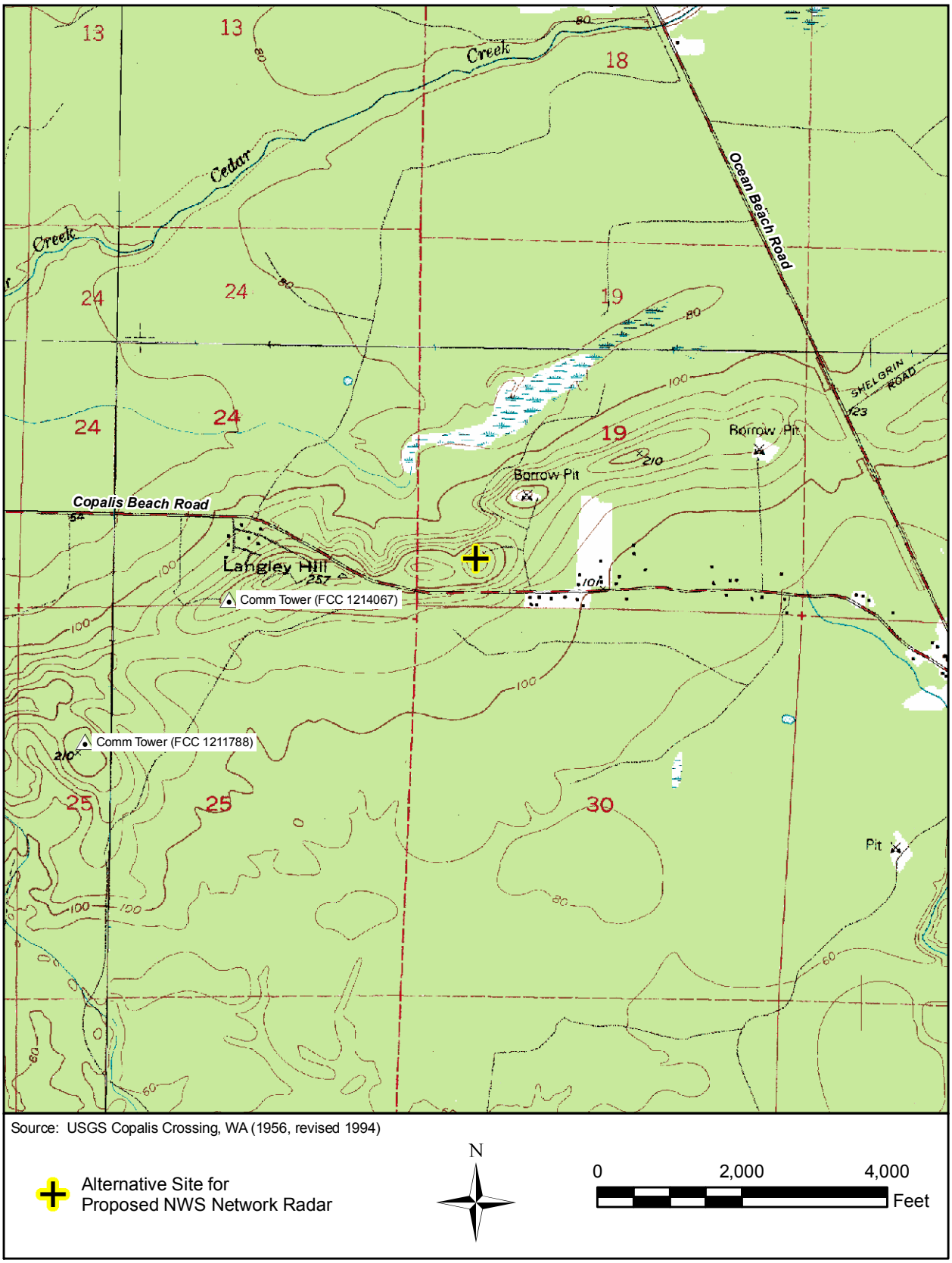

FIGURE 4(a) LOCATION MAP — LANGLEY HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

FIGURE 4(b) AERIAL PHOTOGRAPH — LANGLEY HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

COPALIS BEACH ROAD PASSING SOUTH OF LANGLEY HILL SITE

VIEW (LOOKING NORTH) OF ACCESS ROAD TO LANGLEY HILL SITE

FIGURE 4(c) SITE PHOTOGRAPHS — LANGLEY HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

VIEW (LOOKING WEST) OF LANGLEY HILL SITE

CLOSE-UP VIEW OF LANGLEY HILL SITE

FIGURE 4(c) SITE PHOTOGRAPHS — LANGLEY HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON (continued)

195 ft TALL COMMUNICATIONS TOWER LOCATED ABOUT 3,400 ft WEST-SOUTHWEST OF THE LANGLEY HILL SITE

FIGURE 4(c) SITE PHOTOGRAPHS — LANGLEY HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON (concluded)

2.1.5 Zoning and Future Development Plans

The Langley Hill Site is within a General Development Zoning District (G-5) of Grays Harbor County. Public utility facilities, such as government radio towers, are allowed in the G-5 District. The landowner plans to continue the existing use of the land for timber production and has no plans to develop this property for other uses [Walsh, 2009].

2.1.6 Soils and Topography

The Natural Resources Conservation Service (NRCS) maps soil at the Langley Hill Site as Newskah loam, 8 to 30% slopes. The proposed utility easement would also be located on Newskah loam, 8 to 30% slopes. The access drive would be located on Newskah loam, 8 to 30% slopes, and Calawah silt loam, 8 to 30% slopes. These soils are deep and well drained. The access drive to the site would connect to Copalis Beach Road, follow the route of existing unimproved roads, and be approximately 1,400 ft in length with an average slope gradient of 8.6%. The utility corridor to serve the site would connect to Copalis Beach Road, a distance approximately 500 ft in length with an average slope gradient of 16%.

2.1.7 Geologic Hazards

The proposed Langley Hill Site, access road, and utility easement are located outside the tsunami hazard zone [State of Washington, 2007]. The site and vicinity appear to be geologically stable. No evidence of slope instability or accelerated erosion was noted during a site reconnaissance.

2.1.8 Long-Lead Time Items

Grays Harbor County development review and approval process for non-federal developers typically takes three to four months [Crites, 2009]. (In Appendix A, see Development Application; Grade and Fill Permit Application; and International Building Code/International Fire Code Review for Grays Harbor County.) The time to process an application for extension of power service to the Langley Hill Site would be approximately two months [Wesley, 2009]. The installation of telecommunication lines to serve this site would also require approximately two months [Beltico, 2009].

2.2 OCEAN CITY SITE

2.2.1 General Description and Current Use

The Ocean City Site is located in a mowed field adjacent to a school district administration building. The site is undeveloped, nearly level, and vegetated with mowed grass. The site is part of a six-acre parcel owned by North Beach School District No. 64. Site elevation is approximately 20 ft MSL. The school district uses a portion of the parcel (outside the boundaries of the proposed radar site) for storage of school buses. Use of the property for storage of school buses is expected to end in summer 2010 [Pinnick, 2009]. The site is approximately 500 ft east of State Route (S.R.) 109 and approximately 0.6 mi east of the Pacific Ocean shoreline. The site is in a developed portion of Ocean City, an incorporated community. Ocean Shores is approximately 4 mi to the south and Hoquiam is approximately 14 mi to the east–southeast. Figure 5 contains a location map, aerial photograph, and ground-level photographs of the Ocean City Site and vicinity.

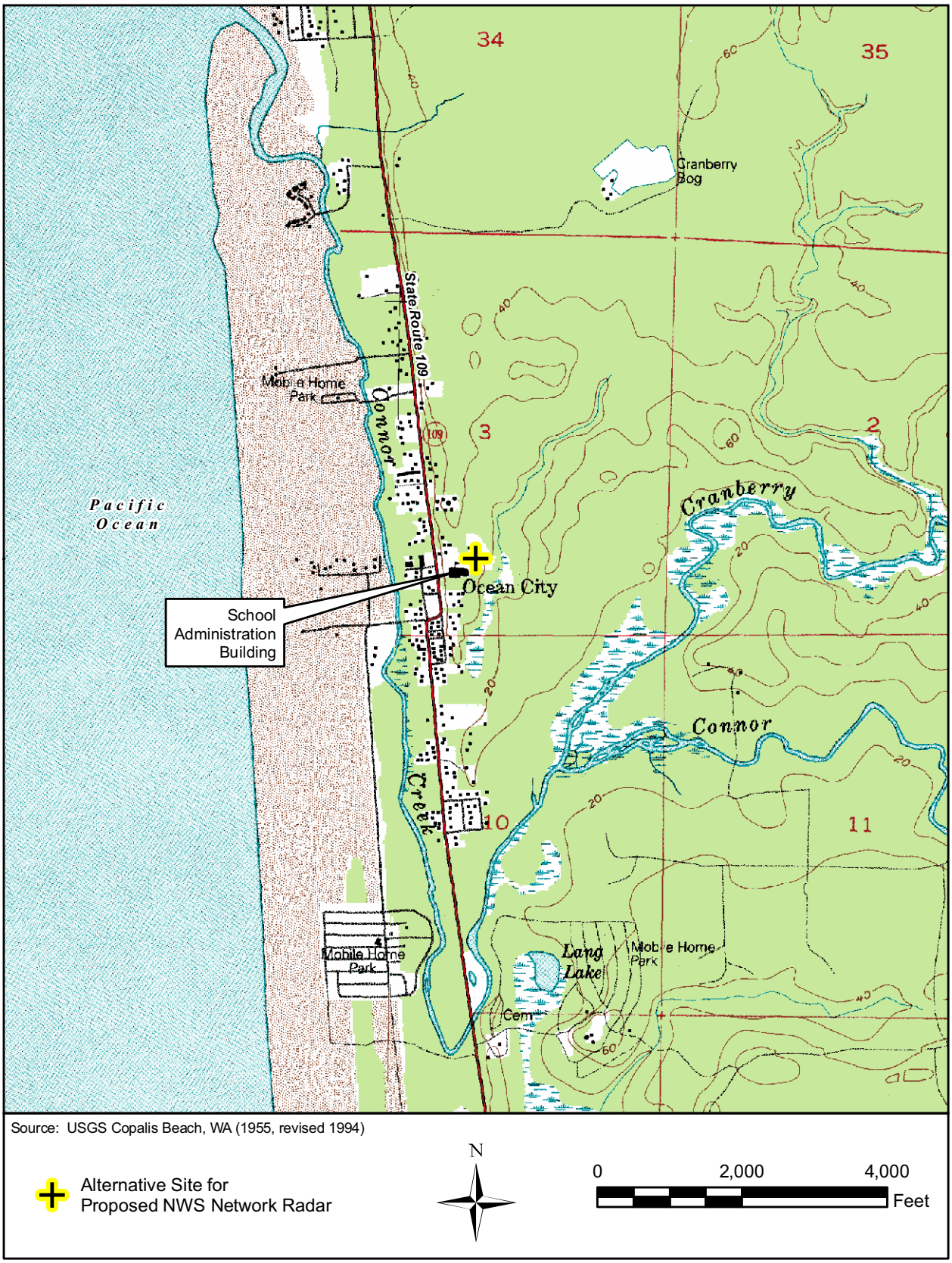

FIGURE 5(a) LOCATION MAP — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

FIGURE 5(b) AERIAL PHOTOGRAPH — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

VIEW (LOOKING EAST ALONG FOURTH AVENUE) OF ROAD ACCESS TO OCEAN CITY SITE

VIEW (LOOKING EAST) OF OCEAN CITY SITE

FIGURE 5(c) SITE PHOTOGRAPHS — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

VIEW (LOOKING WEST) OF OCEAN CITY SITE

FIGURE 5(c) SITE PHOTOGRAPHS — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON (concluded)

2.2.2 Location, Coordinates, and Elevation

The Ocean City Site is located in Ocean City, Grays Harbor County, in the southeast one-fourth of the southwest one-fourth of Section 3, Township 18 north, Range 12 west, Willamette Baseline and Meridian. Site coordinates are 47º 04' 24.6" N / 124º 09' 48.6" W [NAD 83]. Site elevation is approximately 20 ft MSL.

2.2.3 Size, Ownership, and Availability

The Ocean City Site is owned by North Beach School District No. 64. The property is of sufficient size to accommodate the proposed NWS Network Radar and an access/utility easement. This site is available for lease by NWS for purposes of installing and operating an NWS Network Radar [Pinnick, 2009].

2.2.4 Roads and Utilities

The Ocean City Site is accessible via S.R. 109 and Fourth Avenue. Both of those roads are two-lane paved roads. S.R. 109 is maintained by Washington State Department of Transportation (WSDOT) and Fourth Avenue is maintained by Grays Harbor County. A roughly 100 ft long access drive would connect the site to the eastern terminus of Fourth Avenue. Electric power and telecommunication lines would be extended to this site from existing pole-mounted utility lines located along Fourth Avenue. NWS will complete a *Request to Turn on Power* form (see Appendix A) and submit it to the Grays Harbor PUD to extend power to the site [Wesley, 2009].

2.2.5 Zoning and Future Development Plans

The Ocean City Site is within a Resort Residential Zoning District (R-3) of Grays Harbor County. Public utility facilities, such as government radio towers, are allowed in the R-3 District. The landowner has no plans to develop this property for other uses [Pinnick, 2009].

2.2.6 Soils and Topography

NRCS maps soil at the Ocean City Site as Wishkah silty clay loam. This soil is deep and somewhat poorly drained. The proposed radar site slopes downward toward the east at a gradient of 1 to 2%. The access/utility easement serving this site would connect between the terminus of Fourth Avenue and the proposed radar site, would be approximately 100 ft in length, and would cross nearly level ground.

2.2.7 Geologic Hazards

The Ocean City Site is located at approximately 20 ft MSL in a marginal tsunami hazard zone. It would be subject to damage from a tsunami large enough to inundate the shoreline to the height of the site. The only road access to this site is via S.R. 109. There is the potential for loss of vehicle access or utility service to the site during a smaller tsunami (which would not directly impinge on the radar site) because S.R. 109, Fourth Avenue, and electric and telecommunication lines serving the site are located at lower elevation within the area of greatest tsunami hazard [State of Washington, 2007].

2.2.8 Long-Lead Time Items

All long-lead items and estimated times to complete these items would be similar to the Langley Hill Site.

2.3 SADDLE HILL SITE

2.3.1 General Description and Current Use

The Saddle Hill Site is located on a hill crest in unincorporated Grays Harbor County approximately one-half mile north of S.R. 109. The site is at elevation of approximately 220 ft MSL and is approximately 3.5 mi east of the Pacific Ocean shoreline. The proposed radar site is undeveloped and vegetated with low brush and small trees. The site is located on a 320-acre parcel owned by a forestry company. The acre parcel contains six radio towers, grouped together on a hilltop approximately 900 ft southwest of the proposed radar site. Ocean Shores is approximately 4 mi to the south–southwest and Hoquiam is approximately 10 mi to the east–southeast. Figure 6 contains a location map, aerial photograph, and ground-level photographs of the Saddle Hill Site and vicinity.

2.3.2 Location, Coordinates, and Elevation

The Saddle Hill Site is located in unincorporated Grays Harbor County, in the northeast one-fourth of the southeast one-fourth of Section 12, Township 18 north, Range 12 west, Willamette Baseline and Meridian. Site coordinates are 47º 03' 44.9" N /124º 06' 43.6" W [NAD 83]. Site elevation is approximately 220 ft MSL.

2.3.3 Size, Ownership, and Availability

The Saddle Hill Site is owned by Rayonier Northwest Forest Resources, which manages a number of timber properties in the area. The property is of sufficient size to accommodate the proposed NWS Network Radar, an access drive, and a utility corridor. This site is available for lease or purchase by NWS for purposes of installing and operating an NWS Network Radar [Brulotte, 2009].

2.3.4 Roads and Utilities

The Saddle Hill Site is accessible via a one-lane unimproved access drive, which provides access to the existing radio towers and to the nearby knoll proposed for radar installation. The drive connects to S.R. 109 near milepost 14. The existing access road is in fair condition, but some improvements would be required, particularly to the section of road that branches off the main road and connects to the proposed radar site. Electric power lines to serve the radar would connect to existing two-phase pole-mounted lines along S.R. 109, which would be upgraded to supply three-phase power to the radar. Installing additional conductors and transformers, and possibly replacement of some poles, would be required along a roughly 12,000 ft long segment located between the access drive and the current terminus of three-phase power along S.R. 109 west of Saddle Hill. Telecommunications service would be extended from existing underground lines along S.R. 109 to the site. The NWS would install new conduit for underground electric and telecommunication lines along the existing access road between S.R. 109 and the site, a

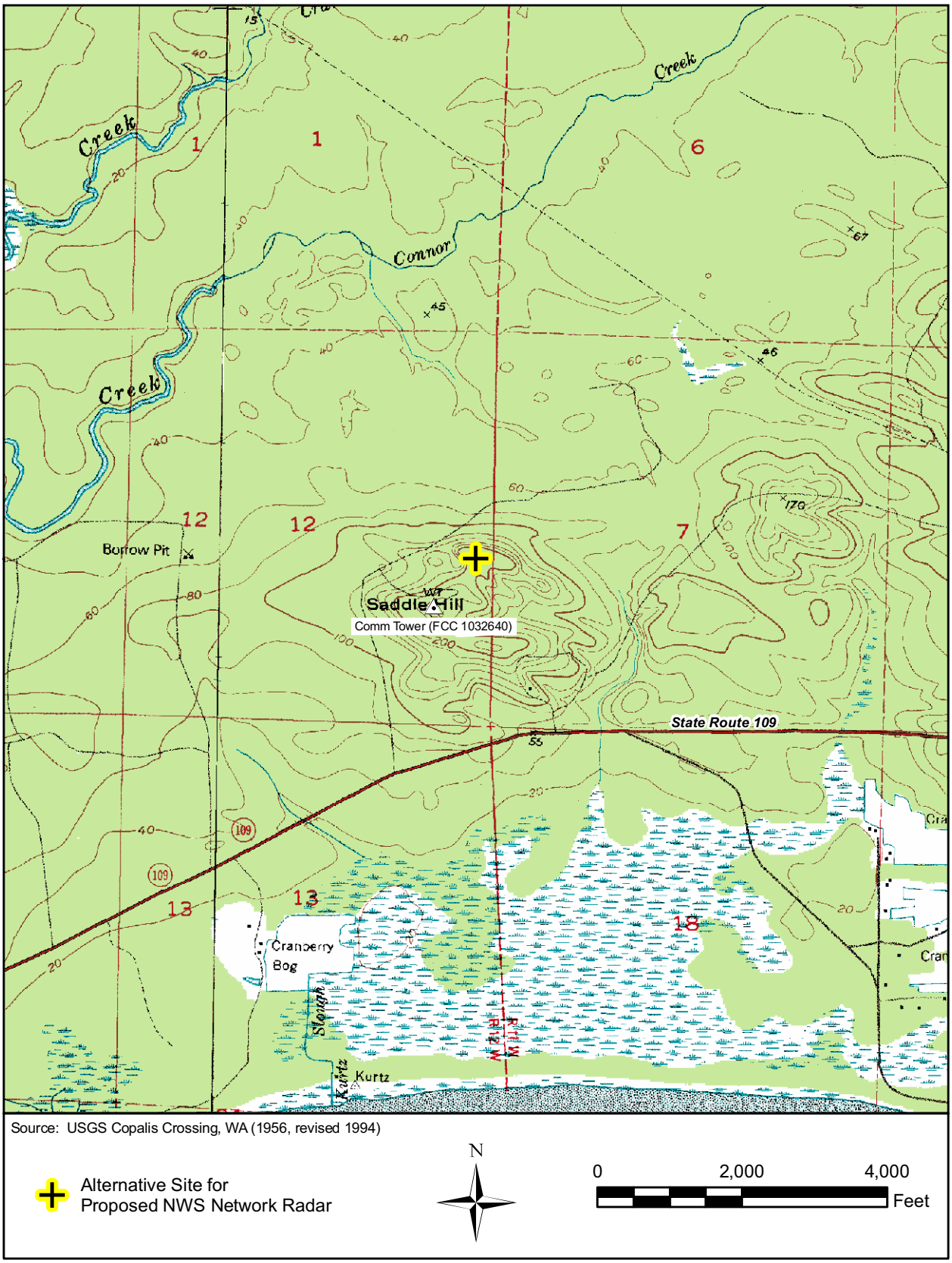

FIGURE 6(a) LOCATION MAP — SADDLE HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

FIGURE 6(b) AERIAL PHOTOGRAPH — SADDLE HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

VIEW (LOOKING NORTH FROM STATE ROUTE 109) OF ACCESS ROAD TO SADDLE HILL

VIEW (LOOKING NORTHEAST) OF SADDLE HILL SITE

FIGURE 6(c) SITE PHOTOGRAPHS — SADDLE HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

VIEW (LOOKING SOUTHWEST) OF EXISTING COMMUNICATIONS TOWERS ON SADDLE HILL

FIGURE 6(c) SITE PHOTOGRAPHS — SADDLE HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON (concluded)

distance of approximately 4,500 ft. The NWS will complete and submit a *Request to Turn on Power* form (see Appendix A) to the Grays Harbor PUD to extend power to the site [Wesley, 2009].

2.3.5 Zoning and Future Development Plans

The proposed site is within a General Development Zoning District (G-5) of Grays Harbor County. Public utility facilities, such as government radio towers, are allowed in the G-5 District. The landowner plans to continue the existing use of the land for timber production and has no plans to develop this property for other uses [Brulotte, 2009].

2.3.6 Soils and Topography

NRCS maps soil at the Saddle Hill Site as Calawah silt loam on 8 to 30% slopes. The access drive and utility easement includes Calawah silt loam on 8 to 30% slopes and Calwah silt loam on 1 to 8% slopes; both these soils are deep and well drained. The average gradient of the access and utility easement route between S.R. 109 and the proposed radar site is approximately 3.8%.

2.3.7 Geologic Hazards

The proposed Saddle Hill Site and access/utility easement are located outside the tsunami hazard zone [State of Washington, 2007]. However, the only road access to Saddle Hill is via S.R. 109. Portions of S.R. 109 east of the site between Saddle Hill and Hoquiam and west of the site along the Pacific Ocean shoreline are within the area of greatest tsunami hazard. Tsunami inundation of S.R. 109 could damage the road and prevent access to the site and damage utility lines serving the site. The site and vicinity appear to be geologically stable. Although minor soil erosion was observed along the access road, no evidence of large-scale slope instability or failure was noted.

2.3.8 Long-Lead Time Items

Grays Harbor County development review and approval process for non-federal developers typically takes from three to four months [Crites, 2009]. The time to process an application for power and installation of power lines at this site would be approximately six months. This time to obtain power service is longer than for the other alternative sites due to the need for the Grays Harbor PUD to submit a franchise agreement to the WSDOT to allow installation of power lines along S.R. 109 [Wesley, 2009]. The installation of telecommunication lines would require approximately two months, including time necessary for Qwest to acquire a Right of Way along S.R. 109 from WSDOT [Beltico, 2009].

3 RADAR COVERAGE

3.1 WEATHER APPROACH DIRECTIONS

Coastal Washington has a temperate climate characterized by cool and damp winters and mild and generally dry summers. Weather patterns are dominated by the adjacent Pacific Ocean, which is characterized by year-round water temperatures of 45 to 50 degrees Fahrenheit (°F). Marine air is typically mild and moist and the predominant west-to-east winds transport marine air onto the land. The jet stream guides weather storms toward the Pacific Northwest, resulting in abundant precipitation and typical wintertime temperatures of 40 to 50°F. The Cascade Mountains generally prevent cold air from the interior from flowing westward into coastal areas. During summer, high pressure forms over the eastern Pacific, pushing the jet stream northward and resulting in drier and warmer temperatures. Offshore airflows can result in warmer temperatures reaching above 85°F, but are relatively rare and usually short-lived. The greatest weather hazards are from winter storms, which are associated with large amounts of rainfall, flooding, and slope failure. Ice and snowstorms are infrequent but can result in severe hazards and widespread property damage and disruption of economic activity [Mass, 2008].

Astoria, located at the northwest corner of Oregon, has similar weather as the area of concern in Coastal Washington, and has an official climatological record extending back to 1975 [National Climatic Data Center, 2004]. In January, the daily mean maximum and minimum temperatures are 48.1°F and 36.2°F, respectively. In August, daily mean maximum and minimum temperatures are 68.3°F and 52.9°F, respectively. Average annual precipitation is 67.13 inches and snowfall is rare [National Climatic Data Center, 2004]. The amount of precipitation is greatly influenced by orographic effects and varies greatly with elevation and aspect. Westward facing hillsides receive far greater precipitation than areas to the east (that is, leeward side) of the mountains, which are in a rain shadow [Mass, 2008]. Areas at higher elevation also receive greater precipitation because the moist air from the Pacific cools as it rises over the coastal ranges and Olympic Mountains, loses moisture-carrying capacity, and drops precipitation. Due to the relative lack of summer heat, convective thunderstorms and tornadoes occur rarely.

3.2 LANGLEY HILL SITE

The Langley Hill Site is located on a hill crest at approximately 240 ft MSL. The site is part of a 265.5 acre property owned by a forestry company and managed for timber production. Timber was harvested from the property in 1983 and mixed Western hemlock and Douglas fir has grown since then. Tree heights at the property were measured at up to 65 ft above ground level (AGL) in November 2009. The trees are expected to grow to a maximum height of 100 ft before they will be harvested, in approximately 2021 [Walsh, 2009]. Although a 20 meter (m) or 25 m tower would place the radar antenna above existing trees, future tree growth could obstruct the antenna, thus a 30 m tower is recommended for this site (see Section 4). The parcel containing the proposed radar site includes the entire hill crest. Adjoining parcels are at lower elevation and trees on those parcels are not expected to grow to sufficient height to obstruct a radar mounted on a 30 m tower. Figure 7 shows the estimated radar coverage for an NWS Network Radar mounted on a 30 m tower, assuming minimum scan angle of 0.5 degree above horizontal

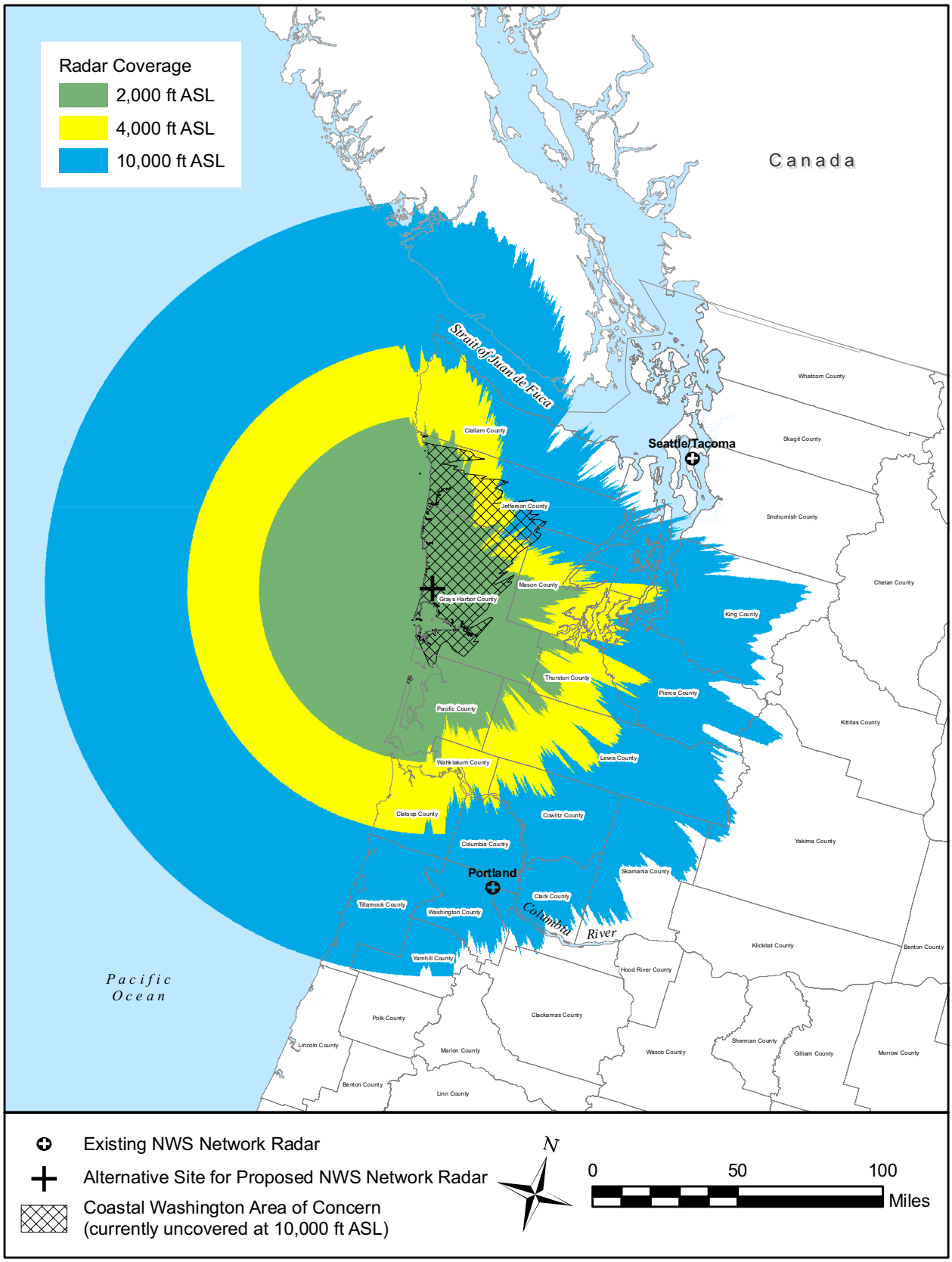

FIGURE 7 ESTIMATED RADAR COVERAGE AT 2,000, 4,000, AND 10,000 ft ABOVE SITE LEVEL FROM LANGLEY HILL SITE (30 m TOWER)

(the minimum currently in use by NWS Network Radars). The radar coverage maps included in this report were prepared using Digital Terrain Elevation Data and assume 4/3 earth radius to account for refraction of the radar signal within the atmosphere.

SRI International conducted a visual inspection in the vicinity of each of the three alternative sites to identify tall trees or structures that may obstruct the radar beam. The dimensions of potentially blocking objects were measured in the field or obtained from filings with the FAA and incorporated into the coverage maps. There would be no blockage in the primary weather approach directions to the southwest, west, or northwest. There would be minor blockage to the south through east. The Olympic Mountains would cause substantial blockage to the east through north. A radar at this site would achieve 73.6% of theoretical maximum coverage (that is, coverage with no terrain, tree, or structural blockage) at 2,000 ft ASL, rising to 81.9% at 10,000 ft ASL. Most of the area of concern (that is, area not currently covered by NWS Network Radars at 10,000 ft ASL) would be covered at 2,000 ft ASL or less and the entire area of concern would be covered at 10,000 ft ASL or less. An NWS Network Radar mounted on a 30 m tower at this site would meet siting criteria R1 through R5.

Two communication towers are located near the Langley Hill Site. The closest tower (FCC 1214067) is approximately 3,400 ft west–southwest of the proposed radar site and the second tower (FCC 1211788) is approximately 5,700 ft southwest, as shown in Figure 4(a). The two communication towers reach heights of 408 ft MSL and 518 ft MSL, respectively. If mounted on a 30 m tower (the tallest available), the center of the NWS Network Radar antenna would be at elevation 359 ft MSL. Both existing communication towers reach higher elevations than the proposed radar and would be illuminated by the main beam of the radar. If mounted on a 30 m tower, the angle from the center of the NWS Radar antenna to the tops of these towers would be 0.91 and 1.59 degrees. Thus, these towers have the potential to obstruct the main beam of the NWS Network Radar when it scans at low elevation angles. Based on visual observations, the tops of these towers have a width of approximately 10 ft (including antennas mounted on the tower (see Figure 4[c]), which would subtend angles of 0.17 degree for the closest antenna and 0.10 degree for the more distant antenna. Thus, these towers would not significantly block the NWS Network Radar if located at the Langley Hill Site.

3.3 OCEAN CITY SITE

The Ocean City Site is located approximately 0.6 mi east of the Pacific Ocean shoreline at approximately 20 ft MSL. Trees located a short distance northwest of the site reach heights of 85 ft AGL and will grow taller in the future. These trees would obstruct the radar if mounted on a tower less than 30 m in height. While a 30 m tower would clear the trees initially, future tree growth could result in the trees obstructing the radar signal in an important weather approach direction. Those trees are located on the parcel containing the proposed radar sites, as well as on six other nearby parcels. Approval from several landowners would be required to trim or remove the blocking trees.

Figures 8(a) and 8(b) show estimated radar coverage for a radar at the Ocean City Site, mounted on a 20 m and 30 m tower, respectively. These coverage estimates assume a minimum scan angle of 0.5 degree above horizontal (the minimum currently in use by NWS Network Radars). The obstruction caused by the trees is shown in Figure 8(a) and would be significant. This obstruction would be eliminated with the use of a 30 m tower as shown in Figure 8(b). There would be no blockage to a radar mounted on a 30 m tower in the primary weather approach directions to the southwest, west, or northwest. There would be minor blockage to the south through east. The Olympic Mountains would cause substantial blockage to the east through north. A radar on a 30 m tower at this site would achieve 73.7% of theoretical maximum coverage (that is, coverage with no terrain, tree, or structural blockage) at 2,000 ft ASL, rising to 82.3% at 10,000 ft ASL. Most of the area of concern (that is, area not currently covered by NWS Network Radars at 10,000 ft ASL) would be covered at 2,000 ft ASL or less and the entire area of concern would be covered at 10,000 ft ASL or less. An NWS Network Radar mounted on a 30 m tower at this site would meet siting criteria R1 through R3 and R5. Due to the potential for future tree growth to obstruct the radar, criterion R4 would only be partially met. Tree removal or trimming could prevent obstruction of the radar beam, but would be complicated by the need to cut or trim many trees located on seven different land parcels. The parcels are owned by North Beach School District No. 64, Fire District No. 7, and four non-government landowners.

3.4 SADDLE HILL SITE

Saddle Hill contains two hill crests of similar elevation. The southern hill crest, elevation 237 ft MSL, is developed with a number of communication towers located in four distinct fenced compounds (see Figure 6[c]). Towers present include a 210 ft tall steel-lattice tower, two steel monopoles supporting cellular telephone antennas, and three smaller towers (one steel-lattice tower and two wooden poles). The proposed site for the NWS Network Radar is located at elevation 220 ft MSL on the northern hill crest, a distance of approximately 900 ft northeast of the existing radio towers on the southern hill crest. Due to the height of the three tallest of the existing towers and their higher base elevation, the main beam of the NWS Network Radar would directly illuminate the existing tower, even if the NWS Network Radar was mounted on a 30 m tower (the tallest available tower). The elevation angle from the center of the NWS Network Radar antenna, mounted on a 30 m tower, to the top of the tallest existing tower would be 7.16 degrees. Most scans by the NWS Network Radar would be conducted at elevation angles less than 7.16 degrees, thus the existing towers present electromagnetic and obstruction concerns.

NOAA conducted an analysis of the effects on radar performance of tall towers in close proximity to a WSR-88D [Sirmans, 1986]. The proposed NWS Network Radar would be very similar in operating characteristics to the WSR-88D; therefore, prior analysis is applicable to the Saddle Hill situation. Potential effects of a tall object near an NWS radar include

- reduction of pattern gain due to enhancement of sidelobes in the sector containing the tall object, and
- spurious reflections from the tall object masking weather reflections.

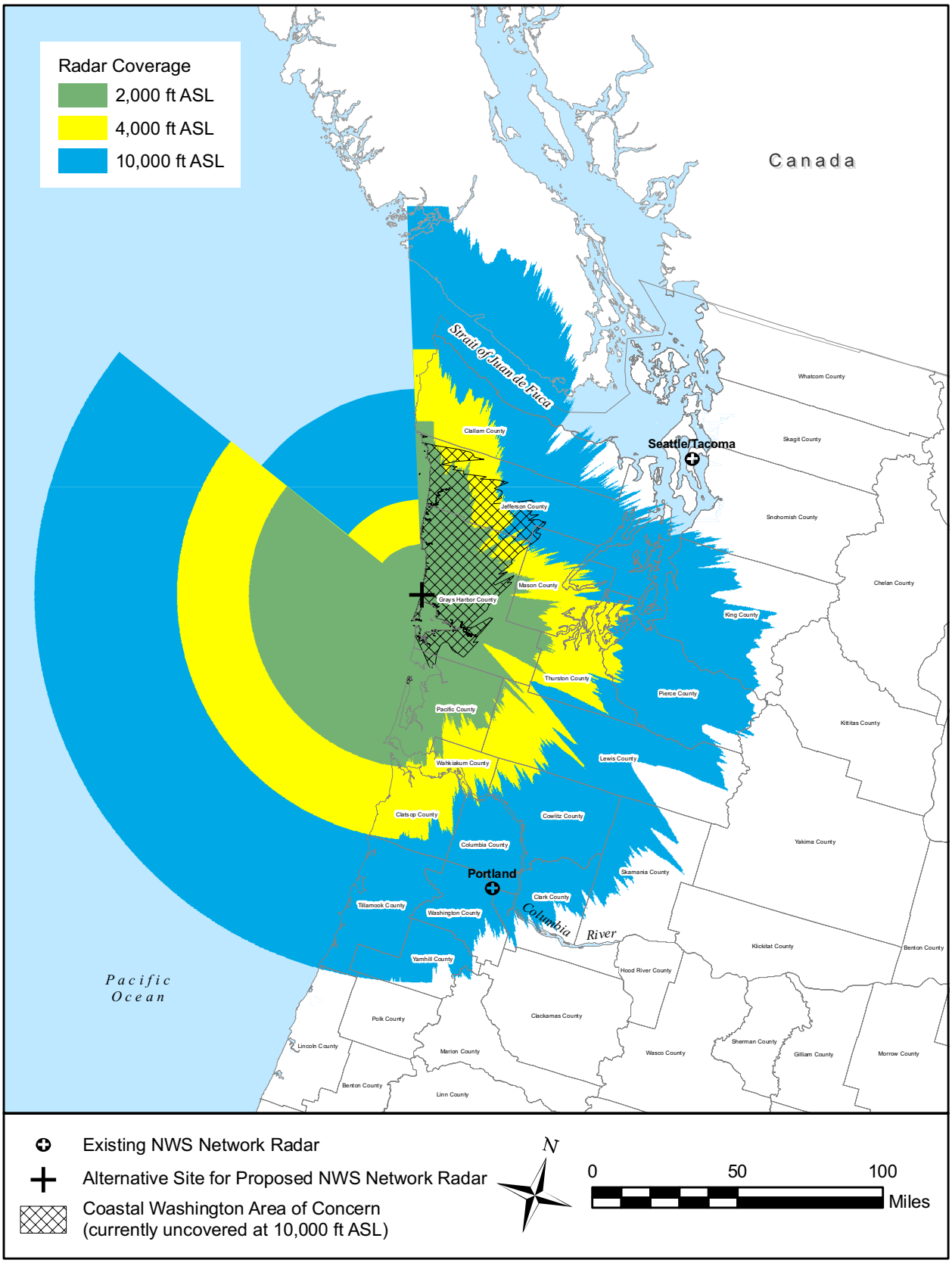

FIGURE 8(a) ESTIMATED RADAR COVERAGE AT 2,000, 4,000, AND 10,000 ft ABOVE SITE LEVEL FROM OCEAN CITY SITE (20 m TOWER)

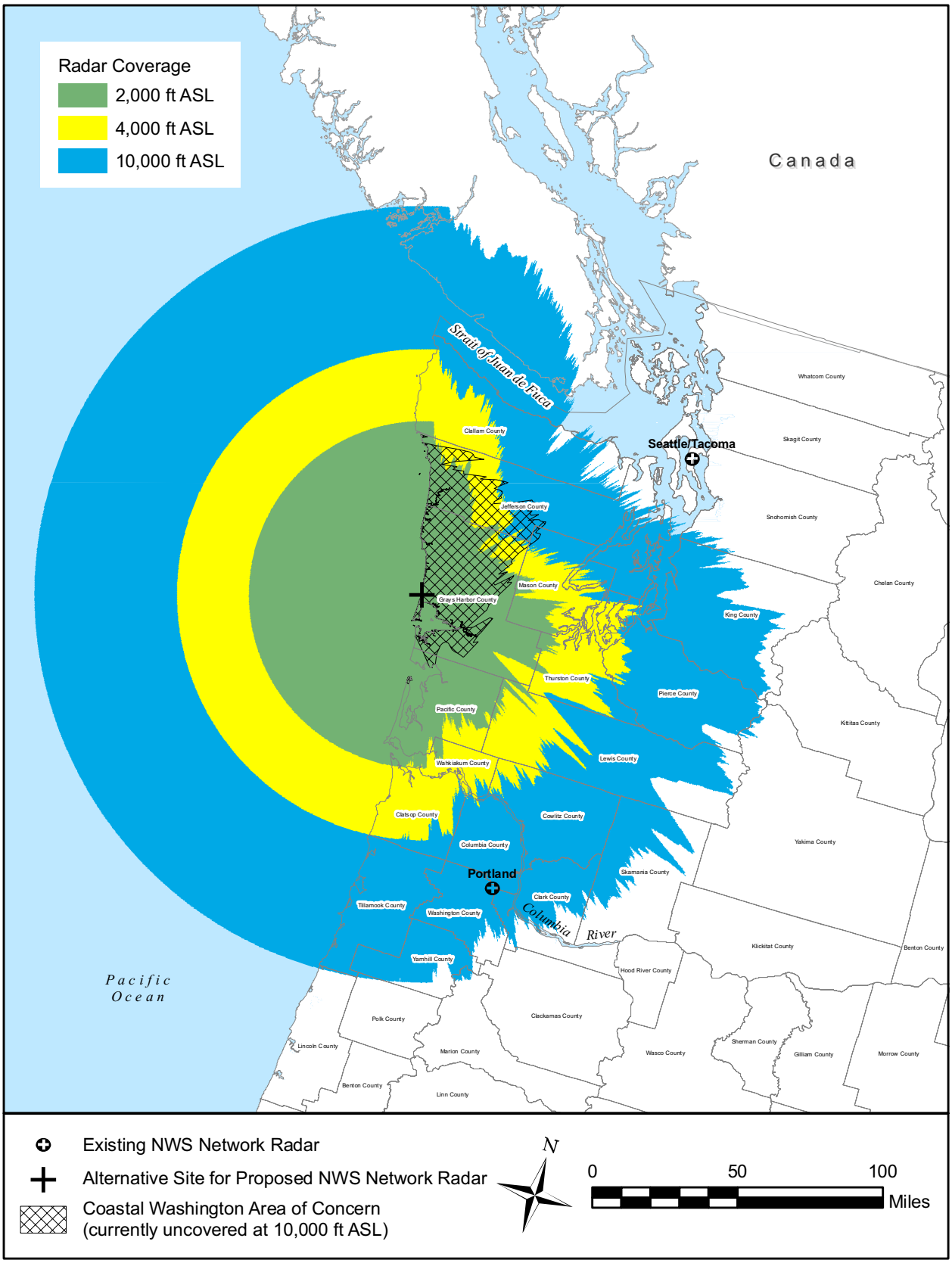

FIGURE 8(b) ESTIMATED RADAR COVERAGE AT 2,000, 4,000, AND 10,000 ft ABOVE SITE LEVEL FROM OCEAN CITY SITE (30 m TOWER)

The NOAA study included field measurements of the reflections from a vertical crane boom at various distances from the radar and modeling of the effects on the radar pattern. One situation studied was a an 18-inch by 23-inch steel lattice crane boom at a distance of 800 ft from the radar, which generated sidelobe returns of –22.5 to –22.3 decibels (dB). This is a very conservative estimate of the sidelobe returns that would result at Saddle Hill because the three towers are all larger than the crane boom and the solid monopoles would have greater reflectivity than a steel lattice. Additionally, the towers are closely grouped and would likely generate a large composite radar return. The distances from the radar for the test and the situation at Saddle Hill are very comparable at 800 ft versus 900 ft.

The NOAA study made the following recommendations with regard to a tower located in proximity to an NWS radar:

1. The nearby tower should be an open framework with minimal cross members.
2. The nearby tower should be located in the sector of least meteorological interest.
3. The minimum distance between the radar and nearby tower should be sufficient to lower higher order sidelobe returns to no greater than –30 dB, compared with the main beam.
4. In the sector of meteorological interest, intermediate sidelobe returns should be no greater than –25 dB [Sirmans, 1986].

The existing towers on Saddle Hill consist of a steel-lattice tower with a considerable number of cross members and solid monopoles. None of the three largest existing towers conform to recommendation 1 above. The existing towers would be located southwest of the NWS Network Radar in storm approach direction of meteorological concern, which does not conform to recommendation 2. The projected level of sidelobe returns from the existing towers would be at least –22.5 dB, which is far higher than the maximum recommended levels in recommendations 3 and 4. If located at Saddle Hill, the proposed NWS Network Radar would be subject to adverse effects on performance due to the nearby presence of existing communication towers.

The existing communication towers would also be a physical obstruction centered at azimuth 220 degrees, blocking the main beam of the NWS Network Radar. Each of the three towers would be a blocking structure with a width of 0.5 to 0.6 degree, when measured from the proposed radar site. Also, the three towers are tightly grouped within a 9 degree sector located southwest of the proposed radar site. The cumulative blockage resulting from these towers would be larger than the 0.5 to 0.6 degree blockage calculated for each individual tower.

