Chapter 4

Cumulative Impacts

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4 CUMULATIVE IMPACTS

4.1 INTRODUCTION AND APPROACH TO ANALYSIS

The analysis of cumulative impacts presented in this section follows the requirements of the National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) guidance (CEQ 1997). Council on Environmental Quality regulations provide the implementing regulations for NEPA. The regulations define cumulative impacts as:

> …the impact on the environment which results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 Code of Federal Regulations [C.F.R.] § 1508.7).

An action's contribution to the overall impacts in a region of influence is of particular concern. While a single project may have minor impacts, overall impacts may be collectively significant when the project is considered together with other projects on a regional scale. A cumulative impact is the additive effect of all projects in the geographic area (defined in Section 4.2.3). The CEQ provides guidance on cumulative impact analysis in *Considering Cumulative Impacts under the National Environmental Policy Act* (CEQ 1997). This guidance further identifies cumulative impacts as those environmental impacts resulting "from spatial and temporal crowding of environmental perturbations. The impacts of human activities will accumulate when a second perturbation occurs at a site before the ecosystem can fully rebound from the impacts of the first perturbation." Noting that environmental impacts result from a diversity of sources and processes, this guidance observes that "no universally accepted framework for cumulative impacts analysis exists," while noting that certain general principles have gained acceptance. The CEQ provides guidance on the extent to which agencies of the federal government are required to analyze the environmental impacts of past actions when they describe the cumulative environmental effect of an action (CEQ 2005). This guidance provides that a cumulative impacts analysis might encompass geographic boundaries beyond the immediate area of an action and a timeframe that includes past actions and foreseeable future actions. Thus, the CEQ guidelines observe, "[it] is not practical to analyze cumulative impacts of an action on the universe; the list of environmental impacts must focus on those that are truly meaningful" (CEQ 2005).

4.2 APPROACH TO ANALYSIS

4.2.1 OVERVIEW

Cumulative impacts on each resource addressed in Chapter 3 were analyzed for the No Action Alternative, Alternative 1, and Alternative 2 in combination with past, present, and reasonably foreseeable future actions in the relevant geographic area. The cumulative impacts analysis included the following steps, which are described in more detail below:

1. Identify appropriate level of analysis for each resource.
2. Define the geographic boundaries and timeframe for the cumulative impacts analysis.
3. Describe current resource conditions and trends.
4. Identify potential impacts of each alternative that might contribute to cumulative impacts.
5. Identify past, present, and other reasonably foreseeable future actions in the relevant geographic regions that affect each resource.

6. Analyze potential cumulative impacts.

4.2.2 IDENTIFY APPROPRIATE LEVEL OF ANALYSIS FOR EACH RESOURCE

The cumulative impacts analysis focused on meaningful impacts from past, present, and reasonably foreseeable future actions. The level of analysis for each resource was commensurate with the intensity of the impacts identified in Chapter 3. The rationale for the level of analysis applied to each resource is described in the resource-specific sections below.

4.2.3 DEFINE THE GEOGRAPHIC BOUNDARIES AND TIMEFRAME FOR ANALYSIS

The geographic boundaries for the cumulative impacts analysis included the Naval Weapons Systems Training Facility (NWSTF) Boardman (Figure 2-1) as well as the associated special use airspace. The boundaries for migratory species were expanded to include land and airspace where activities might impact these species throughout their ranges. Primary considerations from outside NWSTF Boardman include impacts associated with air quality, socioeconomics, transportation, cultural land use compatibility (e.g. wind farms), wildlife, and wildfire.

Determining the timeframe for the cumulative impacts analysis requires estimating the length of time the impacts of the Proposed Action would last and considering the specific resource in terms of its history of degradation (CEQ 1997). The Proposed Action includes ongoing and anticipated future military readiness activities. While United States (U.S.) Department of the Navy (Navy) and Oregon National Guard (ORNG) training and testing requirements change over time in response to world events and several other factors, the general types of activities addressed by this Environmental Impact Statement (EIS) are expected to continue indefinitely, and the associated impacts would occur indefinitely. Therefore, the cumulative impacts analysis is not bounded by a specific future timeframe. For past actions, the cumulative impacts analysis only considers those actions or activities that have ongoing impacts. While the cumulative impacts analysis is not limited by a specific timeframe, it should be recognized that available information, uncertainties, and other practical constraints limit the ability to analyze cumulative impacts for the indefinite future. Future actions that are speculative are not considered.

4.2.4 DESCRIBE CURRENT RESOURCE CONDITIONS AND TRENDS

The Affected Environment sections of Chapter 3 describe current resource conditions and trends, and discuss how past and present human activities influence each resource. The current aggregate impacts of past and present actions are reflected in the baseline information presented in Chapter 3. This information is used in the cumulative impacts analysis to understand how past and present actions are currently impacting each resource and to provide the context for the cumulative impacts analysis.

4.2.5 IDENTIFY POTENTIAL IMPACTS OF ALTERNATIVES 1 AND 2 THAT MIGHT CONTRIBUTE TO CUMULATIVE IMPACTS

The direct and indirect impacts of the alternatives, presented in Chapter 3, were reviewed to identify impacts that are relevant to the cumulative impact analysis. Key factors considered include the current status and sensitivity of the resource and the intensity, duration, and spatial extent of the impacts for each training or testing activity. In general, long-term rather than short-term impacts and widespread rather than localized impacts were considered more likely to contribute to cumulative impacts. For example, for biological resources, population-level impacts were considered more likely to contribute to cumulative impacts than were individual-level impacts. Negligible impacts were not considered further in the cumulative impacts analysis.

4.2.6 IDENTIFY OTHER ACTIONS AND OTHER ENVIRONMENTAL CONSIDERATIONS THAT AFFECT EACH RESOURCE

A list of other reasonably foreseeable future actions was compiled for NWSTF Boardman and surrounding areas based on the scoping process, communications with other agencies, state and