Figures 9(a) and 9(b) show estimated radar coverage for a radar at the Saddle Hill Site, mounted on a 20 m and 30 m tower, respectively. These coverage estimates assume a minimum scan angle of 0.5 degree above horizontal (the minimum currently in use by NWS Network Radars). There would be minimal difference in coverage between use of a 20 m or 30 m tower at this site. A radar on a 20 m tower at this site would achieve 76.0% of theoretical maximum coverage (that is, coverage with no terrain, tree, or structural blockage) at 2,000 ft ASL, rising to 82.4% at 10,000 ft ASL. Most of the area of concern (that is, area not currently covered by NWS Network Radars at 10,000 ft ASL) would be covered at 2,000 ft ASL or less and the entire area of concern would be covered at 10,000 ft ASL or less. An NWS Network Radar mounted on a 20 m or 30 m

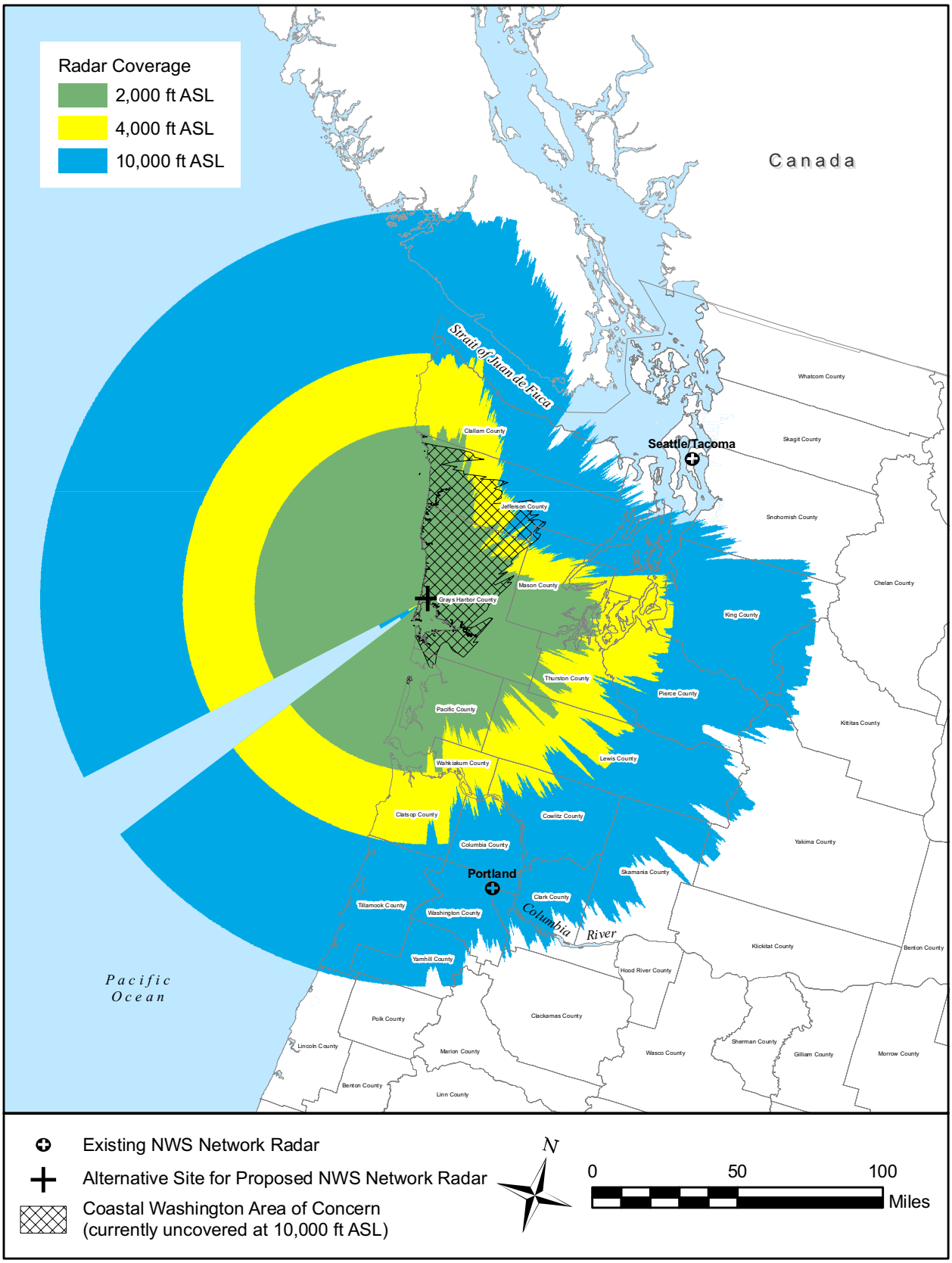

FIGURE 9(a) ESTIMATED RADAR COVERAGE AT 2,000, 4,000, AND 10,000 ft ABOVE SITE LEVEL FROM SADDLE HILL SITE (20 m TOWER)

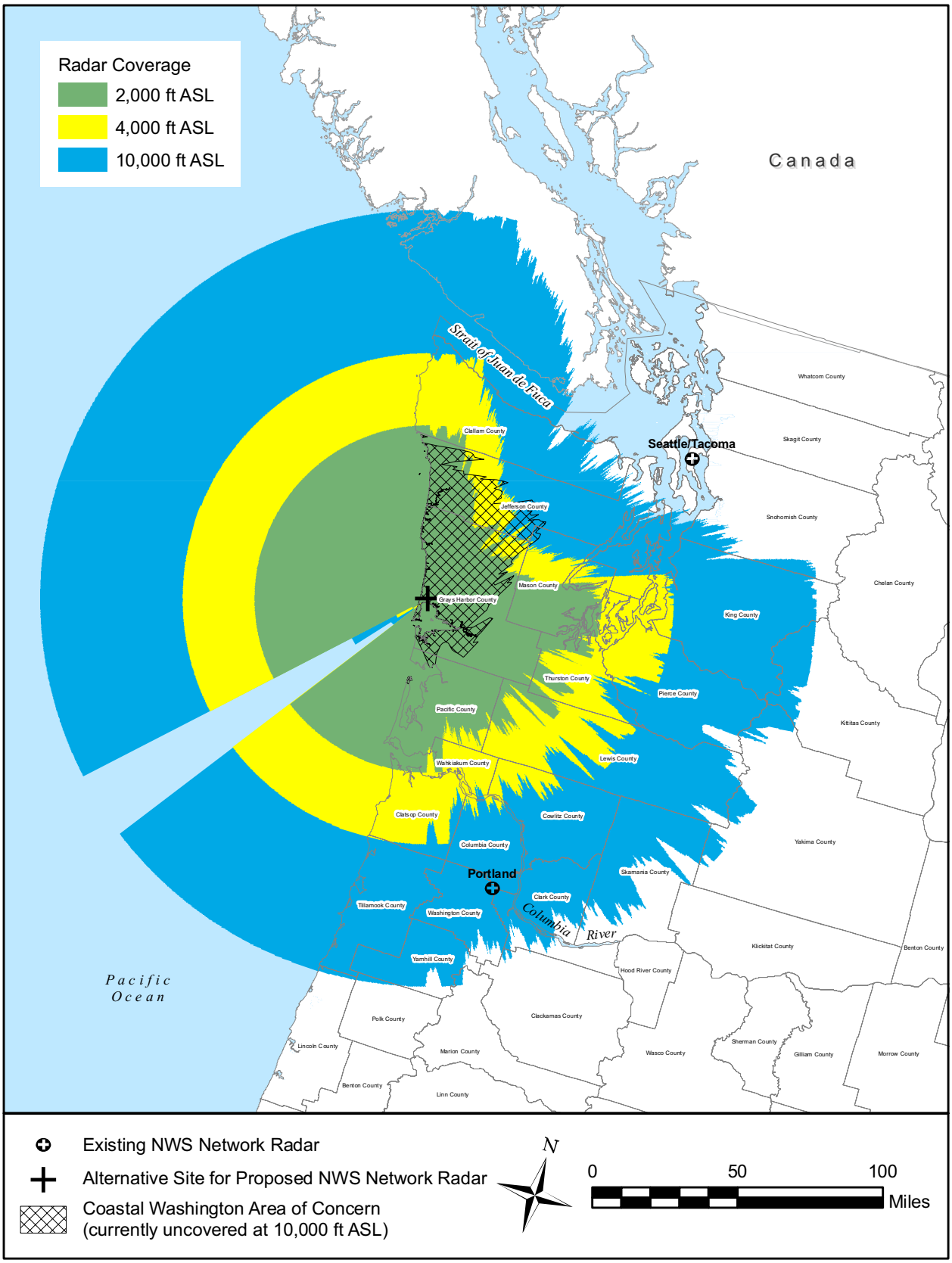

FIGURE 9(b) ESTIMATED RADAR COVERAGE AT 2,000, 4,000, AND 10,000 ft ABOVE SITE LEVEL FROM SADDLE HILL SITE (30 m TOWER)

tower at this site would meet siting criteria R1 through R4. Due to the expected obstruction from the cluster of nearby radio towers, criterion R5 would not be met.

3.5 WIND TURBINES

Wind turbines can adversely affect the performance of meteorological radars in the vicinity. These effects result when direct line of sight (LOS) exists between the wind turbine and the radar. Because both wind turbines and radars are commonly located on hill crests to avoid terrain shielding, LOS often occurs between wind turbines and radars, even when they are separated by relatively long distances. Potential effects of wind turbines on NWS Network Radars include degradation of reflectivity, velocity, and spectrum width radar products. A particular concern is the Doppler radar returns generated by the moving rotors of the wind turbine. Radar clutter filters are designed to cancel radar returns from stationary objects and are not effective when applied to moving objects that vary in speed of movement and times of operation, such as wind turbine rotors. Additionally, if the radar and wind turbine are located within 10 mi of one another and have LOS, the wind turbines can produce anomalous false echoes and the radar's electromagnetic emissions can impact unshielded electronics of the turbine. At closer distances, the wind turbine could affect formation of the radar's main beam [Crum, Ciardi, and Sandifer, 2008].

Based on communications with Grays Harbor PUD and visual inspection of the area, there are no existing wind turbines in close proximity to the proposed radar sites. Several small residential-scale wind turbines are located in Ocean Shores, but are mounted on towers with heights of approximately 35 ft AGL [Gray and Penttila, 2009]. Those wind turbines would be below the main beam of the proposed NWS Network Radar, if located at any of the three alternative sites, and would not affect operation of the radar.

Coastal Community Action proposed the installation of four commercial-scale wind turbines east of Grayland, Washington. The proposed wind turbines would have a maximum height to the tip of the rotor (when vertical) of approximately 394 ft (120 m) AGL and would be located at approximately 400 ft MSL [Gray, 2009]. Therefore, the maximum elevation of the turbine rotors would be roughly 800 ft MSL. Those wind turbines would be approximately 22.6 mi south of the Langley Hill Site, 20.0 mi south of the Ocean City Site, and 18.8 mi south of the Saddle Hill Site. At a distance of 20 mi, earth curvature is approximately 200 ft, reducing the apparent elevation of the turbines to approximately 600 ft, when viewed from the alternative radar sites. There is no intervening terrain that would provide shielding of the turbines. The proposed NWS Network Radar would have LOS to these proposed turbines, and the turbines would produce Doppler radar returns that would be received by the radar. This would be true if the NWS Network Radar is located at any of the three alternative sites. The power level of the return signals would decrease with distance. Because the Langley Hill Site is farthest from the proposed wind turbines, attenuation of the radar returns from the wind turbines would be greatest for radar located at the Langley Hill Site, as compared with a radar located at the Ocean City or Saddle Hill Sites. Thus, there is potential for Doppler returns from the wind turbines to degrade radar performance in the direction of the wind turbines. This is true for all three alternative sites and the Langley Hill Site is marginally superior to the other two alternative sites in that regard. Because all three sites are over 10 mi from the location of the proposed wind turbines,

anomalous false echoes, interference with formation of the radar main beam, or electromagnetic impacts to turbine electronics are not expected.

3.6 COMPARISON OF COVERAGE PROVIDED BY EACH SITE

Figures 10, 11, and 12 show the estimated radar coverage at 2,000 ft ASL, 4,000 ft ASL, and 10,000 ft ASL, respectively, for an NWS Network Radar mounted on a 30 m tower located at all alternative sites. Although a 20 m tower is feasible at the Saddle Hill Site, the difference in coverage between a 20 m tower and 30 m tower at that site would be negligible; therefore, analyzing coverage for a 30 m tower at each of the alternative sites is appropriate. Table 1 shows the area of coverage in square miles and accounts for terrain, tree, and structural blockages.

As shown in Figures 10, 11, and 12, the Langley Hill and Ocean City Sites would initially provide very similar radar coverage. However, a radar at the Ocean City Site would have greater risk of blockage caused by future tree growth. Mitigation of this risk would require trimming/removal of a number of trees on parcels owned by several parties, complicating the process of trimming/removing the blocking trees. A radar at the Saddle Hill Site would cover larger areas at 2,000, 4,000, and 10,000 ft ASL than a radar at either the Langley Hill or Ocean City Sites, but would be subject to blockage to the southwest (a key weather approach direction) due to the existing nearby radio towers.

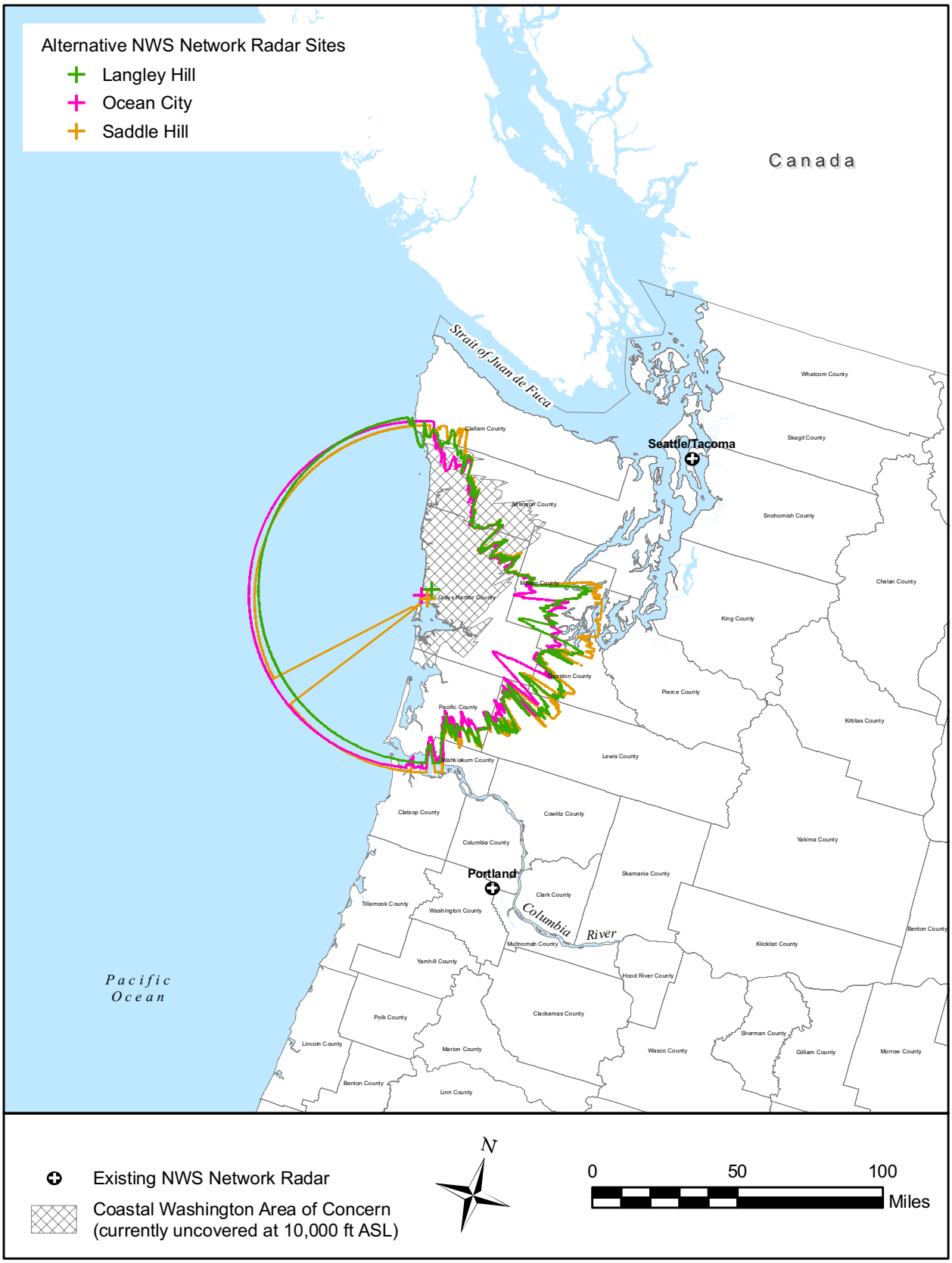

FIGURE 10 ESTIMATED RADAR COVERAGE AT 2,000 ft ABOVE SITE LEVEL FROM ALTERNATIVE NWS NETWORK RADAR SITES (30 m TOWER)

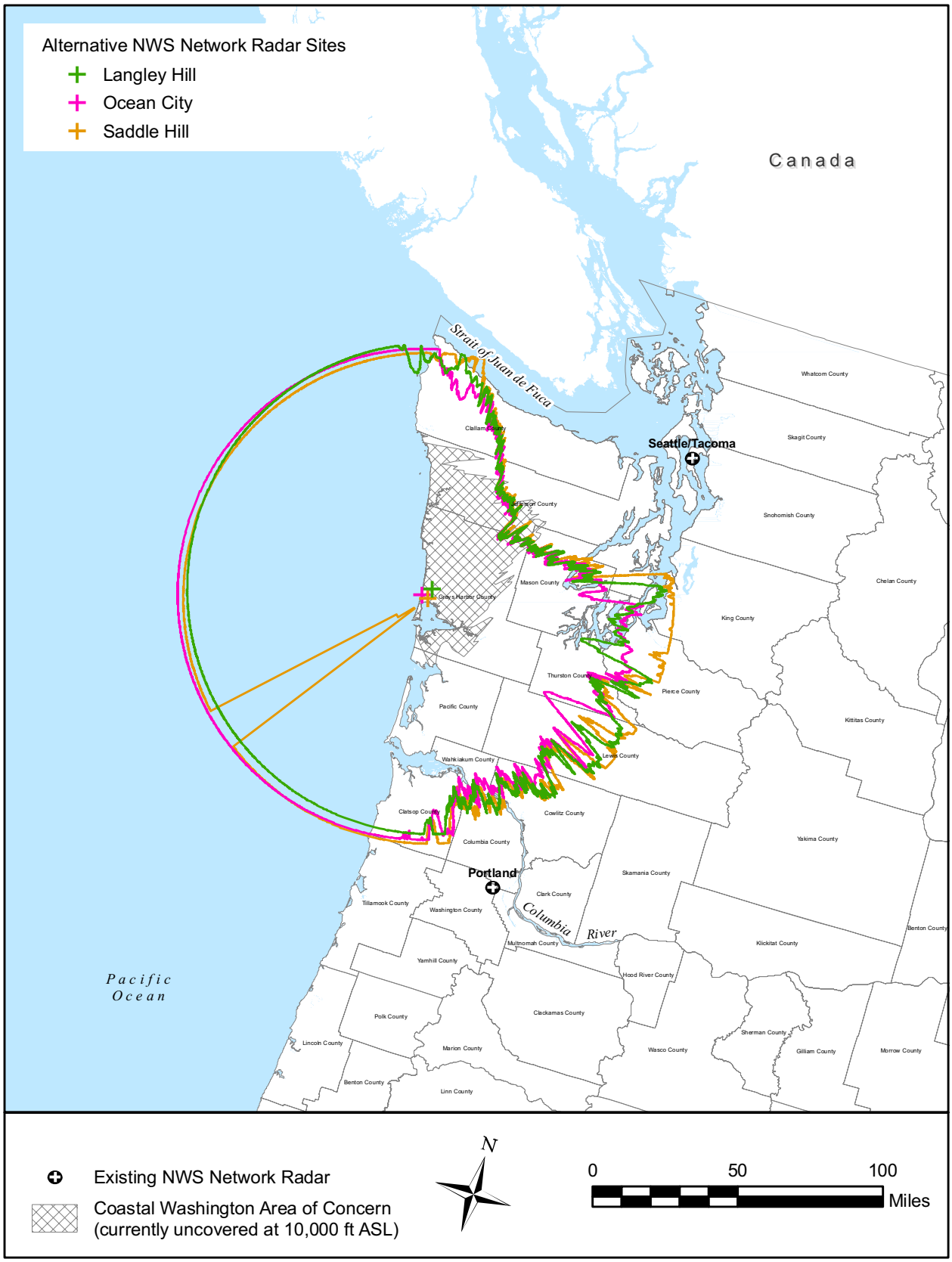

FIGURE 11 ESTIMATED RADAR COVERAGE AT 4,000 ft ABOVE SITE LEVEL FROM ALTERNATIVE NWS NETWORK RADAR SITES (30 m TOWER)

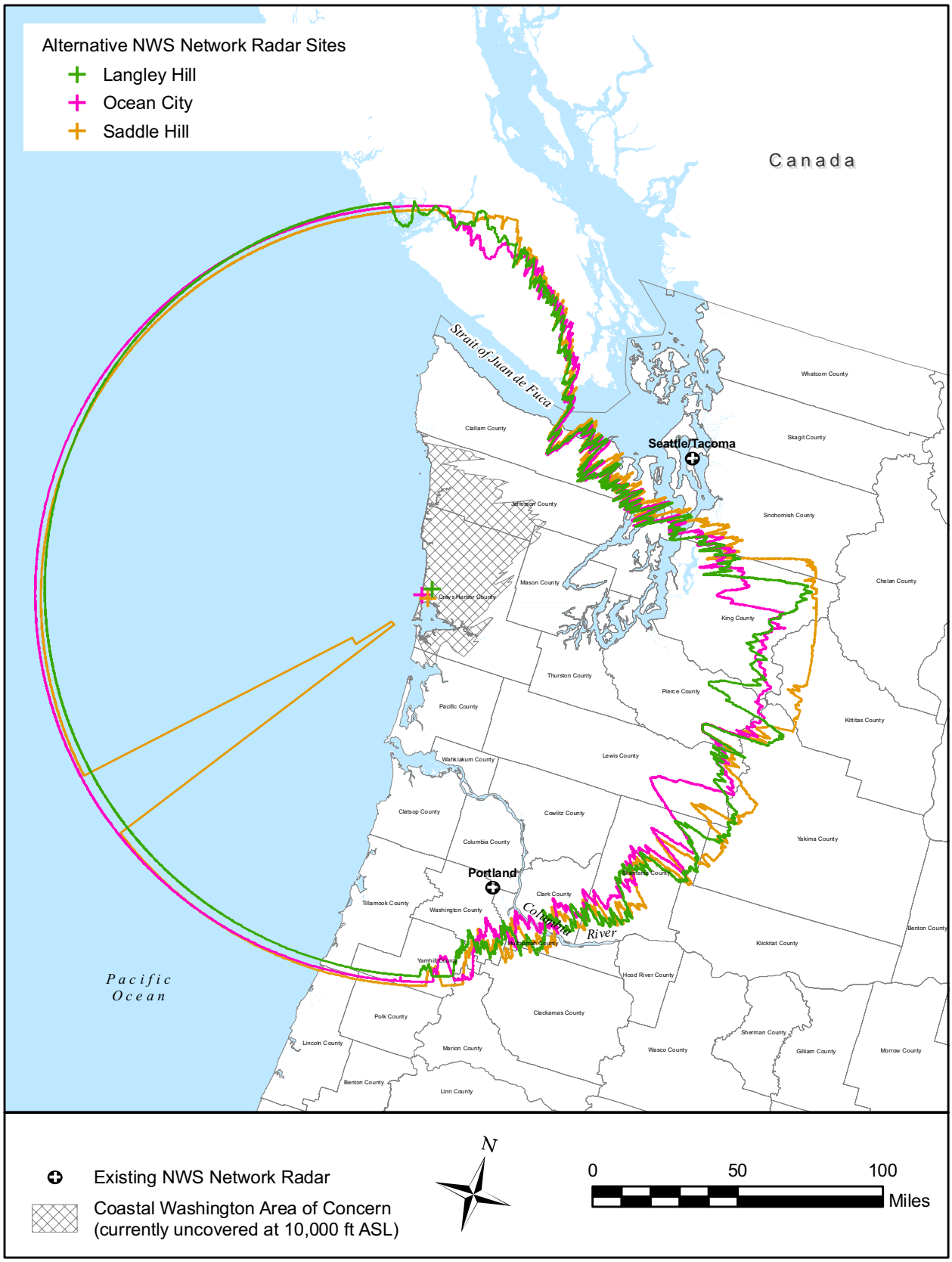

FIGURE 12 ESTIMATED RADAR COVERAGE AT 10,000 ft ABOVE SITE LEVEL FROM ALTERNATIVE NWS NETWORK RADAR SITES (30 m TOWER)

Table 1. Coverage Area in Square Miles by Site and Tower Height

Site Name	Tower height (m)	Altitude (ft ASL)	Coverage Area (sq mi)	% of Theoretical Maximum Coverage
Langley Hill	30	2,000	9,419	73.6
		4,000	19,669	76.8
		10,000	52,420	81.9
Ocean City	20*	2,000	7,739	60.4
		4,000	16,507	64.5
		10,000	45,990	71.8
Ocean City	30	2,000	9,440	73.7
		4,000	19,659	76.8
		10,000	52,651	82.3
Saddle Hill	20**	2,000	9,732	76.0
		4,000	20,051	78.3
		10,000	52,747	82.4
Saddle Hill	30**	2,000	9,797	76.5
		4,000	20,157	78.7
		10,000	52,936	82.7

* Coverage to northwest would be reduced by tree blockage.

** Coverage to southwest would be reduced by radio tower blockage.

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4 RADAR TOWER HEIGHT

4.1 LANGLEY HILL SITE

This site is located in the interior of a privately owned wooded property managed for timber production. The proposed radar site, construction staging area, access drive, and utility corridor are all located within the same parcel, which was clear cut in 1986. The forest has regrown since the 1986 timber harvest. The property contains a dense immature Western hemlock and spruce forest with substantial undergrowth. Tree heights were measured at 60 to 65 ft AGL on November 3, 2009. The landowner states that the forest at the property will be harvested at an age of 35 years, which would occur during the year 2021. At that time, tree heights will range up to 90 to 100 ft AGL. To clear nearby trees at their maximum expected height, the radar would have to be mounted on a maximum height radar tower of 30 m. This would place the center of antenna at 114 ft AGL, which would be sufficient to prevent blockage by nearby trees.

4.2 OCEAN CITY SITE

The Ocean City Site is located in a mowed grass field. Trees in the vicinity are mostly deciduous trees of modest height. However, a small stand of Western hemlock and spruce is located to the northwest of the proposed site at a distance of approximately 150 ft. The tallest trees in that stand are spruce trees, with a height of up to 85 ft measured on November 4, 2009. These trees will be expected to grow taller during the 20-year design life of the proposed radar. Thus, a 30 m radar tower will be required, unless the trees to the northwest are trimmed or removed. However, even if the radar antenna is mounted on a 30 m tower, nearby trees could grow tall enough during the radar lifespan to block the radar signal. If those trees are trimmed or removed, a 20 m tower would be sufficient.

4.3 SADDLE HILL SITE

The property containing the Saddle Hill Site was recently clear cut, and is vegetated mostly with low shrubs and small trees less than 20 ft AGL. A few taller trees reaching up to 50 ft in height were not cut and remain on the property, including a small stand of spruce trees located east and southeast of the proposed radar site. Additionally, the knoll containing the existing radio towers on Saddle Hill, located approximately 900 ft southwest of the proposed radar site, is approximately 20 ft higher in elevation than the site. The proposed radar antenna would have to be higher in elevation than that knoll and the equipment buildings located on it. Thus, a 20 m or taller tower would be required. Table 1 (in Section 3.6) shows that there would be negligible difference in overall coverage between a 20 m and 30 m tower. Neither a 20 m nor a 30 m tower would clear the existing radio towers to the southwest and blockage by those towers is unavoidable.

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5 FREQUENCY ASSIGNMENT

Each NWS Network Radar transmits a radio signal and is assigned an operating frequency to minimize the potential for mutual electromagnetic interference (EMI) with other radio transmitters in the area. Typically, the operating frequency of the NWS Network Radar is between 2,700 and 2,900 megahertz (MHz), except in rare circumstances where that band is congested, in which case the NWS may consider an operating frequency between 2,900 and 3,000 MHz. The National Telecommunications and Information Administration (NTIA) regulates the allowable uses of the radio spectrum. The 2,700 to 2,900 frequency band is reserved for use by government radio location equipment, including NWS Network Radars [NTIA, 2009]. NWS will select an operating frequency for the NWS Network Radar to serve Coastal Washington and submit an application to the Federal Interagency Radio Advisory Committee for approval of those frequencies.

NWS uses the following criteria for selection of an operating frequency for proposed NWS Network Radars:

1. If the NWS Network Radar is replacing an existing radar and would be located within 2 nautical miles (nmi) of the radar to be replaced, the current operating frequency is retained, provided that no EMI problems have occurred.
2. If the NWS Network Radar is replacing an existing radar and would be located greater than 2 nmi but less than 25 nmi from the radar to be replaced, analysis is performed using the Government Master File (GMF) to determine if the current operating frequency can be retained.
3. For sites served by an existing WSR-74C radar (or no radar at all), analysis is performed using the GMF to identify an open frequency band.
4. All frequency assignment recommendations are in the 2,700 to 2,900 MHz band if possible; operating frequencies in the 2,900 to 3,000 MHz band are considered only if analysis shows that all frequencies in the 2,700 to 2,900 MHz band would result in EMI.
5. Special consideration is given to selection of a frequency assignment that would minimize third harmonic receptions by the National Radio Astronomy Observatory (NRAO) Very Large Array and Very Large Baseline Array.
6. Special consideration is given to selection of a frequency assignment that would not trigger the United States (U.S.) Coast Guard (USCG) radar transponder beacon (RACON) when located within 100 nmi.
7. Adjoining NWS Network Radars are given different frequency assignments.

The proposed NWS Network Radar to serve Coastal Washington would be a new unit added to the NWS Network and would not replace an existing radar; therefore criteria 1 and 2 are not applicable.

Criterion 3 is applicable. Alion Technology and Science, Inc. performed a search of the GMF for approved transmitters operating within the 2,650 to 3,050 MHz band and located within 150 mi of the three alternative sites for the NWS Network Radar. The GMF covers both government and

privately owned radio transmitters. A total of 140 separate transmitters were identified in the search area. Most of these transmitters are located in the Seattle, Washington, and Portland, Oregon, metropolitan areas. Due to intervening terrain (that is, Olympic Mountains, Willapa Hills, and Black Hills) and the distance of those transmitters from the alternative sites under consideration for the NWS Network Radar, the transmitters in these two metropolitan areas would not have LOS to the proposed NWS Network Radar unless at very high elevation or mounted on a very tall tower. Obstruction of the radio transmissions by topography results in significant attenuation of the power level of the signal, greatly reducing the potential for EMI. Transmitting antennas located at elevations greater than 600 ft MSL in the Seattle or Portland Metropolitan area, transmitting antennas located west of longitude 123° west and south of latitude 48° north, and USCG RACON beacons located in the Pacific Ocean are of concern and warrant additional consideration. Table 2 lists these transmitters of concern.

Table 2. Transmitters of Concern with Operating Frequencies between 2,650 and 3,050 MHz Listed on the GMF

Transmitting Antenna	Location	Distance from Proposed Radar Sites (miles)	Operating Frequency (MHz)	LOS to Proposed Radar Sites
USCG RACON	Pacific Ocean at entrance to Grays Harbor	15 to 20	2,900 to 3,100	Yes
USCG RACON	Pacific Ocean at entrance to Columbia River	59 to 64	2,900 to 3,100	No
USAF AN/TPS 75	Camp Rilea, Oregon	65 to 69	2,900 to 3,100	No
State of Oregon	Astoria, Oregon	61 to 65	2,900 to 3,100	No
USCG RACON	Pacific Ocean at entrance to Strait of Juan de Fuca	104 to 109	2,900 to 3,100	No
NWS Network Radar serving Portland, Oregon, area	Washington County, Oregon	108 to 111	2,870	No
NWS Network Radar serving Seattle Washington, area	Camano Island, Washington	106 to 110	2,740	No
FAA ASR-9	Newburg, Oregon	135 to 138	2,705 and 2,780	No
Navico NW, Inc. (Call Sign WQEJ480)	Lynnwood, Washington	99 to 101	2,900 to 3,100	No
AN/GPN 30	Mt. Ozzard, BC, Canada	143 to 146	2,880	No

Criterion 4 would be met as the 2,700 to 2,900 MHz band has open frequencies in this area. There are no transmitters of concern listed on the GMF with operating frequencies between 2,780 and 2,870 MHz.

Criterion 5 addresses concerns about EMI with NRAO facilities. NRAO operates in the 2,655 to 2,700 MHz band, which is adjacent to the lower boundary of the 2,700 to 2,900 MHz band used by NWS Network Radars. The Department of Defense Electromagnetic Compatibility Analysis Center performed a study of possible EMI interactions between WSR-88D radars and NRAO facilities [Jones, 1993]. That study evaluated the potential for adjacent band interference, third harmonic interference to NRAO radio telescopes, and radio telescope receiver gain compression. The study found that EMI with radio telescopes could result if the proposed NWS radar is located within 200 mi of an NRAO observatory, particularly if there is LOS between the radar antenna and the radio observatory. The nearest NRAO radio telescope is located at Brewster, Washington, approximately 220 mi east–northeast of the proposed sites for the NWS Network Radar, and the Cascade Mountains provide terrain shielding of the radio telescope. The proposed NWS Network Radar would not be expected to cause EMI with NRAO radio telescopes. A frequency assignment above 2,750 MHz would result in substantial frequency separation and provide an additional margin of safety for adjacent band effects.

Criterion 6 addresses possible EMI with USCG RACON beacons. RACON beacons are located at the entrances to the Strait of Juan de Fuca, Grays Harbor, and the Columbia River. The beacons operate in the 2,900 to 3,100 MHz band. Because frequencies in the 2,700 to 2,900 band are open, the proposed NWS Network Radar would not have a frequency assignment above 2,900 MHz.

Criterion 7 takes into account the operating frequencies used by adjoining NWS Network Radars when selecting an operating frequency for a newly installed radar. The existing NWS Network Radars adjoining the proposed radar are shown in Table 3.

Table 3. NWS Network Radars that Would Adjoin the Radar to Serve Coastal Washington

Service Area	Latitude [NAD 83]	Longitude [NAD 83]	Location	Operating Frequency (MHz)
Portland, Oregon	45° 42' 54" N	122° 57' 45" W	Washington County, Oregon	2,870
Seattle, Washington	48° 11' 41" N	122° 29' 45" W	Camano Island, Island County, Washington	2,740

Based on the information presented above, NWS tentatively selected a frequency assignment of 2,715 MHz to provide frequency separation from adjoining NWS Network Radars and minimize the potential for EMI with licensed transmitters and NRAO radio telescopes. NWS submitted this proposed frequency to the FAA. The FAA responded that this operating frequency has the potential to cause electromagnetic concerns with a U.S. Navy radar located at Whidbey Island; therefore, sector blanking of the NWS Network Radar between azimuths 32 and 43 would be necessary (see FAA Aeronautical Study Numbers 2009-ANM-2331-OE, 2009-ANM-2332-OE,

and 2009-ANM-2333-OE and FAA determination letters dated April 23, 2010 in Appendix A). NWS considered the FAA response and adjusted the frequency assignment to 2,836 MHz. NWS submitted new filings with this frequency to the FAA (see FAA Aeronautical Study Numbers 2010-ANM-1137-OE, 2010-ANM-1138-OE, and 2010-ANM-1139-OE in Appendix A). NWS received approval from the FAA for the frequency assignment of 2,836 MHZ (see FAA determination letters dated June 3, 2010 and June 4, 2010 in Appendix A). The frequency assignment of 2,836 MHz would not result in EMI with other known radio users and is recommended for this NWS Network Radar.

6 FEDERAL AVIATION ADMINISTRATION AIR SPACE COMPLIANCE

6.1 FEDERAL AVIATION REGULATION AT 14 CFR PART 77

Federal Aviation Regulation (FAR) Code of Federal Regulations (CFR) 77.13 requires that the FAA approve all structures exceeding specified heights prior to construction or alteration to ensure that the structure would not be a hazard to aviation [FAA, 1999a]. Filing of FAA Form 7460-1 is required for any construction penetrating a 100:1 (horizontal:vertical) surface extending 20,000 ft from the nearest point for a horizontal distance of 20,000 ft from the nearest point of the nearest runway for any airport with at least one runway more than 3,200 ft in actual length. All three of the alternative sites for the proposed NWS Network Radar meet these distance requirements; therefore, the NWS is required to complete Form 7460-1 and submit it to the FAA for each site. The analyses below are prepared for a 30 m tower at each site.

6.2 LANGLEY HILL SITE

The Langley Hill Site is approximately 19,600 ft east–southeast of the Copalis State Airport. The Airport Reference Point (ARP) for Copalis State Airport is at elevation 1 ft MSL. The controlling airspace surface at the Langley Hill Site is 462.8 ft MSL based on FAR Part 77, Section 77.23(a)(2) [FAA, 1999b]. If mounted on a 30 m tower and including a grade level increase of 5 ft, the NWS Network Radar at the Langley Hill Site would have a height to the top of the lightning rod of 140.2 ft AGL, or 380.2 ft MSL. Therefore, the top of the structure would be 82.6 ft below the controlling surface and would not be an obstruction to aviation (see Figure 13[a]). If the NWS Network Radar is mounted on a 20 m tower, the top of the structure would be 115.4 ft below the controlling surface. The FAA determined that an NWS Network Radar mounted on a 30 m tower at this site would not be a hazard to air navigation (see FAA determination letter dated June 3, 2010 in Appendix A).

6.3 OCEAN CITY SITE

The Ocean City Site is located in proximity to both Hogan's Corner and Copalis State Airports. The Ocean City Site is approximately 12,400 ft north–northwest of the Hogan's Corner Airport ARP, which is at elevation of 50 ft MSL. The controlling airspace surface at the Ocean City Site is 250 ft MSL based on FAR Part 77, Section 77.23(a)(2) [FAA, 1999b]. If mounted on a 30 m tower and including a grade level increase of 5 ft, the NWS Network Radar at the Ocean City Site would have a height to the top of the lightning rod of 140.2 ft (160.2 ft MSL). Therefore, the top of the structure would be 89.8 ft below the Hogan's Corner Airport controlling surface (see Figure 13[b]). If the NWS Network Radar is mounted on a 20 m tower, the top of the structure would be 122.6 ft below the controlling surface.

The Ocean City Site is approximately 19,300 ft south–southeast of the Copalis State Airport ARP. The controlling airspace surface at the Ocean City Site is 237.8 ft MSL based on FAR Part 77, Section 77.23(a)(2) [FAA, 1999b]. If mounted on a 30 m tower and including a grade level increase of 5 ft, the NWS Network Radar at the Ocean City Site would have a height to the top of the lightning rod of 140.2 ft AGL, or 160.2 ft MSL. Therefore, the top of the structure would be 77.6 ft below the Copalis State Airport controlling surface (see Figure 13[c]). If the NWS Network Radar is mounted on a 20 m tower, the top of the structure would be 110.4 ft below the

controlling surface. Considering both airports, the NWS Network Radar located at the Ocean City Site would not be an obstruction to aviation. The FAA determined that an NWS Network Radar mounted on a 30 m tower at this site would not be a hazard to air navigation (see FAA determination letter dated June 4, 2010 in Appendix A).

6.4 SADDLE HILL SITE

The Saddle Hill Site is approximately 11,300 ft northeast of the Hogan's Corner Airport ARP. The controlling airspace surface at the Saddle Hill Site is 420 ft MSL based on FAR Part 77, Section 77.23(a)(2) [FAA, 1999b]. If mounted on a 30 m tower and including a grade level increase of 5 ft, the NWS Network Radar at the Saddle Hill Site would have a height to the top of the lightning rod of 140.2 ft (360.2 ft MSL). Therefore, the top of the structure would be 59.8 ft below the Hogan's Corner Airport controlling surface and would not be an obstruction to aviation (see Figure 13[d]). If the NWS Network Radar is mounted on a 20 m tower, the top of the structure would be 92.6 ft below the controlling surface. The FAA determined that an NWS Network Radar mounted on a 30 m (or shorter) tower at this site would not be a hazard to air navigation (see FAA determination letter dated June 3, 2010 in Appendix A).

6.5 FAA FORM 7460-1

Filing of FAA Form 7460-1 is required for proposed construction of an NWS Network Radar at each of the three alternative sites. NWS has completed this form for each of the three alternative sites and filed them with the FAA (see FAA Aeronautical Study Numbers 2010-ANM-1137-OE, 2010-ANM-1138-OE, and 2010-ANM-1139-OE in Appendix A). The FAA determined that the proposed radar towers at each of the three sites would not be a hazard to air navigation. No marking or lighting of the NWS Network Radar tower is required (see FAA determination letters dated June 3, 2010 and June 4, 2010 in Appendix A). Filing of FAA Form 7460-2 (Notice of Actual Construction or Alteration) is required within 5 days after the construction reaches its greatest height at any of the three alternative sites (see blank 7460-2 Supplemental Notice form in Appendix A).

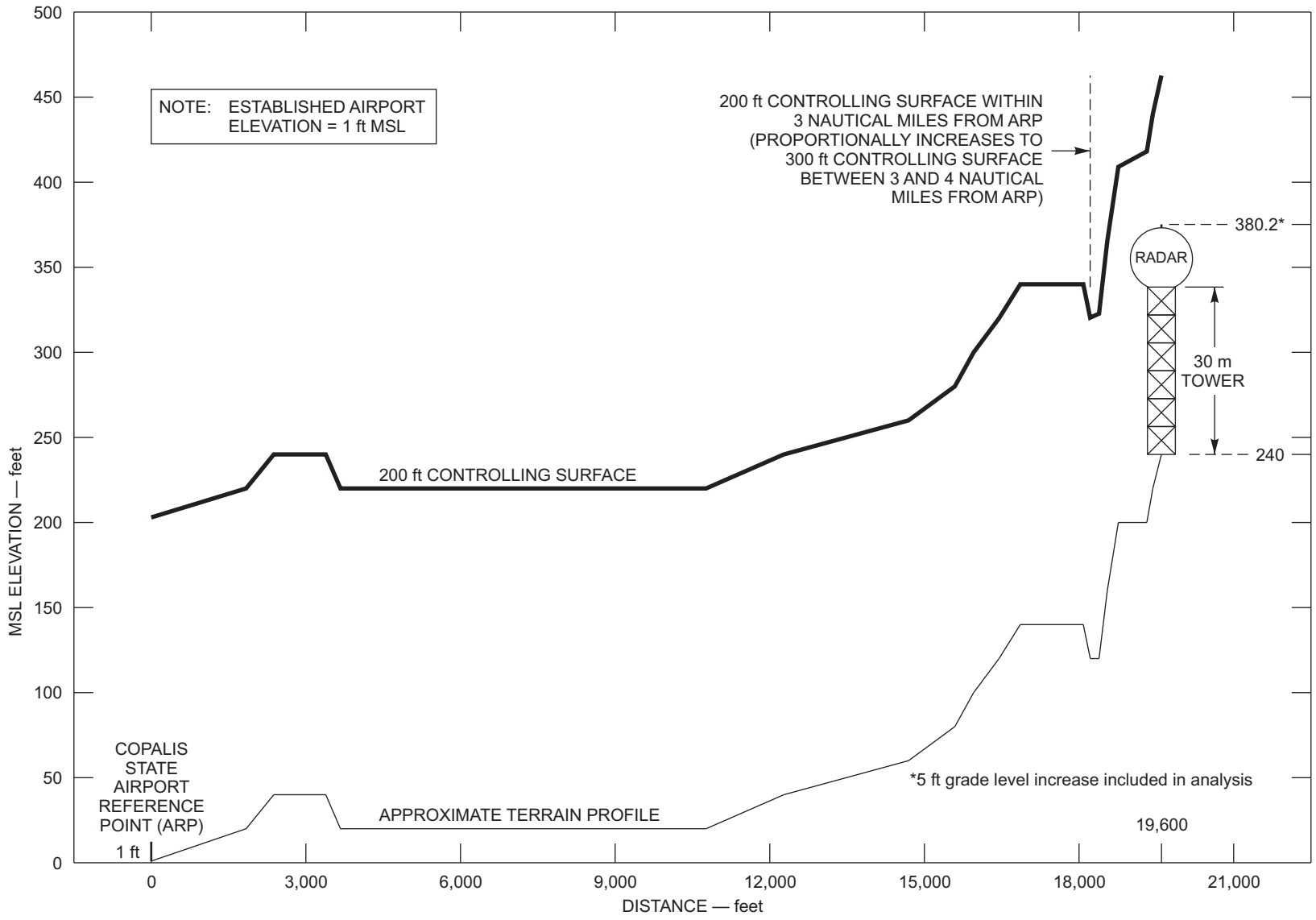


FIGURE 13(a) FAR, 14 CFR PART 77.23(a)(2) STANDARDS FOR DETERMING OBSTRUCTIONS ANALYSIS FOR COPALIS STATE AIRPORT — LANGLEY HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

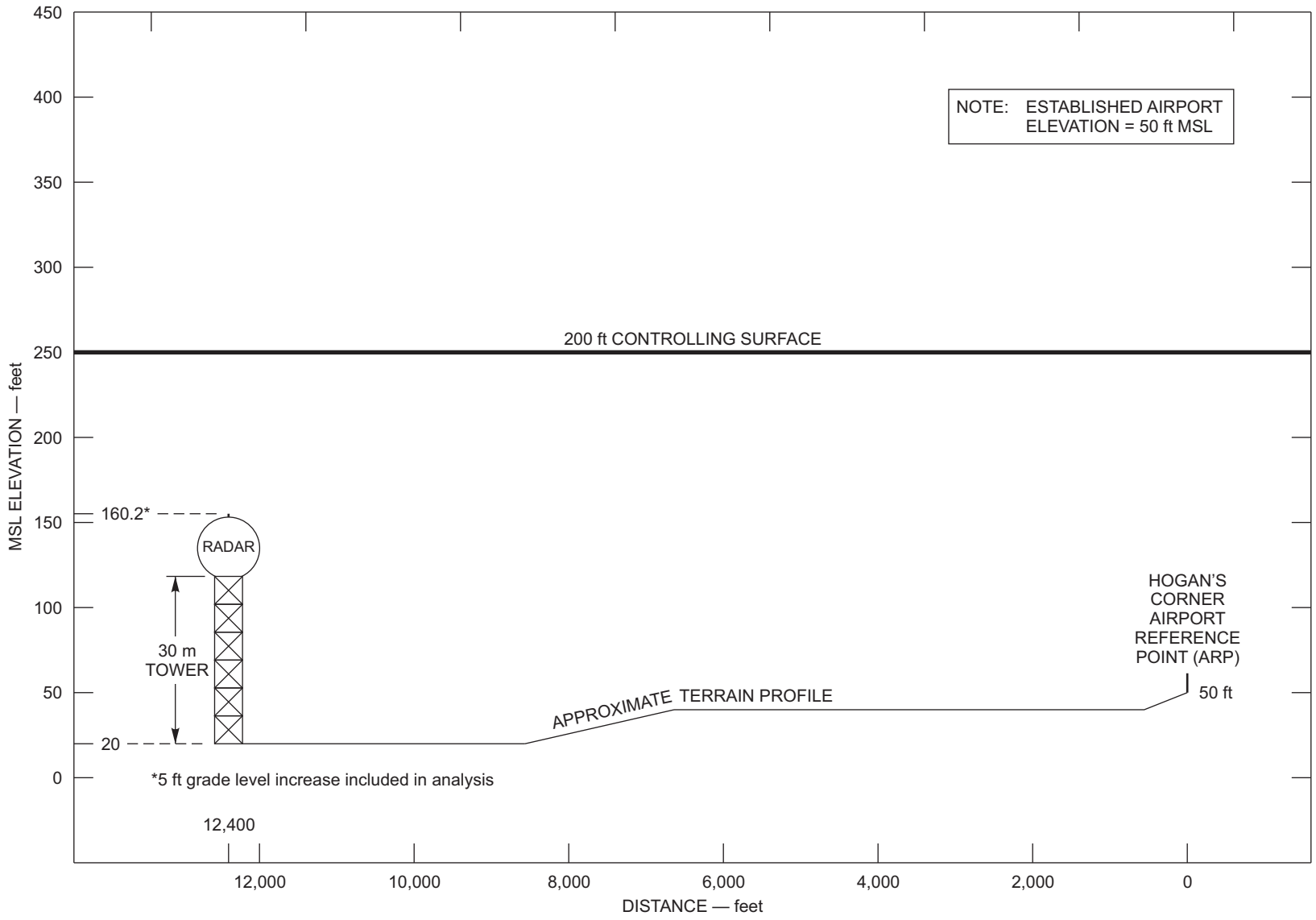


FIGURE 13(b) FAR, 14 CFR PART 77.23(a)(2) STANDARDS FOR DETERMING OBSTRUCTIONS ANALYSIS FOR HOGAN'S CORNER AIRPORT — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

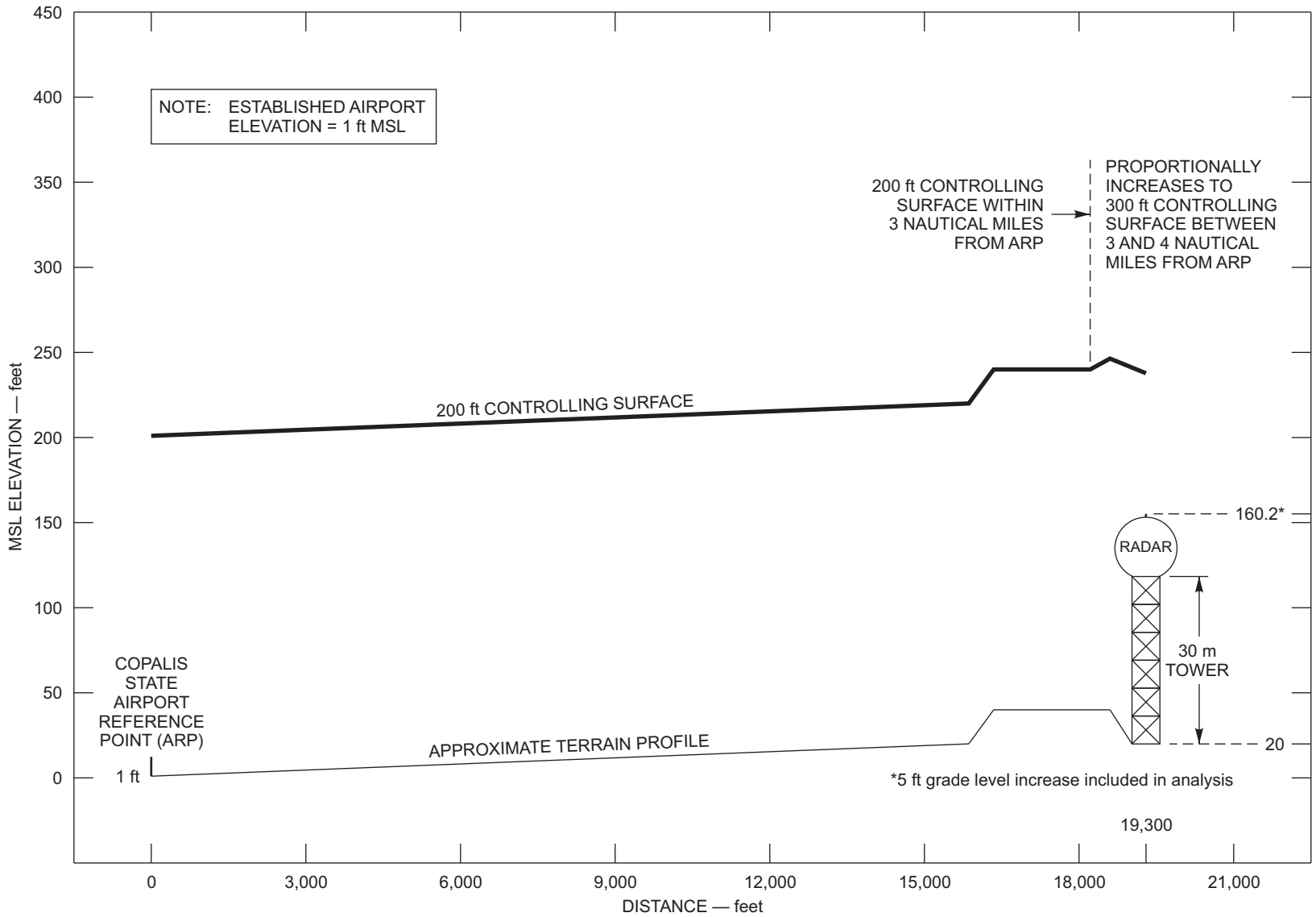


FIGURE 13(c) FAR, 14 CFR PART 77.23(a)(2) STANDARDS FOR DETERMING OBSTRUCTIONS ANALYSIS FOR COPALIS STATE AIRPORT — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

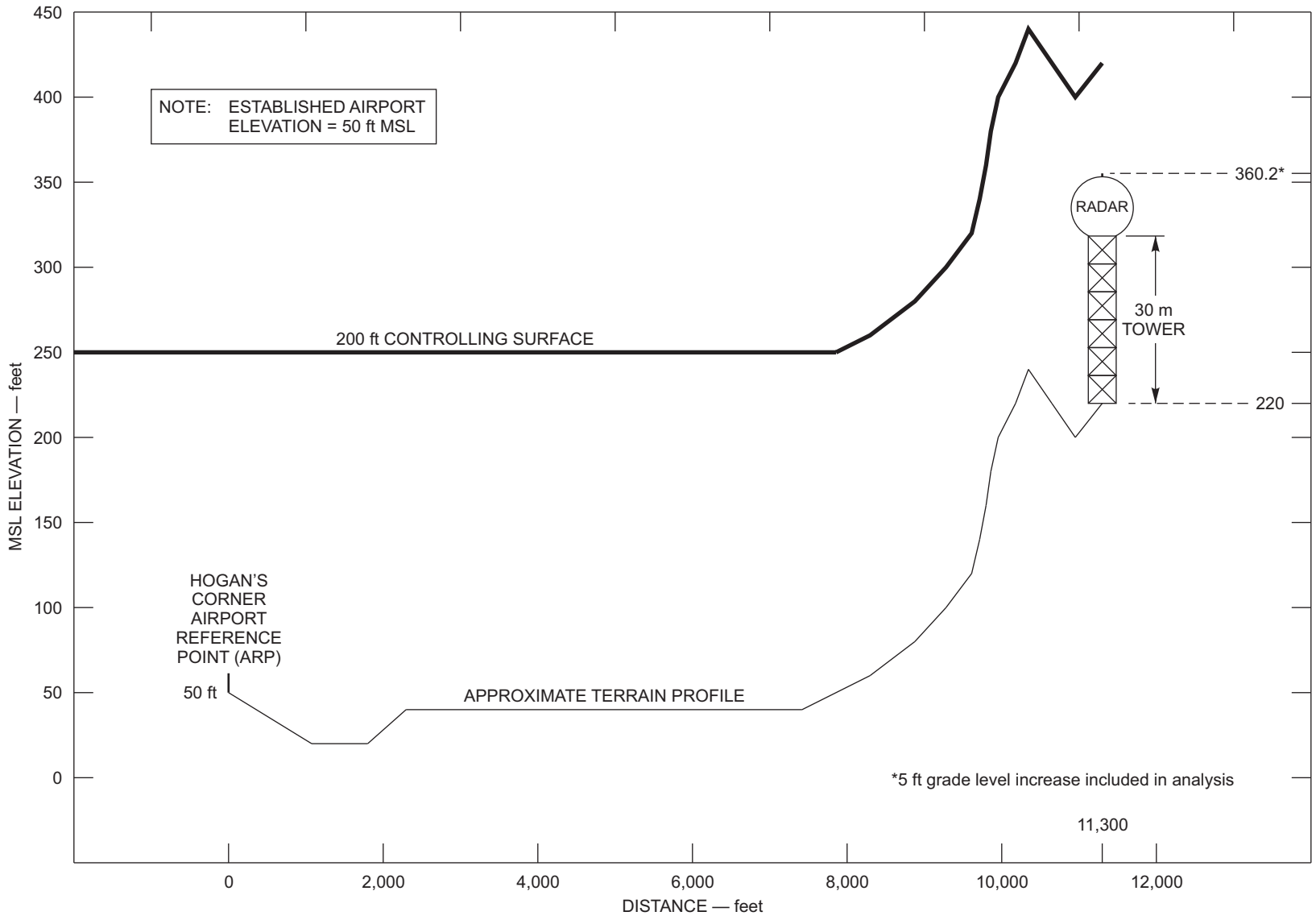


FIGURE 13(d) FAR, 14 CFR PART 77.23(a)(2) STANDARDS FOR DETERMING OBSTRUCTIONS ANALYSIS FOR HOGAN'S CORNER AIRPORT — SADDLE HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

7 ENVIRONMENTAL ASSESSMENT

7.1 PURPOSE AND NEED

The NWS is the nation's premiere meteorological forecasting organization. The agency's official mission is as follows:

> The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community [NWS, 2009].

The NWS operates a nationwide network of Doppler weather radars, which collect data on atmospheric conditions, and include precipitation type and intensity, wind speed and direction, and storms, from near ground level to above 10,000 ft in elevation above the ground. NWS staff use these data to prepare daily forecasts and issue severe weather watches and warnings. However, the effective range of these radars is limited to approximately 230 mi. Additionally, the elevation above the ground at which these radars can collect data increases with increasing distance from the radar due to earth curvature and blockage of the radar beam by topography. Existing NWS radars are located near Seattle, Washington, and Portland, Oregon. Due to the limitations described above, they provide only partial coverage of the Coastal Washington Area. In fact, approximately 1,990 sq mi of Washington State and a large section of the adjoining Pacific Ocean receive no radar coverage at elevations below 10,000 ft AGL. This lack of Doppler radar data hinders the ability of NWS to determine the intensity of storms approaching Washington from the Pacific Ocean and to quantify the expected amount of precipitation that occurs over hillsides and mountain slopes of the area. That information is crucial to the accurate prediction of potential flooding by rivers and streams of the area.

To rectify this situation, NOAA and the Collaborative Center for Adaptive Sensing of the Atmosphere (CASA) cooperated in a study of the feasibility, cost, and benefits of installing one or more additional weather radars to improve meteorological forecasting in the states of Washington and Wyoming [NOAA and CASA, 2009]. CASA is an engineering research center chartered by the National Science Foundation. The feasibility study evaluated both conventional long-range radars (for example, WSR-88D or NWS Network Radar) and short-range "CASA-type" radars. The study found that severe storm warnings and detection of precipitation and wind shear are below average in Coastal Washington and the gaps in weather radar coverage are a contributing factor. Further, the area contains populations with high social vulnerability to weather hazards and weather-sensitive industries (for example, fishing and timber production). The installation of additional radar or radars would improve coverage of the area, improve forecasts, and benefit the local population [NOAA and CASA, 2009]. Data from the proposed radar(s) would be used by the NWS to improve the accuracy of forecasts, watches, and warnings. As an example, the radar(s) would generate precipitation estimates allowing prediction of river flooding in hydrological basins of the area. The NWS would disseminate advance flood warnings

to local and state public safety, emergency managers, and the public, allowing them to take appropriate actions to minimize hazards to life and property.

7.2 DESCRIPTION OF ALTERNATIVE ACTIONS

To improve the quality of atmospheric data collected in the area of concern for use by NWS forecasters, the NWS proposes to install and operate a weather radar located in the Coastal Washington area and to incorporate that radar into the nationwide NWS Radar Network. This approach would allow the NWS to collect the needed atmospheric data, while also taking advantage of the economies achieved by operating a unified national network of radars with similar data outputs, operating characteristics, maintenance needs, and repair requirements. The NWS investigated a number of potential locations for the proposed Network Radar to Serve Coastal Washington in a PSS report issued in July 2009 [SRI International, 2009]. After careful review of the site-specific data contained in the PSS report, NOAA selected three potential radar sites in Grays Harbor County, Washington, for further consideration:

- Langley Hill Site
- Ocean City Site
- Saddle Hill Site

The potential environmental consequences of installing and operating NWS Network Radar at each of the three sites are analyzed herein. Additionally, the alternative of taking no action (that is, not installing a radar) is also analyzed for comparison purposes.

7.3 ENVIRONMENTAL SETTING, CONSEQUENCES, AND MITIGATION

7.3.1 Land Use, Zoning, and Coastal Zone Management

Setting

The three alternative sites for the proposed NWS Network Radar are all located in Grays Harbor County, Washington. Two of the three alternative radar sites are located in rural areas on privately owned land used for timber production (Langley Hill and Saddle Hill). The Langley Hill Site is forested and undeveloped. The Saddle Hill Site is sparsely vegetated and the property is partially developed with existing antenna towers and support equipment. The nearest residences are approximately 1,000 ft southeast of the Langley Hill Site and approximately 1,400 ft southeast of the Saddle Hill Site.

The other alternative site (Ocean City) is in a developed coastal area. The property containing this alternative site is owned by North Beach School District No. 64 and is adjacent to a school administration building. The closest residences are approximately 400 ft northwest and southwest of the Ocean City Site.

There are several commercial wind turbines located in Grayland, Washington, and south of Grayland. According to U.S. Department of Energy National Renewable Energy Laboratory (NREL) wind resource maps, Grays Harbor County is within an area with marginal wind resource potential. Within 5 mi of the shoreline there is good wind resource potential. Beyond 5 mi from shore, the wind resource potential is excellent [NREL, 2009]. There have been

inquiries into installing and operating wind turbines on the Quinault Nation Reservation and on the U.S. Pacific Beach Naval facility, however, these inquires have not led to development of wind turbines. There are no current or future plans to develop commercial-scale wind turbines nearshore or offshore of Grays Harbor County [Wesley, 2009]. Two small residential wind turbines are operational in Ocean Shores, operating at a 2.5 kilowatt (kW) capacity with 35 ft towers. Additionally, large commercial-scale wind turbines are under construction near Grayland, approximately 20 mi south of the alternative radar sites. The frequency field strength of a radar of this type can cause bulk cable interference to the turbine electronics if the radar is sited within 10 mi of wind turbines and the turbine electronic controls are not properly shielded [NWS Radar Operations Center, 2009].

Grays Harbor Title 17, Zoning, is the local zoning ordinance. This ordinance allows development of public utility facilities, including LOS transmission stations in all districts. The NWS Network Radar would be considered a utility by the Planning and Building Division of Gray's Harbor County [Harriman, 2009]. A utility is considered an industrial use within the context of planning purposes. The alternative sites are zoned for General Development (G-5) (Langley Hill and Saddle Hill) or for Resort Residential (R-3) (Ocean City) uses [Grays Harbor County, 1998].

Title 17, Zoning, describes height requirements for different types of structures within different zones. Section 17.60.080(c) of this zoning ordinance exempts radio and television antennas, and necessary government or public utility structures from height limits established for any land use zones (districts), provided that the following requirement is met:

- Structures shall not cover more than 10 percent of the site.

The proposed radar would meet the above criterion and the following setback, parking, and fencing criteria applicable to similar uses explained in *Title 17, Zoning*:

- The setback for the facility must be a distance equal to that of the height of the building or 35 ft (Langley Hill and Saddle Hill).
- The facility requires one parking space per 400 gross sq ft of floor space (pertains to industrial uses/utilities).
- Facilities must be screened by fencing and landscaping (pertains to utilities).

The responsibilities of federal agencies in complying with local zoning ordinances are set forth in *Title 40 U.S. Code (USC), Public Buildings, Property, and Works*, Chapter 33, Section 3312, Compliance with Nationally Recognized Codes (see Title 40 USC in Appendix A). That law requires federal agencies to consider local zoning and development requirements, provide local officials with plans to review for up to 30 days, and permit normal inspections by building officials during the construction period. The NWS intends to comply with these requirements.

Coastal Zone. The Washington State Coastal Zone Management (CZM) Program is federally approved under the Federal Coastal Zone Management Act (CZMA) of 1972. The Coastal Zone is comprised of 15 coastal counties, including Grays Harbor County and all lands and waters from the coastline seaward to three geographical miles. The Washington Department of Ecology administers the program. Under the CZMA, the Department of Ecology is required to review

certain federal agency actions in Washington State for consistency with the CZM Program. Appendix E in the CZM Program document lists federal actions, and includes federal construction projects, subject to consistency review. NOAA will need to determine the degree to which installation and operation of the proposed radar will be consistent with applicable CZM policies, then submit a project description and site layout plans to the Department of Ecology to obtain concurrence with the federal consistency determination, if warranted.

SEPA. The Washington State Environmental Policy Act (SEPA) requires environmental review of proposed government actions [SEPA, 2010]. Environmental analysis prepared to satisfy National Environmental Policy Act (NEPA) requirements may be adopted by a state or local agency in Washington State to meet SEPA requirements, per Washington Administrative Code (WAC) 197-11-610 *Use of NEPA Documents*. If adopted by the state or local government agency, a NEPA EA becomes an Adoption/Determination of Non Significance (DNS) SEPA document. The adopting agency for the proposed NWS Network Radar would be Grays Harbor County. Grays Harbor County will determine whether the NEPA EA prepared by the NWS meets its environmental review standards (see Environmental Checklist in Appendix A). A 14-day comment period may be required for an Adoption notice with a DNS. Details of these procedures can be found in WAC 197-11-630 [Washington State Legislature, 2010].

Consequences

Langley Hill. Construction of the proposed NWS Network Radar, an access drive, and power/telecommunication lines would result in clearing of existing trees from up to approximately 1.2 acres of land. Tree removal would occur in the interior of the parcel and the cleared area and radar facility would be surrounded by dense evergreen forest. The radome would project above the surrounding forest and be visible from long distances. Construction of the radar would not interfere with the ongoing use of the remainder of the parcel for timber production and eventual harvest. Due to the distance to the closest residences and the intervening forest, significant adverse effects on residences are not expected. During the construction period, noise and traffic generated by construction activities would temporarily, but not significantly, affect residences in the vicinity. Construction traffic would use Copalis Beach Road and internal private roads to access the site; significant congestion is not expected. There are no current or future wind turbines (residential or otherwise) close enough to the site to be impacted by the proposed radar. Existing wind turbines associated with residences in Ocean Shores are mounted on relatively short towers and would not be illuminated by the radar's main beam. Larger wind turbines are under development at Grayland, Washington, approximately 22.6 mi south of this site, and would be illuminated by the radar's main beam. However, due to the distance from the radar, adverse effects on the electronics of the wind turbines are not expected. The proposed NWS Network Radar would be compatible with local land uses (for example, timber production and rural residential uses), zoning requirements, and coastal zone management policies.

Ocean City. The Ocean City Site is within a district zoned for resort residential uses and is adjacent to a school administration building. The closest residences are approximately 400 ft away and screened by trees and structures. The proposed radar site is currently a mowed field used infrequently for recreational activities. The proposed radar facility would occupy a large

portion of the field, reducing its value for recreational purposes. During the construction period, noise and traffic generated by construction activities would temporarily, but not significantly, affect residences in the vicinity. Construction traffic would use S.R. 109 and Fourth Avenue to access the site; significant congestion is not expected on those roads. The existing residential turbines in Ocean Shores are roughly 6 mi south of this site. Those wind turbines would be below the main beam of the proposed NWS Network Radar. There are no current or future wind turbines (residential or otherwise) close enough to the site to be impacted by the proposed radar. Existing wind turbines associated with residences in Ocean Shores are mounted on relatively short towers and would not be illuminated by the radar's main beam. Larger wind turbines are under development at Grayland, Washington, approximately 20.0 mi south of this site, and would be illuminated by the radar's main beam. However, due to the distance from the radar, adverse effects on the electronics of the wind turbines are not expected. The proposed NWS Network Radar would be compatible with local land uses (for example, institutional and resort residential uses), zoning requirements, and coastal zone management policies.

Saddle Hill. Impacts would be similar to those at the Langley Hill Site. The proposed radar would be located on a large parcel containing a number of existing radio towers and the NWS Network Radar would intensify that use. During the construction period, noise and traffic generated by construction activities would temporarily, but not significantly, affect residences in the vicinity. Construction traffic would use S.R. 109 and internal private roads to access the site; significant congestion is not expected on those roads. There are no current or future wind turbines (residential or otherwise) close enough to the site to be impacted by the proposed radar. Existing wind turbines associated with residences in Ocean Shores are mounted on relatively short towers and would not be illuminated by the radar's main beam. Larger wind turbines are under development at Grayland, Washington, approximately 18.8 mi south of this site, and would be illuminated by the radar's main beam. However, due to the distance from the radar, adverse effects on the electronics of the wind turbines are not expected. The proposed radar would be compatible with local land uses (for example, timber production and harvesting), zoning requirements, and coastal zone management policies.

Mitigation—Applicable to All Three Alternative Sites

NOAA will determine the extent to which the proposed radar would be consistent with the applicable CZM policies and submit a consistency determination (if warranted) to the Washington Department of Ecology for review and concurrence.

NOAA would supply design plans for the proposed radar to Grays Harbor County for courtesy review at least 30 days before the start of construction activities. In addition, NOAA would permit normal inspections by local building officials during the construction period.

7.3.2 Geology, Soils, and Seismic/Tsunami Hazards

Setting

The three alternative sites are located within the Coastal Mountains and Valleys physiographic province of Washington. Substrate at all three sites consists of terrace deposits and loess of Quarternary age (1.8 million years ago [mya] to present), overlaying Montesano formation

siltstone of the Miocene epoch (11 to 25 mya). The Montesano formation is folded and faulted in this area [American Association of Petroleum Geologists, 1995].

The Langley Hill and Saddle Hill Sites are located on the crests of small coastal hills at elevations of 240 ft and 220 ft above MSL, respectively. The Ocean City Site is on a coastal bluff at 20 ft MSL. The following soil types are present at the three alternative sites (see Figure 14):

- Langley Hill Site: Newskah loam, 8 to 30% slopes
- Ocean City Site: Wishkah silty clay loam
- Saddle Hill Site: Calawah silt loam, 8 to 30% slopes

All three sites appear to be geologically stable. There are no signs of slope instability or accelerated soil erosion at any of the sites.

Coastal Washington is a seismically active area, and over 1,000 earthquakes are measured in the state each year. Most of these earthquakes are too small to cause injury or damage, but strong ground shaking could result during a major earthquake. The Juan de Fuca tectonic plate lies off the coasts of Northern California, Oregon, and Washington and is slowly sliding under the North American plate. The area of convergence of these two plates is called the Cascadia subduction zone, which has the potential to generate large earthquakes. In addition, volcanic activity in the Cascade Mountains can also generate earthquakes. The area of greatest earthquake hazards is the Puget Sound area. In 1949, an earthquake of 7.1 magnitude on the Richter Scale struck near Olympia. In 1965, an earthquake of 6.5 magnitude occurred between Seattle and Tacoma. These earthquakes resulted in fatalities and considerable property damage. It is believed that the Cascadia subduction zone generates very large earthquakes of magnitude 8.0 or more at intervals of roughly 300 to 600 years [Nosan et al., 1988]. At least six earthquakes of magnitude 8.0 or greater have occurred in the region during the last 3,500 years. The most recent such event occurred in January of the year 1700 [State of Washington, 2007]. The Puget Sound area is mapped in seismic Zone 3 (out of 4) and Grays Harbor County area in Zone 2 [International Conference of Building Officials, 1988].

The greatest hazard during an earthquake is strong ground shaking, which can result in damage to structures. Secondary hazards include landslides, rock falls, soil liquefaction, and tsunamis. Coastal Washington is considered to be at risk from a tsunami [Nosan et al., 1988]. Tsunamis generated by earthquakes on the Cascadia subduction zone or elsewhere in the Pacific Rim could affect the coast of Washington. The 1964 Alaska earthquake generated tsunami waves reaching 11 ft (3.4 m) in height at Moclips. The projected height of a tsunami wave generated by a magnitude 8.0 earthquake on the Cascadia subduction zone is 30 ft [State of Washington, 2007].

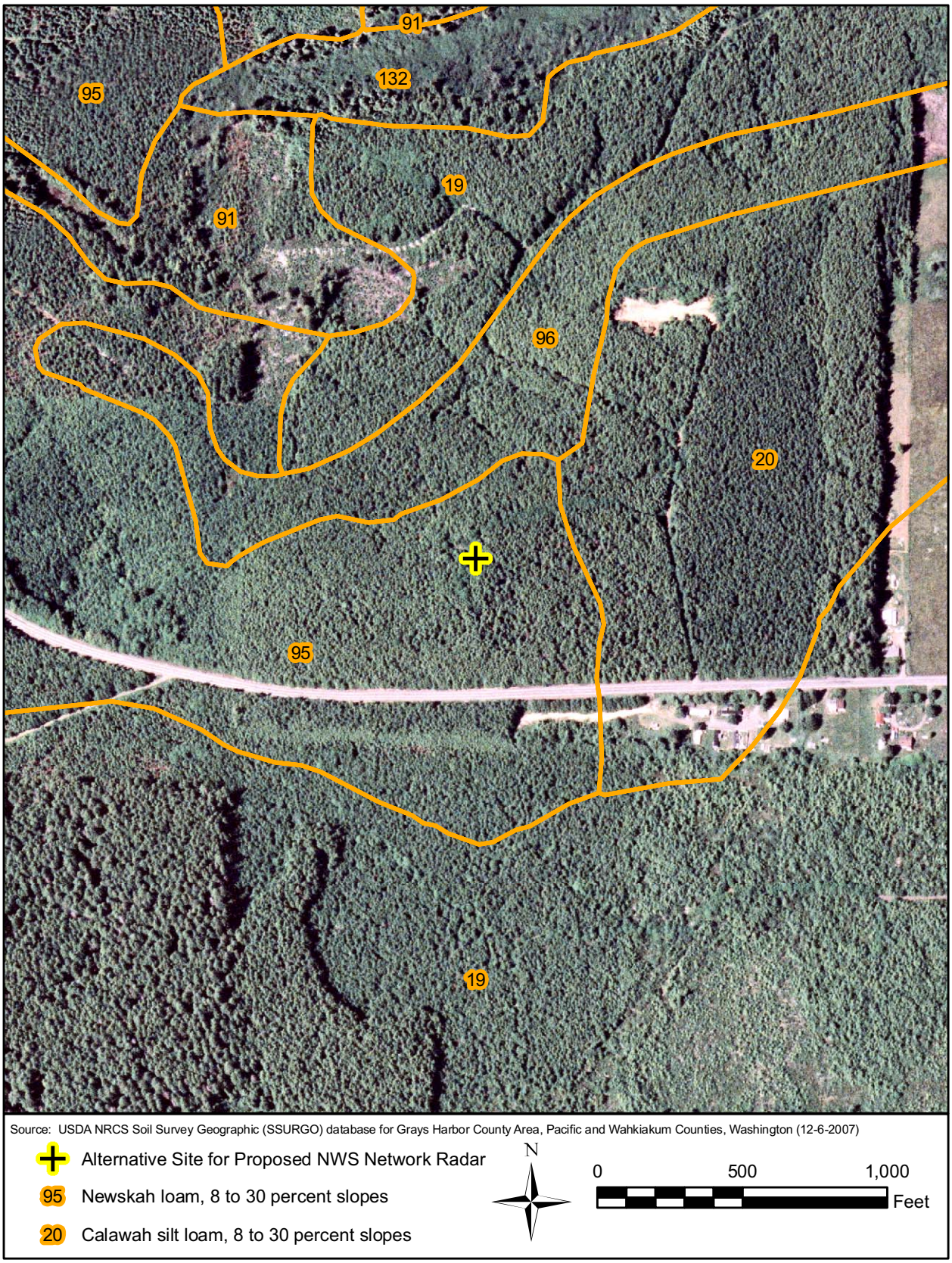


FIGURE 14(a) SOIL SURVEY MAP — LANGLEY HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

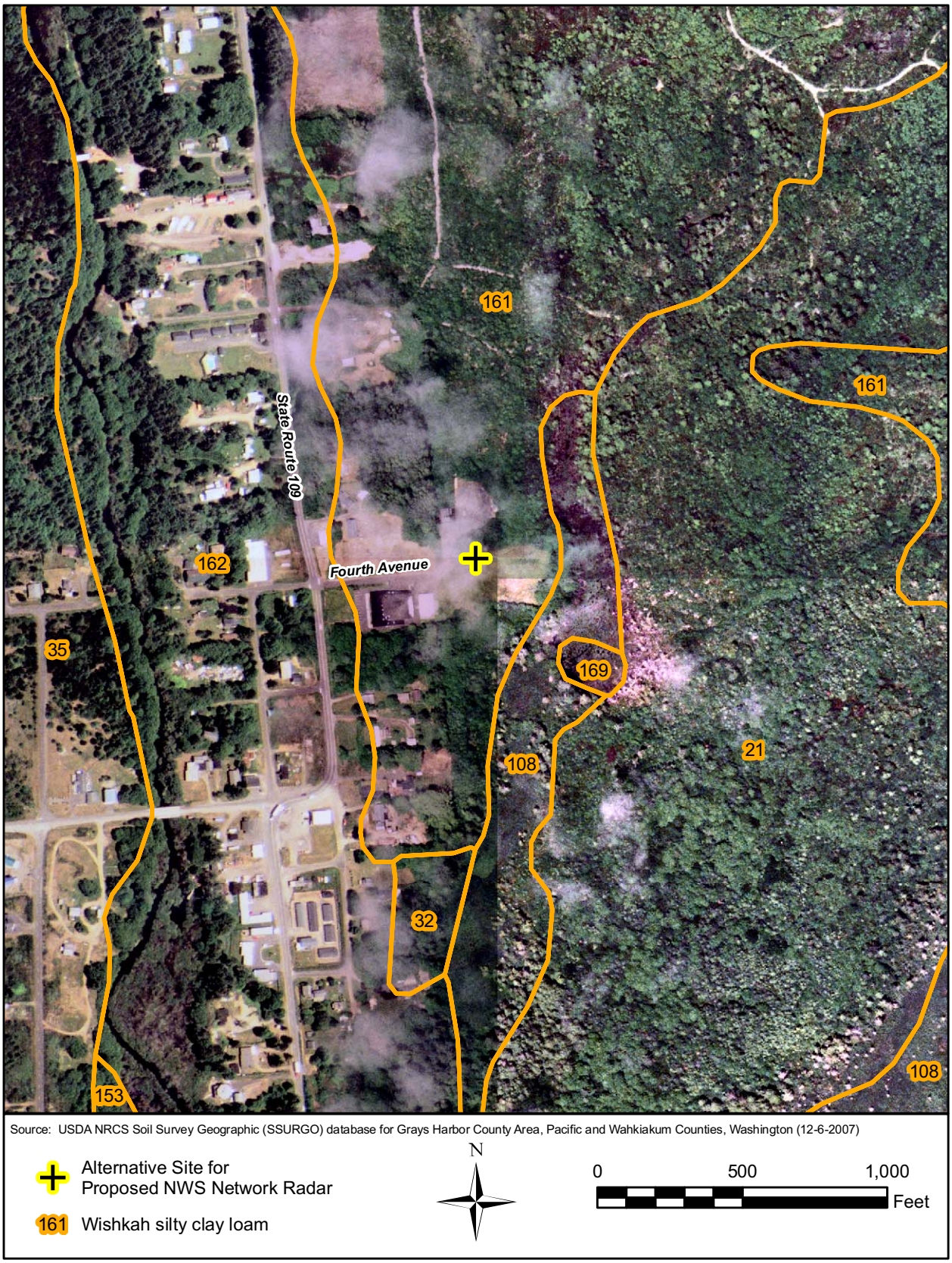


FIGURE 14(b) SOIL SURVEY MAP — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

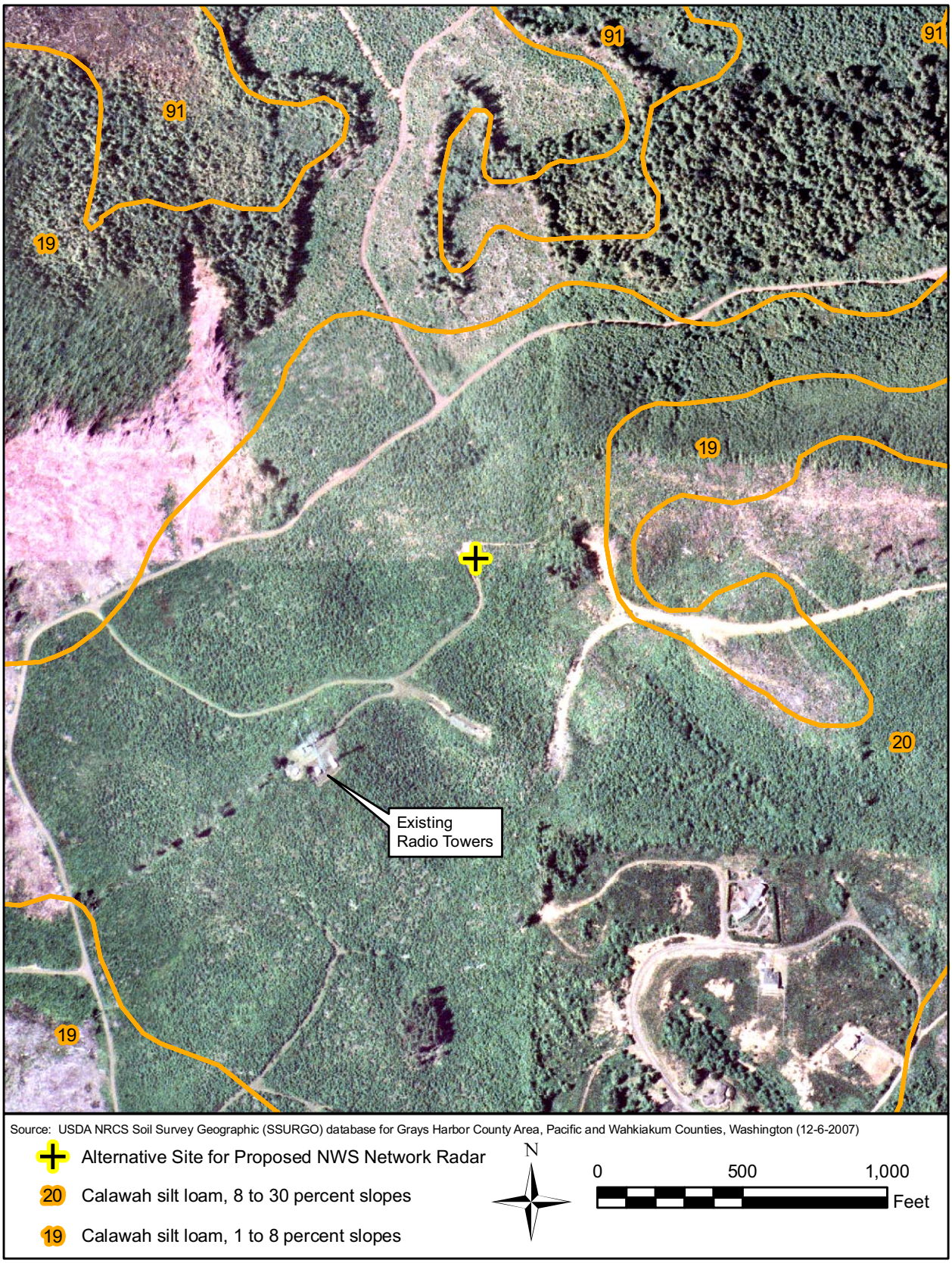


FIGURE 14(c) SOIL SURVEY MAP — SADDLE HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

Consequences

Langley Hill. Soil at the site, access drive, and utility easement is Newskah loam on 8 to 30% slopes. This soil is deep and well drained with a moderate shrink-swell potential. It forms on terraces and the parent material is sandy marine deposits [NRCS, 2009]. The radar site is located on a nearly level hill crest. The access drive has an average slope gradient of approximately 9% between Copalis Beach Road and the site.

Construction of the proposed radar would require clearing of approximately one acre of currently forested land on the crest of Langley Hill. In addition, a roughly 500 ft long and 10 ft wide utility corridor would be cleared between the site and Copalis Beach Road. Existing logging roads provide access to the proposed radar site, but are overgrown in parts; removal of brush and small trees would be necessary to improve the usability of those roads. In total, approximately 1.2 acres of land would be cleared of Western hemlock and spruce trees, and undergrowth. This would expose soil to wind and water erosion, and could lead to soil entrainment and deposition in nearby drainages. The NRCS classifies Newskah loam on 8 to 30% slope as moderate to severely erodible [NRCS, 2009]; therefore, erosion control during construction would be important. The project would be classified as a small construction site (that is, 1 to 5 acres in size).

To prevent erosion, NWS would develop a Storm Water Pollution Prevention Plan (SWPPP) in conformance with Environmental Protection Agency (EPA) National Pollutant Discharge Elimination Systems (NPDES) regulations (40 CFR Section 122.26 – Storm Water Discharges). Although EPA has delegated authority for administration of parts of the NPDES to Washington Department of Ecology, EPA retains authority over NPDES permits for federal facilities in Washington. The proposed radar would be a federal facility subject to EPA permitting for storm water discharges. Discharge of storm water from the construction site would be allowed per EPA's Construction General Permit (CGP) and Permit WAR10000F, which is specific to federal facilities in Washington. These permits require preparation of a SWPPP and filing of a notice of intent (NOI) and a notice of completion (NOC) with EPA Region 10. The SWPPP would describe best management practices (BMPs) applicable to this site to prevent soil erosion and washing of material into drainages. The SWPPP would also contain BMPs for safe handling and containment of materials and potential contaminants on site during construction.

After construction is complete, exposed soil would be covered with structures, concrete paths, gravel, or crushed rock, which would prevent soil erosion. The access road would be surfaced with gravel or crushed rock and include water bars and other drainage features as necessary to forestall long-term erosion. The buffer area around the fenced facility would be allowed to revegetate, thereby stabilizing the soil, although trees in this area may be trimmed or removed to prevent branches from hanging over the fence (a security risk) or tree fall hazards to the facility. In the long term, soil erosion would be insignificant.

The proposed radar would be subject to strong ground shaking during a major earthquake. This could result in structural damage and hazards to construction and maintenance staff, if present at the site during the event. Soil at the site is not subject to liquefaction and the risk of large-scale slope failure or ground rupture is remote. The proposed facilities would be designed and built in

conformance with seismic safety standards to reduce seismic risks. The proposed site is outside the areas of high and marginal tsunami hazard and would not be harmed by a tsunami. The section of Copalis Beach Road providing road access to the site is also outside the high and marginal tsunami hazard areas; road access to the site should not be affected by a tsunami.

Ocean City. Soil at the site and access/utility easement is Wishkah silty clay loam. This soil is deep and somewhat poorly drained with a high shrink-swell potential. It is not a hydric soil. This soil forms on outwash plains and terraces and the parent material is glaciolacustrine sediments [NRCS, 2009]. Construction of the proposed radar would require clearing of ground cover from approximately one acre of a mowed field. In addition, a roughly 100 ft long and 20 ft wide utility corridor would be cleared between the site and Fourth Avenue for installation of an access drive and underground utility lines. In total, approximately 1.1 acres of land would be cleared of vegetation, exposing soil to wind and water erosion, which could lead to soil entrainment and deposition in nearby drainages. The NRCS classifies Wishkah silty clay loam as having a slight erosion hazard [NRCS, 2009]. The project would be classified as a small construction site (that is, 1 to 5 acres in size).

To prevent this erosion, NWS would develop a SWPPP in conformance with EPA NPDES regulations (40 CFR Section 122.26 – *Storm Water Discharges*) and requirements of EPA's CGP and Permit WAR10000F, which is specific to federal facilities in Washington. The SWPPP would describe BMPs applicable to this site to prevent soil erosion and washing of material into drainages. The SWPPP would also contain BMPs for safe handling and containment of materials and potential contaminants on site during construction.

After construction is complete, exposed soil would be covered with structures, concrete paths, or gravel, which would prevent soil erosion. The access road would be surfaced with gravel or crushed rock and include water bars and other drainage features as necessary to forestall long-term erosion. The buffer area around the fenced facility would be allowed to revegetate, thereby stabilizing the soil. In the long term, soil erosion would be insignificant.

The proposed radar would be subject to strong ground shaking during a major earthquake. This could result in structural damage and hazards to construction and maintenance staff, if present at the site during the event. Soil at the site has relatively high clay content [NRCS, 2009], which would reduce the potential for liquefaction. The risk of large-scale slope failure or ground rupture is remote, except during a very large earthquake that causes ground subsidence resulting in formation of substantial surface cracks in the soil. The proposed facilities would be designed and built in conformance with seismic safety standards to reduce seismic risks. The proposed radar site is in an area of marginal tsunami hazard and could be affected by a substantial tsunami (see Figure 15). Based on a 300 to 600 year recurrence interval for a very large tsunami, the annual probability of a tsunami affecting the radar site is 0.33 to 0.66%. The section of S.R. 109 providing road access to the site is within the area of high tsunami hazard; vehicle access and utility service to the site could be affected by a tsunami, even if the tsunami is not large enough to directly affect the proposed radar. In the case of substantial tsunami, the radar site could be inaccessible by road and could lose utility service for an extended period of time.

Source: Washington State Hazard Mitigation Plan (November 2007)

FIGURE 15 TSUNAMI HAZARD ZONES — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

Saddle Hill. Soil at the proposed radar site and vicinity is Calawah silt loam on 8 to 30% slopes. The lower portion of the access road is on Calawah silt loam on 1 to 8% slopes. These soils are not hydric. Both of these soils are deep and well drained with a moderate shrink-swell potential. They form on terraces and the parent material is glaciofluvial deposits [NRCS, 2009].

Construction of the proposed radar would require clearing of approximately one acre of currently forested land on the northern crest of Saddle Hill. In addition, the access road to the hill crest would be improved as necessary and underground utilities would be installed along that road. Assuming a 2 ft wide area of disturbance for installation of underground conduit for electric power and telecommunication lines, the area of soil disturbance would be approximately 0.2 acre. The total area of soil disturbance at the site and access road would be approximately 1.2 acres. The existing road is in fair condition and only minor amounts of brush would be removed to improve the road and install the underground utility conduit. Clearing of vegetation and disturbance of soil could result in wind and water erosion, soil entrainment, and deposition in nearby drainages. The NRCS classifies soil at the site as moderately erodible [NRCS, 2009]; therefore, erosion control during construction would be important. The project would be classified as a small construction site (that is, 1 to 5 acres in size).

To prevent erosion, NWS would develop a SWPPP in conformance with EPA NPDES regulations (40 CFR Section 122.26 – Storm Water Discharges). Although EPA has delegated authority for administration of parts of the NPDES to Washington Department of Ecology, EPA retains authority over NPDES permits for federal facilities in Washington. The proposed radar would be a federal facility subject to EPA permitting for storm water discharges. Discharge of storm water from the construction site would be allowed under EPA's CGP and Permit WAR10000F, which is specific to federal facilities in Washington. These permits require preparation of a SWPPP and filing of an NOI and an NOC with EPA Region 10. The SWPPP would describe BMPs applicable to this site to prevent soil erosion and washing of material into drainages. The SWPPP would also contain BMPs for safe handling and containment of materials and potential contaminants on site during construction.

After construction is complete, exposed soil would be covered with structures, concrete paths, gravel, or crushed rock, which would prevent soil erosion. The access road would be surfaced with gravel or crushed rock and include water bars and other drainage features as necessary to forestall long-term erosion. The buffer area around the fenced facility would be allowed to revegetate, thereby stabilizing the soil, although trees in this area may be trimmed or removed to prevent branches from hanging over the fence (a security risk) or tree fall hazards to the facility. In the long term, soil erosion would be insignificant.

The proposed radar would be subject to strong ground shaking during a major earthquake. This could result in structural damage and hazards to construction and maintenance staff, if present at the site during the event. Soil at the site is not subject to liquefaction and the risk of large-scale slope failure or ground rupture is remote. The proposed facilities would be designed and built in conformance with seismic safety standards to reduce seismic risks. The proposed radar site is outside the area of high or marginal tsunami hazard and would not be directly affected by a tsunami. The section of S.R. 109 in the vicinity of the proposed radar site is also not within the

areas of high or marginal tsunami risks. However, portions of S.R. 109 to the west (near Ocean Shores) and east (near Hoquiam) are within the area of high tsunami hazard; vehicle access and utility service to the site could be affected by a tsunami. In the case of substantial tsunami, the radar site could be inaccessible by road and could lose utility service for an extended period of time.

Mitigation—Applicable to All Three Alternative Sites

NWS would prepare a SWPPP in conformance with EPA regulations at 40 CFR 122.26, and requirements of the CGP and Permit WAR10000F. NWS would also ensure that the plan is implemented during construction, including periodic inspections of the functioning of erosion control features. NWS would submit an NOI to EPA Region 10 a minimum of 7 days in advance of the start of construction, and an NOC to EPA Region 10 within 30 days after the end of the construction activities. These notices can be filed electronically using the EPA electronic notification system.

The proposed radar facility would be designed and constructed in conformance with seismic safety standards applicable to Grays Harbor County contained in the most current version of the Uniform Building Code.

7.3.3 Drainage and Water Quality

Setting

The three alternative sites are located north of Grays Harbor and west of the drainage divide between Puget Sound and the Pacific Ocean. The largest streams of the radar site search area are the Humptulips River, which flows southward and empties into North Bay, and the Copalis River and Connor Creek, which empty into the Pacific Ocean near Copalis Beach.

Langley Hill is part of the drainage divide between the Copalis River basin and the Humptulips River basin. Because the site is on the drainage divide, storm runoff from the radar site flows northward into a headwater of Cedar Creek, a tributary of the Copalis River, and also southward and eastward into an unnamed tributary of the Humptulips River. The proposed access drive and utility easement are within the Humptulips River watershed. The closest drainage is an unnamed tributary of Cedar Creek, approximately 1,250 ft north of the site. Runoff flowing southward and eastward from the site would collect in drainage ditches along Copalis Beach Road and flow eastward into the nearest tributary of the Humptulips River, located approximately 4,500 ft to the east. There are no drainage features or improvements present at the proposed radar site or access drive. A grass-lined roadside swale on the north side of Copalis Beach Road crosses the proposed utility easement.

The Ocean City Site is approximately 3,300 ft east of the shoreline of the Pacific Ocean. The proposed radar site and access/utility easement are located in a field with a gradual slope toward the east. Storm runoff from the site and easement flow west to eastward in response to the slope and empty into a forested wetland area located approximately 250 ft east of the site. The wetland is drained by a tributary of Connor Creek.

Saddle Hill is located on the drainage divide between streams that flow directly into the Pacific Ocean and streams that flow into North Bay. The proposed radar site is on the northern portion of the hill and drains northward into an unnamed tributary of Connor Creek, located approximately 2,200 ft north of the site. Most of the access drive (which includes the proposed route of utility conduit to serve the radar) drains into a grass-lined swale adjacent to S.R. 109 and eventually southward into small streams flowing into wetlands adjacent to North Bay.

Consequences

Langley Hill Site. Development of the Langley Hill Site would create impervious surfaces that would decrease soil infiltration and increase storm runoff. The area within the perimeter fence would be almost completely covered by structures, concrete pads, or gravel, creating approximately 0.2 acre of new impervious surfaces. Upgrade of the existing logging road and installation of utility lines would not create new impervious surfaces. The total amount of impervious surfaces created would be approximately 0.2 acre. This small amount of impervious surfaces would have insignificant impact on runoff volumes and rates. Storm runoff would travel via overland flow into the surrounding forest and along roads. During construction activities, BMPs described in the SWPPP would be implemented to reduce the potential for soil erosion and retain soil and potential water pollutants on site. After construction, the site would be stabilized and bare areas would be allowed to revegetate. The nearest natural streams are approximately 1,250 ft north and 4,500 ft east of the site. Due to these distances, impacts to those channels during construction and operation of the proposed radar would be negligible.

The radar would be equipped with a TPMS, a standby generator and an above-ground storage tank (AST) for diesel fuel. The AST would have a capacity of approximately 1,000 gallons and would have secondary containment and an overflow alarm to prevent release of fuel to the environment. The NWS Network Radar would be automated and unstaffed. The facility would not require water service and would not generate sewage. No adverse effects to water quality would result.

Ocean City Site. Impacts would be similar to those at the Langley Hill Site. The amount of impervious surfaces created would be approximately 0.20 acre, which is slightly more than at Langley Hill due to the need to construct a roughly 100 ft access road. Storm runoff would travel via overland flow into the wetlands and tributary of Connor Creek located approximately 250 ft to the east. This small amount of impervious surfaces would have insignificant impact on runoff volumes and rates. The proposed radar would not consume water or generate wastewater. No adverse effects to water quality would result.

Saddle Hill Site. Impacts would be similar to those at the Langley Hill and Ocean City Sites. The amount of impervious surfaces created would be approximately 0.16 acre at the radar site. Installation of the underground conduit for electric power and telecommunication lines serving the radar would occur along the existing access road, which is an existing impervious surface due to compaction from vehicle use and surfacing with gravel. However, portions of the conduit route may diverge from the road, resulting in creation of new impervious surfaces. Assuming 50% of the utility conduit route is outside the existing road surface, approximately 0.10 acre of new impervious surface would be created. Upgrade of existing pole-mounted utility lines along

S.R. 109 from two-phase to three-phase service would not create new impervious surfaces. The total amount of impervious surfaces created would be approximately 0.26 acre. This small amount of impervious surfaces would have insignificant impact on runoff volumes and rates. Storm runoff from the radar site and adjoining 800 ft of access road/utility easement would flow northward via overland flow into an unnamed tributary of Connor Creek. Storm runoff from the remainder of the access road/utility easement (approximately 3,700 ft in length) would flow southward to S.R. 109 and with drainages flowing into North Bay. The proposed radar would not consume water or generate wastewater. No adverse effects to water quality would result.

Mitigation—Applicable to All Three Alternative Sites

NWS would prepare and implement a SWPPP conforming to the CGP and Permit WAR10000F. Prior to and during construction activities, BMPs described in the SWPPP would be implemented to reduce the potential for soil erosion and retain soil and potential water pollutants on site. The plan would address grading and drainage patterns, installation and maintenance of control measures (for example, silt fences, hay bales, filter strips), proper storage of stockpiles of soil and materials, periodic inspections, and documentation of results.

7.3.4 Transportation

Setting

The alternative sites for the proposed radar are accessible by a combination of public and private roads. The Langley Hill Site is reached by traveling on Copalis Beach Road, a two-lane paved road maintained by Grays Harbor County (see Figure 4[c]), and unimproved logging roads within the property containing the site. A locked gate is present on the logging road at its intersection with Copalis Beach Road (see Figure 4[c]). The length of the logging roads between Copalis Beach Road and the site is approximately 1,050 ft. The 500 ft of road closest to Copalis Beach Road is in good condition. The remaining 550 ft of road is overgrown with brush and small trees and is currently unusable by vehicles.

The Ocean Beach Site is accessible via S.R. 109 and Fourth Avenue: Both are two-lane paved roads. The WSDOT maintains S.R. 109 and Grays Harbor County maintains Fourth Avenue. The proposed radar site is approximately 100 ft across a mowed field from the terminus of Fourth Avenue.

The Saddle Hill Site is accessible via S.R. 109, a two-lane paved road, and approximately 4,500 ft of unimproved former logging roads on the private property containing the site. The WSDOT maintains S.R. 109. A locked gate is present on the logging road at its intersection with S.R. 109 (see Figure 6[c]). The roads within the property are unimproved one-lane tracks that have been partially surfaced with gravel. The section of road between S.R. 109 (approximately 3,950 ft in length) and the sharp right turn to the hill crest containing the existing towers is in good condition. At that turn, the road forks and one branch goes to the hilltop containing the existing tower and the other branch accesses the proposed radar site. The approximately 550 ft of road between the fork in the road and the radar site is in poor condition and somewhat overgrown, but still passable by vehicle.

Consequences—All Three Alternative Sites

Construction of the radar would take approximately 6 to 12 months. During this period, local roads would be used to access the site. Construction equipment, workers' vehicles, and supply trucks would travel to and from the site on a daily basis. The expected number of vehicle trips would not exceed 50 per day and would not result in significant congestion on public roads serving the sites (for example, Copalis Beach Road, S.R. 109, or Fourth Avenue).

During operation, the radar would be automated and unstaffed. Maintenance personnel and trucks delivering diesel fuel would infrequently access the facility. The average number of trips generated would be one or two per week. The radar facility would have adequate parking areas surfaced with crushed rock inside the perimeter fence to accommodate maintenance vehicles and delivery trucks.

Installation of electric power and telecommunication lines serving the radar at the Langley Hill Site would occur within the property. No disruption of traffic on Copalis Beach Road or closure of the road or lanes would be required. The same would be true for installation of utilities at the Ocean Beach Site. No disruption of traffic on S.R. 109 or Fourth Avenue or closure of the road or lanes would be required. In contrast, extending utility service to the Saddle Hill Site would require upgrade of power lines and installation of telecommunication lines along S.R. 109. Hanging of new conductors and possibly installation of new poles would be required over a roughly 1.5 mi stretch of S.R. 109, between mileposts 14 and 15.5. Installation of new underground telecommunication lines would also occur along a short section of S.R. 109. These activities would require temporary closure of the road shoulder and possibly portions of travel lanes. The duration would be short and significant increases in congestion are not expected. Transportation effects would not be significant

Mitigation—Applicable to All Three Alternative Sites

Utility service providers would consult with WSDOT and/or Grays Harbor Department of Public Works to coordinate the timing of work to avoid traffic congestion and implement traffic controls necessary for safety of crews and motorists during installation of utility lines to serve the proposed radar.

7.3.5 Air Quality

Setting

As required by the Clean Air Act (amended in 1990), the EPA issued National Ambient Air Quality Standards (NAAQS) for six criteria pollutants to protect public health, including the health of sensitive populations (that is, asthmatics, children, and the elderly). Those regulations are found at 40 CFR Part 50. The six criteria pollutants are carbon monoxide (CO), lead, nitrogen dioxide, ozone (O_3), particulate matter (PM), and sulfur dioxide. Ozone is a photochemical oxidant and the primary component of smog. Ozone is formed through a series of chemical reactions between O_3 precursors (reactive organic gases and nitrogen oxide [NO_x]) driven by sunlight. Motor vehicles are a major source of emission of O_3 precursors. PM_{10} and $PM_{2.5}$ are the result of vehicle emissions (diesel vehicles) and fugitive dust. Fugitive dust can be emitted when dirt/dust is kicked up from trucks or vehicles moving over unpaved surfaces.

Major sources of PM_{10} include fugitive dust emissions from ground-disturbing activities such as construction [EPA, 2004]. $PM_{2.5}$ can deposit deep in the lungs and contain substances that are particularly harmful to human health. Sensitive populations are susceptible to human health effects from exposures to diesel emissions within a distance of 300 m from the emissions sources [South Coastal Air Quality Management District, 2003].

Areas of Washington State are classified by the EPA as attainment, non-attainment, maintenance, or unclassified for the NAAQS. An attainment designation indicates that the area has met the NAAQS for the given pollutant. Grays Harbor County is in attainment for all six criteria pollutants [EPA, 2009]. The NAAQS are implemented, maintained, and enforced under the Washington State Implementation Plan (SIP). SIPs contain state, local, and federal regulations and orders, the state plan, and compliance schedules approved by the EPA.

The three alternative sites are currently undeveloped and generate little or no air emissions. Existing vehicle traffic (such as cars, school buses, logging trucks) on local roads currently emit air exhausts and generate dust emissions from movement of wheels on paved and unpaved areas. The school district building near the Ocean City Site is used solely for administration purposes and does not contain classrooms. School buses are stored on the property containing the school district building and the Ocean City Site. There are no known facilities (for example, schools, retirement homes, hospitals, or day care facilities) containing populations that are sensitive to air pollutants within a 300 m radius of any of the three alternative sites. However, there are residences and a school district administration building within 300 m of the Ocean City Site, which could be occupied by sensitive person(s).

EPA regulations at 40 CFR Part 93, *Determining Conformity of Federal Actions to State or Federal Implementation Plans,* require preparation of a conformity determination for federal projects proposed in air quality non-attainment and maintenance areas, and for federal highway and mass transit projects [EPA, 2001].

The Olympic Region Clean Air Agency (ORCAA) regulates the installation and operation of generators installed in Grays Harbor County. Standby generators that are rated at 500 brake-horsepower or less are exempt from permitting requirements of the ORCAA [Glass, 2009].

Consequences—All Three Alternative Sites

During construction of the proposed radar, emissions of criteria pollutants will increase over a six-to-twelve month period. During construction activities, cars, trucks, and equipment would generate exhausts containing criteria pollutants, including NO_x (an ozone precursor), carbon monoxide, $PM_{2.5}$, and PM_{10}. Emissions of lead and sulfur dioxide would be negligible. Earthmoving activities, dirt/debris pushing operations, grading, storage pile creation, truck dumping, and wind entrainment of dust from temporary dirt piles and exposed soil would generate fugitive dust.

Table 4 shows the estimated air emissions from all sources (vehicle operations and fugitive dust) during construction activity. The emissions in the table are based on a few assumptions. The emission estimates are based on 170 weekdays (approximately 8 months) of daily travel for the construction crew and that construction workers and delivery trucks would travel from

Aberdeen, Washington. Wind erosion would occur over an eight-month period including non-work days equal to approximately 240 days. The fugitive dust analysis is based on the percentage of time wind speed exceeds 5.4 meters/second, silt content of soil, moisture content of soil, and the number of days precipitation equals or exceeds 0.1 inch. Detailed air emission tables are contained in Appendix A of this report.

Table 4.
Total Emissions of Criteria Pollutants during Construction of NWS Network Radar

Pollutant	Emissions (tons/project)* at Langley Hill	Emissions (tons/project)* at Ocean City	Emissions (tons/project)* at Saddle Hill
$PM_{2.5}$	1.33	1.46	1.42
PM_{10}	5.82	5.84	8.47
CO	1.90	2.14	1.69
NO_x	0.12	0.13	0.10

*Tons/project is equivalent to tons/year since the construction period will be less than one year.

There would be minimal differences among the alternative sites for air emissions contributed by construction of the proposed radar. The amount of air emissions would not be significant. For comparison purposes, air emissions generated during construction at any of the three alternative sites can be compared with conformity determination thresholds established by the EPA (for 10 to 100 tons/year) for federal activities in non-attainment areas (40 CFR Section 51.853). None of the proposed alternative sites at Langley Hill, Ocean City, or Saddle Hill is located in a non-attainment or maintenance area and the proposed action would not be a federal highway or mass transit project. Therefore, preparation of a federal conformity determination is not required.

During operations, the radar would not emit criteria pollutants, except emissions from operation of the standby generator and vehicles used by maintenance technicians or security personnel to visit the site. The proposed radar would be equipped with a standby generator with a capacity of approximately 100 kW. The new generator would be fueled by either natural gas or diesel. The standby generator would operate only during emergencies and for maintenance purposes. The NWS would follow the manufacturer's standard for maintenance. Given the relatively small size of the generator and its limited hours of operation, emissions of air pollutants would be minimal. The proposed standby generator would emit small quantities of criteria pollutants during infrequent use and testing for maintenance purposes. Because the proposed standby generator would operate infrequently and would have a rating of less than 500 brake-horsepower, it would be exempt from permitting requirements of the ORCAA [Glass, 2009]. During typical operations, one or two vehicle trips per week are expected. The amount of emissions from vehicles during operation of the radar would be minor. No significant effects on air quality would result.

Mitigation—Applicable to All Three Alternative Sites

The NWS would implement the following measures during the construction period to minimize emissions of dust and other air pollutants:

- Stabilize unpaved roads at the construction site using water, chemical dust suppressants, and/or other stabilization techniques
- Pre-soak and/or periodically sprinkle water on areas to be cleared of vegetated and/or graded areas
- Periodically sweep streets surrounding the construction site, to minimize dust emissions
- Limit vehicle speeds on unpaved roads and areas to 15 miles per hour
- Promptly revegetate areas of exposed soil as soon as construction activities are completed
- Limit idling time of construction equipment to 10 minutes when not in use

7.3.6 Floodplains

Setting

Executive Order (E.O.) 11988, *Floodplain Management*, requires the Federal Government to locate facilities outside the 100-year or base floodplain (that is, the area subject to a 1% annual chance of flooding), unless there is no practicable alternative [President, 1977a]. Federal Emergency Management Agency (FEMA) maps the three alternative sites and the access and utility easements to serve each of the sites within Zone C—Areas of Minimal Flooding, and are outside the 100-year or base floodplain (see Figure 16).

Consequences—All Three Alternative Sites

The proposed NWS Network Radar would not be subject to coastal or river flood hazards. Installation of the radar at any of the three sites would comply with flood hazard management policies contained in E.O. 11988. This does not apply to tsunami hazards, which are analyzed separately in Section 7.3.2 of this report.

Mitigation—Applicable to All Three Alternative Sites

None required.

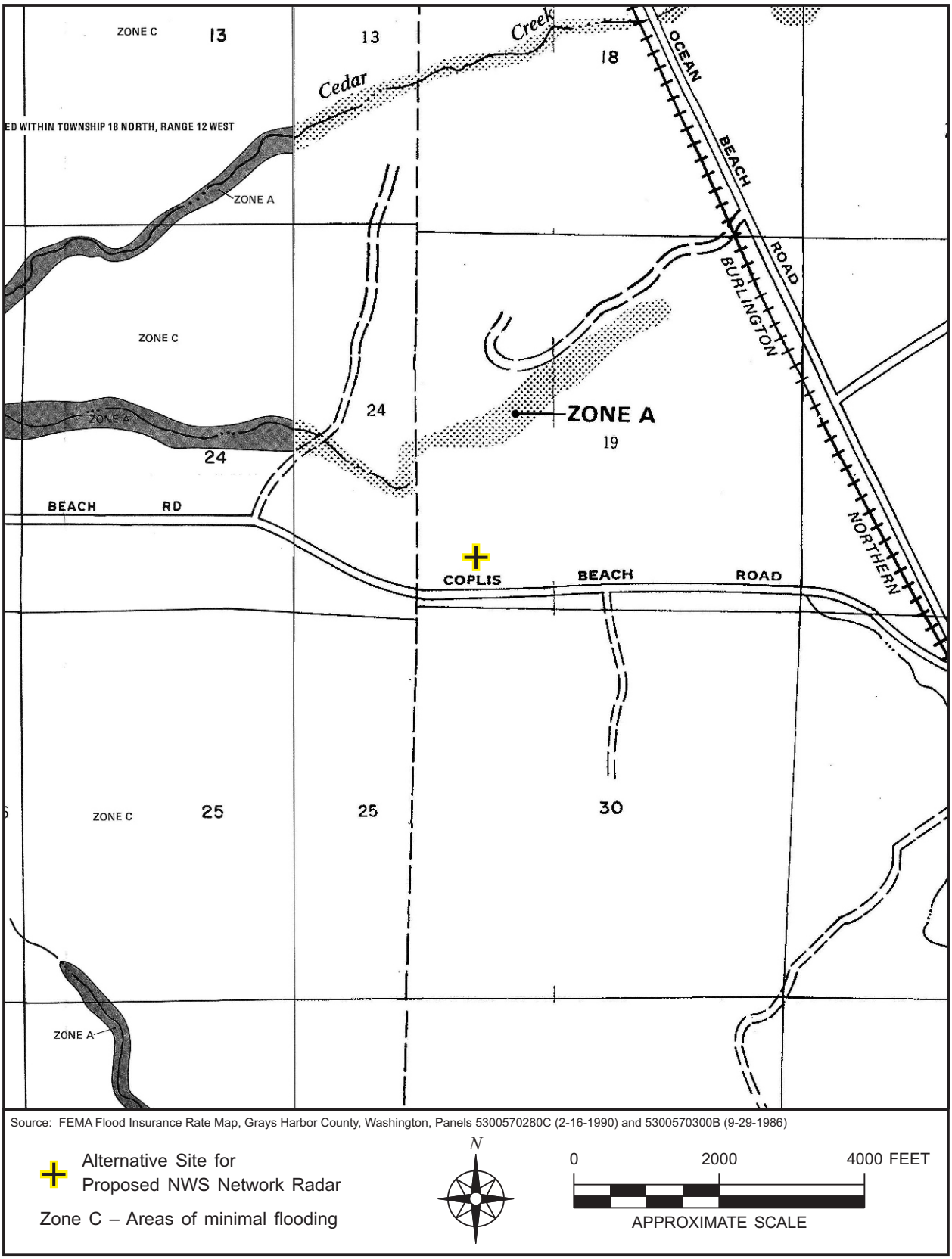
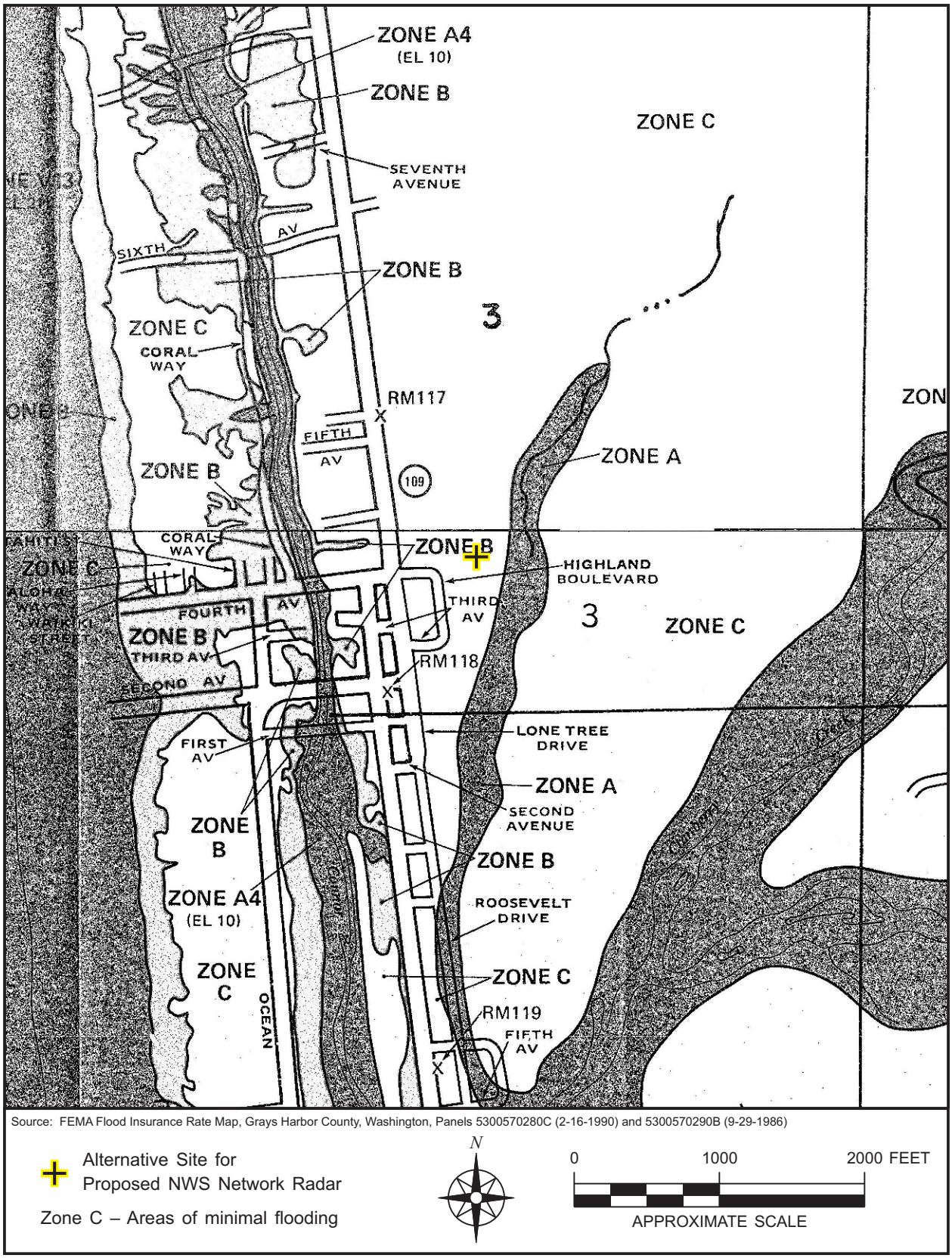


FIGURE 16(a) FEMA FLOODPLAIN MAP — LANGLEY HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON



Source: FEMA Flood Insurance Rate Map, Grays Harbor County, Washington, Panels 5300570280C (2-16-1990) and 5300570290B (9-29-1986)

Alternative Site for Proposed NWS Network Radar

Zone C – Areas of minimal flooding

N

0 1000 2000 FEET

APPROXIMATE SCALE

FIGURE 16(b) FEMA FLOODPLAIN MAP — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

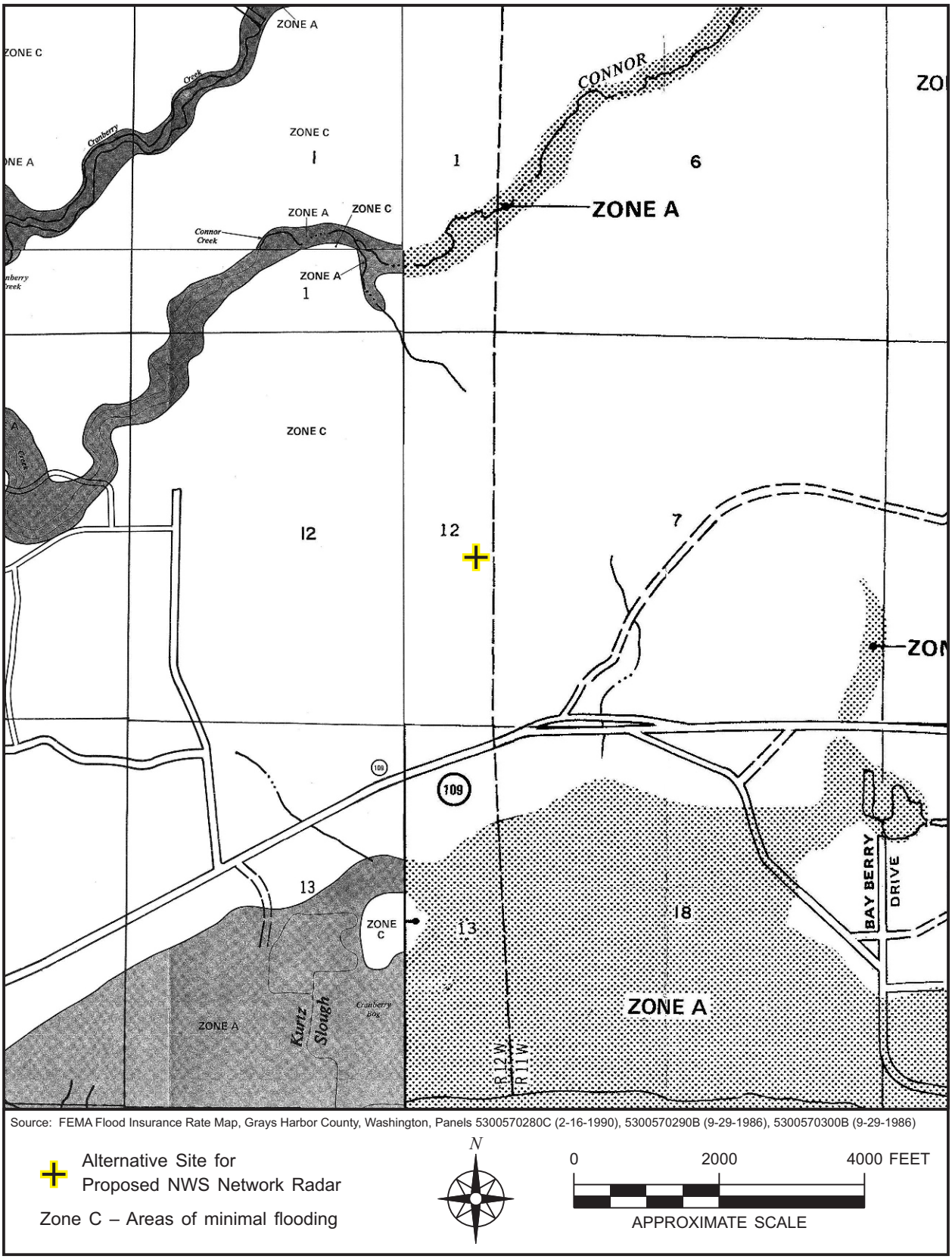


FIGURE 16(c) FEMA FLOODPLAIN MAP — SADDLE HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

7.3.7 Wetlands

Setting

E.O. 11990, *Protection of Wetlands*, requires the Federal Government to locate facilities outside federal jurisdictional wetlands unless there is no practicable alternative location and the proposed action incorporates all practical measures to minimize harm to the affected wetlands [President, 1977b]. Federal definition of wetlands are those areas that contain hydric soils, water at or near the ground surface during the growing season, and support (or could support) hydrophilic vegetation. Based on National Wetland Inventory maps prepared by the U.S. Fish and Wildlife Service (USFWS), none of the three alternative sites, and proposed access/utility easements to serve each site, contain federal jurisdictional wetlands (see Figure 17). The soils at each of the sites and access/utility easements are also non-hydric, which confirms the lack of wetlands at the proposed radar sites and easements. The nearest federal-jurisdictional wetlands are located 1,500 ft north of the Langley Hill Site, 250 ft east of the Ocean City Site, and 1,200 ft northeast of the Saddle Hill Site.

Consequences—All Three Alternative Sites

Installation of the radar and support infrastructure at any of the three alternative sites would not affect federal jurisdictional wetlands. The proposed action would comply with wetlands protection policies contained in E.O. 11990.

Mitigation—Applicable to All Three Alternative Sites

During construction, the NWS would implement BMPs described in the SWPPP to prevent washing of sediment and pollutants into wetlands.

7.3.8 Biological Resources/Protected Species

Setting

The Federal Endangered Species Act (ESA) of 1973 protects plants and animals in danger of extinction, and Section 9 of the Act prohibits taking of these species. Take is the act of harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, or collecting threatened or endangered species. Harming a listed species includes injuring or destroying individuals of the species or modifying the habitat of the listed species. Threatened and endangered species are protected under the ESA. Candidate species receive no formal protection under the ESA; however, the USFWS encourages agency cooperation in conservation of candidate species since these species may warrant future protection under the ESA. The Migratory Bird Treaty Act (MBTA) of 1918 prohibits the taking of migratory birds listed for protection. The MBTA protects species that are native and belong to families, groups, or species covered by conventions implemented by the MBTA. The MBTA does not contain habitat protection policies. The USFWS has voluntary guidelines for communication towers to reduce collision hazards to birds. The degree to which the proposed project will follow these guidelines is analyzed in the consequences section below.

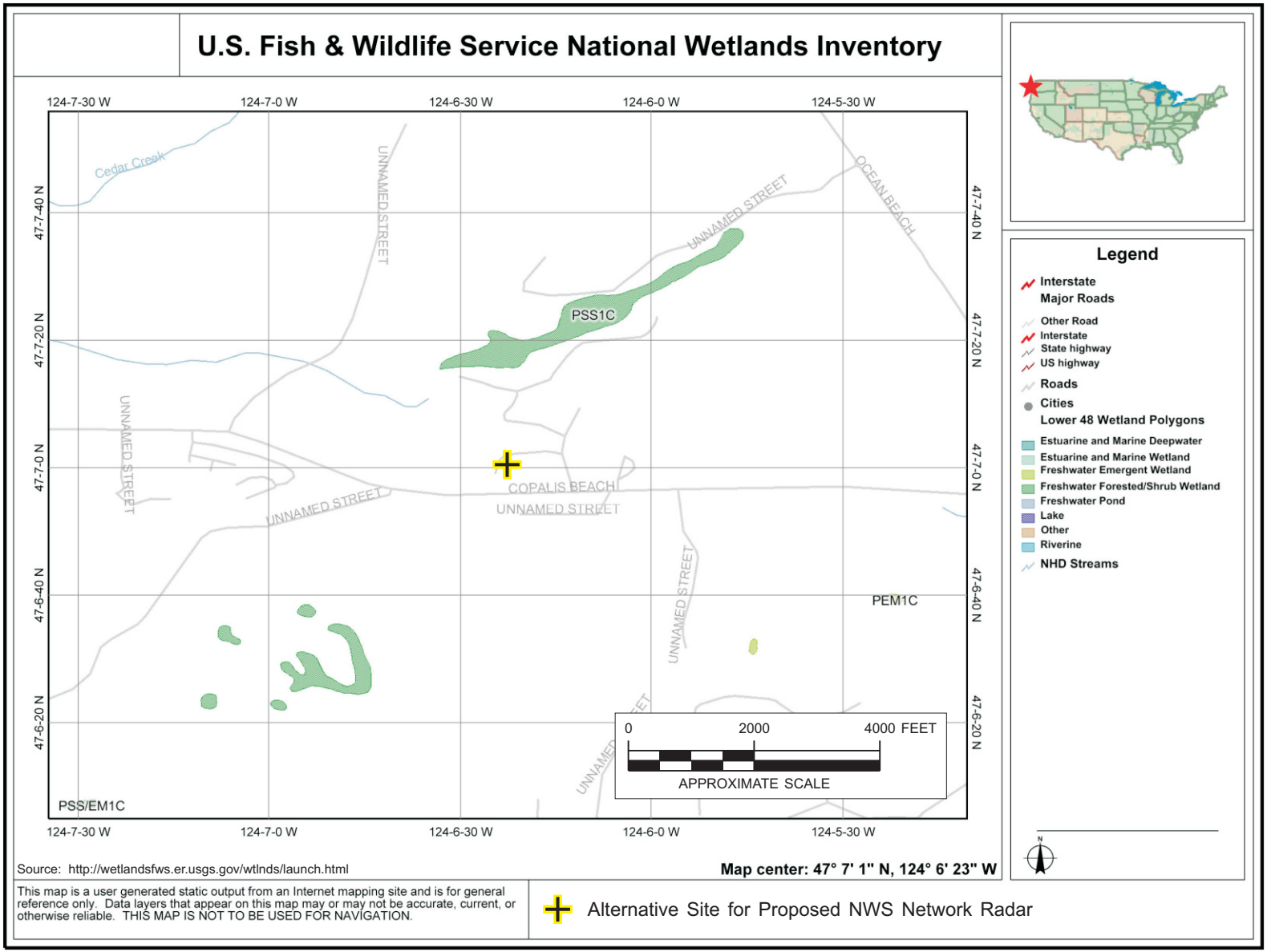


FIGURE 17(a) USFWS NWI MAP — LANGLEY HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

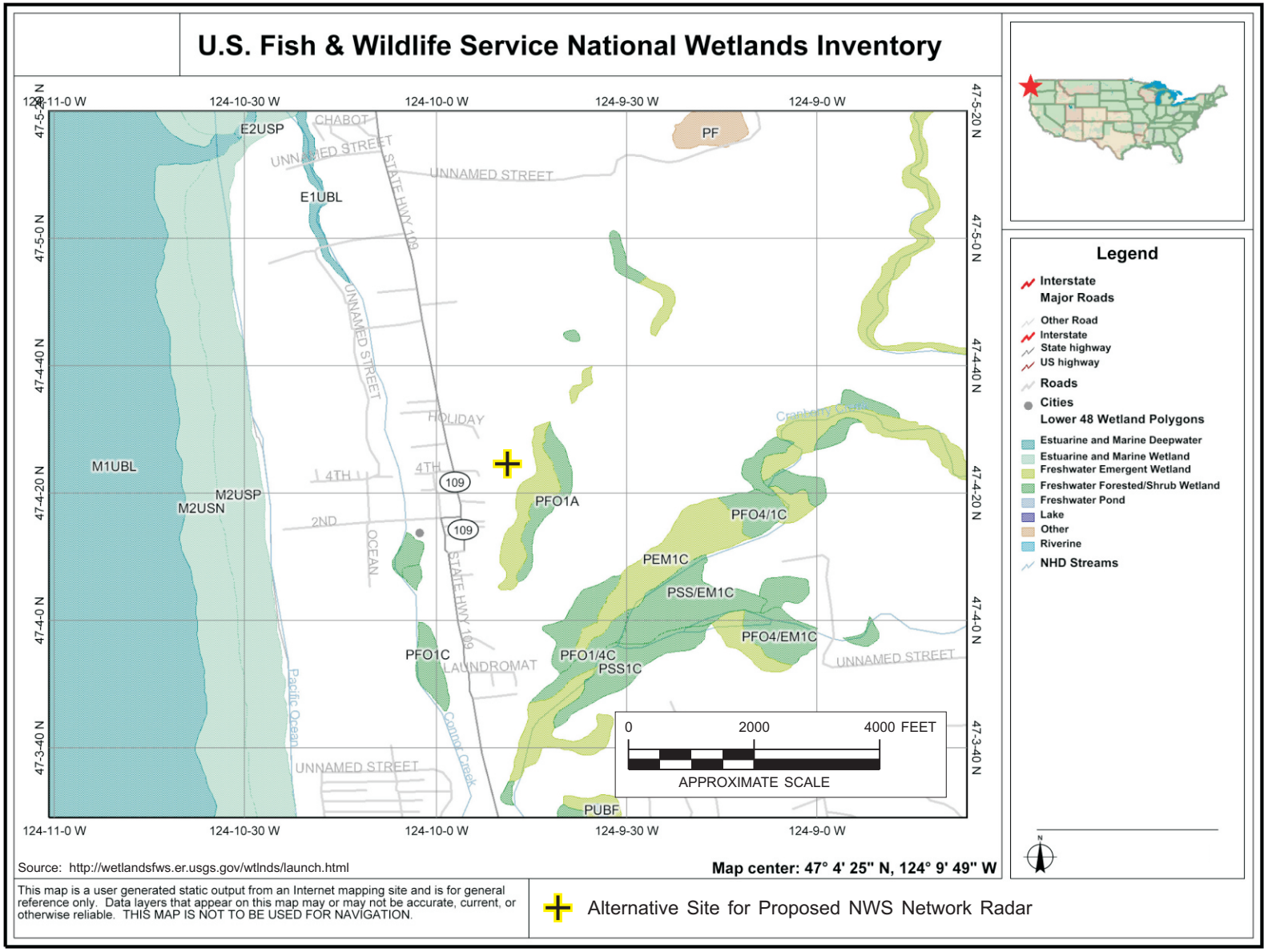


FIGURE 17(b) USFWS NWI MAP — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

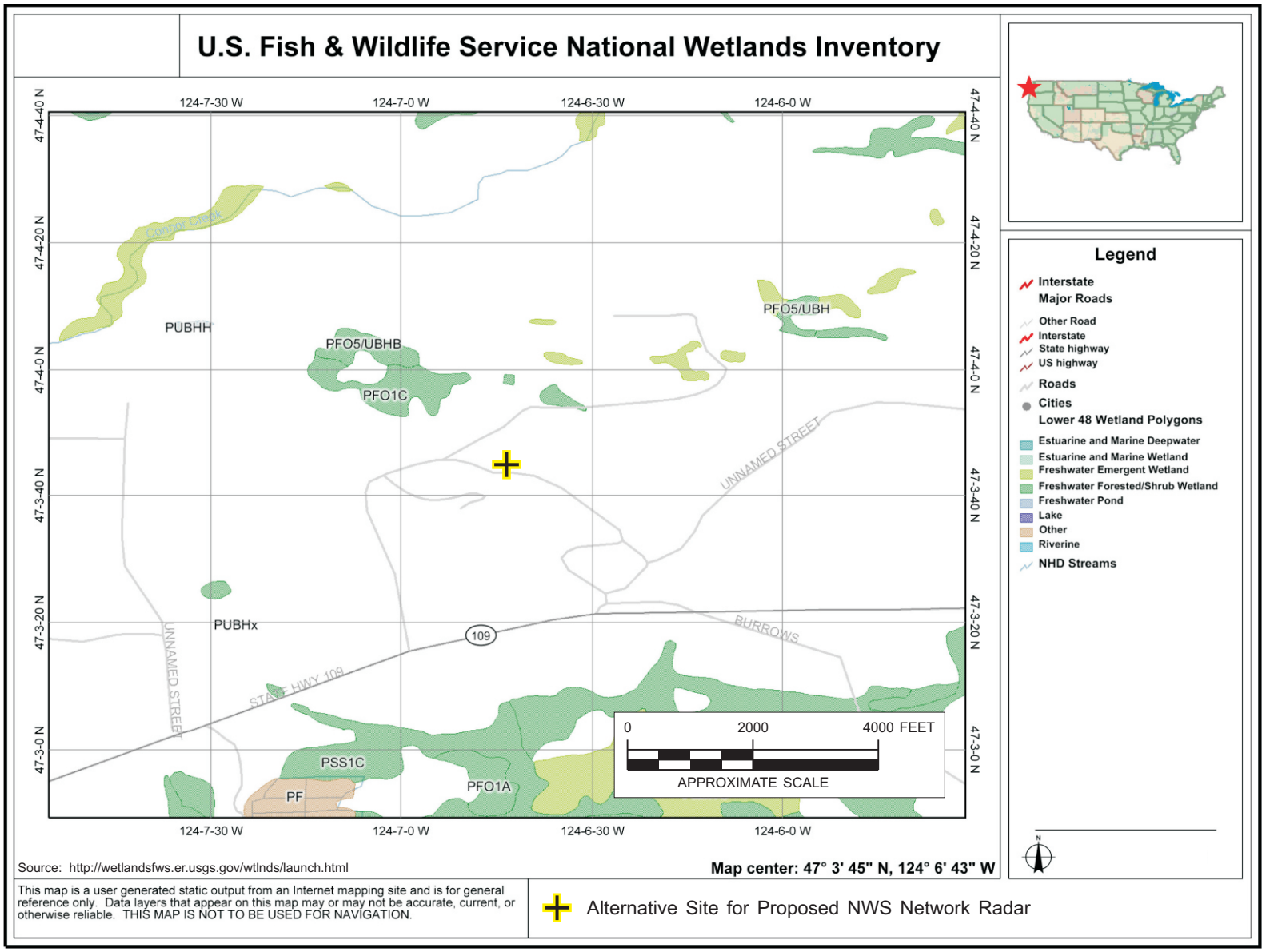


FIGURE 17(c) USFWS NWI MAP — SADDLE HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

Under the ESA, federal agencies must ensure their activities will not adversely modify critical habitat, thereby negatively affecting species recovery. Critical habitat designation is given to habitat deemed essential to federally listed species. None of the three alternative sites or associated access/utility easements is located on designated critical habitat for federally listed species [USFWS, 2009]. Table 5 lists federally protected species that may occur in Grays Harbor County. Designated critical habitat for these species is not present at or near any of the three alternative sites, but the sites may have habitat that could be used by listed species.

Table 5. Threatened and Endangered Species that May Occur in Grays Harbor County

Common Name	Scientific Name	Description	Federal Status	Habitat
Marbled Murrelet	*Brachyramphus marmoratus*	Bird	Threatened	Nearshore and pelagic—nesting up to 84 kilometers (km) inland in Washington
Northern Spotted Owl	*Strix occidentalis caurina*	Bird	Threatened	Low and mid-elevation mature forests
Oregon Silverspot Butterfly	*Speyeria zerene hippolyta*	Non-migrating butterfly	Threatened	Coastal salt spray meadows, stabilized dunes, and mountain meadows
Streaked Horned Lark	*Eremophila alpestris strigata*	Bird	Endangered	Large expanses of bare or thinly vegetated land such as fields, prairies, dunes, upper beaches, airports, and similar areas with sparse grassy vegetation

The three alternative sites for the NWS Network Radar are located within the Queets-Quinault and Grays Harbor watersheds. Depending on the alternative site selected by the NWS, storm water runoff from the radar site would drain into the Copalis River basin, the Humptulips River basin, or the Connor Creek basin [Washington Department of Fish and Wildlife, 2009]. There are no federally listed salmon species occurring within the Copalis River, Humptulips River, or Connor Creek basins. Two candidate species of fish, Coho Salmon and Coastal Cutthroat, occur in the Humptulips River basin.

The three alternative sites vary in vegetation cover. The Langley Hill Site is in a rural area and was clear cut in 1986 [Walsh, 2009]. It is currently vegetated with a dense Western hemlock/ spruce forest. Tree heights range up to 65 ft AGL. The Ocean City Site is a mowed field in a developed area. There may be a need to remove a grove of spruce trees located adjacent to the site to prevent radar blockage. Those trees range in height up to 65 ft AGL. The Saddle Hill Site was recently clear cut and is vegetated with brush and small trees. Tree heights are less than 20 ft AGL.

The USFWS has developed voluntary guidelines for design and location of communications towers to reduce collision hazards to birds, including migratory birds. The guidelines and the degree to which the proposed NWS Network Radar would conform to the USFWS recommendations are given in Table 6. The proposed radar, if located at any of the three alternative sites, would conform to these guidelines to the maximum extent practical.

Table 6. USFWS's Voluntary Interim Guidelines for Minimizing Potential Collision Hazards to Migratory Birds as Applied to the Proposed NWS Network Radar to Serve Coastal Washington

Summary of USFWS Guidelines for Bird Collision Hazard	Application to NWS Network Radar
Collocate the proposed communication equipment on an existing communication tower or related existing structure (for example, a church steeple, billboard mount, water tower, electric transmission tower, monopole, or building).	The proposed NWS Network Radar cannot be collocated on an existing communication tower due to electromagnetic compatibility concerns. The radar cannot be located on another kind of tower or building because the Doppler radar has a large rotating antenna that produces large dynamic loads, which most structures cannot tolerate.
If collocation is not practical, license applicants are strongly encouraged to construct towers less than 200 ft (61 m) AGL, using construction techniques that do not require guy wires (for example, lattice or monopole structures). Such towers do not require lighting under FAA regulations unless located within 3.8 mi (6.1 km) of airports and near major travel corridors, and so should not be lighted unless required.	The radar tower would be up to 143 ft AGL and would not be guyed, complying with this recommendation. It is NWS policy to put FAA aviation warning lights on all network radars. The proposed radar would be so equipped.
If at all possible, new towers should be located within existing "antenna farms," preferably in areas not used by migratory birds or species federally or state-listed as endangered or threatened, or listed as Nongame Species of Management Concern. Avoid siting towers in or near wetlands, near other known bird concentration areas (for example, National Wildlife Refuges), or in habitat of threatened or endangered species known to be impacted by towers.	Due to electromagnetic compatibility and blockage concerns, it is difficult to locate the Doppler radar within an existing antenna farm. The Saddle Hill Site is the closest alternative site to an antenna farm and is approximately 0.2 mi northeast from an existing commercial antenna farm. The three alternatives sites are not within wetlands, wildlife refuges, or habitat for threatened or endangered species.
Local meteorological conditions should be reviewed, and areas with an especially high incidence of fog, mist, and low cloud ceilings should be avoided, especially during spring and fall migrations.	Coastal Washington is subject to fog, mist, and low cloud ceilings during portions of the year. The entire area of concern is subject to these conditions, therefore, avoidance is infeasible.

Summary of USFWS Guidelines for Bird Collision Hazard	Application to NWS Network Radar
If taller towers (more than 199 ft [61 m] AGL) requiring lighting to warn pilots must be constructed, the minimum amount of warning and obstruction lighting required by the FAA should be used. Where permissible by FAA and local zoning regulations, only white strobe lights should be used at night. These should be up-shielded to minimize disruption to local residents, and should be the minimum number, with minimum intensity and number of flashes per minute (that is, the longest duration between flashes, currently three seconds) allowed by the FAA. The use of solid red or pulsating red warning lights should be avoided at night. Construction techniques which do not require the use of guy wires should be employed whenever possible.	The proposed radar tower would be less than 199 ft in height and this guideline is not applicable.
Guyed towers constructed in known raptor or waterbird concentration areas should use daytime visual markers (for example, bird diverter devices) on the guy wires to prevent collisions by these diurnally active species. Suggested bird avoidance guidelines are available from the electric utility, and research and experimental design recommendations are available from the wind generation industry.	The proposed radar tower would not be guyed. This guideline is not applicable.
Towers should be constructed in a way that limits or minimizes habitat loss within the tower "footprint." Road access and fencing should be minimized to reduce or prevent habitat fragmentation and disturbance, and to reduce above-ground obstacles that might impact birds in flight. A larger tower footprint, however, is preferable to construction of a guy-supported tower.	There would be a very minimal habitat reduction. Between 1 and 1.2 acres of vegetation, consisting of either immature hemlock/spruce forest (Langley or Saddle Hill Sites) or mowed grasses (Ocean City Site) would be removed.
If significant populations of breeding birds are known to occur within the proposed tower footprint, construction should be limited to those months when birds are not nesting (that is, times other than spring and summer).	No populations of breeding birds are expected to occur within the radar footprint at any of the alternative sites.
New towers should be designed structurally and electrically to accommodate the applicant's antenna(s), and comparable antennas for at least two additional users, to reduce the number of future towers—unless this design would require the addition of lights or guy wires to an otherwise unlighted and/or unguyed tower.	Due to security concerns and the potential for electrometric interference, it would not be possible to install commercial antennas on the proposed NWS Network Radar tower.
Security lighting for on-ground facilities and equipment should be down-shielded to keep light within the boundaries of the site and minimize its potential attraction for birds.	Exterior lighting at the radar facility would be shielded and pointed as recommended.

Summary of USFWS Guidelines for Bird Collision Hazard	Application to NWS Network Radar
If a tower is constructed or proposed for construction, USFWS personnel and/or researchers from the Communication Tower Working Group or their designees should be allowed access to the site after construction is complete to conduct both large (for example, crane [Gruidae], swan, and goose [Anatidae]) and small dead bird searches; to place net catchments below the tower but above the ground; to position radar, Global Positioning System, infrared, thermal imagery, and acoustical monitoring equipment as necessary to assess and verify bird migrations and habitat use; and to gain information on the impacts of various tower sizes, configurations, and lighting regimes.	The NWS would allow USFWS staff to access the site to conduct dead bird searches. NWS would have to review the proposed placement of electronic monitoring equipment at the site to determine if it would adversely affect operation of the facility.
If constructing multiple towers, providers should consider the cumulative impacts of all of those towers on migratory birds, including impacts on birds listed as threatened and endangered and nongame species of management concern. The impacts of each individual tower should also be considered.	Not applicable: Only one tower would be installed.
If significant numbers of breeding, feeding, or roosting birds are known to habitually use a proposed tower construction site, relocation to an alternate site is recommended. If this is not an option, seasonal restrictions on construction may be advisable in order to avoid disturbance during periods of high bird activity.	There are no known breeding, feeding, or roosting birds at the Langley Hill, Ocean City, or Saddle Hill Sites.
Towers no longer in use or determined to be obsolete should be removed within 12 months of the cessation of use.	NWS policy is to remove decommissioned facilities as soon as possible, subject to the availability of funding.

In compliance with the MBTA and Section 7 of the ESA, NWS sent a consultation letter to USFWS requesting information on potential impacts to listed species, designated critical habitat, or migratory birds that may result from installation and operation of the proposed radar at any of the alternative sites (see SRI International Letter to USFWS in Appendix A).

Consequences

Langley Hill Site. The site and utility easement were subject to timber harvest in 1986 and are vegetated with an immature Western hemlock forest with tree heights of approximately 65 ft. The access easement would follow the route of an existing logging road, which connects to Copalis Beach Road; the existing road would be upgraded for a distance of approximately 1,400 ft to support radar construction and operation. A new utility easement with a length of approximately 500 ft would be established between Copalis Beach Road and the site. Tree removal for construction of the radar and installation of utility lines would affect approximately 1.2 acres of land. Since the site has been previously harvested and will be subject to future timber harvest, the site does not contain suitable habitat for the Oregon Silverspot Butterfly or nesting habitat for the three listed bird species. According to USFWS, Marbled Murrelets may occur in the vicinity, however “the presence of a large structure (like a Doppler radar) at that

height is likely to be avoided by a murrelet, and is not likely to measurably affect its behavior or pose a risk of collision" (see email from the USFWS in Appendix C). Based on this informal consultation with USFWS, NWS determined that no adverse effects would result to endangered or threatened species (see email from Anne Elston, SRI, to USFWS in Appendix A). The USFWS concurs with the NWS determination (see response letter from USFWS in Appendix A). The proposed radar would conform to the USFWS guidelines for bird collision hazards and would not significantly affect migratory birds protected under the MBTA.

Construction activities would occur in upland areas approximately 1,250 ft from the nearest drainage (a tributary of the Copalis River) or wetland. Installation and operation of the proposed radar would not require construction of in-water structures or disturbance of wetlands. The Langley Hill Site is on the drainage boundary between the Copalis River and the Humptulips River basin. The Coho Salmon and Coastal Cutthroat are candidate species and occur in the Humptulips River basin. Mitigation measures would be implemented to ensure no adverse impacts to water quality of the Humptulips River or its tributaries. No impacts to Coho Salmon and Coastal Cutthroat would result.

No significant impacts to threatened and endangered species, species eligible for listing (for example, candidate species), designated critical habitat, or migratory birds would result.

Ocean City Site. The site is in proximity to the North Beach School District No. 64 school administration building. The Ocean City Site is a nearly level mowed field. Site disturbance from construction/staging would be limited to an area of approximately 1.1 acres. Nearby trees with heights of approximately 85 ft may need to be trimmed to 40 ft or removed to prevent adverse effects on radar operations. Up to 2.7 acres of mostly spruce trees would need to be trimmed or removed. Since the site has previously been disturbed and the mature grove of trees is in close proximity to S.R. 109, several residences, and two county buildings, the site does not contain suitable habitat for the Oregon Silverspot Butterfly or nesting habitat for the three listed bird species. According to USFWS, Marbled Murrelets may occur in the vicinity, however "the presence of a large structure (like a Doppler radar) at that height is likely to be avoided by a murrelet, and is not likely to measurably affect its behavior or pose a risk of collision" (see email from the USFWS in Appendix C). Based on this informal consultation with USFWS, NWS determined that no adverse effects would result to endangered or threatened species (see email from Anne Elston, SRI, to USFWS in Appendix A). The USFWS concurs with the NWS determination (see response letter from USFWS in Appendix A). The proposed radar would conform to the USFWS guidelines for bird collision hazards and would not significantly affect migratory birds protected by the MBTA. The nearest water body to the radar site is a tributary of Connor Creek and associated wetlands, located approximately 250 ft to the east. Construction activities would not directly disturb those water bodies. BMPs would be implemented during construction to prevent soil erosion and washing of sediment into the creek or wetland to the east of the site.

Saddle Hill Site. The Saddle Hill Site was subject to timber harvesting in the last 10 years and is vegetated with immature Western hemlock/spruce forest with tree heights less than 20 ft. The access/utility easement will follow existing private unimproved roads connecting the hilltop to

S.R. 109. About 4,900 ft of existing road would be upgraded. During radar construction staging, approximately one acre of immature forest vegetation would be removed. Since the site has been disturbed by recent forestry practices and contains immature forest, the site does not contain suitable habitat for the Oregon Silverspot Butterfly or nesting habitat for the three listed bird species. According to USFWS, Marbled Murrelets may occur in the vicinity, however "the presence of a large structure (like a Doppler radar) at that height is likely to be avoided by a murrelet, and is not likely to measurably affect its behavior or pose a risk of collision" (see email from the USFWS in Appendix C). Based on this informal consultation with USFWS, NWS determined that no adverse effects would result to endangered or threatened species (see email from Anne Elston, SRI, to USFWS in Appendix A). The USFWS concurs with the NWS determination (see response letter from USFWS in Appendix A). The proposed radar would conform to the USFWS guidelines for bird collision hazards and would not significantly affect migratory birds protected under the MBTA.

The nearest water body to the radar site is a tributary of Connor Creek and associated wetlands, located approximately 2,200 ft north of the proposed radar site. Construction activities would not directly disturb those water bodies. BMPs would be implemented during construction to prevent soil erosion and washing of sediment into the creek or wetland to the north of the site.

Mitigation—Applicable to All Three Alternative Sites

Best management practices will be implemented to prevent soil erosion and sedimentation of drainages, thereby mitigating any adverse impacts to candidate salmon species.

NWS would allow USFWS personnel to access the radar site to conduct searches for deceased birds. If dead birds are found, they will be inspected by the USFWS personnel to identify species of bird and reason for death. NWS would cooperate with the USFWS in placement of monitoring equipment at the radar site, provided the equipment does not result in physical or electromagnetic interference with radar operations.

7.3.9 Cultural and Historic Resources

Setting

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) requires federal agencies to consider the effects of their actions on historic places and to seek comments from the State Historic Preservation Officer (SHPO). Additional NOAA compliance procedures for considering impacts to places of cultural, historical, and scientific importance are laid out in NAO 216-6. Section 106 requirements are set forth in 36 CFR Part 800, *Protection of Historic and Cultural Properties*. Under Section 106 Regulations 36 CFR Section 800.16 4(a) & (b), the NWS is required to consult with SHPO, identify the area of potential effects (APE), and determine whether historic properties listed or eligible for listing on the National Register of Historic Places (NRHP) are within the APE. The APE is defined by 36 CFR Section 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking." Regulations at 36 CFR 800.4(a)(4) requires agencies to

gather information from Native American tribes to identify places within the APE that may have religious and cultural significance.

In consideration of the NWS's requirements under the NHPA and NAO 216-6, a records search of listed and candidate cultural resources and historic properties was conducted for Grays Harbor County on the National Register of Historic Places and the Washington Heritage Register (WHR). Figure 18 shows the location of the three alternative sites for the proposed NWS Network Radar and the locations of places listed on the NRHP or WHR. Additionally, a windshield reconnaissance of structures within the APEs was conducted for the alternative sites for their historic potential and eligibility for listing on the NRHP or the WHR.

Consequences

Langley Hill Site. For the proposed NWS Network Radar to serve Coastal Washington, the APE is comprised of three components:

1. The radar facility footprint and construction staging area
2. Area around the radar facility subject to indirect visual and noise impacts
3. Access drive and areas to be disturbed during installation of utility lines

Direct impacts could occur within the facility footprint (that is, 102 ft × 68 ft), at nearby areas that would be physically disturbed during construction staging, and within the corridor used for installation of new/upgraded utility lines and access drive to serve the radar. Indirect effects could result from the views of the radar tower and noise generated during construction and operation of the radar. Visual effects are dependent on the height of the radar tower and generally decrease with increasing distance from the tower. The total height of the radar structure would be up to 143 ft AGL. At distances beyond 10 tower heights, the tower would blend into the background and would be a minor visual element. The APE for indirect effects is estimated at 10 times the height of the tower structure or approximately 1,400 ft from the base of the tower (approximately 0.25 mi). Construction and operational noise levels dissipate to insignificant levels at a distance of 0.25 mi; therefore, consideration of noise effects will not result in enlargement of this APE. Improvements to existing roads and utility lines would have minimal visual and noise effects and would not increase the APE for indirect effects. Therefore, considering both direct and indirect effects, the APE is comprised of the area within 0.25 mi of the tower location and the road and utility corridors that may extend farther than 0.25 mi from the radar tower.

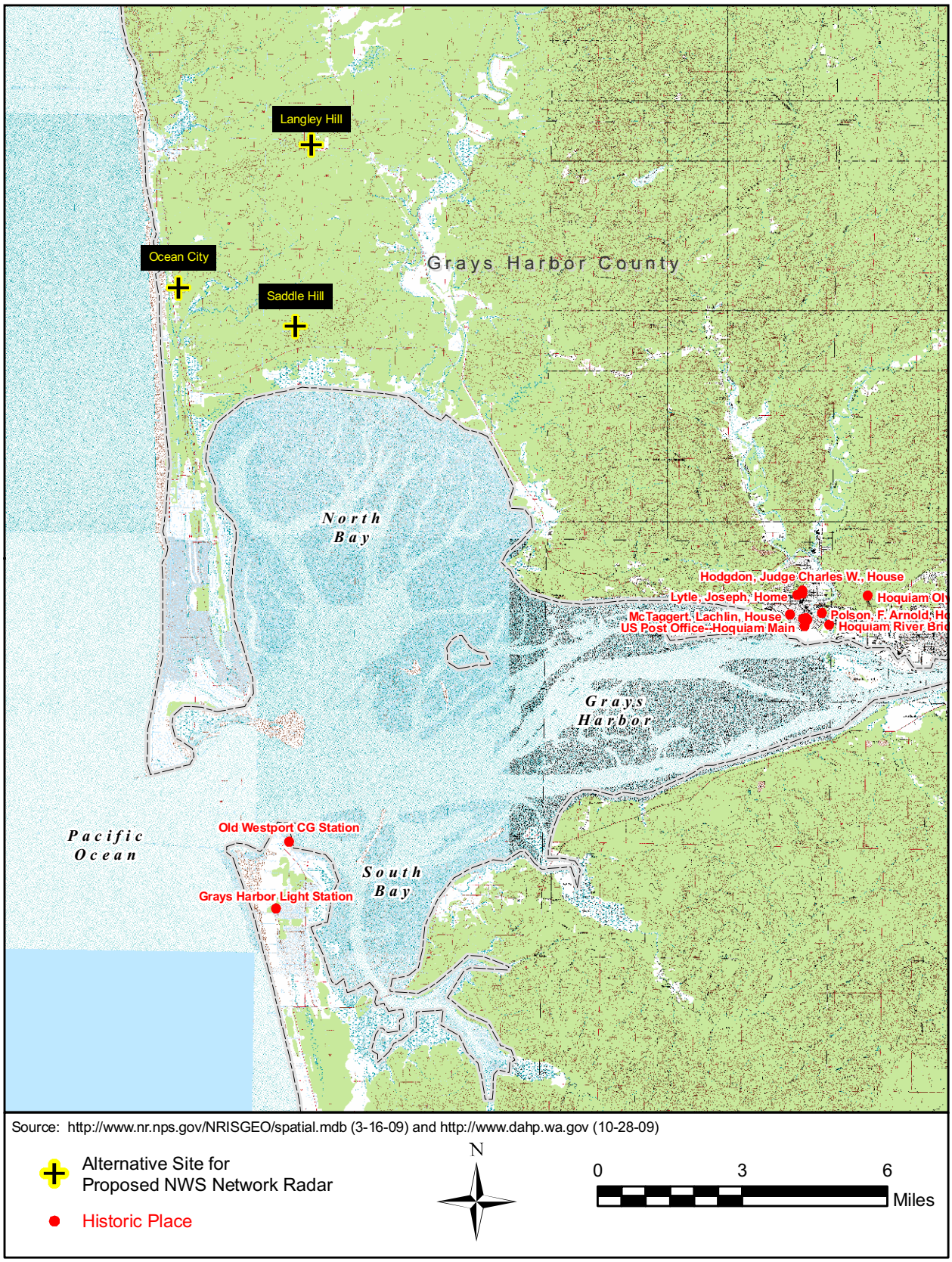


FIGURE 18 HISTORIC SITES LISTED ON NATIONAL REGISTER OF HISTORIC PLACES AND WASHINGTON HERITAGE REGISTER IN VICINITY OF ALTERNATIVE RADAR SITES

Figure 19 shows the APE for installation and operation of an NWS Network Radar at the Langley Hill Site. Structures within the APE for the Langley Hill Site include one modern house on Copalis Beach Road and several small outbuildings (see Figure 19). The Langley Hill Site has been subject to timber harvesting in the last few years. The radar footprint at the Langley Hill Site and access/utility corridors serving the site would be located on previously disturbed land and the likelihood of archaeological resources occurring at this site is low. A record search found no historic places listed on the NRHP and the WHR within the APE for the Langley Hill Site. Based on the results of those investigations, NWS determined that no places listed or eligible for listing on either NRHP or WHR occur within the APE for the Langley Hill Site and none would be affected. Department of Archaeology and Historic Preservation (DAHP) concurs with that determination (see DAHP letter in Appendix A). No significant impacts to cultural resources or historic places would result.

The Draft ESS/EA report was distributed to the Native American tribes of the area for review and comment. No comments on the Draft ESS/EA were received from Native American tribes.

Ocean City Site. Impacts would be similar to those at the Langley Hill Site. Figure 20 shows the APE for installation and operation of an NWS Network Radar at the Ocean City Site. Structures within the APE of the Ocean City Site include a school administration building, several prefabricated homes, storage buildings, rental cabins, and recreational vehicle campgrounds located on First Avenue, Second Avenue, Third Avenue, Fourth Avenue, Fifth Avenue, Pacific Boulevard, Lone Tree Drive, and S.R. 109. The Ocean City Site is a leveled and mowed field. The radar footprint at the Ocean City Site and access/utility corridors serving the site would be located on previously disturbed land and the likelihood of archaeological resources occurring at this site is low. A record search found no historic places listed on the NRHP and the WHR within the APE for the Ocean City Site. Based on the results of those investigations, NWS determined that no places listed or eligible for listing on either NRHP or WHR occur within the APE for the Ocean City Site and none would be affected. DAHP concurs with that determination (see DAHP letter in Appendix A). No significant impacts to cultural resources or historic places would result.

The Draft ESS/EA report was distributed to the Native American tribes of the area for review and comment. No comments on the Draft ESS/EA were received from Native American tribes.

FIGURE 19 AREA OF POTENTIAL EFFECT — LANGLEY HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

FIGURE 20 AREA OF POTENTIAL EFFECT — OCEAN CITY SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

Saddle Hill Site. Impacts would be similar to those at the Langley Hill and Ocean City Sites. Figure 21(a) shows the APE for installation and operation of an NWS Network Radar at the Saddle Hill Site, including the proposed route for upgrade of power lines from two- to three-phase service, which is necessary for operation of the NWS Network Radar. Figure 21(b) shows a large-scale view of the APE in the vicinity of the radar site, superimposed on an aerial photograph. Structures within the APE for the Saddle Hill Site consist of several modern radio towers and electronic shelters and fencing associated with those towers as well as a few modern houses. The Saddle Hill Site has been subject to timber harvesting in the last few years. The radar footprint at the Saddle Hill Site and access/utility corridors serving the site would be located on previously disturbed land and the likelihood of archaeological resources occurring at this site is low. A record search found no historic places listed on the NRHP and the WHR within the APE for the Saddle Hill Site. Based on the results of those investigations, NWS determined that no places listed or eligible for listing on either NRHP or WHR occur within the APE for the Saddle Hill Site and none would be affected. DAHP concurs with that determination (see DAHP letter in Appendix A). No significant impacts to cultural resources or historic places would result.

The Draft ESS/EA report was distributed to the Native American tribes of the area for review and comment. No comments on the Draft ESS/EA were received from Native American tribes.

Mitigation—Applicable to All Three Alternative Sites

The NWS sent copies of the Draft ESS/EA for review and comment to the Confederated Tribes of the Chehalis Reservation, Shoalwater Bay Tribe, and Quinault Indian Nation, pursuant to 36 CFR 800.4(a)(4).

If potentially significant archaeological materials are uncovered during site preparation or construction of the radar, the NWS will halt construction activities that could affect the find and will immediately notify the DAHP, and the local tribal cultural staff and cultural committee, if warranted by the nature of the find.

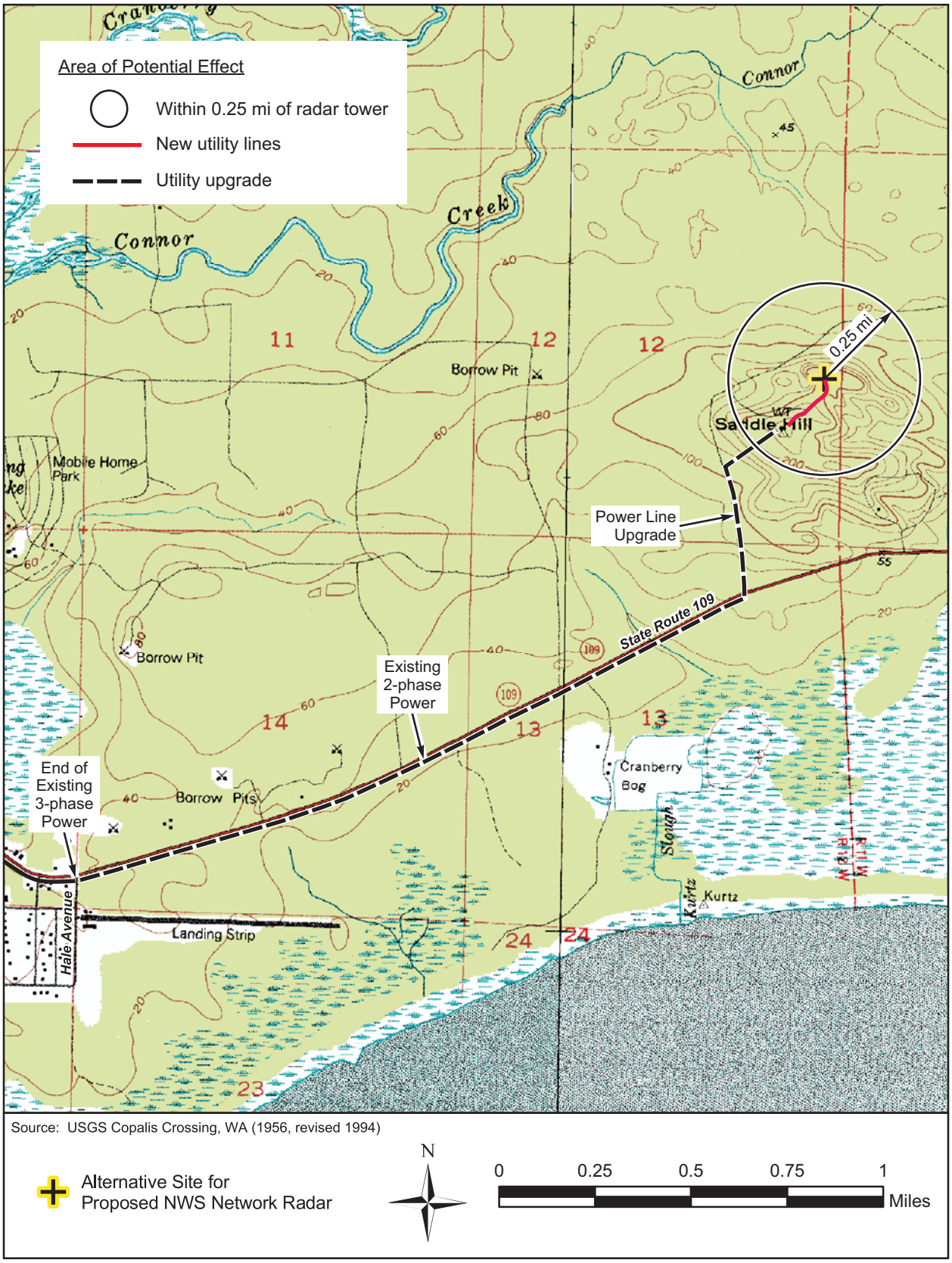


FIGURE 21(a) AREA OF POTENTIAL EFFECT SHOWN ON TOPOGRAPHIC MAP — SADDLE HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

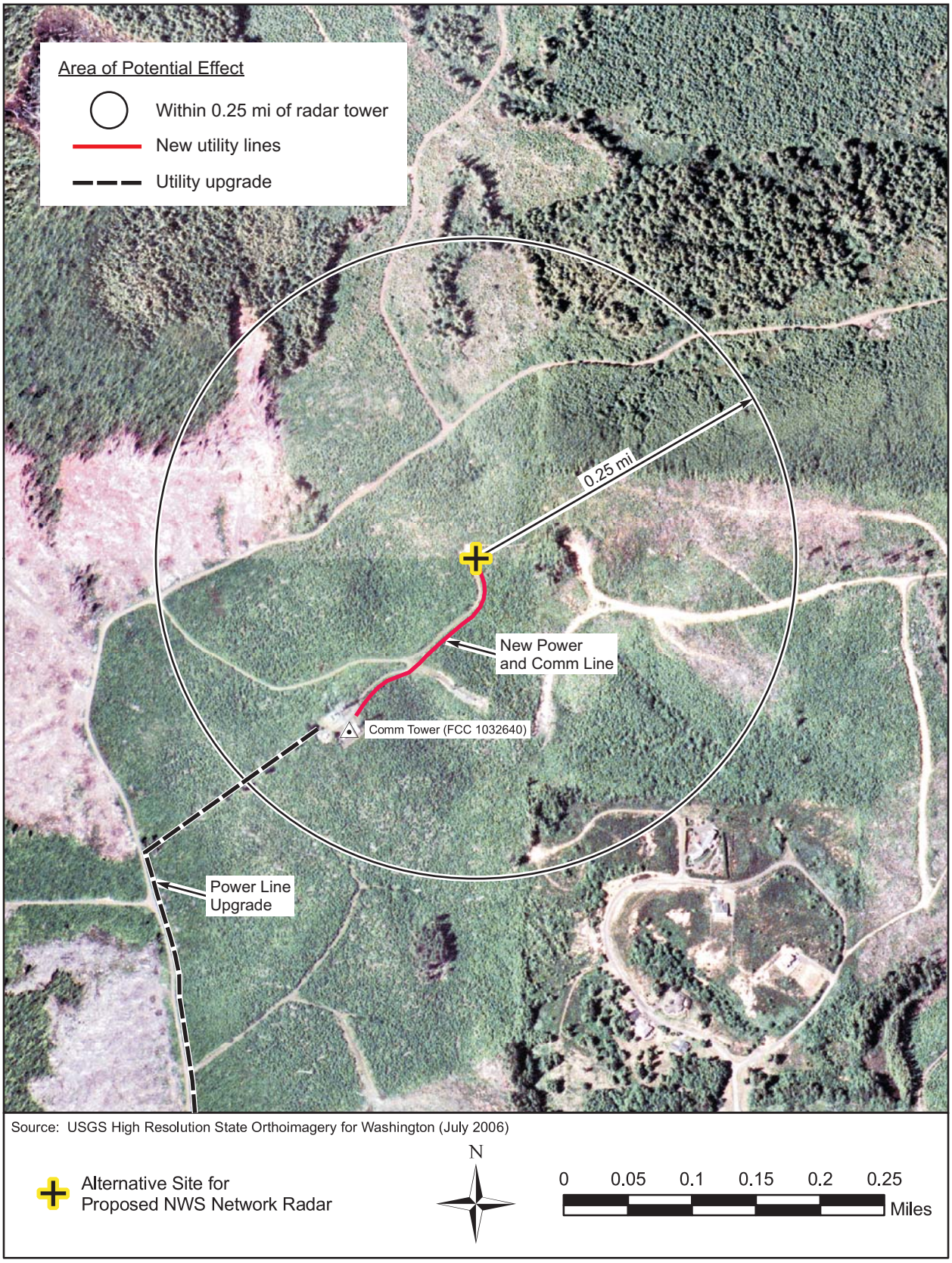


FIGURE 21(b) AREA OF POTENTIAL EFFECT SHOWN ON AERIAL PHOTOGRAPH — SADDLE HILL SITE FOR NWS NETWORK RADAR TO SERVE COASTAL WASHINGTON

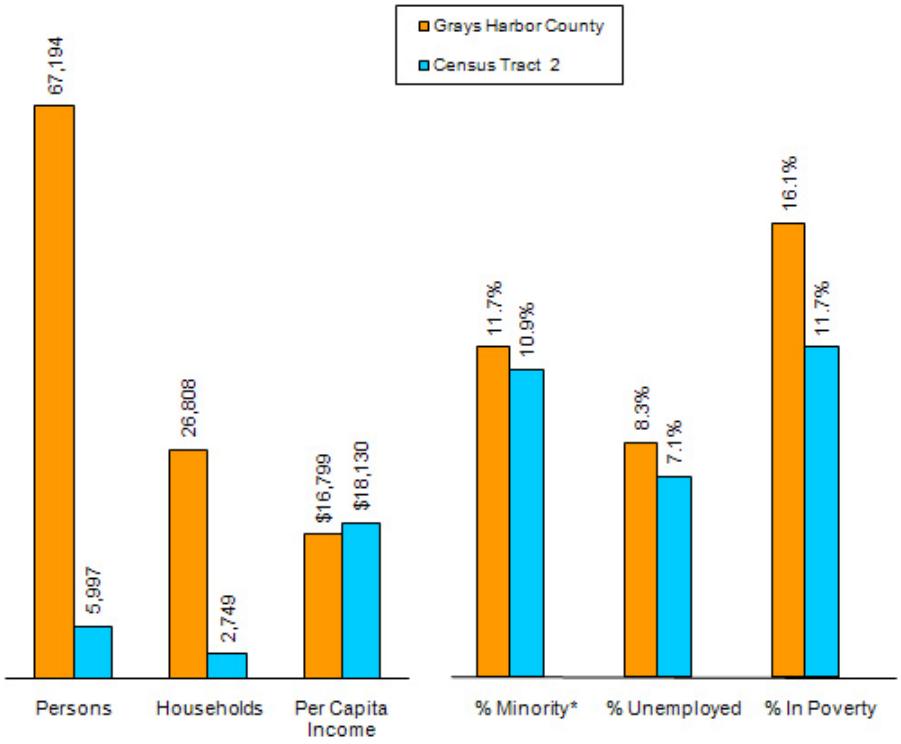
7.3.10 Environmental Justice/ Socioeconomic Impacts

Setting

E.O. 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, requires federal agencies to identify and address, as appropriate, disproportionately high and adverse environmental or human health effects on minority populations and low income populations. Federal agencies, programs, and policies should not exclude people and populations of people based on race, color, or nationality from federal activities or benefits of such activities. Minority communities and low income communities must also have access to public information on matters related to human health and the environment [President, 1994].

The alternative sites are all located in Census Tract 2 in Grays Harbor County, which has a population of 5,997 persons. Compared with the county as a whole, Census Tract 2 has somewhat higher per capita income and lower rates of unemployment, persons living in poverty, and percentage of minorities in the population (see Chart 1). About 11% of the tract's residents are minorities.

Chart 1.
Census Data for Census Tract 2 and Grays Harbor County, Washington



*Minority = persons of Black or African-American, American Indian, Alaskan Native, Asian, Native Hawaiian and Pacific Islander, Hispanic or Latino, or other (non-white) race.

The three alternative sites are located in Grays Harbor County, Washington. According to the year 2000 census, Grays Harbor County had a total population of 67,194 persons. Per capita income was $16,799 per year. Based on the year 2000 census, the county's gross domestic product (GDP) is $1.13 billion per year. Although economic growth has occurred since the year 2000, the recent nationwide recession has affected Grays Harbor County. The county unemployment rate reached 11.3% in 2009 and is expected to continue to rise [Grays Harbor Economic Development Council, 2009)].

Consequences—All Three Alternative Sites

Construction and operation of the proposed NWS Network Radar at any of the three alternative sites would not generate noxious emissions or pollutant streams. Temporary noise and traffic impacts would occur during the construction period. After construction is complete, the primary environmental effect would be the visual presence of the radar tower. Compared with Grays Harbor County as a whole, the census tract containing the three alternative sites does not contain significant minority or low-income populations. Disproportionately high and adverse environmental or human health effects would not result to minority or low-income populations in the vicinity.

The expected cost of procuring and installing the NWS Network Radar is $9 million. However, much of that expenditure would be for purchase of equipment and engineering design studies, which would occur outside Grays Harbor County. An estimated $2 million would be spent in the county to construct the radar and install an access drive and utility lines serving the radar. The local construction expenditures would provide a modest boost to the economy of Grays Harbor. Assuming a multiplier of three for local construction expenditures, the economic benefit to the economy of Grays Harbor County would be $6 million, which would represent 0.5% of the annual GDP. While this economic impact would be beneficial, it would not be significant when compared with the overall economy of the county. Indirectly, the NWS Network Radar would provide improved weather forecasts and data that would benefit many of the industries (such as fishing, tourism, shipping, logging) of Grays Harbor.

Mitigation—Applicable to All Three Alternative Sites

None required.

7.3.11 Farmlands

Setting

The Farmland Protection Policy Act (FPPA) sets forth federal policies to prevent the unnecessary conversion of agricultural land to non-agricultural use. NRCS regulations at 7 CFR Part 658, FPPA, are designed to implement those policies. Regulations at 7 CFR 658.2(a) exclude from definition as farmland those lands already in urban use or committed to urban development or water storage. Completion of Form AD-1006 and submission to the U.S. Department of Agriculture (DoA) is required if a federal agency proposes to convert land designated as prime farmland, farmland of statewide importance, or unique farmland to non-agricultural use.

The Langley Hill Site is located on timberland and is vegetated with a planted forest comprised primarily of immature hemlock trees. Soil at this site is Newskah loam, 8 to 30% slopes, which is classified as farmland of statewide importance.

The Ocean City Site consists of a mowed grass field in a developed area. Soil at this site is Wishkah silty clay loam, which can support prime farmland if the soil is drained. This site is in an urban use and committed to development, as evidenced by its inclusion in an R-3 zoning district by Grays Harbor County.

The Saddle Hill Site is located on recently harvested timberland and is vegetated with brush and grass. Soil at this site is Calawah silt loam, 8 to 30% slopes, which is classified as farmland of statewide importance. A portion of the existing access road crosses Calawah silt loam on 1 to 8% slopes, which is considered prime farmland.

Consequences—All Three Alternative Sites

Construction of the proposed NWS Network Radar at the Langley Hill Site would remove approximately one acre of land from potential agricultural (timber production) use. An additional 0.1 acre of land would be removed from timber production for installation of utility lines serving the radar if located at the Langley Hill Site. Existing logging roads would be upgraded to provide access to the site and would not remove land from timber production. Thus, a total of approximately 1.1 acres of timber land of statewide importance would be converted to non-agricultural use at the Langley Hill Site.

Construction of the proposed NWS Network Radar at the Saddle Hill Site would remove approximately one acre of land from potential agricultural (timber production) use. Installation of utility lines serving the radar would occur along S.R. 109 and existing roads providing access to the crest of Saddle Hill and the proposed radar site. Those roads would be upgraded as necessary to provide access to the Saddle Hill Site. Installation of utility lines and upgrade of existing roads would not remove land from timber production. Thus, a total of approximately one acre of timber land of statewide importance would be converted to non-agricultural use at the Saddle Hill Site.

If the Langley Hill or Saddle Hill Site is selected by the NWS, completion of Form AD-1006 and submission to the NRCS would be required to comply with FPPA requirements. Because the Ocean City Site is already committed to urban development, completion of Form AD-1006

would not be required for that site. Construction of the proposed radar on any of the sites would result in conversion of up to 1.1 acres of farmland of statewide importance to government (that is, non-agricultural) use. That impact would be insignificant.

Mitigation—Applicable to Langley Hill or Saddle Hill Sites

If the Langley or Saddle Hill Site is selected, the NWS would complete Form AD-1006 and submit it to the NRCS.

7.3.12 Energy Consumption

Setting

Grays Harbor PUD provides electric service to the county. Existing electric power lines are located along Copalis Beach Road, Fourth Avenue, and S.R. 109 in the vicinity of the three alternative sites.

Consequences—All Three Alternative Sites

Grays Harbor PUD would provide primary electric service to the radar via extension of existing electric power lines to the facility. The radar would have 200-amp 208Y/120 primary electric service. Average monthly electric consumption by a similar radar (Airport Surveillance Radar, Model 11 serving Stockton Municipal Airport) is 18,800 kW-hours per month. It is expected that the NWS Network Radar would consume similar amounts of electricity. Consumption of electricity would not vary significantly among the three alternative sites. The radar would be equipped with a transitional power maintenance unit and a standby diesel generator to provide service if primary power is lost. The generator would be equipped with an AST with capacity to store approximately 1,000 gallons of fuel. The standby generator would operate only during periodic testing and maintenance (approximately once per month) and during failure of primary power. It is expected that total hours of operation of the generator would be less than 200 per year. Diesel fuel consumption by a 100 kW generator operating at full load would be approximately 6.8 gallons per hour [Pramac, n.d.]. Thus, fuel use by the standby generator would be no more than 1,360 gallons per year. Energy consumption would not be significant.

Mitigation—Applicable to All Three Alternative Sites

None required.

7.3.13 Visual/Light Emissions

Setting

The 41-mile section of S.R. 109 between Hoquiam and Toholah, which is in proximity to the three alternative sites, is a designated Washington State Scenic Byway (see Figure 22). This byway is known as the Hidden Coast Scenic Byway and provides views of pristine beaches and rugged cliffs. In addition, large numbers of shorebirds migrate through this area in the spring [WSDOT, 2009]. S.R. 109 supports a large number of recreational travelers, and highway access is the primary mode of transportation in the area.

The Langley Hill Site is adjacent to Copalis Beach Road, a two-lane paved road. The site and vicinity are mostly vegetated with immature forest, comprised primarily of hemlock trees. The dense forest prevents long-range views from ground level on this hill, except longitudinal views along the axis of Copalis Beach Road. This site is approximately 2.9 mi east of the Hidden Coast Scenic Byway (that is, S.R. 109).

The Ocean City Site is at the eastern edge of the unincorporated community of Ocean Beach. It is at the terminus of Fourth Avenue, a paved two-lane road, and approximately two blocks from S.R. 109. The nearest development is a two-story school administration building. Buildings and forest block long-range views from ground level at this site. This site is approximately 0.1 mi east of the Hidden Coast Scenic Byway (that is, S.R. 109).

The Saddle Hill Site is located on a recently cleared hilltop, which is vegetated with low brush. Most of the land in the vicinity is undeveloped; however, several steel-lattice radio towers are located on this hilltop and residences are located on the southeastern flank of the hill. Long-range views of North Bay and development along the shoreline of the bay west of Hoquiam are available from the hill crest. This site is approximately 0.5 mi north of the Hidden Coast Scenic Byway (that is, S.R. 109).

Consequences—All Three Alternative Sites

The proposed NWS Network Radar is a spherical white fiberglass radome mounted on a free-standing (that is, lacking guy wires) steel-lattice tower. Two one-story shelters containing electronic equipment and a standby diesel generator would be located at the base of the tower. The tower and shelters would be contained within a 102 ft × 68 ft area surrounded by a 7 ft tall chain-link fence (see Figure 2). A steady burning red aviation warning light may be installed at the top of the radome. Other than the aviation warning light, the radar tower and radome would not be visible. If located at the Langley Hill Site, the radar shelters and fencing would only be visible from a short section of Copalis Beach Road. The dense forest would block views from other directions. The tower and radome would be a prominent new visual element and would be visible from a large segment of that road. The tower and radome would rise above the forest and be visible from Ocean Beach Road and S.R. 109, but at a distance of 1.5 to 3 mi. Due to the distance to Ocean Beach Road and S.R. 109, the radar tower and radome would be minor visual elements on the horizon, although they would contrast with the dark green of the surrounding forest. The community of Copalis Crossing is located approximately 1.5 mi east of this site.

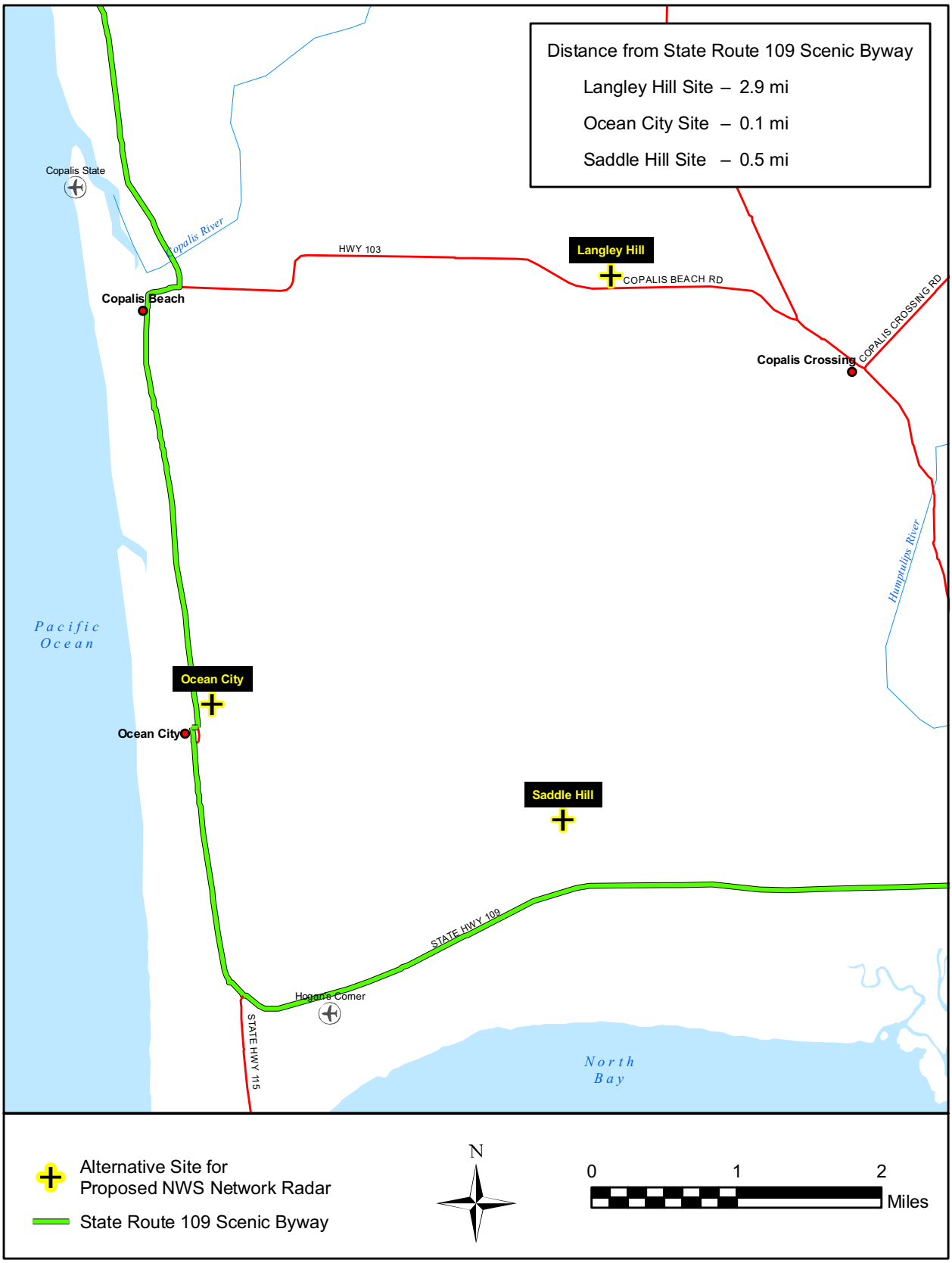


FIGURE 22 ALTERNATIVE SITES SELECTED BY NWS FOR FURTHER CONSIDERATION AND STATE ROUTE 109 SCENIC BYWAY

The tower and radome may be visible from the community of Copalis Crossing, but would appear as a minor feature on the distant horizon and would not dominate the viewshed. The radar would be located 2.9 mi from S.R. 109, a scenic byway. At that distance, the proposed radar tower and radome would generally not be visible from S.R. 109. The nearest residences are single-family houses on Copalis Beach Road approximately 1,000 ft from the site. The dense surrounding forest would shield exterior lighting at the radar facility and prevent adverse effects on residences. The forest is evergreen and would provide shielding throughout the year.

If located at the Ocean City Site, the radar facility would be visible from Fourth Avenue and nearby streets of the Ocean City community. The tower and radome would be a new and substantial visual element rising above all other structures in the community. It would be visible and prominent to motorists on S.R. 109 approaching Ocean City from the north and south, and also in views from the Pacific Ocean shoreline and beach west of Ocean City. In these views, it would be associated with the existing structures, especially the large school administration building, of the community. The radome would be prominent due to its color and shape, but because of its location within a developed area, it would not significantly alter the visual quality of the area. The tower and radome would be located on the inland side of S.R. 109 and would not impact views of the ocean, shoreline, and beach from the highway. The closest residences are located 400 to 500 ft southwest and northwest of the proposed radar sites. Exterior lighting of the radar facility would not affect residents due to the distance and intervening structures and vegetation.

If located at the Saddle Hill Site, the radar shelters and fencing would not be visible from public roads. Due to the proposed location of the radar on the north side of the hill approximately 0.5 mi from S.R. 109, the ability of motorists to see the radome and tower would be very limited. The southern slopes of the Saddle Hill Site slope steeply down to the road and are partially forested, obstructing views of a structure on the north side of the hill. As a result, the proposed tower and radome would not be a prominent visual element within the S.R. 109 viewshed. The closest residences are single-family houses on Alpine Loop, approximately 1,400 ft southeast of the radar site. Due to the distance to the nearest residences, exterior lighting at the facility would not adversely affect occupants of those residences.

The proposed NWS Network Radar tower and radome would be visible from segments of S.R. 109, a state-designated scenic byway, but would not significantly change the visual quality of the local viewshed. Exterior lights at the facility would not adversely affect the closest residences. Visual effects and light emissions would not be significant.

Mitigation—Applicable to Langley Hill, Ocean City, and Saddle Hill Sites

To minimize the potential for exterior lighting of the radar facility to affect nearby properties, lighting would be shielded and directed to minimize the amount of light spilling outside the fenced area.

7.3.14 Radio Frequency Effects

Setting

The proposed NWS Network Radar would be very similar in radio frequency (RF) emissions and characteristics (for example, transmit power, frequency, antenna gain) to the WSR-88D. Therefore, previous RF radiation assessments that were performed and reported for the WSR-88D are applicable to the proposed NWS Network Radar to serve Coastal Washington.

The effects of microwave radiation are often confused with the effects of higher frequency radiation such as ultraviolet light, X-rays, and gamma rays. These higher-frequency forms of radiation are called ionizing radiation because they can displace electrons from molecules (that is, ionize the molecules) in animal tissues, causing permanent damage. Ultraviolet radiation contained in sunlight is a common example of ionizing radiation that can harm the human body if exposure levels are sufficiently high.

In contrast, non-ionizing radiation, such as radio signals, microwaves, or infrared emissions, contain insufficient energy to ionize molecules in biological tissues. The NWS Network Radar or WSR-88D radio signal is one form of non-ionizing radiation. However, non-ionizing radiation can cause heating of body tissues if the amount of energy absorbed by the tissue exceeds the ability of the body's thermoregulatory system to dissipate the heat. Excessive heating can be dangerous, hence, the rate of heating is critical. Adverse biological effects have been shown to result from exposure to RF radiation that exceeds the body's ability to dissipate heat.

Microwave energy heats most effectively those objects that have sizes, shapes, or compositions that trap the radiation through resonance or absorption. Both resonance and absorption rates are very sensitive to the frequency used. The WSR-88D operates at radio frequencies that are inefficiently absorbed by humans and wildlife, and consequently cause little heating. The amount of energy absorbed by humans exposed to the WSR-88D radio signal is well below the ability of the body's thermoregulatory system to dissipate heat. Thus, exposure to the WSR-88D radio signal does not result in ionization or heating of body tissues.

Consequences—All Three Alternative Sites

The NWS prepared a detailed study of the power density of the WSR-88D radio signal during initial deployment of the radar network in the early 1990s [Next Generation Weather Radar Joint System Program Office, 1993]. The calculations contained in that earlier environmental document are accurate and valid for the proposed NWS Network Radar to serve Coastal Washington. The radar would emit a radio signal in the 2,700 to 3,000 MHz frequency band with a maximum power output of 475 kW. The radio signal will be in the form of a narrow beam with a width and height of approximately one degree. The radar antenna would rotate and step up and down in elevations using a scan pattern to cover most of the sky. The minimum elevation angle at which the WSR-88D main beam currently operates is 0.5 degree above the horizon.

The Institute of Electrical and Electronics Engineers (IEEE) has developed safety guidelines for human exposure to RF radiation, which has been approved by the American National Standards Institute (ANSI) (ANSI/IEEE, 2005). The ANSI/IEEE safety standard is designed to protect all persons (including infants, elderly persons, pregnant women, and so forth) from adverse health

effects from exposure to RF, even if exposure should last over an entire lifetime. These guidelines set safety levels for maximum permissible exposure (MPE) to RF signals, which include a 10- to 50-fold safety margin and are intended to protect all members of the population. MPEs are specified in power density of the radio signal in milliwatt(s) per square centimeter (mW/cm^2) and vary with operating frequency. Separate MPEs have been established for exposure of the general public and workers and for time-averaged exposure and peak exposure. At the operating frequency of the NWS Network Radar, the time-averaged MPE level (that is, safety standard) for exposure of the general public is 1.0 mW/cm^2, based on averaging time of 30 minutes. The safety standard for occupational exposure is 9.0 to 10.0 mW/cm^2, based on an averaging time of 6 minutes.

The proposed NWS Network Radar would be mounted on a 20 m to 30 m tall steel-lattice tower. The center of the antenna height would be 82 to 114 ft AGL. Because the radar would be located at the highest ground in the local area, the radar's main beam would not illuminate the ground in proximity to the radar. The main beam would illuminate ground at distances of many miles from the radar, but the energy intensity of the beam would be greatly reduced at those distances. If mounted on the 30 m tower, the maximum average power density at ground level, the maximum RF level to which the general public could be exposed, would be less than 0.0003 mW/cm^2, 3,333 times lower than the current U.S. safety standard. If mounted on a 20 m tower, the maximum RF level to which the public could be exposed would be 0.001 mW/cm^2, a factor of 1,000 times below the safety standard. No safety hazards would result from exposure of the general public to RF emissions from the proposed NWS Network Radar. The WSR-88D radio signal would also comply with the MPE for occupational exposure.

High-power radar, such as the WSR-88D, can interfere with operation of radio, television, cellular telephone, and cordless telephones in close vicinity to the radar antenna. However, these devices operate at different frequencies from the WSR-88D, reducing the potential for radio interference. Based on the experience of the NWS in operating a nationwide network of over 100 radars for the last 15 years, the potential for electromagnetic interference with radio, television, or telephone interference is very low.

Electro-explosive devices are used to detonate explosives, separate missiles from aircraft, and propel ejection seats from aircraft. Under extreme circumstances, electromagnetic radiation can cause unintended firing of electro-explosive devices. Calculations based on a U.S. Air Force (USAF) standard indicate that using electric blasting caps at distances beyond approximately 900 ft from the relocated WSR-88D is a safe practice, even in the main beam of the radar, where the power density of the WSR-88D radio signal is greatest [USAF, 1982]. The U.S. Navy Hazards of Electromagnetic Radiation to Ordnance (HERO) regulations uses a slightly larger safe distance of 1,524 ft for exposure of HERO susceptible ordnance [Naval Sea Systems Command, 2005]. Because the main beam would not be directed downward far enough to illuminate objects close to the ground (within 900 ft or 1,524 ft), the WSR-88D would not be a threat to electro-explosive device operations in the vicinity.

Electromagnetic fields can induce currents in conductive materials and those currents can generate sparks when contacts between conductive materials are made or broken. Sparks can

ignite liquid fuels, such as gasoline. This phenomenon is rare, but can result in hazards to human health and property. The USAF has developed a standard for the power density of RF energy that can be hazardous to fueling activities. The USAF considers RF fields exceeding 5.0 mW/cm^2 hazardous to operations involving the transfer of liquid fuels [USAF, 1971]. The power density of the proposed NWS Network Radar would not exceed this threshold, even within the main beam of the radar. The U.S. Navy uses a safe standoff distance based on radar operating characteristics [Naval Sea Systems Command, 2003]. For the NWS Network Radar, the safe distance would be 537 ft (164 m). The main beam of the radar would be well above the ground at that distance and exposure of fueling operations would be very unlikely. Based on either the USAF or the Navy regulations, the proposed radar would not be a hazard to fueling operations.

The proposed radar, if located at any of the alternative sites under consideration, would comply with the national safety standards for human exposure to radio emissions. The radar would not be expected to interfere with reception of television, radio, or cellular or wireless telephone reception. The radar signal would not be a hazard to blasting caps or fueling operations. These findings are applicable to all alternative sites.

Mitigation—Applicable to Langley Hill, Ocean City, and Saddle Hill Sites

The NWS would install a fence around the radar and lock the entrance gates to the facility to prevent unauthorized entry.

7.3.15 Solid and Hazardous Waste

Setting

The three alternative sites are undeveloped. The Langley Hill and Saddle Hill Sites are located on timber production land and contain immature trees, which are growing back after previous timber harvests on these properties. These sites were inspected by a Registered Environmental Assessor on November 3 and 4, 2009. There are no structures on either of these two proposed sites and no evidence of waste disposal or soil contamination. Evidence of contamination (such as stained soil, stressed vegetation, chemical odors) was not present at either site.

The Ocean City Site is a mowed grass field used in the past for recreational purposes. The site was inspected by a Registered Environmental Assessor on November 4, 2009. The site does not contain structures, accumulations of waste, stained soils, or stressed vegetation. However, the owner of the Ocean City Site also owns and operates a bus storage yard adjacent to the northern border of the proposed radar site. The bus yard contains a diesel fuel tank, which lacks secondary containment. Stained soil was observed under the tank. There are also accumulations of solid waste at the eastern and western portions of the bus storage yard. Wastes deposited on the property include desks and chairs, plastic sheeting, metal sheeting, metal and plastic pipes, tires, a commode, lumber, unlabeled five-gallon buckets containing liquids, and a television set. The School District plans to move bus storage to a new yard in Ocean Shores and discontinue use of the existing bus storage yard on August 15, 2010. As part of that move, it will remove the existing diesel fuel tank. Although the solid wastes at the bus storage yard are outside the proposed radar site, they are within 200 ft of the site and at higher elevation, creating a potential

for transport of contaminants onto the proposed radar site through surface or subsurface movement.

Consequences—All Three Alternative Sites

Construction of the proposed radar, upgrade of the access drive, and installation of underground utility lines would generate solid wastes typical of a construction site, including building scraps, lumber, metal parts, cables, waste paper, empty containers and packaging, and vegetative materials. These wastes would be removed from the construction site for recycling or disposal at a licensed facility. The radar facility would be very similar at each of the three alternative sites, and the amount of waste generated during radar construction would not vary greatly. If the NWS Network Radar is located at the Saddle Hill Site, upgrade of power lines along S.R. 109 from two-phase to three-phase service, and installation of approximately 4,500 ft of underground utility conduit along the access drive would be required. In comparison, the Langley Hill and Ocean City Sites would require installation of only 500 and 100 ft, respectively, of underground utility conduit to serve the radar. Development of the Saddle Hill Site would result in generation of larger amounts of solid waste than development of either of the other two alternative sites.

During operation, the radar would generate small quantities of solid waste, which would be periodically removed from the site for disposal. The radar would be equipped with a standby diesel generator to provide electric power in case of loss of primary electric service. The generator would include a roughly 1,000-gallon tank for diesel fuel. The tank would be located above ground in a masonry building with secondary containment to prevent release of fuel to the environment. The fuel storage tank would also be equipped with an overflow alarm.

Mitigation—Langley Hill and Saddle Hill Sites

If the Langley Hill or Saddle Hill Site is selected, NOAA would conduct a Phase 1 environmental due diligence audit (EDDA) of the proposed radar site and easements in conformance with American Society of Testing and Materials (ASTM) E1527 Standard.

Mitigation—Ocean City Site

If the Ocean City Site is selected, NOAA would conduct a Phase 2 EDDA of the proposed radar site and easements in conformance with ASTM E1527 Standard. The Phase 2 EDDA would include sampling and testing of soil at the proposed radar site to determine if contaminants have migrated onto the site from the adjacent bus storage yard. If the Phase 2 EDDA study finds that contaminants are present at levels of concern at the proposed radar site or access/utility easement, corrective action should be undertaken prior to construction of the NWS Network Radar.

7.3.16 Wild and Scenic Rivers

Setting

The Wild and Scenic Rivers Act of 1968 protects free-flowing rivers of the U.S. These rivers are protected under the Act by prohibiting water resource projects from adversely impacting values of the river: protecting outstanding scenic, geologic, fish and wildlife, historic, cultural, or recreational values; maintaining water quality; and implementing river management plans for

these specific rivers. There are three designated wild and scenic rivers in Washington State: Klickitat, Skagit, and White Salmon rivers. All designated wild and scenic rivers are located outside of Grays Harbor County [DoA Forest Service, Bureau of Land Management, USFWS, National Park Service, 2008].

Consequences—All Three Alternative Sites

There are no designated wild and scenic rivers within Grays Harbor County. All wild and scenic rivers are too far from the three alternative sites to be impacted by the proposed radar.

Mitigation—Applicable to All Three Alternative Sites

None required.

7.3.17 Cumulative Impacts

Langley Hill Site. This proposed site is located in a rural portion of Grays Harbor County. Construction of a radar facility at Langley Hill would result in removal of approximately 1.2 acres of Western hemlock and spruce trees approximately 12 years before they would typically be harvested. This would cumulatively add to tree removal due to timber harvesting in the local area, but would not result in impacts to protected species. A new 143 ft tall radio tower along Copalis Beach Road would be visually prominent and would add to the visual impacts from two existing taller radio towers along the road. Copalis Road is not a scenic byway and cumulative visual impacts would not be significant. Substantial new development is not expected in the Langley Hill area. Cumulative impacts from installation of the radar and other nearby development would not be significant.

Ocean City Site. The Ocean City Site is located in the small community of Ocean City. Due to its location on the Pacific Shoreline, Ocean City has several recreational vehicle resorts and vacation cabins. S.R. 109 is a scenic highway. A new radar tower would be visible to motorists using S.R. 109, but would be one block from the highway and set among other urban development, including a nearby school administration building. The radar tower would not significantly change the visual character of the area. Substantial new development is not expected in the Ocean City area; cumulative impacts from installation of the radar and other nearby development would not be significant.

Saddle Hill Site. This proposed site is located in a rural portion of Grays Harbor County. S.R. 109 passes south of Saddle Hill and is a scenic highway. A new radar tower would be visible to motorists using S.R. 109, but would be located on the far side of the hill from the highway. The existing radio towers on this hill are much taller than the proposed radar tower would be, and are located closer to the highway. The radar tower would cumulatively add to the visual impacts from a cluster of radio towers on Saddle Hill, but not significantly change the visual character of the area. The proposed site was recently clear cut and only removal of brush and small trees would be required to construct the radar. Other than construction of scattered single-family residences, substantial new development is not expected in the Saddle Hill area. Cumulative impacts from installation of the radar and other nearby development would not be significant.

7.4 NO ACTION ALTERNATIVE

This alternative assumes that the NWS would not install a network radar to serve the Coastal Washington area. In the absence of a radar, the meteorological data that would be collected by the proposed radar would not be available to government forecasters and, consequently, the expected improvement in accuracy and timeliness of forecasts and severe weather warnings would not be achieved. The environmental consequences arising from installation and operation of a network radar would also not occur. Those consequences would vary depending on which of the three alternative site locations are chosen for the radar, and are summarized below.

The proposed radar would be a new land use in this mostly rural area, but would be consistent with nearby land uses and existing zoning policies of the area. The radar tower would be a prominent visual element contrasting with the mostly forested viewsheds in the vicinity of the Langley Hill or Saddle Hill Sites. The Ocean City Site is more urbanized and the radar would be visually compatible with this human-influenced landscape. However, the Saddle and Langley Hill Sites are not located within viewing distance of scenic highways, while the Ocean City Site is in proximity to S.R. 109, a scenic highway. A radar tower at any of the three sites would result in minor insignificant visual impacts. The no-action alternative would result in no visual impacts.

Construction of the radar at any of the three alternative sites would result in temporary impact during the roughly 6-to-12-month construction period. These impacts would include generation of noise and dust, and increased traffic on local roadways. None of these impacts would be significant; all would be completely avoided if NWS takes no action. Construction of the radar would require clearing of vegetation from approximately one acre of land. Critical habitat for protected species would not be affected. Impacts to biological resources would be insignificant for construction for the radar at any of the three alternative locations, or for the no-action alternative.

During operation, the radar would generate small amounts of air pollutants during maintenance testing or operation of the standby diesel generator. This would occur for only a few hours per year, depending on the duration of power outages, and would not be significant. The standby diesel generator would generate acoustic noise, but, if located at any of the three alternative locations would be sufficiently distant from residences, hospitals, schools, or other noise-sensitive uses to not adversely affect those uses. The radar would emit an RF signal in the 2,700 to 3,000 MHz band; the RF signal would comply with national safety standards and would not expose persons outside the fenced compound to safety hazards. The radar would also generate a few trips on local roads by maintenance vehicles. The number of trips would be too few to affect operation of local roads. The no-action alternative would not result in emissions of air pollutants, or generate noise, RF emissions, or vehicle trips.

7.5 EA FINDINGS

This EA evaluates the potential for construction and operation of an NWS Network Radar to serve Coastal Washington to affect the quality of the human environment. The EA analyzes three alternative sites for the proposed radar and the no-action alternative. Environmental impacts expected to result from construction and operation of the proposed radar at each of the three alternative sites would be minor and could be avoided or reduced in intensity through application of measures contained in this EA. No significant impacts to the environment would result from implementation of any of the alternatives evaluated in this report.

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8 COMMUNITY INVOLVEMENT

8.1 PUBLIC REVIEW OF DRAFT ESS/EA

NOAA prepared this Final ESS/EA in conformance with NOAA Administrative Order 216-6, *Environmental Review Procedures for Implementing the National Environmental Policy Act*, and NEPA. This Final ESS/EA examines the potential impacts to the human and natural environments that could result from the construction and operation of an NWS Network Radar to serve Coastal Washington. This Final ESS/EA analyzes three alternative sites for the new NWS Network Radar and the no-action alternative.

During preparation of this Final ESS/EA, federal, state, and local agencies and organizations were consulted. The Draft ESS/EA was distributed to interested members of the public, and government agencies for review and comment in March 2010. Additionally, NWS made electronic copies of the Executive Summary and the full text of the Draft ESS/EA available for download on an NWS worldwide web site (http://www.wrh.noaa.gov/wrh/washington _coast_doppler_radar/). An NOA for the Draft ESS/EA was published in *The Daily World* of Aberdeen, Washington, on March 15, 2010 (see affidavit of publication in Appendix A). NOAA established an official period for review of the Draft ESS/EA and submission of comments on possible impacts to the human and natural environments that could result from the proposed action. The 31-day comment period lasted from March 15, 2010 through April 16, 2010. Eleven comment letters/emails were received by NOAA during the official comment period on the Draft ESS/EA. Table 7 lists persons, agencies, and organizations who submitted comment on the Draft ESS/EA.

Table 7. Comments on Draft ESS/EA Received by NWS during Official Comment Period

Letter / Email No.	Author/Organization	Date
1	Tony Sermonti	March 16, 2010
2	Brian Tole	March 17, 2010
3	Geoffrey Glass, Olympic Region Clean Air Agency	March 17, 2010
4	Ronald Thomasson, Coast Communications	March 17, 2010
5	Helen Peters	March 17, 2010
6	Albert A. Carter, Terry Willis, and Mike Wilson, Board of Commissioners, Grays Harbor County	March 19. 2010
7	Jaen P. Henry	March 21, 2010
8	Arthur (R.D.) Grunbaum, Friends of Grays Harbor County	March 23, 2010
9	John Andrews	March 27, 2010
10	Jenni Dykstra, U.S. Fish and Wildlife Service	April 7, 2010
11	Mike Drumright and Roberta Wood, Department of Ecology Southwest Regional Office	April 16, 2010

8.2 RESPONSES TO COMMENTS

This section includes responses to all pertinent questions and comments on the Draft ESS/EA received during the official comment period. All letters and emails commenting on the Draft ESS/EA are reprinted in Appendix C.

Response to Comments from Tony Sermonti. Mr. Sermonti stated his support for the weather radar system. Further, Mr. Sermonti notes the report is missing language regarding damage to the radar from the salt air because of the close proximity to the coast and he hopes that the radar is built for coastal conditions.

> The NWS operates a number of radars in coastal locations and plans to draw on this experience when designing and constructing the proposed radar to serve Coastal Washington. The proposed radar would be constructed of materials, such as galvanized steel and masonry, designed to withstand severe weather. NWS would select electronic, heating, ventilation, and air conditioning systems that are appropriate for the maritime climate and weather conditions of Grays Harbor County.

Response to Comments from Brian Tole. Mr. Tole suggested a possible radar site for further consideration. He suggested Point Grenville, an abandoned naval facility over four miles north of Pacific Beach.

> As stated in the PSS, the radar signal would be significantly blocked to the northeast, east, and southeast by the Olympic Mountain Range if the radar is located north of Pacific Beach (that is, Point Grenville). As a percentage of theoretical maximum coverage at 2,000 ft above site level, a radar at Pacific Beach could achieve 68.7% coverage [SRI International, 2009], as compared to 73.6 to 76.5% coverage for a radar located at one of the three alternative sites examined in this report. A radar located at Point Grenville would be expected to provide coverage similar to that of a radar at Pacific Beach. Therefore, the alternative site proposed in this comment would be less advantageous to the NWS than the three alternative sites examined in the ESS/EA.

Response to Comments from Geoffrey Glass, Olympic Region Clean Air Agency. ORCAA noted that Section 7.3.5 of the Draft ESS/EA is incorrect with respect to the brake-horsepower rating of standby generators that are exempt from ORCAA's permitting program.

> The ESS/EA text has been changed to "500 brake-horsepower or less" as recommended by ORCAA. The 100 kW energy standby generator, which would support the proposed NWS Network Radar, would be below the 500 brake-horsepower threshold and would be exempt from ORCAA's permitting program.

Additionally, ORCAA notes ORCAA Rule 8.3(d) prohibits construction unless precautions are taken to prevent air pollution.

> The NWS would conform to ORCAA Rule 8.3(d). Measures to minimize emissions of construction-related air pollutants are listed in Section 7.3.5 of the ESS/EA.

Response to Comments from Ronald Thomasson, Coast Communications. Mr. Thomasson requested information on how the radar would communicate with the outside world.

As detailed in Sections 1.2 and 2.1 through 2.3 of the ESS/EA, the proposed radar would have a commercial telecommunications link connecting to the NWS WFO at Seattle, Washington.

Response to Comments from Helen Peters. Ms. Peters noted her appreciation for the new Doppler Radar Station to be located in Grays Harbor County and her preference for the Langley Hill Site.

Comment noted.

Response to Comments from Albert A. Carter, Terry Willis, and Mike Wilson, Grays Harbor County Board of Commissioners. Grays Harbor County Commissioners noted they concur with the survey/report findings.

Comment noted.

Response to Comments from Jaen P. Henry. Mr. Henry commented on the need for the radar and requested a hard copy of the Draft ESS/EA.

The NWS objectives for the proposed radar are described in Section 7.1 of the ESS/EA and are consistent with the need described in this comment. NWS sent a hard copy of the Draft ESS/EA to Mr. Henry as requested.

Response to Comments from Arthur (R.D.) Grunbaum, Friends of Grays Harbor (FOGH). FOGH noted its support for the radar and its preference for the Langley Hill Site.

Comment noted.

Response to Comments from John Andrews. Mr. Andrews suggested another radar site with existing infrastructure (for example, utility and roads) for further consideration. He suggested a site owned by Blues Land Development LLC in the northeast quarter of Section 8, Township 20 north, range 12 west (near Moclips).

The site is located 10 to 14 miles north of the three finalist sites at Langley Hill, Ocean City, and Saddle Hill. At elevation 275 ft MSL, the site is similar in elevation to the Langley Hill and Saddle Hill Sites and higher in elevation than the Ocean City Site. Hills located in Sections 9 and 10, Township 20 north, range 12 west, are at elevation 350 ft MSL and would cause a close-in obstruction of a radar located at this site. The area of obstruction would range from azimuths 115 through 135. Additionally, a radar at this site would suffer greater long-range obstruction of its signal by the Olympic Mountains, degrading coverage to the northeast through southeast, compared with a radar located at Langley Hill, Ocean City, or Saddle Hill. Coverage over the Pacific Ocean and shoreline areas would be similar as for the other three sites. The alternative site proposed in this comment would be less advantageous to the NWS than the three alternative sites examined in the ESS/EA.

Response to Comments from Jenni Dykstra, U.S. Fish and Wildlife. Ms. Dykstra commented that in November 2009, the USFWS delisted the Brown Pelican. Ms. Dykstra mentioned that the ESA-protected species Oregon Silverspot Butterfly, Streaked Horned Lark, and Spotted Owl are not present and not likely to be present at the three alternative sites. Additionally, Ms. Dykstra noted Marbled Murrelets may be present at any of the alternative sites, however "the presence of a large structure (like a Doppler radar) at that height is likely to be avoided by a murrelet, and is not likely to measurably affect its behavior or pose a risk of collision."

> Section 7.3.8, Biological Resources/Protected Species has been updated with this information.

Ms. Dykstra recommended avoiding the use of lights if not required by the FAA (especially for the Ocean City Site due to its proximity to the coastland and wetland areas). If the use of lights cannot be avoided, she recommends using white strobe lights in place of red lights since red lights confuse migrating birds at night.

Ms. Dykstra requested clarification on NWS effects determination for each species.

> The NWS determined that no adverse effects would result to endangered or threatened species and submitted this to USFWS (see email from Anne Elston, SRI to USFWS in Appendix A).

Response to Comments from Mike Drumright and Roberta Wood, Department of Ecology Southwest Regional Office. Mr. Drumright stated that a solid waste handling permit would be required from the local health department if greater than 250 cubic yards of inert, demolition, and/or wood waste is used as fill material. WAC 173-350-990 (2) lists "asphaltic materials that have been used for structural and construction purposes that were produced from mixtures of petroleum asphalt and sand, gravel or other similar materials" as inert wastes [Washington State Legislature, 2010].

> The NWS would not use any wastes of inert, demolition, or wood material as fill material. During construction of the NWS Network Radar, the access road and site within the fence perimeter would be surfaced with crushed rock. The crushed rock would be purchased from a commercial source and would not include waste materials.

Ms. Wood noted discharges of sediment-laden runoff or other pollutants into state waters would violate WAC 90.48 RCW, Water Pollution Control, and WAC 173-201A, Water Quality Standard.

> The proposed NWS Network Radar would be a federal facility subject to EPA permitting for storm water discharges. Discharge of storm water from the construction site would be allowed per EPA's CGP and Permit WAR10000F, which is specific to federal facilities in Washington. The NWS would develop a SWPPP to prevent erosion of soil or washing of sediment into water bodies. This information is contained in Sections 7.3.2 and 7.3.3 of the ESS/EA.

Ms. Wood mentioned erosion control measures must be implemented prior to clearing, grading, or construction.

> Measures to minimize soil erosion during the construction period are mentioned in Section 7.3.3 of the Draft ESS/EA. The ESS/EA text has been changed to "Prior to and during construction activities, BMPs described in the SWPPP would be implemented to reduce the potential for soil erosion and retain soil and potential water pollutants on site."

Ms. Wood noted construction debris cannot enter the natural storm water drainage patterns, waters of the state, and buffers, or cause water quality degradation of state waters and must be properly disposed of on land.

> The NWS would comply with this requirement. The NWS would dispose of construction waste at a licensed facility, as mentioned in Section 7.3.15 of the ESS/EA.

Ms. Wood stated "during construction, all releases of oils, hydraulic fluids, fuels, other petroleum products, paints, solvents, and other deleterious material must be contained and removed in a manner that will prevent their discharge to waters and soils of the state."

> As now noted in Section 7.3.3 of the ESS/EA, NWS would implement BMPs prior to and during construction activities to prevent water pollution.

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9 OVERALL FINDINGS

The Langley Hill, Ocean City, and Saddle Hill Sites are carefully evaluated against the following site selection criteria:

Property Size

(S1) Minimum site size is 210 ft × 210 ft

Radar Coverage

(R1) Coverage would extend over the area of concern (that is, area not covered by existing NWS Network Radars), Pacific Ocean, and windward slopes of the Olympic Mountains

(R2) High-value military assets and the FAA's National Airspace System would receive radar coverage

(R3) Terrain blockage of radar beam is minimized, particularly in weather approach directions of southwest through northwest

(R4) Radar beam is not blocked by trees (antenna should rise above nearby trees, accounting for future tree growth)

(R5) Structures (such as tall buildings, wind turbines) or terrain in vicinity will not cause excessive clutter returns

Infrastructure

(I1) Site is within short distance of suitable electric power (that is, three-phase 200-A 208Y/120V)

(I2) Site is served by commercial T-1 communication lines (or can receive T-1 service through minor line extensions)

(I3) Site is accessible by good condition all-weather roads

(I4) Construction access is not restricted by bridges or culverts with low weight capacity

Economic

(EC1) Sites on suitable government property are preferred over private land

(EC2) Site is available from a willing owner for purchase or 20 plus year lease

(EC3) Likelihood of substantial environmental contamination of the site by regulated materials or hazardous wastes is low

Environmental

(EV1) Radar would be compatible with nearby land uses and local zoning

(EV2) Radar structure would comply with FAA height restrictions at 14 CFR Part 77

(EV3) Site is at least 3,000 ft from an airport surveillance radar or airport traffic control tower

(EV4) Site is sufficiently distant from radio transmitters or receivers to prevent EMI

(EV5) Site is not eroded or geologically unstable

(EV6) Site is not within a 100-year floodplain or tsunami hazard zone

(EV7) Site does not contain federal-jurisdictional wetlands

(EV8) Construction of the radar will not cause significant conversion of farmland under the Farmland Protection Policy Act

(EV9) No taking of threatened or endangered species or destruction of critical habitat

(EV10) No significant effects on historic or traditional cultural properties

(EV11) No significant effects on scenic viewshed, such as a scenic highway, or wilderness area

(EV12) Not within one-quarter mile of wild and scenic river

Results of the evaluation are shown in Table 8.

Table 8. Site Selection Findings for NWS Network Radar to Serve Coastal Washington

			Site Name		
			Langley Hill	Ocean City	Saddle Hill
Radar Siting Criteria	Property Size	S1	●	●	●
	Radar Coverage	R1	●	●	●
		R2	●	●	●
		R3	●	●	●
		R4	●	■	●
		R5	●	●	✕
	Infrastructure	I1	●	●	■
		I2	●	●	■
		I3	●	●	●
		I4	●	●	●
	Economic	EC1	✕	●	✕
		EC2	●	●	●
		EC3	●	■	●
	Environmental	EV1	●	●	●
		EV2	●	●	●
		EV3	●	●	●
		EV4	●	●	●
		EV5	●	●	●
		EV6	●	✕	●
		EV7	●	●	●
		EV8	●	●	●
		EV9	●	●	●
		EV10	●	●	●
		EV11	●	●	●
		EV12	●	●	●

Key:

● Meets Criterion ■ Partially Meets Criterion ✕ Does Not Meet Criterion

10 LIST OF PREPARERS

This ESS/EA was prepared by SRI International, Menlo Park, California, under contract to NOAA. The following staff from SRI International contributed to this ESS/EA:

- Anne Elston, B.S., biology with an emphasis in marine science, University of California, Santa Cruz; four years experience analyzing resource impact data, including marine fishery and desert ecosystem data. Ms. Elston conducted resource analysis research for this ESS/EA.
- Linda Hawke-Gerrans, A.A., technical illustration, College of San Mateo, California; 35 years experience in technical illustration and 13 years experience in geographic information systems (GIS). Ms. Hawke-Gerrans served as illustrator and geographic analyst for this ESS/EA.
- James Manitakos, Jr., J.D., law, Peninsula University College of Law; M.A., geology, University of California at Berkeley; B.A., geology and economics, Williams College, Williamstown, Massachusetts; certificate in hazardous materials management, University of California at Santa Cruz Extension; California Registered Environmental Assessor I-07047; 25 years experience in environmental impact assessment and project management. Mr. Manitakos served as Project Supervisor for this ESS/EA.
- Christine Stensig, B.S., business management with minor in communication, College of Notre Dame (now University of Note Dame de Namur), Belmont, California; over 30 years experience in publications management, technical editing, and desktop publishing. Ms. Stensig served as technical editor for this ESS/EA.
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The following staff from Alion Science and Technology in Chicago, Illinois, contributed to this ESS/EA under contract to SRI International:

- Peter Karns, B.S., geography, Frostburg State University, Frostburg, Maryland; 18 years experience in usage and application of GIS, applying GIS knowledge to develop new visualization tools for electromagnetic compatibility (EMC) analysis. Mr. Karns provided radar coverage data and frequency assignment data for this ESS/EA.
- Emil W. Levering, has 35 years experience developing and maintaining databases, extracting data, and running engineering models. Mr. Levering provided radar coverage data and frequency assignment data for this ESS/EA.
- Lee S. Wilk, B.S., electrical engineering, Pennsylvania State University, University Park, Pennsylvania; 30 years experience in conducting and managing all phases of EMC/EMI analysis programs, specializing in radar and communication systems. Mr. Wilk provided radar coverage data and frequency assignment data for this ESS/EA.

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11 AGENCIES AND PERSONS CONTACTED

- Heidi A. Beltico, Lead Engineer, and Karren Kelly, Customer Care Representative, Qwest
- Allyson Brooks, State Historic Preservation Officer, Washington State Department of Archaeology and Historic Preservation
- George E. Brulotte, Timberland Acquisition Analyst, Rayonier
- Dr. Brad Colman, Meteorologist in Charge, NOAA NWS Seattle Weather Forecast Office
- Curtis Crites, Planner III; Michael Ferry, Plans Examiner/Inspector; and Brian Shea, Director of Planning & Building, Grays Harbors County Department of Public Services
- Edward Berkowitz, Program Branch Chief; William Deringer, NEXRAD Program Manager; Jeffery B. Turner, General Engineer; and Marty Williams, Lead General Engineer, NOAA NWS Radar Operations Center
- Wesley Gray, Manager of Engineering, and Phil A. Penttila, System Engineering Supervisor, Grays Harbor County Public Utilities District
- Jenni Dykstra, Fish and Wildlife Biologist, and Martha Jensen, Branch Manager, U.S. Fish and Wildlife Service, Division of Consultation and Technical Assistance
- Dr. Cliff Mass, Professor, and Dr. Socorro Medina, Research Scientist, University of Washington, Department of Atmospheric Sciences
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- Steve Todd, Meteorologist in Charge, NOAA NWS Portland Weather Forecast Office
- Mike Walsh, Area Manager of SW Division, Green Crow Corporation

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APPENDIX A

CORRESPONDENCE AND BACKGROUND MATERIALS

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CONTENTS

Notice of Availability Affidavit of Publication 3-15-2010 ..... A-5

Request to Turn on Power A-7

Development Application, Grays Harbor County, Department of Public Services, Planning and Building Division A-9

Grade and Fill Permit Application, Grays Harbor County, Department of Public Services, Planning and Building Division A-11

International Building Code/International Fire Code Review, Grays Harbor County, Department of Public Services, Planning and Building Division A-15

Federal Aviation Administration Notice of Proposed Construction or Alteration - Off Airport 7460-1 Forms (ASN 2009-AMN-2331-OE, ASN 2009-AMN-2332-OE, and ASN 2009-AMN-2333-OE) A-17

Federal Aviation Administration Determination of No Hazard to Air Navigation Letters 4-23-2010 (ASN 2009-AMN-2331-OE, ASN 2009-AMN-2332-OE, and ASN 2009-AMN-2333-OE) A-21

Federal Aviation Administration Notice of Proposed Construction or Alteration - Off Airport 7460-1 Forms (ASN 2010-AMN-1137-OE, ASN 2010-AMN-1138-OE, and ASN 2010-AMN-1139-OE) A-33

Federal Aviation Administration Determination of No Hazard to Air Navigation Letters 6-3-2010 and 6-4-2010 (ASN 2010-AMN-1137-OE, ASN 2010-AMN-1138-OE, and ASN 2010-AMN-1139-OE) A-37

Federal Aviation Administration Supplemental Notice Form 7460-2 ..... A-47

Title 40 USC, Chapter 33, Section 3312 ..... A-49

Environmental Checklist, Grays Harbor County, Department of Public Services, Planning and Building Division A-51

Air Emissions during Construction of NWS Network Radar A-59

SRI International Letter to U.S. Fish and Wildlife Service 11-9-2009 ..... A-73

SRI International Email to U.S. Fish and Wildlife Service 4-13-2010 ..... A-80

U.S. Fish and Wildlife Service Response Letter 4-26-2010 ..... A-81

Department of Archaeology & Historic Preservation Response Letter 11-12-2009 ..... A-85

Affidavit of Publication

The Daily World

P.O. Box 269
315 S. Michigan St
Aberdeen, WA
98520

The undersigned being first duly sworn oath deposed and says: The he/she is the Principal Clerk of the Daily World, which is a legal newspaper printed and published in the City of Aberdeen Grays Harbor County, Washington: of general circulation in said City, County and State that the

SRI International
Notice of Availability # 80463

of which the attached is a printed Copy, was published in said newspaper on the

State of Washington
County of Grays Harbor
Account Number 0

15th	day of	March	2010
	day of		2010
	day of		2010
	day of		2010
	day of		2010
	day of		2010
	day of		2010
	day of		2010
	day of		2010

said newspaper was generally circulated during all said time, and has been published than six months prior to the dates of the publication of this legal document, and that ce was published in the newspaper proper, and not in supplied form.

ount of fee charged for this publication is: $ 147.00

PO Number:

cipal Clerk: Brianne Ensor

rn to me this 15 day of March, 2010

Nancy M. Barnett

otary Public for the State of Washington Grays Harbor County Washington

NANCY M. BARNETT
NOTARY PUBLIC
STATE OF WASHINGTON
My Commission Expires Oct. 09, 2010

Notice of Availability

Draft Expanded Site Survey/Environmental Assessment Report for the National Weather Service (NWS) Network Weather Radar to Serve Coastal Washington

The NWS announces the availability of a Draft Expanded Site Survey/Environmental Assessment (ESS/EA) for public and agency review and comment. The Draft ESS/EA includes an analysis of potential environmental impacts that may result from installing and operating a network radar at one of three alternatives sites in Grays Harbor County, Washington: Langley Hill, Ocean City, and Saddle Hill. In compliance with National Oceanic and Atmospheric Administration Administrative Order 216-6, the Draft ESS/EA also provides an analysis of potential environmental impacts from the no-action alternative. As part of the proposed action, NWS would construct and operate a Doppler weather radar consisting of a rotating antenna within a 35-ft diameter fiberglass radome mounted on a steel lattice tower between 65 and 98 feet (ft) in height. The radar tower and supporting equipment shelters would be located within a 102 ft x 68 ft fenced area. The radar would be similar to the Weather Surveillance Radar-1988, Doppler (WSR-88D) radars currently operating in Seattle and Portland to ensure seamless integration into the NWS nationwide radar network. The proposed radar would provide NWS forecasters and emergency response managers with improved radar coverage over portions of Coastal Washington, especially off shore, and over the Willapa Hills and western slopes of the Olympic Mountains.
The NWS will accept public and agency comments on the Draft ESS/EA from March 15 to April 16, 2010.

The report is available electronically at: http://www.wrh.noaa.gov/wrh/washington_coast_doppler_radar/.
Please send your comments or request for a paper copy of the Draft ESS/EA report to:

Ms. Anne Elston
SRI International
333 Ravenswood Avenue, BS-343
Menlo Park, California 94025-3493
anne.elston@sri.com

Published March 15, 2010 The Daily World #80463

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Grays Harbor PUD
"It's your PUD!" ™

Request to Turn on Power (Business)

Need to have power turned on in your Business name? If so, please fill out this form, sign it, and return to us WITH AN ENLARGED LEGIBLE COPY OF YOUR PHOTO ID OR DRIVERS LICENSE and a copy of Corporation Papers or Limited Liability Papers. Questions? Call us at (360-532-4220 or 1-800-562-7726).

Business Name on the Account_____

I,_____,authorized applicant, of legal age hereby make application
(Name of Authorized applicant. If not listed on corporation papers please include a Letter of Authorization.)

for electrical service at _____ to begin _____ from P.U.D. No 1
(Address) (Date service to start)

of Grays Harbor County, Washington, subject to all of the provisions of the District resolutions establishing service policies and rates, which are by this reference incorporated into and made a part of this application. This application, when accepted by the District, becomes a contract committing the Applicant/Customer to pay for electrical service furnished in accordance with the applicable rate schedules, including mimimum charges, and for any unpaid service and charges previously rendered to the Applicant/Customer by the district.

In the event of breach of this contract by Applicant/Customer, Applicant/Customer shall be liable for the damage or loss suffered by the district.

Contact Name	Phone #	
Type of Ownership ( ) Sole ( ) Partnership ( ) Corp ( ) LLC		
Officer's Name	Title	Phone
Officer's Name	Title	Phone
Officer's Name	Title	Phone
Owner's Home Address		Phone
Mailing Address for Bills		Phone

Security Deposit: A security deposit is required on new accounts. Have your current utility company fax us a "Letter of Credit." (If you have at least one year of satisfactory payment history, a letter of credit will allow you to open an account without the required deposit.) If your payment history becomes unsatisfactory at any time, a security deposit may be required.
If the account is to be put in the name of an LLC, then a Limited Liability Agreement must be signed and returned.

Account Service Fee: $20.00 - Billed on your first statement.

Customer Signature	Date

Please return completed form along with the required documents
To: Grays Harbor P U D, Attn: Customer Service, P O Box 480, Aberdeen Wa. 98520
or Fax it to: Grays Harbor P U D at (360) 538-6400, or bring it to our office.

Receipt of this form will be verified by a follow-up telephone call from the PUD.

Customer Service Representative Signature	Date of call

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Grays Harbor County
Department of Public Services
Planning and Building Division
100 West Broadway Avenue, Suite 31
Montesano, WA 98563-3614
(360) 249-5579 Fax (360) 249-3203
www.co.grays-harbor.wa.us

DEVELOPMENT APPLICATION NUMBER _____

Applicant Information:

1. Applicant (If not owner) _____ Parcel No. _____
2. Site Address_____City _____ Zip _____Phone_____
3. Owner _____E-mail address _____
4. Owner Address_____City _____ Zip _____Phone _____
5. Contractor Business Name_____
6. Contractor Address_____
7. Contractor Phone_____Contractor Registration #_____Expiration Date_____
8. UBI Number_____
9. If owner-builder, will you be occupying this structure? ☐Yes ☐No

Structure Information:

10. Describe what you plan to build _____
11. Use of improvement: ☐Residential ☐Commercial ☐Industrial ☐Garage ☐ Storage ☐ Other_____
12. Total number of bedrooms (including proposed additions) _____
13. Square footage of proposed construction Dwelling _____Garage_____Other _____

Structural Heating Information:

14. Primary Heat Source: Heated? ☐Yes ☐No
    a. Fuel? ☐Electric ☐Natural Gas ☐Oil ☐LP Gas ☐Other _____

       Type? ☐Forced Air Furnace ☐Zone ☐Radiant ☐Other (explain) _____
    b. Will you be using a Heat Pump? ☐Yes ☐No
    c. Will you be installing a LPG burning appliance? ☐Yes ☐No
       ☐ Range ☐Fireplace ☐ Hot Water Tank ☐Other_____
    d. Will you be installing a wood-burning appliance? ☐Yes ☐ No

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Site Information:

15. Does the development involve or require the removal or placement of dirt, gravel, sand, etc.? ☐Yes ☐No If yes, how many cubic yards? _____

16. Do slopes greater than 33% (1-foot vertical to 3-feet horizontal) exist within 50-feet of the proposed building site? ☐Yes ☐No

17. How close is the property to any river, stream, lake, bay, wetland, or the ocean? _____

18. Does the proposal involve/require the crossing or filling of any ditches, drainage systems, or wetlands? ☐Yes ☐No

19. Has this property been the subject of a Washington State Department of Natural Resources (DNR) Class I, Class II, or Class III Forest Practices Approval (FPA) development moratorium during the past 6-years? ☐Yes ☐No

20. Will this project disturb more than 1-acre of soil during the entire length of the project? ☐Yes ☐No

Manufactured Home Information:

21. To be placed in a Park? ☐Yes ☐No If yes, Park Name _____Space No. _____

22. Make/Model _____Length _____Width _____Value $_____

23. Date of Manufacture _____Installer _____ WAINS# _____

NOTE: Washington State Department of Labor & Industries (L&I) Fire/Safety Certification must be provided if the mobile home was manufactured before July 1976.

Application Statement:

I authorize Grays Harbor County to make any site visits necessary to evaluate this application. I understand that Grays Harbor County assumes no responsibility to notify applicants of the state or federal permit requirements associated with this application. I hereby certify that I have prepared this application and site development plan and that, to the best of my knowledge, the information provided is complete, accurate, and a true representation of the proposed development. I further attest that I have the authority to submit this application and agree to comply with any and all conditions of development permit approval. I agree to provide any additional information required, and understand that if the scope of the project is modified a new application may be required.

23. Owner/Applicant Signature_____ Date_____

----------COUNTY USE ONLY----------

FEES:

Permit Fee: _____

Plan Check: _____

Plumbing: _____

Mechanical: _____

State BBC $4.50

TOTAL: _____

G:\PS\Planning\forms\Development App. 12/2007

Grays Harbor County Department of Public Services
Planning and Building Division
100 W Broadway, Suite 31
Montesano, WA 98563
(360) 249-5579; Fax (360) 249-3203

GRADE AND FILL PERMIT APPLICATION

1. Applicant _____
2. Owner (if different from applicant) _____
3. Applicant ☐ Owner ☐ Lessee ☐ Contract Purchaser ☐ Other _____
4. Mailing _____
   Street City Zip Code
5. Telephone _____
   Home Work
6. Site Address _____
   Street City
7. Parcel Number _____
   12 digits
8. General Location _____
9. Proposed development is for what use: ☐ Commercial ☐ Single-family residence
   ☐ Multi-family residence ☐ Agricultural ☐ Other _____
10. Give a detailed description of what you plan to do _____

_____

_____

Length_____ft. x Width _____ft. x Depth _____ft. ÷ 27 = Cubic Yards _____

What type of materials will you be using? _____

Where are you getting the fill material from? _____

Please Note: Any Grade and Fill activities in excess of 100 cubic yards will require the completion of a State Environmental Policy Act (SEPA) review.

11. On-Site Sewage
    Is there an on-site sewage system? ☐ Yes ☐ No
    Has the property been evaluated before for on-site sewage? ☐ Yes ☐ No
    Will you be applying for on-site sewage? ☐ Yes ☐ No

    Include the location of existing/proposed on-site sewage on your site plan.

Please Note: Grading and/or filling may affect the ability of the land to accommodate an on-site sewage disposal system. If you plan, at some point, to install a septic system you should review your plans with an Environmental Health Specialist before proceeding with the grading and/or filling project.

12. Road Access:
    Is the proposed access off a ☐ private lane ☐ county road ☐ state highway?

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Revised April 29, 2009

Is the access currently used for ☐ commercial ☐ residential use?

If residential, how many families are using this access? _____

If commercial, how much traffic? _____

If the access is off a state highway, have you contacted WSDOT? ☐ Yes ☐ No

Please refer to Grays Harbor County Public Works Division Development Assistance Bulletin #1 for additional information concerning road access requirements.

Please answer YES or NO. If the answer is YES, provide details and explanation.

13. Is there any standing or running water on the surface of the property or on any nearby property at any time during the year? ☐ Yes ☐ No

14. Has any portion of the property or any nearby property ever been identified as a wetland or swamp? ☐ Yes ☐ No

15. Are any willows, cattails, wild iris, skunk cabbage, alders, or cottonwoods present on your property or adjacent properties? ☐ Yes ☐ No

16. Are there any indications on any portion of the property or on any nearby property of rockslides, earth movements, mudslides, or landslides? ☐ Yes ☐ No

17. Does the site have slopes with little to no vegetation? ☐ Yes ☐ No

18. Does the site contain high percentages of silt and/or very fine sand? ☐ Yes ☐ No

19. Does the site contain ground water seepage or springs near the surface of the ground? ☐ Yes ☐ No

20. Does the site contain a river, creek, slough, lake, or other water feature? ☐ Yes ☐ No

21. Has this property been the subject of a Washington State Department of Natural Resources (DNR) Class I, Class II, or Class III Forest Practices Approval (FPA) development moratorium during the past 6 years? ☐ Yes ☐ No

The applicant, or his/her agent, hereby certifies that all of the above statements and the information contained in any other transmittals made herewith are true, and the applicant acknowledges that any action taken by Grays Harbor County based in whole or in part on this application may be reversed if it develops that any such statement or other information contained herein is false.

Signature _____ Date _____

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Revised April 29, 2009

Plan Review - Grading Permit Fee				
CUBIC YARD	PLAN REVIEW	GRADING PERMIT FEE	SEPA FEE	TOTAL
50	0	27.43		27.43
51-100	27.43	43.19		70.62
101-200	43.19	43.19	713	799.38
201-300	43.19	63.61	713	819.80
301-400	43.19	84.04	713	840.23
401-500	43.19	104.47	713	860.66
501-600	43.19	124.9	713	881.09
601-700	43.19	145.32	713	901.51
701-800	43.19	165.75	713	921.94
801-900	43.19	186.17	713	942.36
901-1000	43.19	206.6	713	962.79
1001-2000	57.49	227.04	713	997.53
2001-3000	57.49	243.95	713	1,014.44
3001-4000	57.49	260.88	713	1,031.37
4001-5000	57.49	277.81	713	1,048.30
5001-6000	57.49	294.73	713	1,065.22
6001-7000	57.49	311.66	713	1,082.15
7001-8000	57.49	328.57	713	1,099.06
8001-9000	57.49	345.5	713	1,115.99
9001-10000	57.49	362.43	713	1,132.92

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Revised April 29, 2009

SITE PLAN

(This is not a permit)

Parcel Number _____ Building Permit Number _____

County Road _____ Septic Permit Number _____

INSTRUCTIONS: Show the following information on the site plan, and mark the appropriate box. Mark "NA" next to the box if item does not apply.

- ❑ 1. North arrow and scale
- ❑ 2. Boundary lines showing whole property
- ❑ 3. Major features of property (ravines, seasonal creeks, bodies of water)
- ❑ 4. Septic system location
- ❑ 5. Wells or drinking water source
- ❑ 6. Paved surfaces (i.e., driveways and patios)
- ❑ 7. Arrows showing direction of slope; assume an elevation of 100 feet at one lot corner and indicate the other lot corner elevations to it
- ❑ 8. Structures – label existing and proposed with dimensions and distances from lot lines and other structures on the site.
- ❑ 9. Plumbing stub out of proposed residence
- ❑ 10. Wells or springs within 100 feet of property lines
- ❑ 11. Easements or Rights-of-Way

MINIMUM DISTANCE IN FEET

Component	Well or Suction Line	Water Supply Line Under Pressure	Surface Water	Building Foundation	Property Line	Cuts or Bank
Building Sewer	50	10	10	-	-	-
Septic Tank	50	10	50	5	5	-
Drainfield	100	10	100	10	5	25/50 (depending on restrictive layer)

SCALE: 1" = _____

North Arrow

I understand that any permits issued by the county consistent with the above site plan are valid only if allowed by all applicable laws and codes. Further, that all permits issued are valid only if construction is according to this plan. This site plan shows all existing and proposed structures.

Owner/Applicant Signature_____ **Date**_____

FOR OFFICE USE ONLY

Zoning _____ Front Yard Setback _____ Shoreline _____ Setback _____

Side Yard Setback _____ Height _____

Rear Yard Setback _____

Flood Zone _____ Panel _____ Reviewed by _____ Date _____

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Revised April 29, 2009

Grays Harbor County
Department of Public Services
Planning and Building Division
100 West Broadway Avenue, Suite 31 Phone: (360) 249-5579
Montesano, WA 98563-3614 Fax: (360) 249-3203

International Building Code / International Fire Code Review

The following is a list of required plan submittal items to be provided prior to commencing the building plans review. Please note that all drawings shall be scaled and dimensioned and that all plan submittal pages shall be the same size (w/in +/- 1-1/2" overall).

1. **Cover Sheet Page** – including, as needed, but not limited to:
    a. Names and Contact Information for:
        i. Owner
        ii. Architect
        iii. Civil Engineer
        iv. Structural Engineer
        v. Other Licensed / Certified Professionals
        vi. General Contractor
        vii. Specialty Contractors (mechanical, electrical, etc)
        viii. Special Inspection Agency
    b. Legal Description, including address and parcel #
    c. Code Summary, including:
        i. Detailed Description for Use of Each Space
        ii. Occupancy Determination – including summary of allowable hazardous materials (as applicable)
        iii. Special Occupancy requirements (as applicable)
        iv. Allowable Height and Area
        v. Mixed-Use Occupancy Separations
        vi. Type of Construction and Required Fire Resistance Ratings
        vii. Allowable Interior Finishes
        viii. Required Fire Protection Systems (fire sprinklers, fire alarms, portable fire extinguishers, etc)
        ix. Means of Egress – including occupant loads, exit access, # of exits, exit illumination, travel distance, etc.
        x. Handicap Accessibility Summary
        xi. Plumbing Fixture Summary
    d. Index – each plan page individually and consecutively numbered
    e. Approved Deferred Submittal List (including submittal date)
    f. General Construction Notes
2. **Civil Drawing(s)** - including, as needed, but not limited to:
    a. Property lines and lengths / Compass Heading
    b. Locations of Proposed and Existing Buildings and Structures
    c. Elevation Contour Lines
    d. Road Access(s)
    e. Parking (including details of compliance for Handicap Accessible)
    f. Exterior Illumination
    g. Drainage / SWPPP Details
    h. U/G Utilities / Wells / Septic Tanks / Drain Fields
    i. Fire Mains / Fire Lanes / Hydrants (including bollard details)
    j. Impervious Surface Areas (includes compacted gravel, asphalt, concrete)
    k. Easements

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3. **Architectural Drawings** - including, as needed, but not limited to:
    a. Elevations: all four sides with openings, terminations, appurtenances, etc. noted.
    b. Floor Plan: each floor level with all interior bearing and non-bearing wall types and locations; interior / exterior opening(s) size, type and location; all spaces labeled as to use; location of all fixtures. Note types and locations of portable fire extinguishers. Provide window and door schedules.
    c. Means of Egress / Exiting Plan – including exit access and exit door(s) location and swing and hardware type; rated corridors, exit enclosures and stairways; exit signage and illumination (including emergency lighting types and locations); exit discharge path and details.
    d. Section Drawings – for each wall and ceiling height and type. Include all floor, wall, ceiling and roof materials and finishes. Annotate each framing member size and type; each crawlspace, floor and ceiling height; each insulation type, R-value and location; each type of opening and roof flashing; each type of underlayment or weather barrier. Provide details for all fire –rated wall or floor / ceiling assemblies including opening and penetration seals.
    e. Reflective Ceiling Plan – including installation details and seismic bracing requirements
4. **Structural Drawings** – including, as needed, but not limited to:
    a. Site Specific Design Criteria
    b. Foundation Plan: including size, location and reinforcing details for each footing and wall type; anchor and hold-down size, types and locations; insulation; moisture barrier; etc.
    c. Floor Framing Plan: for each level and all decks: including size, type, direction and location of all joists, rim, support beams and columns. Details at all openings and for stairways and ledger attachments.
    d. Wall Framing Plan – including size, type, spacing and location of each framing member. Note concentrated load points, shear wall and diaphragm types, locations and construction details.
    e. Roof Framing Plan – including size, type, location and O.C. spacing of manufactured trusses, rafters and ceiling joists. Note size, type and location of all support beams and bearing columns and walls.
5. **Mechanical Drawings** – including equipment location, duct layout and support types and spacing, Equipment Schedules including all heaters, furnaces, exhaust fans, condenser units. Provide ventilation system design details.
6. **Plumbing Drawings** – include type and location of each fixture. Provide details of required handicap accessibility features.
7. **Electrical Drawings** – as needed to identify and detail all building and fire code requirements; exiting and emergency lighting; fire alarm system; accessibility features.
8. **Fire Sprinkler Drawings** – as required; includes piping layout and sprinkler type and support details; riser location and feature details; flow test results.
9. **Energy Code Summary** – Provide completed NREC worksheets for Building Envelope, Mechanical Systems and Interior and Exterior Lighting. Provide details as needed to verify compliance.
10. **Specifications and Materials "Cut-Sheets" –** As needed to demonstrate compliance.
11. **Engineering Design Calculations –** For structural design; heating and ventilation systems; fire sprinkler hydraulic systems; fire alarm demand and battery supply; other, as needed. All with cover "wet-stamp" of licensed / certified design professional.

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Federal Aviation Administration

« OE/AAA

Form 7460-1 for ASN: 2009-ANM-2331-OE

Overview

Study (ASN):	2009-ANM-2331-OE	**Received Date:**	12/22/2009
Prior Study:		**Entered Date:**	12/22/2009
Status:	Determined	**Completion Date:**	04/23/2010
Letters:	Determination	**Expiration Date:**	10/23/2011
Supplemental Form 7460-2:	Please login to add a Supplemental Form 7460-2.	**Map:**	View Map

Sponsor Information

Sponsor:	James M. Williams
Attention Of:	Radar Operations Center
Address:	1313 Halley Circle
Address2:	
City:	Norman
State:	OK
Postal Code:	73069
Country:	US
Phone:	(405) 573-3498
Fax:	(405) 573-3480

Sponsor's Representative Information

Representative:	SRI International
Attention Of:	Linda Hawke-Gerrans
Address:	333 Ravenswood Ave
Address2:	Building G225
City:	Menlo Park
State:	CA
Postal Code:	94025
Country:	US
Phone:	(650) 859-4253
Fax:	

Construction Info

Notice Of:	CONSTR
Duration:	PERM (Months: 0 Days: 0)
Work Schedule:	01/01/2012 to 12/31/2012
Date Built:	

Structure Summary

Structure Type:	Antenna Tower
Structure Name:	Network Weather Radar
NACG Number:	
FCC Number:	

Structure Details

Latitude (NAD 83):	47° 07' 00.50" N
Longitude (NAD 83):	124° 06' 22.50" W
Horizontal Datum:	NAD 83
Survey Accuracy:	4D
Marking/Lighting:	None
Other Description:	
Current Marking/Lighting:	None
Current Marking/Lighting Other Description:	
Name:	
City:	Copalis Crossing
State:	WA
Nearest Airport:	S16
Distance to Structure:	19728.71 feet
On Airport:	No
Direction to Structure:	98.5°
Description of Location:	On top of 240 ft hill north of Copalis Beach Road (USGS 7.5 minute quad Copalis Crossing).
Description of Proposal:	1 of 3 alt. radar sites. Operating freq: 2700–2900 MHz. Parabolic antenna within highly visible white fiberglass radome on steel-lattice tower. 2 red warning lights on radome top. Radome surface allows passage of radio signal with min. attenuation; painting radome would adversely affect operation.

Height and Elevation

	Proposed	DNE	DET
Site Elevation:	240		
Structure Height:	140	0	140
Total Height (AMSL):	380	240	380

Frequencies

Low Freq	High Freq	Unit	ERP	Unit
2715	2715	MHz	475	kW

Federal Aviation Administration

« OE/AAA

Form 7460-1 for ASN: 2009-ANM-2332-OE

Overview

Study (ASN):	2009-ANM-2332-OE	**Received Date:**	12/22/2009
Prior Study:		**Entered Date:**	12/22/2009
Status:	Determined	**Completion Date:**	04/23/2010
Letters:	Determination	**Expiration Date:**	10/23/2011
Supplemental Form 7460-2:	Please login to add a Supplemental Form 7460-2.	**Map:**	View Map

Sponsor Information

Sponsor:	James M. Williams
Attention Of:	Radar Operations Center
Address:	1313 Halley Circle
Address2:	
City:	Norman
State:	OK
Postal Code:	73069
Country:	US
Phone:	(405) 573-3498
Fax:	(405) 573-3480

Sponsor's Representative Information

Representative:	SRI International
Attention Of:	Linda Hawke-Gerrans
Address:	333 Ravenswood Ave
Address2:	Building G225
City:	Menlo Park
State:	CA
Postal Code:	94025
Country:	US
Phone:	(650) 859-4253
Fax:	

Construction Info

Notice Of:	CONSTR
Duration:	PERM (Months: 0 Days: 0)
Work Schedule:	01/01/2012 to 12/31/2012
Date Built:	

Structure Summary

Structure Type:	Antenna Tower
Structure Name:	Network Weather Radar
NACG Number:	
FCC Number:	

Structure Details

Latitude (NAD 83):	47° 04' 24.60" N
Longitude (NAD 83):	124° 09' 48.60" W
Horizontal Datum:	NAD 83
Survey Accuracy:	4D
Marking/Lighting:	None
Other Description:	
Current Marking/Lighting:	None
Current Marking/Lighting Other Description:	
Name:	
City:	Ocean City
State:	WA
Nearest Airport:	S16
Distance to Structure:	19439.22 feet
On Airport:	No
Direction to Structure:	164.34°
Description of Location:	In field adjacent to a school district administration building, approximately 500 ft east of S.R. 109.
Description of Proposal:	1 of 3 alt. radar sites. Operating freq: 2700–2900 MHz. Parabolic antenna within highly visible white fiberglass radome on steel-lattice tower. 2 red warning lights on radome top. Radome surface allows passage of radio signal with min. attenuation; painting radome would adversely affect operation.

Height and Elevation

	Proposed	DNE	DET
Site Elevation:	25		
Structure Height:	140	0	140
Total Height (AMSL):	165	25	165

Frequencies

Low Freq	High Freq	Unit	ERP	Unit
2715	2715	MHz	475	kW

Federal Aviation Administration

« OE/AAA

Form 7460-1 for ASN: 2009-ANM-2333-OE

Overview

Study (ASN):	2009-ANM-2333-OE	**Received Date:**	12/22/2009
Prior Study:		**Entered Date:**	12/22/2009
Status:	Determined	**Completion Date:**	04/23/2010
Letters:	Determination	**Expiration Date:**	10/23/2011
Supplemental Form 7460-2:	Please login to add a Supplemental Form 7460-2.	**Map:**	View Map

Sponsor Information

Sponsor:	James M. Williams
Attention Of:	Radar Operations Center
Address:	1313 Halley Circle
Address2:	
City:	Norman
State:	OK
Postal Code:	73069
Country:	US
Phone:	(405) 573-3498
Fax:	(405) 573-3480

Sponsor's Representative Information

Representative:	SRI International
Attention Of:	Linda Hawke-Gerrans
Address:	333 Ravenswood Ave
Address2:	Building G225
City:	Menlo Park
State:	CA
Postal Code:	94025
Country:	US
Phone:	(650) 859-4253
Fax:	

Construction Info

Notice Of:	CONSTR
Duration:	PERM (Months: 0 Days: 0)
Work Schedule:	01/01/2012 to 12/31/2012
Date Built:	

Structure Summary

Structure Type:	Antenna Tower
Structure Name:	Network Weather Radar
NACG Number:	
FCC Number:	

Structure Details

Latitude (NAD 83):	47° 03' 44.90" N
Longitude (NAD 83):	124° 06' 43.60" W
Horizontal Datum:	NAD 83
Survey Accuracy:	4D
Marking/Lighting:	None
Other Description:	
Current Marking/Lighting:	N/A New Structure
Current Marking/Lighting Other Description:	
Name:	
City:	Ocean City
State:	WA
Nearest Airport:	W04
Distance to Structure:	24097.74 feet
On Airport:	No
Direction to Structure:	18.28°
Description of Location:	Located on a hill crest in unincorporated Grays Harbor County about one half mile north of State Route 109.
Description of Proposal:	1 of 3 alt. radar sites. Operating freq: 2700–2900 MHz. Parabolic antenna within highly visible white fiberglass radome on steel-lattice tower. 2 red warning lights on radome top. Radome surface allows passage of radio signal with min. attenuation; painting radome would adversely affect operation.

Height and Elevation

	Proposed	DNE	DET
Site Elevation:	220		
Structure Height:	140	0	140
Total Height (AMSL):	360	220	360

Frequencies

Low Freq	High Freq	Unit	ERP	Unit
2715	2715	MHz	475	kW

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Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-ANM-2331-OE

Issued Date: 04/23/2010

Radar Operations Center
James M. Williams
1313 Halley Circle
Norman, OK 73069

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Antenna Tower Network Weather Radar
Location:	Copalis Crossing, WA
Latitude:	47-07-00.50N NAD 83
Longitude:	124-06-22.50W
Heights:	140 feet above ground level (AGL) 380 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

See attachment for additional condition(s) or information.
Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 10/23/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

Page 1 of 4

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (425) 203-4562. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-ANM-2331-OE.

Signature Control No: 674270-125114419 (DNE)
Kathie Curran
Specialist

Attachment(s)
Additional Information
Frequency Data

cc: FCC

Additional information for ASN 2009-ANM-2331-OE

The issuance of a Final Determination of No Hazard for this case, does not provide allowance for the proponent to transmit on 2715 MHz. The proponent must obtain a formal frequency transmit license from the National Telecommunications and Information Administration (NTIA), prior to use this frequency." The following Commerce Temporary (C T) serial numbers are needed for frequency coordination with the NTIA: C T100008.....M2715 (Require to blank transmissions between the true bearing radials of 033 to 043 degrees) C T100009.....M2715 (Require to blank transmissions between the true bearing radials of 033 to 043 degrees) C T100010.....M2715 (Require to blank transmissions between the true bearing radials of 032 to 042 degrees) If you have any technical questions, please contact Vu Pham at 425-227-2480 or email at vu.pham@faa.gov

Page 3 of 4

Frequency Data for ASN 2009-ANM-2331-OE

LOW FREQUENCY	HIGH FREQUENCY	FREQUENCY UNIT	ERP	ERP UNIT
2715	2715	MHz	475	kW

Page 4 of 4

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-ANM-2332-OE

Issued Date: 04/23/2010

Radar Operations Center
James M. Williams
1313 Halley Circle
Norman, OK 73069

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Antenna Tower Network Weather Radar
Location:	Ocean City, WA
Latitude:	47-04-24.60N NAD 83
Longitude:	124-09-48.60W
Heights:	140 feet above ground level (AGL) 165 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

See attachment for additional condition(s) or information.
Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 10/23/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

Page 1 of 4

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (425) 203-4562. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-ANM-2332-OE.

Signature Control No: 674271-125114559 (DNE)
Kathie Curran
Specialist

Attachment(s)
Additional Information
Frequency Data

cc: FCC

Additional information for ASN 2009-ANM-2332-OE

The issuance of a Final Determination of No Hazard for this case, does not provide allowance for the proponent to transmit on 2715 MHz. The proponent must obtain a formal frequency transmit license from the National Telecommunications and Information Administration (NTIA), prior to use this frequency." The following Commerce Temporary (C T) serial numbers are needed for frequency coordination with the NTIA: C T100008.....M2715 (Require to blank transmissions between the true bearing radials of 033 to 043 degrees) C T100009.....M2715 (Require to blank transmissions between the true bearing radials of 033 to 043 degrees) C T100010.....M2715 (Require to blank transmissions between the true bearing radials of 032 to 042 degrees) If you have any technical questions, please contact Vu Pham at 425-227-2480 or email at vu.pham@faa.gov

Page 3 of 4

Frequency Data for ASN 2009-ANM-2332-OE

LOW FREQUENCY	HIGH FREQUENCY	FREQUENCY UNIT	ERP	ERP UNIT
2715	2715	MHz	475	kW

Page 4 of 4

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2009-ANM-2333-OE

Issued Date: 04/23/2010

Radar Operations Center
James M. Williams
1313 Halley Circle
Norman, OK 73069

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Antenna Tower Network Weather Radar
Location:	Ocean City, WA
Latitude:	47-03-44.90N NAD 83
Longitude:	124-06-43.60W
Heights:	140 feet above ground level (AGL)
	360 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

See attachment for additional condition(s) or information.
Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 10/23/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (425) 203-4562. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2009-ANM-2333-OE.

Signature Control No: 674272-125114658 (DNE)
Kathie Curran
Specialist

Attachment(s)
Additional Information
Frequency Data

cc: FCC

Additional information for ASN 2009-ANM-2333-OE

The issuance of a Final Determination of No Hazard for this case, does not provide allowance for the proponent to transmit on 2715 MHz. The proponent must obtain a formal frequency transmit license from the National Telecommunications and Information Administration (NTIA), prior to use this frequency." The following Commerce Temporary (C T) serial numbers are needed for frequency coordination with the NTIA: C T100008.....M2715 (Require to blank transmissions between the true bearing radials of 033 to 043 degrees) C T100009.....M2715 (Require to blank transmissions between the true bearing radials of 033 to 043 degrees) C T100010.....M2715 (Require to blank transmissions between the true bearing radials of 032 to 042 degrees) If you have any technical questions, please contact Vu Pham at 425-227-2480 or email at vu.pham@faa.gov

Page 3 of 4

Frequency Data for ASN 2009-ANM-2333-OE

LOW FREQUENCY	HIGH FREQUENCY	FREQUENCY UNIT	ERP	ERP UNIT
2715	2715	MHz	475	kW

Page 4 of 4

Federal Aviation Administration

« OE/AAA

Notice of Proposed Construction or Alteration - Off Airport

Project Name: JAMES-000147734-10 **Sponsor:** James M. Williams

Details for Case : Network Weather Radar

Show Project Summary

Case Status

ASN:	2010-ANM-1137-OE	**Date Accepted:**	06/01/2010
Status:	Determined	**Date Determined:**	06/03/2010
		Letters:	06/03/2010 DNEFT
	7460-2 (PART II) required within 5 days after the construction reaches its greatest height.	**Documents:**	06/01/2010 Standard NWS Netw...
			06/01/2010 Langley Hill Site...
	Add Supplemental Notice (7460-2)		

Construction / Alteration Information

Notice Of:	Construction
Duration:	Permanent
if Temporary :	Months: Days:
Work Schedule - Start:	01/01/2012
Work Schedule - End:	12/31/2012
State Filing:	Not filed with State

Structure Summary

Structure Type:	Antenna Tower
Structure Name:	Network Weather Radar
FCC Number:	
Prior ASN:	2009-ANM-2331-OE

Structure Details

Latitude:	47° 7' 0.50'' N
Longitude:	124° 6' 22.50'' W
Horizontal Datum:	NAD83
Site Elevation (SE):	240 (nearest foot)
Structure Height (AGL):	140 (nearest foot)
Requested Marking/Lighting:	Red lights
Other :	
Recommended Marking/Lighting:	None
Current Marking/Lighting:	N/A New Structure
Other :	
Nearest City:	Copalis Crossing
Nearest State:	Washington
Description of Location:	On top of 240 ft hill north of Copalis Beach Road (USGS 7.5 minute quad Copalis Crossing)
Description of Proposal:	1 of 3 alt. radar sites. Operating freq: 2700–2900 MHz. Parabolic antenna within highly visible white fiberglass radome on steel-lattice tower. 2 red warning lights on radome top. Radome surface allows passage of radio signal with min. attenuation; painting radome would adversely affect operation.

Common Frequency Bands

Low Freq	High Freq	Freq Unit	ERP	ERP Unit

Specific Frequencies

Low Freq	High Freq	Freq Unit	ERP	ERP Unit
2836	2836	MHz	475	kW

Federal Aviation Administration

« OE/AAA

Notice of Proposed Construction or Alteration - Off Airport

Project Name: JAMES-000147735-10 **Sponsor:** James M. Williams

Details for Case : Network Weather Radar

Show Project Summary

Case Status

ASN:	2010-ANM-1138-OE	**Date Accepted:**	06/01/2010
Status:	Determined	**Date Determined:**	06/04/2010
		Letters:	06/04/2010 DNEFT18
	7460-2 (PART II) required within 5 days after the construction reaches its greatest height.	**Documents:**	06/01/2010 Standard NWS Netw...
			06/01/2010 Ocean City Site_A...
	Add Supplemental Notice (7460-2)		

Construction / Alteration Information

Notice Of:	Construction
Duration:	Permanent
if Temporary :	Months: Days:
Work Schedule - Start:	01/01/2012
Work Schedule - End:	12/31/2012
State Filing:	Not filed with State

Structure Summary

Structure Type:	Antenna Tower
Structure Name:	Network Weather Radar
FCC Number:	
Prior ASN:	2009-ANM-2332-OE

Structure Details

Latitude:	47° 4' 24.60'' N
Longitude:	124° 9' 48.60'' W
Horizontal Datum:	NAD83
Site Elevation (SE):	25 (nearest foot)
Structure Height (AGL):	140 (nearest foot)
Requested Marking/Lighting:	Red lights
Other :	
Recommended Marking/Lighting:	None
Current Marking/Lighting:	N/A New Structure
Other :	
Nearest City:	Ocean City
Nearest State:	Washington
Description of Location:	In field adjacent to school district administration building, approximately 500 ft east of S.R. 109.
Description of Proposal:	1 of 3 alt. radar sites. Operating freq: 2700–2900 MHz. Parabolic antenna within highly visible white fiberglass radome on steel-lattice tower. 2 red warning lights on radome top. Radome surface allows passage of radio signal with min. attenuation; painting radome would adversely affect operation.

Common Frequency Bands

Low Freq	High Freq	Freq Unit	ERP	ERP Unit

Specific Frequencies

Low Freq	High Freq	Freq Unit	ERP	ERP Unit
2836	2836	MHz	475	kW

Federal Aviation Administration

« OE/AAA

Notice of Proposed Construction or Alteration - Off Airport

Project Name: JAMES-000147736-10 **Sponsor:** James M. Williams

Details for Case : Network Weather Radar

Show Project Summary

Case Status

ASN:	2010-ANM-1139-OE	**Date Accepted:**	06/01/2010
Status:	Determined	**Date Determined:**	06/03/2010
		Letters:	06/03/2010 DNEFT
	7460-2 (PART II) required within 5 days after the construction reaches its greatest height.	**Documents:**	06/01/2010 Standard NWS Netw...
			06/01/2010 Saddle Hill Site_...
	Add Supplemental Notice (7460-2)		

Construction / Alteration Information

Notice Of:	Construction
Duration:	Permanent
if Temporary :	Months: Days:
Work Schedule - Start:	01/01/2012
Work Schedule - End:	12/31/2012
State Filing:	Not filed with State

Structure Summary

Structure Type:	Antenna Tower
Structure Name:	Network Weather Radar
FCC Number:	
Prior ASN:	2009-ANM-2333-OE

Structure Details

Latitude:	47° 3' 44.90'' N
Longitude:	124° 6' 43.60'' W
Horizontal Datum:	NAD83
Site Elevation (SE):	220 (nearest foot)
Structure Height (AGL):	140 (nearest foot)
Requested Marking/Lighting:	Red lights
Other :	
Recommended Marking/Lighting:	None
Current Marking/Lighting:	N/A New Structure
Other :	
Nearest City:	Ocean City
Nearest State:	Washington
Description of Location:	Located on a hill crest in unincorporated Grays Harbor County about one mile north of S.R. 109.
Description of Proposal:	1 of 3 alt. radar sites. Operating freq: 2700–2900 MHz. Parabolic antenna within highly visible white fiberglass radome on steel-lattice tower. 2 red warning lights on radome top. Radome surface allows passage of radio signal with min. attenuation; painting radome would adversely affect operation.

Common Frequency Bands

Low Freq	High Freq	Freq Unit	ERP	ERP Unit

Specific Frequencies

Low Freq	High Freq	Freq Unit	ERP	ERP Unit
2836	2836	MHz	475	kW

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Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-ANM-1137-OE
Prior Study No.
2009-ANM-2331-OE

Issued Date: 06/03/2010

Radar Operations Center
James M. Williams
1313 Halley Circle
Norman, OK 73069

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Antenna Tower Network Weather Radar
Location:	Copalis Crossing, WA
Latitude:	47-07-00.50N NAD 83
Longitude:	124-06-22.50W
Heights:	140 feet above ground level (AGL) 380 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 12/03/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (425) 203-4562. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-ANM-1137-OE.

Signature Control No: 710160-126676037 (DNE)
Kathie Curran
Specialist

Attachment(s)
Frequency Data

cc: FCC

Frequency Data for ASN 2010-ANM-1137-OE

LOW FREQUENCY	HIGH FREQUENCY	FREQUENCY UNIT	ERP	ERP UNIT
2836	2836	MHz	475	kW

Page 3 of 3

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-ANM-1138-OE
Prior Study No.
2009-ANM-2332-OE

Issued Date: 06/04/2010

Radar Operations Center
James M. Williams
1313 Halley Circle
Norman, OK 73069

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Antenna Tower Network Weather Radar
Location:	Ocean City, WA
Latitude:	47-04-24.60N NAD 83
Longitude:	124-09-48.60W
Heights:	140 feet above ground level (AGL)
	165 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 12/04/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (425) 203-4562. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-ANM-1138-OE.

Signature Control No: 710161-126694016 (DNE)
Kathie Curran
Specialist

Attachment(s)
Frequency Data

cc: FCC

Frequency Data for ASN 2010-ANM-1138-OE

LOW FREQUENCY	HIGH FREQUENCY	FREQUENCY UNIT	ERP	ERP UNIT
2836	2836	MHz	475	kW

Page 3 of 3

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-ANM-1139-OE
Prior Study No.
2009-ANM-2333-OE

Issued Date: 06/03/2010

Radar Operations Center
James M. Williams
1313 Halley Circle
Norman, OK 73069

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Antenna Tower Network Weather Radar
Location:	Ocean City, WA
Latitude:	47-03-44.90N NAD 83
Longitude:	124-06-43.60W
Heights:	140 feet above ground level (AGL) 360 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking and/or lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 12/03/2011 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (425) 203-4562. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-ANM-1139-OE.

Signature Control No: 710162-126675981 (DNE)
Kathie Curran
Specialist

Attachment(s)
Frequency Data
Map(s)

cc: FCC

Frequency Data for ASN 2010-ANM-1139-OE

LOW FREQUENCY	HIGH FREQUENCY	FREQUENCY UNIT	ERP	ERP UNIT
2836	2836	MHz	475	kW

Page 3 of 4

TOPO Map for ASN 2010-ANM-1139-OE

Form Approved OMB No. 2120-0001
Expiration Date: 7/31/07

SUPPLEMENTAL NOTICE

Submission Instructions: For Advance Notice of Actual Construction or Alteration. Complete items 1, 2, 3A (1), 3A(2), and 6. If applicable, also complete items 4 and 5. Detach Part 1. Fold and tape at bottom. Mail to the FAA Regional Office for your area. Part 1A is provided for your file.

Aeronautical Study No.

U.S. Department of Transportation
Federal Aviation Administration

Notice of Actual Construction or Alteration

(Please Type or Print on this Form)

1. Construction

A. Type and Description of Construction
☐ New
☐ Alteration

B. Owner of Structure

2. Construction Location -- Height

A. Coordinates *(To hundredths of seconds, if known)*

Latitude			Longitude		
°	'	"	°	'	"

B. Location *(City, State, include Street Address if any)*

C. Construction Heights

Site Elevation Ft. AMSL
Structure Height Ft. AGL

Total Height *(Structure & Site)* Above Mean Sea Level
Ft. AMSL

D. Site Elevation Determined By
☐ Actual Survey
☐ USGS 7.5' Quad Chart
☐ Other *(Specify)*

E. Reference datum of coordinates
☐ NAD 27
☐ NAD 83
☐ Other *(Specify)*

F. Name of Nearest Public-Use or Military Airport *(include Distance and Direction from the Airport)*

3. Construction Notifications

A. Notification (Notice Is Critical to Flight Safety --- FAR Part 77 Required) ★	Date	B. Construction/Project	Date
★ (1) Construction will start (Submit at least 48 hrs. in advance		(1) Project Abandoned	
(2) Estimated Completion			
★ (3) Structure Reached Greatest Height *(Submit within 5 days)*		(2) Construction Dismantled	

4. Marking and Lighting

A. Marked
☐ Yes ☐ No ☐ Temporary

B. Lighted
☐ Medium Intensity White
☐ Dual (Medium Intensity White & Red)
☐ High Intensity White
☐ Dual (High Intensity White & Red)
☐ Red
☐ None

5. Antenna Requiring FCC License

A. Call Sign	B. Frequency	C. Date Applied for FCC Construction Permit	D. Date Construction Permit Issued

6. Preparer's Certification

Submitted by: (If submitted by a proponent's representative, please also complete item B.)

A. Proponent's Representative
Name:
Address:
Tel. No.: *(Include Area Code)*

B. Construction Proponent
Name:
Address:
Tel. No.: *(Include Area Code)*

I hereby certify that the information provided is true, complete, and correct to the best of my knowledge.

Signature	Title	Date

Notice is required by 14 Code of Federal Regulations, part 77 pursuant to 49 U.S.C., Section 44718. Persons who knowingly and willingly violate the notice requirements of part 77 are subject to a civil penalty of $1,000 per day until the notice is received, pursuant to 49 U. & C., Section 46301(a).

FAA Form 7460-2 (7-98) SUPERSEDES PREVIOUS EDITION

ADVANCE NOTICE OF CONSTRUCTION
SUBMIT WITHOUT DELAY

Part 1

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TITLE 40 > SUBTITLE II > PART A > CHAPTER 33 > § 3312

§ 3312. Compliance with nationally recognized codes

(a) Application.—

(1) In general.— This section applies to any project for construction or alteration of a building for which amounts are first appropriated for a fiscal year beginning after September 30, 1989.

(2) National security waiver.— This section does not apply to a building for which the Administrator of General Services or the head of the federal agency authorized to construct or alter the building decides that the application of this section to the building would adversely affect national security. A decision under this subsection is not subject to administrative or judicial review.

(b) Building Codes.— Each building constructed or altered by the General Services Administration or any other federal agency shall be constructed or altered, to the maximum extent feasible as determined by the Administrator or the head of the federal agency, in compliance with one of the nationally recognized model building codes and with other applicable nationally recognized codes, including electrical codes, fire and life safety codes, and plumbing codes, as the Administrator decides is appropriate. In carrying out this subsection, the Administrator or the head of the federal agency shall use the latest edition of the nationally recognized codes.

(c) Zoning Laws.— Each building constructed or altered by the Administration or any other federal agency shall be constructed or altered only after consideration of all requirements (except procedural requirements) of the following laws of a State or a political subdivision of a State, which would apply to the building if it were not a building constructed or altered by a federal agency:

(1) Zoning laws.

(2) Laws relating to landscaping, open space, minimum distance of a building from the property line, maximum height of a building, historic preservation, esthetic qualities of a building, and other similar laws.

(d) Cooperation With State and Local Officials.—

(1) State and local government consultation, review, and inspections.— To meet the requirements of subsections (b) and (c), the Administrator or the head of the federal agency authorized to construct or alter the building—

(A) in preparing plans for the building, shall consult with appropriate officials of the State or political subdivision of a State, or both, in which the building will be located;

(B) on request shall submit the plans in a timely manner to the officials for review by the officials for a reasonable period of time not exceeding 30 days; and

(C) shall permit inspection by the officials during construction or alteration of the building, in accordance with the customary schedule of inspections for construction or alteration of buildings in the locality, if the officials provide to the Administrator or the head of the federal agency—

(i) a copy of the schedule before construction of the building is begun; and

(ii) reasonable notice of their intention to conduct any inspection before conducting the inspection.

(2) Limitation on responsibilities.— This section does not impose an obligation on any State or political subdivision to take any action under paragraph (1).

(e) State and Local Government Recommendations.— Appropriate officials of a State or political subdivision of a State may make recommendations to the Administrator or the head of the federal agency authorized to construct or alter a building concerning measures necessary to meet the requirements of subsections (b) and (c). The officials also may make recommendations to the Administrator or the head of the federal agency concerning measures which should be taken in the construction or alteration of the building to take into account local conditions. The Administrator or the head of the agency shall give due consideration to the recommendations.

(f) Effect of Noncompliance.— An action may not be brought against the Federal Government and a fine or penalty may not be imposed against the Government for failure to meet the requirements of subsection (b), (c), or (d) or for failure to carry out any recommendation under subsection (e).

(g) Limitation on Liability.— The Government and its contractors shall not be required to pay any amount for any action a State or a political subdivision of a State takes to carry out this section, including reviewing plans, carrying out on-site inspections, issuing building permits, and making recommendations.

Grays Harbor County Department of Public Services
Planning and Building Division
100 W. Broadway Ave. #31, Montesano, WA 98563
Tel: 360-249-5579, Fax: 360-249-3203
Website: www.co.grays-harbor.wa.us

ENVIRONMENTAL CHECKLIST

Purpose of checklist:

The State Environmental Policy Act (SEPA), Chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write, "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." **IN ADDITION**, complete the **SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D)**.

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

A. BACKGROUND

	OFFICE USE ONLY
1. Project Title:	
2. Applicant:	
3. Address and Phone:	
4. Date checklist prepared:	
5. Agency requiring checklist: Grays Harbor County	
6. Proposed timing or schedule:	

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	OFFICE USE ONLY
7. Plans for future additions, expansion, or further activity. If yes, explain.	
8. List other environmental information you know about related to this proposal:	
9. List other pending applications or approvals:	
10. Give detailed description of proposal including off-site improvements, utility requirements, land and building dimensions, etc. (attach site plan):	
11. Location of proposal including section, township, range and parcel number.	

B. ENVIRONMENTAL ELEMENTS

1. EARTH	OFFICE USE ONLY
a. General description of the site (circle one): flat, rolling, hilly, steep slopes, mountainous, other.	
b. What is the steepest slope on site (approximate percent slope)?	
c. What general types of soils are found on the site (e.g., clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.	
d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.	
e. Describe purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.	
f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.	
g. About what percent of the site will be covered with impervious surfaces after project construction (e.g., asphalt or buildings)?	

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	OFFICE USE ONLY
h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:	
2. AIR	
a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.	
b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.	
c. Proposed measures to reduce or control emissions or other impacts to air, if any:	
3. WATER	
a. Surface:	
1. Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.	
2. Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.	
3. Estimate amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.	
4. Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.	
5. Does the proposal lie within a 100-year flood plain? If so, note location on the site plan.	
6. Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.	
b. Ground:	
1. Will groundwater be withdrawn, or will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.	
2. Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (e.g., domestic sewage; industrial, containing the following chemicals _____; agricultural, etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.	

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c. **Water Runoff (including storm water):**	**OFFICE USE ONLY**
1. Describe the source of runoff, (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.	
2. Could waste materials enter ground or surface waters? If so, generally describe.	
3. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:	
4. PLANTS	
a. Check or circle types of vegetation found on the site: ___ deciduous tree: alder, maple, aspen, other _____ ___ evergreen tree: fir, cedar, pine, other _____ ___ shrubs ___ grass ___ pasture ___ crop or grain ___ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other _____ ___ water plants: water lily, eel grass, milfoil, other _____ ___ other types of vegetation	
b. What kind and amount of vegetation will be removed or altered?	
c. List threatened or endangered species known to be on or near the site.	
d. Proposed landscaping, use of native plants, or measures to preserve or enhance vegetation on the site, if any:	
5. ANIMALS	
a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site: birds: hawk, heron, eagle, songbirds, other _____ mammals: deer, bear, elk, beaver, other _____ fish: bass, salmon, trout, herring, shellfish, other	
b. List any threatened or endangered species known to be on or near the site.	
c. Is site part of a migration route? If so, explain.	
d. Proposed measures to preserve or enhance wildlife, if any:	
6. ENERGY AND NATURAL RESOURCES	
a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.	
b. Would your project affect the potential use of solar energy on adjacent properties? If so, generally describe.	
c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:	

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7. ENVIRONMENTAL HEALTH	OFFICE USE ONLY
a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.	
1. Describe special emergency services that might be required.	
2. Proposed measures to reduce or control environmental health hazards, if any.	
b. Noise	
1. What types of noise exist in the area which may affect your project (e.g., traffic, equipment operation, other)?	
2. What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (e.g., traffic, construction, operation, other)? Indicate what hours noise would come from the site.	
3. Proposed measures to reduce or control noise impacts, if any:	
8. LAND AND SHORELINE USE	
a. What is the current use of site and adjacent properties?	
b. Has the site been used for agriculture? If so, describe.	
c. Describe any structures on site.	
d. Will any structures be demolished? If so, what?	
e. What is the current zoning classification of the site?	
f. What is the current comprehensive plan designation of the site?	
g. If applicable, what is the current shoreline master program designation of the site?	
h. Has any part of the site been classified as an "environmentally sensitive" area? NO	
i. Approximately how many people would reside or work in the completed project?	
j. Approximately how many people would the completed project displace?	
k. Proposed measures to avoid or reduce displacement impacts, if any:	
l. Proposed measures to ensure proposal is compatible with existing and projected land uses and plans, if any:	
9. HOUSING	
a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.	
b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.	

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	OFFICE USE ONLY
c. Proposed measures to reduce or control housing impacts, if any:	
10. AESTHETICS	
a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?	
b. What views in the immediate vicinity would be altered or obstructed?	
c. Proposed measures to reduce or control aesthetics impacts, if any:	
11. LIGHT AND GLARE	
a. What type of light or glare will the proposal produce? What time of day would it mainly occur?	
b. Could light or glare from the finished project be a safety hazard or interfere with views?	
c. What existing off-site sources of light or glare may affect your proposal.	
d. Proposed measures to reduce or control light and glare impacts, if any:	
12. RECREATION	
a. What designated and informal recreational opportunities are in the immediate vicinity?	
b. Would the proposed project displace any existing recreational uses? If so, describe.	
c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:	
13. HISTORIC AND CULTURAL PRESERVATION	
a. Are there any places or objects listed on, or proposed for, national, state or local preservation registers known to be on or next to the site? If so, generally describe.	
b. Generally describe any landmarks or evidence of historic, archaeological, scientific or cultural importance known to be on or next to the site.	
c. Proposed measures to reduce or control impacts, if any:	
14. TRANSPORTATION	
a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.	
b. Is site currently served by public transit? If not, what is the approximate distance to nearest transit stop?	
c. How many parking spaces would the completed project have? How many would the project eliminate?	
d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).	

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	OFFICE USE ONLY
e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.	
f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.	
g. Proposed measures to reduce or control transportation impacts, if any:	
15. PUBLIC SERVICES	
a. Would the project result in an increased need for public services (e.g., fire protection, police protection, health care, schools, other)? If so, generally describe.	
b. Proposed measures to reduce or control direct impacts on public services, if any.	
16. UTILITIES	
a. Circle utilities available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.	
b. Describe the utilities that are proposed for the project, the utility providing the service and the general construction activities on the site or in the immediate vicinity which might be needed.	

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature:_____

Date Submitted:_____

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D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (do not use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment. When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

	OFFICE USE ONLY
1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise? Proposed measures to avoid or reduce such increases are:	
2. How would the proposal be likely to affect plants, animals, fish, or marine life? Proposed measures to protect or conserve plants, animals, fish, or marine life are:	
3. How would the proposal be likely to deplete energy or natural resources? Proposed measures to protect or conserve energy and natural resources are:	
4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands? Proposed measures to protect such resources or to avoid or reduce impacts are:	
5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans? Proposed measures to avoid or reduce shoreline and land use impacts are:	
6. How would the proposal be likely to increase demands on transportation or public services and utilities? Proposed measures to reduce or respond to such demand(s) are:	
8. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.	

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Estimated $PM_{2.5}$ Emissions During NWS Network Radar Construction Period at Langley Hill Site

Vehicle Type	Emission Type	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	$PM_{2.5}$ (Pounds [lbs]/VMT)	$PM_{2.5}$ (lbs/day)	$PM_{2.5}$ (lbs/project)	$PM_{2.5}$ (tons/project)	Emission Factor Criteria
Passenger[1]	Vehicle Exhaust	170	10	40	0.018	7.20	1,224.00	0.61	Passenger vehicle on paved road or highway with street cleaning
Dump Truck[1,2]	Vehicle Exhaust	5	1	0.3	6.540	1.96	9.81	0.00	Trucks on unpaved roadway
Water Truck[1,2]	Vehicle Exhaust	34	1	0.3	6.540	1.96	66.71	0.03	Trucks on unpaved roadway
Haul Truck[1,2]	Vehicle Exhaust	5	1	0.3	6.540	1.96	9.81	0.00	Trucks on unpaved roadway
Dump Truck[1]	Vehicle Exhaust	5	1	40	0.400	16.00	80.00	0.04	Trucks on paved roadways with street cleaning
Water Truck [1]	Vehicle Exhaust	34	1	40	0.400	16.00	544.00	0.27	Trucks on paved roadways with street cleaning
Haul Truck[1]	Vehicle Exhaust	5	1	40	0.400	16.00	80.00	0.04	Trucks on paved roadways with street cleaning
Supply/Materials Truck[1]	Vehicle Exhaust	20	2	40	0.400	32.00	640.00	0.32	Trucks on paved roadways with street cleaning
Bulldozing[3]	Fugitive Dust	1	1	10	—	7.45	7.45	0.00	Dirt/debris pushing operations
Scraping[4]	Fugitive Dust	1	1	5	0.423	2.11	2.11	0.00	Earthmoving (cut and fill operations, and pan scraper operations)
Grading[5]	Fugitive Dust	1	1	2	0.019	0.04	0.04	0.00	Graded surface
Dirt Piling or Material Handling[6]	Fugitive Dust	5	1	2	0.000518	0.00	0.01	0.00	Storage pile filling or truck dumping
Total $PM_{2.5}$ Emissions						**102.69**	**2,663.93**	**1.33**	

Notes: 1 - Emission factors are from Final Environmental Assessment of Airport Surveillance Radar, Model 11 (ASR-11) to Serve the North Valley Area, Phoenix, Arizona (March 2006).
2 - Emission factors are based on an average mean vehicle weight of 13 tons.
3 - U.S. EPA AP-42 Chapter 11, Tables 11.9-3, 11.9-5
4 - U.S. EPA AP-42, Chapter 13, Tables 13.2.2-1 to 5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
5 - U.S. EPA AP-42, Chapter 11, Tables 11.9-5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
6 - U.S. EPA AP-42, Ch 13.2.4

Estimated PM_{10} Emissions During NWS Network Radar Construction Period at Langley Hill Site

Vehicle Type	Emission Type	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	PM_{10} (Pounds [lbs]/VMT)	PM_{10} (lbs/day)	PM_{10} (lbs/project)	PM_{10} (tons/project)	Emission Factor Criteria
Passenger[1]	Vehicle Exhaust	170	10	40	0.018	7.20	1,224.00	0.61	Passenger vehicle on paved road or highway with street cleaning
Dump Truck[1,2]	Vehicle Exhaust	5	1	0.3	6.540	1.96	9.81	0.00	Trucks on unpaved roadway
Water Truck[1,2]	Vehicle Exhaust	34	1	0.3	6.540	1.96	66.71	0.03	Trucks on unpaved roadway
Haul Truck[1,2]	Vehicle Exhaust	5	1	0.3	6.540	1.96	9.81	0.00	Trucks on unpaved roadway
Dump Truck[1]	Vehicle Exhaust	5	1	40	0.400	16.00	80.00	0.04	Trucks on paved roadways with street cleaning
Water Truck [1]	Vehicle Exhaust	34	1	40	0.400	16.00	544.00	0.27	Trucks on paved roadways with street cleaning
Haul Truck[1]	Vehicle Exhaust	5	1	40	0.400	16.00	80.00	0.04	Trucks on paved roadways with street cleaning
Supply/Materials Truck[1]	Vehicle Exhaust	20	2	40	0.400	32.00	640.00	0.32	Trucks on paved roadways with street cleaning
Bulldozing[3]	Fugitive Dust	1	1	10	–	21.31	21.31	0.01	Dirt/debris pushing operations
Scraping[4]	Fugitive Dust	1	1	5	0.988	4.94	4.94	0.00	Earthmoving (cut and fill operations, and pan scraper operations)
Grading[5]	Fugitive Dust	1	1	2	0.275	0.55	0.55	0.00	Graded surface
Wind Erosion[6]	Fugitive Dust	240	–	1.2	31.11529532	37.338	8,961.21	4.48	Open storage piles
Dirt Piling or Material Handling[7]	Fugitive Dust	5	1	2	0.003422	0.01	0.03	0.00	Storage pile filling or truck dumping
Total PM_{10} Emissions						**157.23**	**11,642.37**	**5.82**	

Notes: 1 - Emission factors are from Final Environmental Assessment of Airport Surveillance Radar, Model 11 (ASR-11) to Serve the North Valley Area, Phoenix, Arizona (March 2006).
2 - Emission factors are based on an average mean vehicle weight of 13 tons.
3 - U.S. EPA AP-42 Chapter 11, Tables 11.9-3, 11.9-5
4 - U.S. EPA AP-42, Chapter 13, Tables 13.2.2-1 to 5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
5 - U.S. EPA AP-42, Chapter 11, Tables 11.9-5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
6 - U.S. EPA Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (1992), equation 2-12. Emission factor is expressed in lbs/day/acre; therefore, VMT/day is expressed in acre/day. Emission factor for active storage piles was applied to all exposed areas which would be subject to wind erosion. Acres effected by wind erosion would only occur within the construction footprint and areas to be cleared for construction purposes.
7 - U.S. EPA AP-42, Ch 13.2.4

Estimated CO Emissions During NWS Network Radar Construction Period at Langley Hill Site

Vehicle Type	Travel Route	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	Emission Factor (pounds [lbs]/VMT)[1]	CO (lbs/day)	CO (lbs/project)	CO (tons/project)
Passenger	**paved surface road/highway**	170	10	40	0.050	20.00	3,400.00	1.70
Dump Truck[2]	**unpaved road**	5	1	0.3	0.120	0.04	0.18	0.00
Water Truck[2]	**unpaved road**	34	1	0.3	0.120	0.04	1.22	0.00
Haul Truck[2]	**unpaved road**	5	1	0.3	0.120	0.04	0.18	0.00
Dump Truck[2]	**surface road**	5	1	40	0.120	4.80	24.00	0.01
Water Truck[2]	**surface road**	34	1	40	0.120	4.80	163.20	0.08
Haul Truck[2]	**surface road**	5	1	40	0.120	4.80	24.00	0.01
Supply/Materials Truck[2]	**surface road**	20	2	40	0.120	9.60	192.00	0.10
Bulldozing[2]	—	1	1	2	0.120	0.24	0.24	0.00
Scraping[2]	—	1	1	2	0.120	0.24	0.24	0.00
Total CO Emissions						**44.59**	**3,805.26**	**1.90**

Notes: 1 - Emission factors are from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks (2000).

2 - Emission factors are derived from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks. Factors for heavy duty trucks were calculated by taking factor from light trucks and doubled.

Estimated NO_x (Ozone Precursor) Emissions During NWS Network Radar Construction Period at Langley Hill Site

Vehicle Type	Travel Route	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	Emission Factor (pounds [lbs]/VMT)[1]	NO_x (lbs/day)	NO_x (lbs/project)	NO_x (tons/project)
Passenger	**paved surface road/highway**	170	10	40	0.003	1.20	204.00	0.10
Dump Truck[2]	**unpaved road**	5	1	0.3	0.008	0.00	0.01	0.00
Water Truck[2]	**unpaved road**	34	1	0.3	0.008	0.00	0.08	0.00
Haul Truck[2]	**unpaved road**	5	1	0.3	0.008	0.00	0.01	0.00
Dump Truck[2]	**surface road**	5	1	40	0.008	0.32	1.60	0.00
Water Truck[2]	**surface road**	34	1	40	0.008	0.32	10.88	0.01
Haul Truck[2]	**surface road**	5	1	40	0.008	0.32	1.60	0.00
Supply/Materials Truck[2]	**surface road**	20	2	40	0.008	0.64	12.80	0.01
Bulldozing[2]	—	1	1	2	0.008	0.02	0.02	0.00
Scraping[2]	—	1	1	2	0.008	0.02	0.02	0.00
Total NO_x Emissions							**231.02**	**0.12**

Notes: 1 - Emission factors are from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks (2000).

2 - Emission factors are derived from EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks. Factors for heavy duty trucks were calculated by taking factor from light trucks and doubled.

Estimated $PM_{2.5}$ Emissions During NWS Network Radar Construction Period at Ocean City Site

Vehicle Type	Emission Type	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	$PM_{2.5}$ (Pounds [lbs]/VMT)	$PM_{2.5}$ (lbs/day)	$PM_{2.5}$ (lbs/project)	$PM_{2.5}$ (tons/project)	Emission Factor Criteria
Passenger[1]	**Vehicle Exhaust**	170	10	45	0.018	8.10	1,377.00	0.69	Passenger vehicle on paved road or highway with street cleaning
Dump Truck[1,2]	**Vehicle Exhaust**	5	1	0.1	6.540	0.65	3.27	0.00	Trucks on unpaved roadway
Water Truck[1,2]	**Vehicle Exhaust**	34	1	0.1	6.540	0.65	22.24	0.01	Trucks on unpaved roadway
Haul Truck[1,2]	**Vehicle Exhaust**	5	1	0.1	6.540	0.65	3.27	0.00	Trucks on unpaved roadway
Dump Truck[1]	**Vehicle Exhaust**	5	1	45	0.400	18.00	90.00	0.05	Trucks on paved roadways with street cleaning
Water Truck [1]	**Vehicle Exhaust**	34	1	45	0.400	18.00	612.00	0.31	Trucks on paved roadways with street cleaning
Haul Truck[1]	**Vehicle Exhaust**	5	1	45	0.400	18.00	90.00	0.05	Trucks on paved roadways with street cleaning
Supply/Materials Truck[1]	**Vehicle Exhaust**	20	2	45	0.400	36.00	720.00	0.36	Trucks on paved roadways with street cleaning
Bulldozing[3]	**Fugitive Dust**	1	1	2	—	9.52	9.52	0.00	Dirt/debris pushing operations
Scraping[4]	**Fugitive Dust**	1	1	2	0.461	0.92	0.92	0.00	Earthmoving (cut and fill operations, and pan scraper operations)
Grading[5]	**Fugitive Dust**	1	1	2	0.019	0.04	0.04	0.00	Graded surface
Dirt Piling or Material Handling[6]	**Fugitive Dust**	5	1	2	0.000557	0.00	0.01	0.00	Storage pile filling or truck dumping
Total $PM_{2.5}$ Emissions						**110.55**	**2,928.27**	**1.46**	

Notes: 1 - Emission factors are from Final Environmental Assessment of Airport Surveillance Radar, Model 11 (ASR-11) to Serve the North Valley Area, Phoenix, Arizona (March 2006).
2 - Emission factors are based on an average mean vehicle weight of 13 tons.
3 - U.S. EPA AP-42 Chapter 11, Tables 11.9-3, 11.9-5
4 - U.S. EPA AP-42, Chapter 13, Tables 13.2.2-1 to 5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
5 - U.S. EPA AP-42, Chapter 11, Tables 11.9-5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
6 - U.S. EPA AP-42, Ch 13.2.4

Estimated PM_{10} Emissions During NWS Network Radar Construction Period at Ocean City Site

Vehicle Type	Emission Type	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	PM_{10} (Pounds [lbs]/VMT)	PM_{10} (lbs/day)	PM_{10} (lbs/project)	PM_{10} (tons/project)	Emission Factor Criteria
Passenger[1]	Vehicle Exhaust	170	10	45	0.018	8.10	1,377.00	0.69	Passenger vehicle on paved road or highway with street cleaning
Dump Truck[1,2]	Vehicle Exhaust	5	1	0.1	6.540	0.65	3.27	0.00	Trucks on unpaved roadway
Water Truck[1,2]	Vehicle Exhaust	34	1	0.1	6.540	0.65	22.24	0.01	Trucks on unpaved roadway
Haul Truck[1,2]	Vehicle Exhaust	5	1	0.1	6.540	0.65	3.27	0.00	Trucks on unpaved roadway
Dump Truck[1]	Vehicle Exhaust	5	1	45	0.400	18.00	90.00	0.05	Trucks on paved roadways with street cleaning
Water Truck [1]	Vehicle Exhaust	34	1	45	0.400	18.00	612.00	0.31	Trucks on paved roadways with street cleaning
Haul Truck[1]	Vehicle Exhaust	5	1	45	0.400	18.00	90.00	0.05	Trucks on paved roadways with street cleaning
Supply/Materials Truck[1]	Vehicle Exhaust	20	2	45	0.400	36.00	720.00	0.36	Trucks on paved roadways with street cleaning
Bulldozing[3]	Fugitive Dust	1	1	2	—	28.11	28.11	0.01	Dirt/debris pushing operations
Scraping[4]	Fugitive Dust	1	1	2	1.078	2.16	2.16	0.00	Earthmoving (cut and fill operations, and pan scraper operations)
Grading[5]	Fugitive Dust	1	1	2	0.275	0.55	0.55	0.00	Graded surface
Wind Erosion[6]	Fugitive Dust	240	—	1.1	33.04279149	36.347	8,723.30	4.36	Open storage piles
Dirt Piling or Material Handling[7]	Fugitive Dust	5	1	2	0.003677	0.01	0.04	0.00	Storage pile filling or truck dumping
Total PM_{10} Emissions						**167.24**	**11,671.93**	**5.84**	

Notes: 1 - Emission factors are from Final Environmental Assessment of Airport Surveillance Radar, Model 11 (ASR-11) to Serve the North Valley Area, Phoenix, Arizona (March 2006).
2 - Emission factors are based on an average mean vehicle weight of 13 tons.
3 - U.S. EPA AP-42 Chapter 11, Tables 11.9-3, 11.9-5
4 - U.S. EPA AP-42, Chapter 13, Tables 13.2.2-1 to 5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
5 - U.S. EPA AP-42, Chapter 11, Tables 11.9-5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
6 - U.S. EPA Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (1992), equation 2-12. Emission factor is expressed in lbs/day/acre; therefore, VMT/day is expressed in acre/day. Emission factor for active storage piles was applied to all exposed areas which would be subject to wind erosion. Acres effected by wind erosion would only occur within the construction footprint and areas to be cleared for construction purposes. Tree removal for the Ocean City site in order to improve radar coverage would not create fugitive dust, only trees would be cut or removed not the ground cover.
7 - U.S. EPA AP-42, Ch 13.2.4

Estimated CO Emissions During NWS Network Radar Construction Period at Ocean City Site

Vehicle Type	Travel Route	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	Emission Factor (pounds [lbs]/VMT)[1]	CO (lbs/day)	CO (lbs/project)	CO (tons/project)
Passenger	**paved surface road/highway**	170	10	45	0.050	22.50	3,825.00	1.91
Dump Truck[2]	**unpaved road**	5	1	0.1	0.120	0.01	0.06	0.00
Water Truck[2]	**unpaved road**	34	1	0.1	0.120	0.01	0.41	0.00
Haul Truck[2]	**unpaved road**	5	1	0.1	0.120	0.01	0.06	0.00
Dump Truck[2]	**surface road**	5	1	45	0.120	5.40	27.00	0.01
Water Truck[2]	**surface road**	34	1	45	0.120	5.40	183.60	0.09
Haul Truck[2]	**surface road**	5	1	45	0.120	5.40	27.00	0.01
Supply/Materials Truck[2]	**surface road**	20	2	45	0.120	10.80	216.00	0.11
Bulldozing[2]	—	1	1	2	0.120	0.24	0.24	0.00
Scraping[2]	—	1	1	2	0.120	1.00	1.00	0.00
Total CO Emissions						**50.78**	**4,280.37**	**2.14**

Notes: 1 - Emission factors are from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks (2000).

2 - Emission factors are derived from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks. Factors for heavy duty trucks were calculated by taking factor from light trucks and doubled.

Estimated NO_x (Ozone Precursor) Emissions During NWS Network Radar Construction Period at Ocean City Site

Vehicle Type	Travel Route	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	Emission Factor (pounds [lbs]/VMT)[1]	NO_x (lbs/day)	NO_x (lbs/project)	NO_x (tons/project)
Passenger	paved surface road/highway	170	10	45	0.003	1.35	229.50	0.11
Dump Truck[2]	unpaved road	5	1	0.1	0.008	0.00	0.00	0.00
Water Truck[2]	unpaved road	34	1	0.1	0.008	0.00	0.03	0.00
Haul Truck[2]	unpaved road	5	1	0.1	0.008	0.00	0.00	0.00
Dump Truck[2]	surface road	5	1	45	0.008	0.36	1.80	0.00
Water Truck[2]	surface road	34	1	45	0.008	0.36	12.24	0.01
Haul Truck[2]	surface road	5	1	45	0.008	0.36	1.80	0.00
Supply/Materials Truck[2]	surface road	20	2	45	0.008	0.72	14.40	0.01
Bulldozing[2]	—	1	1	2	0.008	0.02	0.02	0.00
Scraping[2]	—	1	1	2	0.008	0.02	0.02	0.00
Total NO_x Emissions							**259.81**	**0.13**

Notes: 1 - Emission factors are from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks (2000).
2 - Emission factors are derived from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks. Factors for heavy duty trucks were calculated by taking factor from light trucks and doubled.

Estimated $PM_{2.5}$ Emissions During NWS Network Radar Construction Period at Saddle Hill Site

Vehicle Type	Emission Type	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	$PM_{2.5}$ (Pounds [lbs]/VMT)	$PM_{2.5}$ (lbs/day)	$PM_{2.5}$ (lbs/project)	$PM_{2.5}$ (tons/project)	Emission Factor Criteria
Passenger[1]	Vehicle Exhaust	170	10	35.4	0.018	6.37	1,083.24	0.54	Passenger vehicle on paved road or highway with street cleaning
Dump Truck[1,2]	Vehicle Exhaust	5	1	1.9	6.540	12.43	62.13	0.03	Trucks on unpaved roadway
Water Truck[1,2]	Vehicle Exhaust	34	1	1.9	6.540	12.43	422.48	0.21	Trucks on unpaved roadway
Haul Truck[1,2]	Vehicle Exhaust	5	1	1.9	6.540	12.43	62.13	0.03	Trucks on unpaved roadway
Dump Truck[1]	Vehicle Exhaust	5	1	35.4	0.400	14.16	70.80	0.04	Trucks on paved roadways with street cleaning
Water Truck [1]	Vehicle Exhaust	34	1	35.4	0.400	14.16	481.44	0.24	Trucks on paved roadways with street cleaning
Haul Truck[1]	Vehicle Exhaust	5	1	35.4	0.400	14.16	70.80	0.04	Trucks on paved roadways with street cleaning
Supply/Materials Truck[1]	Vehicle Exhaust	20	2	35.4	0.400	28.32	566.40	0.28	Trucks on paved roadways with street cleaning
Bulldozing[3]	Fugitive Dust	1	1	10	—	12.14	12.14	0.01	Dirt/debris pushing operations
Scraping[4]	Fugitive Dust	1	1	5	0.659	3.30	3.30	0.00	Earthmoving (cut and fill operations, and pan scraper operations)
Grading[5]	Fugitive Dust	1	1	2	0.019	0.04	0.04	0.00	Graded surface
Dirt Piling or Material Handling[6]	Fugitive Dust	5	1	2	0.000545	0.00	0.01	0.00	Storage pile filling or truck dumping
Total $PM_{2.5}$ Emissions						**129.93**	**2,834.91**	**1.42**	

Notes: 1 - Emission factors are from Final Environmental Assessment of Airport Surveillance Radar, Model 11 (ASR-11) to Serve the North Valley Area, Phoenix, Arizona (March 2006).
2 - Emission factors are based on an average mean vehicle weight of 13 tons.
3 - U.S. EPA AP-42 Chapter 11, Tables 11.9-3, 11.9-5
4 - U.S. EPA AP-42, Chapter 13, Tables 13.2.2-1 to 5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
5 - U.S. EPA AP-42, Chapter 11, Tables 11.9-5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
6 - U.S. EPA AP-42, Ch 13.2.4

Estimated PM_{10} Emissions During NWS Network Radar Construction Period at Saddle Hill Site

Vehicle Type	Emission Type	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	PM_{10} (Pounds [lbs]/VMT)	PM_{10} (lbs/day)	PM_{10} (lbs/project)	PM_{10} (tons/project)	Emission Factor Criteria
Passenger[1]	Vehicle Exhaust	170	10	35.4	0.018	6.37	1,083.24	0.54	Passenger vehicle on paved road or highway with street cleaning
Dump Truck[1,2]	Vehicle Exhaust	5	1	1.9	6.540	12.43	62.13	0.03	Trucks on unpaved roadway
Water Truck[1,2]	Vehicle Exhaust	34	1	1.9	6.540	12.43	422.48	0.21	Trucks on unpaved roadway
Haul Truck[1,2]	Vehicle Exhaust	5	1	1.9	6.540	12.43	62.13	0.03	Trucks on unpaved roadway
Dump Truck[1]	Vehicle Exhaust	5	1	35.4	0.400	14.16	70.80	0.04	Trucks on paved roadways with street cleaning
Water Truck [1]	Vehicle Exhaust	34	1	35.4	0.400	14.16	481.44	0.24	Trucks on paved roadways with street cleaning
Haul Truck[1]	Vehicle Exhaust	5	1	35.4	0.400	14.16	70.80	0.04	Trucks on paved roadways with street cleaning
Supply/Materials Truck[1]	Vehicle Exhaust	20	2	35.4	0.400	28.32	566.40	0.28	Trucks on paved roadways with street cleaning
Bulldozing[3]	Fugitive Dust	1	1	10	—	39.62	39.62	0.02	Dirt/debris pushing operations
Scraping[4]	Fugitive Dust	1	1	5	1.540	7.70	7.70	0.00	Earthmoving (cut and fill operations, and pan scraper operations)
Grading[5]	Fugitive Dust	1	1	2	0.275	0.55	0.55	0.00	Graded surface
Wind Erosion[6]	Fugitive Dust	240	—	1.2	48.87579574	58.651	14,076.23	7.04	Open storage piles
Dirt Piling or Material Handling[7]	Fugitive Dust	5	1	2	0.003600	0.01	0.04	0.00	Storage pile filling or truck dumping
Total PM_{10} Emissions						**220.98**	**16,943.56**	**8.47**	

Notes: 1 - Emission factors are from Final Environmental Assessment of Airport Surveillance Radar, Model 11 (ASR-11) to Serve the North Valley Area, Phoenix, Arizona (March 2006).
2 - Emission factors are based on an average mean vehicle weight of 13 tons.
3 - U.S. EPA AP-42 Chapter 11, Tables 11.9-3, 11.9-5
4 - U.S. EPA AP-42, Chapter 13, Tables 13.2.2-1 to 5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
5 - U.S. EPA AP-42, Chapter 11, Tables 11.9-5 & SCAQMD Sample Construction Scenario Projects less than 5 acres
6 - U.S. EPA Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (1992), equation 2-12. Emission factor is expressed in lbs/day/acre; therefore, VMT/day is expressed in acre/day. Emission factor for active storage piles was applied to all exposed areas which would be subject to wind erosion. Acres effected by wind erosion would only occur within th construction footprint and areas to be cleared for construction purposes.
7 - U.S. EPA AP-42, Ch 13.2.4

Estimated CO Emissions During NWS Network Radar Construction Period at Saddle Hill Site

Vehicle Type	Travel Route	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	Emission Factor (pounds [lbs]/VMT)[1]	CO (lbs/day)	CO (lbs/project)	CO (tons/project)
Passenger	**paved surface road/highway**	170	10	35.4	0.050	17.70	3,009.00	1.50
Dump Truck[2]	**unpaved road**	5	1	1.9	0.120	0.23	1.14	0.00
Water Truck[2]	**unpaved road**	34	1	1.9	0.120	0.23	7.75	0.00
Haul Truck[2]	**unpaved road**	5	1	1.9	0.120	0.23	1.14	0.00
Dump Truck[2]	**surface road**	5	1	35.4	0.120	4.25	21.24	0.01
Water Truck[2]	**surface road**	34	1	35.4	0.120	4.25	144.43	0.07
Haul Truck[2]	**surface road**	5	1	35.4	0.120	4.25	21.24	0.01
Supply/Materials Truck[2]	**surface road**	20	2	35.4	0.120	8.50	169.92	0.08
Bulldozing[2]	—	1	1	2	0.120	0.24	0.24	0.00
Scraping[2]	—	1	1	2	0.120	0.24	0.24	0.00
Total CO Emissions						**40.10**	**3,376.34**	**1.69**

Notes: 1 - Emission factors are from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks (2000).

2 - Emission factors are derived from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks. Factors for heavy duty trucks were calculated by taking factor from light trucks and doubled.

Estimated NO_x (Ozone Precursor) Emissions During NWS Network Radar Construction Period at Saddle Hill Site

Vehicle Type	Travel Route	Duration (days)	Number of Units	Vehicle Mile Traveled (VMT)/day	Emission Factor (pounds [lbs]/VMT)[1]	NO_x (lbs/day)	NO_x (lbs/project)	NO_x (tons/project)
Passenger	paved surface road/highway	170	10	35.4	0.003	1.06	180.54	0.09
Dump Truck[2]	unpaved road	5	1	1.9	0.008	0.02	0.08	0.00
Water Truck[2]	unpaved road	34	1	1.9	0.008	0.02	0.52	0.00
Haul Truck[2]	unpaved road	5	1	1.9	0.008	0.02	0.08	0.00
Dump Truck[2]	surface road	5	1	35.4	0.008	0.28	1.42	0.00
Water Truck[2]	surface road	34	1	35.4	0.008	0.28	9.63	0.00
Haul Truck[2]	surface road	5	1	35.4	0.008	0.28	1.42	0.00
Supply/Materials Truck[2]	surface road	20	2	35.4	0.008	0.57	11.33	0.01
Bulldozing[2]	—	1	1	2	0.008	0.02	0.02	0.00
Scraping[2]	—	1	1	2	0.008	0.02	0.02	0.00
Total NO_x Emissions							**205.03**	**0.10**

Notes: 1 - Emission factors are from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks (2000).
2 - Emission factors are derived from U.S. EPA Emission Facts Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks. Factors for heavy duty trucks were calculated by taking factor from light trucks and doubled.

Fugitive Dust Calculations

Used U.S. EPA AP-42 Chapters 11 & 13 and SCAQMD CEQA Air Quality Handbook (1993) & U.S. EPA Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (November 19, 1992).

1. Bulldozer

Source: Tables 11.9-1. Silt content came from USDA SSURGO RUSLE2 Related Attributes Table and moisture content came from Soil Properties (available water capacity, also known as available moisture capacity in the Glossary of the Soil Survey report).

Langley Hill Site:

Particle	Equation Overburden Material (lb/hr)	PM Diameter Fraction	PM Grading (lb/hr)	PM Grading (lb/day [8 hr])
PM_{10}	3.551500775	0.75	2.663625582	21.30900465
$PM_{2.5}$	8.866788783	0.105	0.931012822	7.448102578

Ocean City Site:

Particle	Equation Overburden Material (lb/hr)	PM Diameter Fraction	PM Grading (lb/hr)	PM Grading (lb/day [8 hr])
PM_{10}	4.685488146	0.75	3.514116109	28.11292887
$PM_{2.5}$	11.33650692	0.105	1.190333226	9.522665811

Saddle Hill Site:

Particle	Equation Overburden Material (lb/hr)	PM Diameter Fraction	PM Grading (lb/hr)	PM Grading (lb/day [8 hr])
PM_{10}	6.603459384	0.75	4.952594538	39.6207563
$PM_{2.5}$	14.45649009	0.105	1.51793146	12.14345168

2. Grading (all three sites)

Source: Tables 11.9-1 & SCAQMD Sample Construction Scenario Projects less than 5 acres.
Assume in equation S (speed) = 3 mph per SCAQMD

Particle	Equation (lb/VMT)	PM Diameter Fraction	PM Grading (lb/VMT)
PM_{10}	0.459	0.6	0.2754
$PM_{2.5}$	0.623538291	0.031	0.019329687

3. Scraping

Source: Tables 13.2.2-1 to 5 and SCAQMD Sample Construction Scenario Projects less than 5 acres. Silt content came from USDA SSURGO RUSLE2 Related Attributes Table and moisture content came from Soil Properties (available water capacity, also known as available moisture capacity in the Glossary of the Soil Survey report).

Assume in equation S (speed) = 3 mph per SCAQMD
C-Emission Factor to 1980's Exhaust, Brake and Tire Wear
The metric conversion from lb/VMT to grams (g) per vehicle kilometer traveled (VKT) is as follows: 1 lb/VMT = 281.9 g/VKT

Langley Hill Site:

Particle	Equation (lb/VMT)	C (lb/VMT)	PM Scraping (lb/VMT)
PM_{10}	0.988510863	0.00047	0.988040863
$PM_{2.5}$	0.423255065	0.00036	0.422895065

Ocean City Site:

Particle	Equation (lb/VMT)	C (lb/VMT)	PM Scraping (lb/VMT)
PM_{10}	1.078158568	0.00047	1.077688568
$PM_{2.5}$	0.461639919	0.00036	0.461279919

Saddle Hill Site:

Particle	Equation (lb/VMT)	C (lb/VMT)	PM Scraping (lb/VMT)
PM_{10}	1.54012371	0.00047	1.53965371
$PM_{2.5}$	0.659441575	0.00036	0.659081575

Fugitive Dust Calculations

4. Material Handling

Source: U.S. EPA AP-42 Ch 13.2.4. Assumed Mean Speed is 10 mph per SCAQMD Sample Construction Scenario Projects less than 5 acres.

Langley Hill Site:

Particle	PM Scraping (lb/ton) (Equation 1)	Est. Earth Removal (cubic yards)	Est. Earth Removal (tons)	PM Scraping (lbs)	lbs/day	
PM_{10}	8.50557E-05	2,980	4,023	0.342178962	0.00342179	0.171089481
$PM_{2.5}$	1.28799E-05	2,980	4,023	0.051815671	0.000518157	0.025907836

Ocean City Site:

Particle	PM Scraping (lb/ton) (Equation 1)	Est. Earth Removal (cubic yards)	Est. Earth Removal (tons)	PM Scraping (lbs)	lbs/day	
PM_{10}	0.00010254	2,656	3,586	0.367666311	0.003676663	0.183833155
$PM_{2.5}$	1.55274E-05	2,656	3,586	0.055675184	0.000556752	0.027837592

Saddle Hill Site:

Particle	PM Scraping (lb/ton) (Equation 1)	Est. Earth Removal (cubic yards)	Est. Earth Removal (tons)	PM Scraping (lbs)	lbs/day	
PM_{10}	8.0331E-05	3,320	4,482	0.360043397	0.003600434	0.180021699
$PM_{2.5}$	1.21644E-05	3,320	4,482	0.054520857	0.000545209	0.027260429

5. Wind Erosion from Open Storage Piles

Source of Equation: U.S. EPA Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (1992).

Acres effected by wind erosion for each alternative site is contained within this Expanded Site Survey/Environmental Assessment. The area affected by wind erosion would only occur within the construction footprint (clearing for construction purposes). Tree removal for the Ocean City Site in order to improve radar coverage would not create fugitive dust, only trees would be cut or removed not the ground cover.

Numbers of days with > or = 0.1 in of precipitation was taken from Local Climatological Data for Astoria, Oregon. Normal number of days was used as opposed to the numbers for the year 2004.

Silt content came from USDA SSURGO RUSLE2 Related Attributes Table.
Percent (%) of time that unobstructed wind speed exceeds 5.4 m/s at the mean pile height was calculated using data from the Wind Systems of the Mountain West: Station Graphics (http://www.met.utah.edu/jimsteen/jstewart/windroses.html). The nearest airport (e.g. HQM) and summer season were selected (since construction will begin in the summer). For each hour the % of wind speeds between 5-7.49 m/s were added. The % was averaged by adding up the % per hour divided by 24 hrs. The average was used as an estimate for the % of time that unobstructed wind speeds exceed 5.4 m/s.

Langley Hill Site:

Particle	Equation 2-12 (lbs/acre-day)	Acres	lbs/day
PM_{10}	31.11529532	1.2	37.33835438

Ocean City Site:

Particle	Equation 2-12 (lbs/acre-day)	Acres	lbs/day
PM_{10}	33.04279149	1.1	36.34707064

Saddle Hill Site:

Particle	Equation 2-12 (lbs/acre-day)	Acres	lbs/day
PM_{10}	48.87579574	1.2	58.65095489

6. Unpaved Roads

Source: U.S. EPA AP-42 Ch 13.2.2-4

	Unpaved Roads (Equation 1a) Emissions (lb/VMT)
PM_{10}	3.677067269
$PM_{2.5}$	0.367706727

November 9, 2009

Martha Jensen
U.S. Fish and Wildlife Service
510 Desmond Dr. SE
Lacey, WA 98503

Re: Proposed NWS Network Radar to serve Coastal Washington

1. **Federal Sponsor and Proposed Action**

The National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) proposes to construct and operate a Doppler weather radar to serve the coastal area of Washington. The proposed radar will close the gap in radar coverage provided by the existing NWS weather radar network. The new Doppler weather radar will collect data on weather conditions on the coast of Washington and will provide critical inputs to NWS forecasters. In compliance with Section 7 of the Endangered Species Act, to the NWS is consulting with the USFWS regarding potential impacts to listed species, designated critical habitat, or migratory birds that may result from installation and operation of the proposed NWS network weather radar to serve Coastal Washington. SRI, under contract to the NWS, is analyzing three alternative sites for the proposed radar. The following three alternative sites for this radar are under consideration by NWS and are located in Grays Harbor County, WA:

Langley Hill Site
Ocean City Site
Saddle Hill Site

Figure 1 is a map of the three alternative sites under consideration for the NWS network Doppler weather radar. Figures 2 through 4 shows location maps, aerials, and site photographs of each alternative site. Figure 5 provides drawings, site layout, and configuration of the typical NWS network radar.

The NWS Weather Forecast Office serving the Seattle area would operate the radar. The new radar facility would consist of a rotating antenna inside a 34.8 foot (ft) tall fiberglass radome mounted on a 98.4 ft tall steel-lattice tower. The total height of the radar structure, including a 9 ft lightning rod on top of the radome, will be up to 143 feet (ft) above ground level. Equipment, generator and transition power maintenance shelters will be installed at the base of the tower. A chain-link fence topped with barbed wire will be installed around the perimeter of the property for security. The radar facility installation would require a temporary construction staging area of approximately 4,097 sq meters (44,100 sq ft). Figures 2(a), (b) and (c) show a photograph, site

SRI International
333 Ravenswood Avenue • Menlo Park, California 94025-3493 • 650.859.2000

plan, and site configuration of a typical NWS network radar. Electric power utility infrastructure and telephone service would be extended to the radar from existing utility lines. The radar would be un-staffed and would not require water or wastewater utilities.

2. Description of Alternative Sites Under Consideration

The NWS is considering three alternative sites, which are described in detail below:

Langley Hill Site is near the paved two lane Copalis Beach Road. The proposed radar site, access easement, and utility easement are owned by Green Crow Management Services LLC. The site and utility easement were subject to timber harvest in 1986 and are vegetated with an immature Western hemlock forest with tree heights of about 60 ft. The access easement would follow the route of an existing logging road which connects to Copalis Beach Road; the existing roadwould be upgraded for a distance of about 1,400 ft to support radar construction and operation. A new utility easement with a length of about 500 ft would be established between Copalis Beach Road and the site. Tree removal for construction of the radar and installation of utility lines would affect about 1.2 acres of land.

The Ocean City Site and access/utility easement are located in a mowed grass field owned by North Beach School District No. 64. The easement would connect to Fourth Avenue in Ocean City. The site is in proximity to the North Beach School District No. 64 School Administration Building as seen in Figures 3(a) and (b). Site disturbance would be limited to the site footprint and a construction/staging at this site, an area of about 1.1 acre.

The Saddle Hill Site is a on a hilltop which contains several existing communications towers, see Figures 4(a), (b), and (c). The site and access/utility easement are owned by Rayonier Forestry Co. The proposed radar site was subject to timber harvesting in the last 10 years and is vegetated with immature western hemlock/spruce forest with tree heights less than 20 ft. The access/utility easement will follow existing private unimproved roads connecting the hilltop to State Route 109. About 4,900 ft of existing road would be upgraded. During radar construction staging, about 1 acre of immature forest vegetation would be removed.

3. Analysis of Potential Impacts to Protected Species, Critical Habitat, and Migratory Birds

Based on the Washington Department of Fish and Wildlife's Priority Habitats and Species list, the following federally-listed species in Table 1 are present in Grays Harbor County.

Table 1. Species List

Common Name	Scientific Name	Description	Federal Status	Habitat
Brown Pelican	Pelecanus occidentalis	bird	endangered	coastal, nearshore, bay, lagoon, forested or scrub-shrub wetland
Marbled Murrelet	Brachyramphus marmoratus	bird	threatened	nearshore & pelagic - nesting up to 84 km inland in WA

Common Name	Scientific Name	Description	Federal Status	Habitat
Northern Spotted Owl	Strix occidentalis caurina	bird	threatened	low and mid-elevation mature forests
Oregon Silverspot Butterfly	Speyeria zerene hippolyta	non-migrating butterfly	threatened	coastal salt spray meadows, stabilized dunes, and mountain meadows
Streaked Horned Lark	Eremophila alpestris strigata	bird	endangered	large expanses of bare or thinly vegetated land such as fields, prairies, dunes, upper beaches, airports, and similar areas with sparse grassy vegetation

The three sites under consideration for the weather radar to serve Coastal Washington are previously disturbed areas and do not contain wetlands, dunes, meadows, or mature forest that could provide habitat for listed species occurring in Gray Harbor County. Based on the *FWS Critical Habitat for Threatened and Endangered Species* Online Mapper, none of the three alternative sites or associated access/utility easements are located on critical habitat for listed species.

The Washington Department of Fish and Wildlife's *Salmon Scape* mapping tool shows the three alternative sites are located within the Queets-Quinault and Grays Harbor watersheds. Storm water runoff from the Ocean City Site drains into the Copalis River basin. The *Salmon Scape* mapping tool shows that the Langley Hill and Saddle Hill Sites fall on the boundary between the Grays Harbor and Queets-Quinault Watershed sub-basins. The Langley Hill site is on the drainage boundary between the Copalis River and the Humptulips River basin. Based on site investigations, the Saddle Hill site would drain northwestward into the Connor Creek basin within the Queets-Quinnault Watershed. There are no federally-listed salmon species occurring within either the Copalis, Humptulip,or Connor Creek basins. Two candidate species -- coho salmon and coastal cutthroat occur in the Humptulips basin. Installation and operation of the proposed radar would not require construction of in-water structures or defects on wetlands. All construction activities would occur in upland areas at least 250 ft from the nearest drainage or wetland. Best management practices would be implemented to prevent soil erosion and sedimentation of drainages. As a result no adverse impacts to listed or candidate salmon species would result.

USFWS guidelines contained in the *The ABC's of Bird Collisions At Communications Towers: The Next Steps* (1999) document are used to evaluate the potential for hazards to migratory birds. The design of the radar will reduce bird collisions to the maximum extent possible. The degree to which the proposed radar would conform to the guidelines are provided in Table 2.

Table 2.
USFWS's Voluntary Interim Guidelines For Minimizing Potential Collision Hazards to Migratory Birds as Applied to the Proposed NWS Network Radar to Serve Coastal Washington.

Summary of USFWS Guidelines for Bird Collision Hazard[1]	Application to NWS Network Radar
Collocate the proposed communication equipment on an existing communication tower or related existing structure (*e.g.*, a church steeple, billboard mount, water tower, electric transmission tower, monopole, or building).	The proposed NWS Network Doppler radar cannot be co-located on an existing communications tower since the communication tower would cause interference in the Doppler radar and give imprecise readings for weather patterns. The radar cannot be located on another kind of tower or building because the Doppler radar has a rotating antenna and requires an unobstructed view in all directions to maximize weather readings.
If collocation is not practical, license applicants are strongly encouraged to construct towers less than 200 feet (61 m) AGL, using construction techniques that do not require guy wires (*e.g.*, lattice or monopole structures). Such towers do not require lighting under FAA regulations unless located within 3.8 miles (6.1 km) of airports and near major travel corridors, and so should not be lighted unless required.	The radar tower would be up to143 ft AGL and would not be guyed, complying with this recommendation. It is NWS policy to put FAA aviation warning lights on all network radars. The proposed radar would be so equipped.
If at all possible, new towers should be located within existing "antenna farms," preferably in areas not used by migratory birds or species Federally or state-listed as endangered or threatened, or listed as Nongame Species of Management Concern. Avoid siting towers in or near wetlands, near other known bird concentration areas (*e.g.*, National Wildlife Refuges), or in habitat of threatened or endangered species known to be impacted by towers.	Due to electromagnetic concern it is difficult to locate the Doppler radar within an antennae farm. The Saddle Hill Site is the closest alternative site to an antennae farm and is about than 0.2 mi northeast from an existing commercial antennae farm. The three alternatives sites are not within wetlands, wildlife refuges, or habitat for threatened or endangered species.
Local meteorological conditions should be reviewed, and areas with an especially high incidence of fog, mist, and low cloud ceilings should be avoided, especially during spring and fall migrations.	Coastal Washington is subject to fog, mist, and low cloud ceilings during portions of the year. Avoidance is infeasible.
If taller towers (more than 199 feet [61 m] AGL) requiring lighting to warn pilots must be constructed, the minimum amount of warning and obstruction lighting required by the FAA should be used. Where permissible by FAA and local zoning regulations, only white strobe lights should be used at night. These should be up-shielded to minimize disruption to local residents, and should be the minimum number, with minimum intensity and	The proposed radar tower would be less than 199 ft in height and this guideline is not applicable.

Page 4

Summary of USFWS Guidelines for Bird Collision Hazard[1]	Application to NWS Network Radar
number of flashes per minute (*i.e.*, the longest duration between flashes, currently three seconds) allowed by the FAA. The use of solid red or pulsating red warning lights should be avoided at night. Construction techniques which do not require the use of guy wires should be employed whenever possible.	
Guyed towers constructed in known raptor or waterbird concentration areas should use daytime visual markers (*e.g.*, bird diverter devices) on the guy wires to prevent collisions by these diurnally active species. Suggested bird avoidance guidelines are available from the electric utility industry (APLIC 1994, 1996), and research and experimental design recommendations are available from the wind generation industry (NREL 1995, Anderson *et al.* 1999).	Not applicable; the proposed Doppler radar tower would not be guyed.
Towers should be constructed in a way that limits or minimizes habitat loss within the tower "footprint." Road access and fencing should be minimized to reduce or prevent habitat fragmentation and disturbance, and to reduce above-ground obstacles that might impact birds in flight. A larger tower footprint, however, is preferable to construction of a guy-supported tower.	There would be a very minimal habitat reduction. Between 1 and 1.2 acres of vegetation, consisting of either immature hemlock/spruce forest (Langley or Saddle Hill Sites) or mowed grasses (Ocean City Site) would be removed.
If significant populations of breeding birds are known to occur within the proposed tower footprint, construction should be limited to those months when birds are not nesting (*i.e.*, times other than spring and summer).	No populations of breeding birds are expected to occur within the radar footprint at any of the alternative sites.
New towers should be designed structurally and electrically to accommodate the applicant's antenna(s), and comparable antennas for at least two additional users, to reduce the number of future towers -- unless this design would require the addition of lights or guy wires to an otherwise unlighted and/or unguyed tower.	Due to security concerns and the potential for electrometric interference, it would not be possible to install other antennas on the proposed NWS network Doppler radar tower.
Security lighting for on-ground facilities and equipment should be down-shielded to keep light within the boundaries of the site and minimize its potential attraction for birds.	Exterior lighting at the radar facility would be shielded and pointed as recommended.
If a tower is constructed or proposed for construction, FWS personnel and/or researchers from the Communication Tower Working Group or their designees should be allowed access to the site after construction is complete to conduct both large (*e.g.*, crane [Gruidae], swan, and goose [Anatidae]) and small dead-bird searches; to place net	The NWS would allow USFWS staff to access the site to conduct dead bird searches. NWS would have to review the proposed placement of electronic monitoring equipment at the site to determine if it would adversely affect operation of the facility.

Page 5

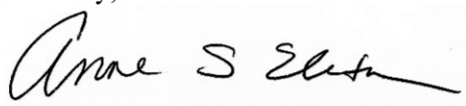
Summary of USFWS Guidelines for Bird Collision Hazard[1]	Application to NWS Network Radar
catchments below the tower but above the ground; to position radar, Global Positioning System, infrared, thermal imagery, and acoustical monitoring equipment as necessary to assess and verify bird migrations and habitat use; and to gain information on the impacts of various tower sizes, configurations, and lighting regimes.	
If constructing multiple towers, providers should consider the cumulative impacts of all of those towers on migratory birds, including impacts on birds listed as threatened and endangered and nongame species of management concern. The impacts of each individual tower should also be considered.	Not applicable.
If significant numbers of breeding, feeding, or roosting birds are known to habitually use a proposed tower construction site, relocation to an alternate site is recommended. If this is not an option, seasonal restrictions on construction may be advisable in order to avoid disturbance during periods of high bird activity.	There are no known breeding, feeding, or roosting birds at the Langley Hill, Ocean City or Saddle Hill sites.
Towers no longer in use or determined to be obsolete should be removed within 12 months of the cessation of use.	NWS policy is to remove decommissioned facilities as soon as possible, subject to the availability of funding.

1 – Source: Manville II, Alber M., Wildlife Biologist, U.S. Fish and Wildlife Service Division of Migratory Bird Management. *The ABC's of Bird Collisions At Communications Towers: The Next Steps.* Proceedings of the Avian Interactions Workshop. (December 2, 1999).

4. NWS Determination

The NWS determined that no adverse impacts to threatened or endangered species or designated critical habitat would result and the proposed radar, located at any of the three alternative sites, would not jeopardize the continued existence of protected species. We request your concurrence with this finding. The proposed radar would also comply with USFWS guidance to minimize impacts to migratory birds and would not result in a significant collision hazard. We would appreciate receiving any information or comments you may have with respect to potential impacts to biological resources or measures to eliminate or avoid impacts. If you have any questions, please contact me at anne.elston@sri.com or (650) 859-2693. We appreciate your assistance.

Sincerely,



Anne Elston
Environmental Analyst
Envirotechnical Program

Page 6

Attachments (13):

Figure 1 Alternative Sites Selected by NWS for Further Consideration

Figure 2(a) Location Map – Langley Hill Site for NWS Network Radar to Serve Coastal Washington

Figure 2(b) Aerial Photograph – Langley Hill Site for NWS Network Radar to Serve Coastal Washington

Figure 2(c) Site Photographs – Langley Hill Site for NWS Network Radar to Serve Coastal Washington

Figure 3(a) Location Map – Ocean City Site for NWS Network Radar to Serve Coastal Washington

Figure 3(b) Aerial Photograph – Ocean City Site for NWS Network Radar to Serve Coastal Washington

Figure 3(c) Site Photographs – Ocean City Site for NWS Network Radar to Serve Coastal Washington

Figure 4(a) Location Map – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington

Figure 4(b) Aerial Photograph – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington

Figure 4(c) Site Photographs – Saddle Hill Site for NWS Network Radar to Serve Coastal Washington

Figure 5(a) Photograph of a Typical NWS Network Radar Site

Figure 5(b) Standard NWS Network Radar Site Layout

Figure 5(c) Standard NWS Network Radar Site Configuration

Subject: Re: Washington NWS Network Radar: follow-up
From: Anne Elston <anne.elston@sri.com>
Date: Tue, 13 Apr 2010 14:00:04 -0700
To: Jenni_Dykstra@fws.gov
CC: Jim Manitakos <james.manitakos@sri.com>, Envtek <envtek@sri.com>

Hello Jenni,

Regarding the proposed NWS Network Radar to serve coastal Washington, please refer to the table below for clarification of the effects determination for each species. Please feel free to call me at (650) 859-2693 or email me if you have any additional questions.

ESA Threatened and Endangered Species Common Name	NWS Determination (applies to all three alternative sites)	Reason for NWS Determination
Brown Pelican (endangered)	not applicable	Species was de-listed in November, 2009 per telephone and email communication with USFWS.
Marbled Murrelet (threatened)	may affect, but not likely to adversely affect	The three alternative sites lack suitable habitat, however this species is present in nearby areas (particularly nearby to the Ocean City site). The NWS Determination of "may affect, but not likely to adversely affect" is based on telephone and email communication with the USFWS.
Northern Spotted Owl (threatened)	no effect	The three alternative sites lack suitable habitat (See Section 3 of the Letter sent to the USFWS dated November 9. 2009 for detailed analysis).
Oregon Silverspot Butterfly (threatened)	no effect	The three alternative sites lack suitable habitat (See Section 3 of the Letter sent to USFWS dated November 9, 2009 for detailed analysis).
Streaked Horned Lark (endangered)	no effect	The three alternative sites lack suitable habitat (See Section 3 of the Letter sent to USFWS dated November 9, 2009 for detailed analysis).

Thank you,

Anne Elston
Environmental Analyst

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

APR 26 2010

In Reply Refer To:
13410-2010-I-0080

Anne Elston
SRI International
333 Ravenswood Avenue
Menlo Park, California 94025

Dear Ms. Elston

Subject: NWS Network Radar to serve Coastal Washington

This is in response to your letter dated November 9, 2009, and email dated April 13, 2010, requesting our concurrence with your finding that the proposed construction and operation of a Doppler radar weather tower at one of three sites in Grays Harbor County "may affect, but is not likely to adversely affect" the marbled murrelet (*Brachyramphus marmoratus*). This request is being submitted by SRI International on behalf of the National Oceanic and Atmospheric Administration National Weather Service. This request was submitted in accordance with section 7 (a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

The new radar facility will consist of a rotating antenna inside of a 35 ft tall fiberglass radome, mounted on a 98 ft tall steel lattice tower. The total height of the radar structure, including a 9-ft lightning rod on top of the radome, will be up to 143 ft above ground level. Additional equipment, a generator, and transmission power maintenance shelters will be installed at the base of the tower, and a chain-link fence with barbed wire will be installed around the perimeter of the property. Installation of the facilities will require a temporary construction staging area of approximately 44,100 ft^2. The top of the tower may be lit at night with a steady, red aviation warning light. The proposed tower does not include guy wires, thus greatly reducing the potential risk for bird impacts.

The new facility will be constructed at one of the following three sites.

- The Langley Hill Site, located near Copalis Beach Road (T19N, R12W, Section 24), is an immature (20 year-old) western hemlock (*Tsuga heterophylla*) timber stand, accessible via an existing logging road. Construction of the radar at this site would require improvements to the access road and removal of trees from 1.2 acres of land.

TAKE PRIDE IN AMERICA

- The Ocean City Site is located in a mowed grass field adjacent to the School Administration Building (T18N, R12W, Section 3) within the city limits. The site is approximately 1,000 ft from the ocean, and is located 250 ft west of a wetland. Site disturbance for construction would affect 1.1 acres of land.
- The Saddle Hill Site (T18N, R12W, Section 12) is located on a hilltop that houses several existing communications towers. The site is vegetated with an immature (10 year-old) western hemlock and Sitka spruce (*Picea sitchensis*) timber stand, and is accessible via an existing road. Construction of the radar at this site would require improvements to the access road and removal of 1 acre of trees.

All three of the potential sites are surrounded by clearcuts and second-growth commercial timber lands. Both the Langley Hill and Saddle Hill sites are currently managed for commercial timber production and are harvested on approximately 60 year rotations. The expected loss of up to 1.2 acres of managed forest at these sites would have no effect on potential marbled murrelet nesting habitat. Forests at these sites have not been identified as important for marbled murrelet recovery, and there is no expectation that the forest at these sites would be managed to allow for the long-term development of marbled murrelet nesting habitat.

Based on the information provided, we have concluded that effects to the marbled murrelet will be discountable and insignificant. Therefore, we concur with your "may affect, not likely to adversely affect" determination. Our conclusion is based on the following rationale.

- Marbled murrelets forage in the nearshore coastal areas of Grays Harbor County, and transit inland to their nesting sites, generally at dawn or dusk during the nesting season. Therefore, this species may be present in the action area of the proposed project.
- The project will not result in the destruction or modification of suitable marbled murrelet nesting habitat and there is no suitable habitat within seven miles of the potential project sites. The nearest known occupied marbled murrelet site is located approximately 11 miles inland from the potential radar sites. Therefore, effects of construction or operation of the facility to marbled murrelets or their young while in the nest stand are considered discountable.
- The proposed communications tower will be a free-standing structure, 143 ft in height, with minimal lighting. There will be no guy-wires supporting the structure. Because the tower will extend above the surrounding forest canopy, the tower could present a minor collision hazard for marbled murrelets. Based on recent radar surveys of marbled murrelet flight heights (mean height approximately 650 to 980 ft), we expect that they will be flying well above the tower, making it extremely unlikely that the tower would be within their direct flight path. Additionally, marbled murrelets are very agile in flight and can easily avoid a large structure like the proposed Doppler radar at this height. Because the construction and operation of the facility is not expected to measurably affect marbled murrelet behavior or pose a risk of injury, the effects are considered insignificant and discountable.

We believe sufficient information has been provided to determine the effects of the proposed project to federally listed species, and to conclude whether this project is likely to adversely

affect those species. To expedite the environmental review process, if the National Weather Service concurs with the effect determinations for listed species, then you may consider this action to be in compliance with requirements of 50 CFR 402.13, thereby concluding the consultation process.

This project should be re-analyzed if new information reveals effects of the action that may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation. The project should also be re-analyzed if the action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this consultation, and/or a new species is listed or critical habitat is designated that may be affected by this project.

Our review and concurrence with your effect determination is based on the implementation of the project as described. It is the responsibility of the Federal action agency to ensure that projects that they authorize or carry out are in compliance with the regulatory permit and/or the Endangered Species Act, respectively. If a permittee or the Federal action agency deviates from the measures outlined in a permit or project description, the Federal action agency has the obligation to reinitiate consultation and comply with section 7(d).

Recommendations
Although we have determined that the proposed action will not adversely affect marbled murrelets, the following recommendations are provided to assist you in meeting your obligations under the Migratory Bird Treaty Act.

We commend you for implementing guidelines to reduce the risk of bird collisions. However, the use of steady-burning, red aviation warning light on the proposed structure poses a risk to migrating birds at night, especially at the Ocean City Site, as it is located along a migratory corridor and is adjacent to a wetland. To protect migratory birds from collisions, we recommend that lighting not be used on the structure if it is not required by the Federal Aviation Administration. If lighting is to be used, we recommend that only a white strobe light with a long duration between the flashes be used at night. Red lights should be avoided, as they are more likely to confuse migrating birds at night.

If you have any questions about this letter or our joint responsibilities under the Endangered Species Act, please contact Jenni Dykstra at (360) 753-5824 or Martha Jensen at (360) 753-9000, of this office.

Sincerely,

Martha L. Jensen

for Ken S. Berg, Manager
Washington Fish and Wildlife Office

cc:
WDFW, Region 6, Montesano, WA

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STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 • Fax Number (360) 586-3067 • Website: www.dahp.wa.gov

November 12, 2009

Ms. Anne Elston
SRI International
333 Ravenswood Avenue
Menlo Park, California 94025-3493

Re: NWS Network Radar Project
Log No.: 111209-08-NOAA

Dear Ms. Elston:

Thank you for contacting our department. We have reviewed the materials you provided for the proposed NWS Network Radar Project near Ocean Shores, Grays Harbor County, Washington.

We concur with your determination of No Historic Property Affected.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and the concerned tribe's cultural staff and cultural committee and this office notified.

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in compliance with the Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations 36CFR800.4. Should additional information become available, our assessment may be revised, including information regarding historic properties that have not yet been identified. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360)586-3080
email: rob.whitlam@dahp.wa.gov

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION
Protect the Past, Shape the Future

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APPENDIX B

REPORT DISTRIBUTION

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John Andrews
andrews.lisam@gmail.com

Heidi A. Beltico
Qwest
711 Capitol Way S, Suite 307
Olympia, WA 98501

Ms. Nancy Briscoe
NOAA Office of General Counsel
1325 East West Highway
Silver Spring, MD 20910-3283

Allyson Brooks
Washington State Department of Archaeology and Historic Preservation
PO Box 48343
Olympia, WA 98504-8343

Mr. George E. Brulotte
Rayonier, Northwest Forest Resources
3033 Ingram St
Hoquiam, WA 98550-4410

Mr. David Burnett
Confederated Tribes of the Chehalis Reservation
420 Howanut Road
Oakville, WA 98568

Dr. Brad Colman
Seattle WFO
7600 Sandpoint Way NE
Seattle, WA 98115-6349

Ms. Linda Crerar
State of Washington, Department of Agriculture
PO Box 42560
Olympia, WA 98504-2560

Mr. William Deringer
NOAA NWS Radar Operations Center
1200 Westheimer Drive
Norman, OK 73069

Jenni Dykstra
U.S. Fish and Wildlife Service, Division of Consultation and Technical Assistance
510 Desmond Dr SE, Suite 102
Lacey, WA 98503

Ms. Teresa Eturaspe
State of Washington, Department of Fish and Wildlife
PO Box 43200
Olympia, WA 98504-3155

Mr. Michael A. Ferry
Grays Harbor County, Department of Public Services, Building Division
100 W. Broadway, Suite 31
Montesano, WA 98563-3614

Mr. Geoffrey Glass
Olympic Region Clean Air Agency
2940-B Limited Lane NW
Olympia, WA 98502-6503

Mr. Wesley W. Gray, P.E.
Grays Harbor PUD
2720 Sumner Ave
Aberdeen, WA 98520-4321

Arthur (R.D.) Grunbaum
Friends of Grays Harbor
PO Box 1512
Westport, WA 98595-1512

Mr. Jaen P. Henry
PO Box 457
Ocean Shores, WA 98569

Mr. Steve Kokkinakis
NOAA PPI
1325 East West Highway
Silver Spring, MD 20910-3282

Dr. Socorro Medina
University of Washington, Department of Atmospheric Sciences
618 ATG Building, Box 351640
Seattle, WA 98195-1640

Charlene Nelson
Shoalwater Bay Tribal Council (Shoalwater Bay Tribe)
2373 Old Tokeland Rd
Tokeland, WA 98590

Helen Peters
PO Box 527
Copalis Beach, WA 98535

Mr. Stanley G. Pinnick
North Beach School District No. 64
729 Point Brown Ave NW
Ocean Shores, WA 98569-9563

Ms. Carol Lee Roalkvam
State of Washington, Department of Transportation
PO Box 47330
Olympia, WA 98504-7330

Tony Sermonti
Olympia, WA
sermonti20@yahoo.com

Fawn Sharp
Quinault Indian Nation
1214 Aalis Drive
Taholah, WA 98587

Mr. Brian Shea
Grays Harbor County, Department of Public Services, Planning & Building Division
100 W. Broadway, Suite 31
Montesano, WA 98563-3614

Mr. Mark A. Tew
NOAA NWS Western Region Headquarters
125 S. State St, Room 1311
Salt Lake City, UT 84138

Mr. Steve Todd
Portland WFO
5241 NE 122nd Ave
Portland, OR 97230-1089

Brian Tole
Montesano, WA
tole_brian@yahoo.com

Ronald P. Thomasson
Coast Communications
ron@coastaccess.com

Mr. Mihn Trihn
NOAA Safety and Environ. Compliance Off.
7600 Sand Point Way NE
Seattle, WA 98115

Mr. Mike Walsh
Green Crow Management Services LLC
PO Box 990
Aberdeen, WA 98520-0916

Mr. Robert G. Whitlam, Ph.D.
Washington State Department of Archaeology and Historic Preservation
PO Box 48343
Olympia, WA 98504-8343

Mr. Lee Wilk
Alion Science and Technology Corp.
306 Sentinel Drive, Suite 300
Annapolis, MD 20701-1045

Mr. James M. (Marty) Williams
NOAA NWS Radar Operations Center
1313 Halley Circle
Norman , OK 73069

Board of Commissioners
(Albert A. Carter, Terry L. Willis, and Mike Wilson)
Grays Harbor County
100 West Broadway, Suite #1
Montesano, WA 98563

Department of Natural Resources, SEPA Center
PO Box 47015
Olympia, WA 98504-7015

Review Team
State of Washington, Department of Community Development
906 Columbia St SW
Olympia, WA 98501-1216

State of Washington, Department of Ecology
Mike Drumwright and Roberta Wood
PO Box 47775
Olympia, WA 98504-7775

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APPENDIX C

COMMENTS RECEIVED ON DRAFT ESS/EA

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Subject: Grays Harbor weather radar
From: Tony Sermonti <sermonti20@yahoo.com>
Date: Tue, 16 Mar 2010 14:31:34 -0700 (PDT)
To: anne.elston@sri.com

I wanted to write with two brief comments about the site selection for the Grays Harbor, Washington weather radar. First, as an amateur weather watcher and as a citizen of Western Washington, I am thrilled that we will soon have this new system in place. The sooner, the better - I hope the process will move forward quickly.

I did not read in the site selection report any language regarding the damage that can be done by the air near the saltwater ocean. It is highly corrosive, and I hope that wherever the radar installation is sited, it is built specifically for these coastal conditions.

Thanks,
Tony Sermonti
Olympia, WA

Subject: new doppler sight
From: brian tole <tole_brian@yahoo.com>
Date: Wed, 17 Mar 2010 11:00:41 -0700 (PDT)
To: anne.elston@sri.com

Hi Anne, my name is Brian, I live in Montesano. I wanted to bring this sight to someones attention but did not know who to contact. Has anyone looked at Point Grenville? This is an old abandoned naval facility just out of Moclips towards Tahola. I believe this site could save a lot of time and money. It has a paved road to the sight, and most likely an underground heavy duty power supply.There is also several concrete slabs, concrete buildings designed to house large computor and radar/navigation equipment as well as barracks for personell.This is one of the prettiest pieces of coastline in the area. It sits on a plateau that juts out into the ocean.It has a high elevation for protection that I think your sight requires.It was good enough for the US navy so it should be a great pick for the new radar. Go and at least have a look, great place for a picnic.If I can be of any assistance you may e-mail me or call 249-6352. I think this land has been turned over to the tribe, but they have done nothing with it. Im sure a deal could be worked out.Let me know what you think

Brian Tole

Subject: Comment on Draft ESS/EA for NWS Radar in Coastal Washington
From: Geoffrey Glass <geoffrey.glass@orcaa.org>
Date: Wed, 17 Mar 2010 11:03:51 -0700
To: "'anne.elston@sri.com'" <anne.elston@sri.com>

Anne:

Section 7.3.5 of the Draft ESS/EA states that emergency standby generators powered by engines with a peak power rating of 5,000 brake-horsepower or less are exempt from ORCAA's permitting program. This is incorrect. The threshold in ORCAA regulations is actually 500 brake-horsepower.

Nevertheless, a 100 kW emergency standby generator would still be below the threshold and thus exempt from ORCAA's permitting program.

In addition, ORCAA Rule 8.3(d) prohibits construction work unless precautions are taken to prevent air pollution.

Thank you.

Geoffrey L. Glass, Engineer II
++
Olympic Region Clean Air Agency - *"Clean Air is Everyone's Business!"*

2940-B Limited Lane NW · Olympia WA 98502
1-800-422-5623 · (360) 539-7610 ext. 115 · www.orcaa.org

Subject: Doppler radar
From: Ron Thomasson <ron@coastaccess.com>
Date: Wed, 17 Mar 2010 11:34:02 -0700
To: anne.elston@sri.com

Dear Ms. Elston,
I read in our local newspaper, *The Daily World,* about the possible site of the Doppler radar for the coast of Washington state.

I have a couple of questions about the potential sites. But the major question I have is regarding how does the radar site communicate with the outside world.

Is this something you could share with me?

I would like to discuss this question with you if at all possible..
Thank you for your attention,

Ronald P. Thomasson
VP/General Manager

Coast Communications
360-589-5001
360-580-6920 cell

Subject: Doppler Radar Station
From: Helen Peters <nellie@seanet.com>
Date: Wed, 17 Mar 2010 12:20:26 -0700 (Pacific Daylight Time)
To: anne.elston@sri.com

Anne Elston:
We who live in the Copalis Beach area are so encouraged and pleased that the new Doppler Radar Station for Grays Harbor County will be built in this area. I think that Langley Hill would be the perfect side. It may be "the smallest mountain" in Washington, but it has plenty of good height to be out of tsunami zone and only a few minutes driving time to the ocean. A clear view for all storms coming in from whatever direction. A good county road goes over hill (Copalis Beach Road) *east or west*. this is the way most of us always drive to town or to I-5.

The Copalis area so badly needs the employment and interest this location would mean. We very much welcome you in this area. Sincerely.

Helen Peters
P. O. Box 527
Copalis Beach, WA 98535
360-276-4532

OFFICE OF
COUNTY COMMISSIONERS
TERRY L. WILLIS
FIRST DISTRICT
MIKE WILSON
SECOND DISTRICT
ALBERT A. CARTER
THIRD DISTRICT
DONNA CATON
ADMINISTRATIVE ASSISTANT/
CLERK OF THE BOARD

GRAYS HARBOR COUNTY
1854
STATE OF WASHINGTON

100 West Broadway, Suite #1
MONTESANO, WASHINGTON 98563
PHONE (360) 249-3731
FAX (360) 249-3783

March 19, 2010

Anne Elston
SRI International
333 Ravenswood Avenue, BS-343
Menlo Park, CA 94025-3493

Re: *Proposed National Weather Service Network Radar*

Dear Ms. Elston:

Thank you for the opportunity to comment on the United States Department of Commerce's March 2010 draft document entitled *Expanded Site Survey and Environmental Assessment Report: National Weather Service (NWS) Network Radar to Serve Coastal Washington*.

We have reviewed the document and concur with the survey and report findings regarding project selection criteria governing property size, radar coverage, infrastructure, economics and environmental impacts.

Thank you again for your comprehensive review of this important project, as it will provide vital weather information to the citizens of Grays Harbor County, Washington State and the United States of America.

Sincerely,

BOARD OF COMMISSIONERS
GRAYS HARBOR COUNTY

Albert A. Carter
ALBERT A. CARTER, Chairman, District 3

Terry L. Willis
TERRY L. WILLIS, Commissioner, District 1

Mike Wilson
MIKE WILSON, Commissioner, District 2

cc: United State Senator Patty Murray
United Stated Senator Maria Cantwell
United States Representative Norm Dicks
United States Representative Brian Baird
Washington State Senator James Hargrove
Washington State Senator Brian Hatfield
Washington State Representative Dean Takko
Washington State Representative Brian Blake
Washington State Representative Kevin Van De Wege
Washington State Representative Lynn Kessler
City of Ocean Shores Mayor Garland French
City of Westport Mayor Michael Bruce

Subject: Doppler Radar at Grays Harbor
From: Marjorie Henry <mhenry@techline.com>
Date: Sun, 21 Mar 2010 10:57:57 -0700
To: anne.elston@sri.com

I am a citizen of Ocean Shores, Wa. in Grays Harbor Washington. I realize the necessity of a Radar located in this area due to the shadow effect the Olympic Mountains create. Living on the Pacific Ocean we have experienced many storms that endanger both property and lives. Early warning, provided by this radar, will help enhance the ability to forecast more accurately and faster.

I read in the local paper that the National Weather Service is accepting public comment on their report and requests for hard copies of the report can be requested from you. I would appreciate a hard copy of that report. Thank You.

Mr. Jaen P. Henry
PO Box 457
Ocean Shores, Wa. 98569

March 23, 2010

Ms. Anne Elston
SRI International
333 Ravenswood Avenue BS-343
Menlo Park, California 94025-3493

Via Electronic Submission: anne.elston@sri.com

In Re: Proposed National Weather Service (NWS) Network Weather Radar to Serve Coastal Washington

Dear Ms. Elston,

Thank you for this opportunity to comment on the above referenced project.

FOGH is a broad-based 100% volunteer tax-exempt 501(c)(3) citizens group made up of crabbers, fishers, oyster growers and caring citizens. The mission of FOGH is to foster and promote the economic, biological, and social uniqueness of Washington's estuaries and ocean coastal environments. The goal of FOGH is to protect the natural environment, human health and safety in Grays Harbor and vicinity through science, advocacy, law, activism and empowerment.

As an original signatory to the Appropriations Request to Senators Cantwell, Murray and Representative Dicks, we were elated to hear that Senator Cantwell was able to secure funding to make the addition of Doppler technology to the Washington Coast. Many of our supporters work, live and recreate at the water's edge and they are comforted by the prospect of real time wind, rain and storm forecasts.

We have reviewed the draft analysis of the placement of the Doppler and concur that Langley Hill appears to be the most favorable location to achieve the maximum coverage and protection to the Doppler operation.

We hope that the necessary review process, permits and funding can be expedited and that the Washington Coast Doppler system can be operational before the next storm season.

Sincerely,

Arthur (R.D.) Grunbaum
Vice President

cc: Cliff Mass cliff@atmos.washington.edu
Tim Crum tim.d.crum@noaa.gov

Post Office Box 1512 Westport, Washington 98595-1512 Phone/Fax (360) 648-2254
http:fogh.org rd@fogh.org brady@foght.org 501(c)(3) tax-deductible

Subject: Dopplar radio station in Grays Harbor County Alternative Site
From: Lisa Andrews <andrews.lisam@gmail.com>
Date: Sat, 27 Mar 2010 11:51:20 -0700
To: anne.elston@sri.com

Hello,

My name is John Andrews and I recently read an article in the newspaper the Daily World about the dopplar radio station that is being put in Grays Harbor County. I would like to offer a different site for consideration. The site is located near Moclips, WA. It's in the northeast quarter section 8 township 20N range 12W. The site has a road, electricity and phone close to the property. Approximately a 230 foot elevation that overlooks the Pacific Ocean. If you are interested in speaking to me more about the site please contact me and I would be happy to speak to you. Property owned by Blues Land Development LLC.

Sincerely,

John Andrews

Cell phone: 360-580-8788
Home phone: 360-289-3963
Fax: 360-289-3528

Subject: Washington NWS Network Radar: follow-up
From: Jenni_Dykstra@fws.gov
Date: Wed, 07 Apr 2010 12:12:27 -0700
To: anne.elston@sri.com

Hello Anne,
As I mentioned on the phone, I have been reviewing the project and would like clarification on what the effects determination is for each species. Generally, it is either a "No Effect", a "may affect, but not likely to adversely affect", or "may affect, likely to adversely affect". Under the ESA, a jeopardy determination for any species is a very specific process, and is conducted by either NMFS or USFWS.

Regarding the species listed in your letter requesting our comments: Brown Pelican were delisted in November of 2009, so we are no longer consulting on that species under the Endangered Species Act. The Oregon Silverspot Butterfly and Streaked Horned Lark are not likely to be present in the action area of the project. I looked at our presence maps and aerial photos for the spotted owl. None of the three alternative sites for the proposed Doppler radar are within or near spotted owl habitat. Marbled murrelets are present in the nearshore coastal areas of Grays Harbor County, and they do fly inland to their nesting sites, generally at dawn or dusk during the nesting season. Therefore, this species may be present in the action area of the proposed project. However, murrelets are very agile at flying. I have spoken with a couple of experts in my office and confirmed that the presence of a large structure (like a Doppler radar) at that height is likely to be avoided by a murrelet, and is not likely to measurably affect its behavior or pose a risk of collision.

As I mentioned in our phone conversation, to protect other non-ESA-listed migratory birds from collisions, we recommend that if lighting is not required by the FAA, that it not be used on the structure. If lighting is to be used, we recommend that only a white strobe light with a long duration between the flashes be used at night. We recommend that red lights be avoided, as they are more likely to confuse migrating birds at night. Regarding lighting, of the three potential locations for the proposed Doppler radar, the Ocean City site is of most concern due to its location, as it is near the coastline and adjacent to a wetland.

Please send me clarification on your effects determination for each species. An email is sufficient. Thanks Anne. If you have any additional questions, please feel free to give me a call.

Jenni Dykstra
Fish and Wildlife Biologist

U.S. Fish and Wildlife Service
510 Desmond Drive,SE, Suite 102
Lacey, Washington 98503-1263
360.753.5824
jenni_dykstra@fws.gov

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

April 16, 2010

Ms. Anne Elston
SRI International
333 Ravenswood Avenue, BS-343
Menlo Park, CA 94025-3493

Dear Ms. Elston:

Thank you for the opportunity to comment on the national environmental policy act for the National Weather Service (NWS) Network Radar to Serve Coastal Washington proposal located at in Grays Harbor County. The Department of Ecology (Ecology) reviewed the information provided and has the following comment(s):

WASTE 2 RESOURCES: Mike Drumright (360) 407-6397

If greater than 250 cubic yards of inert, demolition, and/or wood waste is used as fill material, a solid waste handling permit is required from the local jurisdictional health department. Standards apply as defined by Washington Administrative Code (WAC) 173-350-990-Criteria for Inert Waste.

WATER QUALITY: Roberta Woods (360) 407-6269

Any discharge of sediment-laden runoff or other pollutants to waters of the state is in violation of Chapter 90.48 RCW, Water Pollution Control, and WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington, and is subject to enforcement action.

Erosion control measures must be in place prior to any clearing, grading, or construction. These control measures must be effective to prevent stormwater runoff from carrying soil and other pollutants into surface water or storm drains that lead to waters of the state. Sand, silt, clay particles, and soil will damage aquatic habitat and are considered to be pollutants.

Proper disposal of construction debris must be on land in such a manner that debris cannot enter the natural stormwater drainage patterns, waters of the state and buffers or cause water quality degradation of state waters.

During construction, all releases of oils, hydraulic fluids, fuels, other petroleum products, paints, solvents, and other deleterious materials must be contained and removed in a manner that will prevent their discharge to waters and soils of the state. The cleanup of spills should take precedence over other work on the site.

Ecology's comments are based upon information provided by the lead agency. As such, they may not constitute an exhaustive list of the various authorizations that must be obtained or legal requirements that must be fulfilled in order to carry out the proposed action.

If you have any questions or would like to respond to these comments, please contact the appropriate reviewing staff listed above.

Department of Ecology
Southwest Regional Office

(SM:10-1298)

cc: Mike Drumright, W2R
Roberta Wood, WQ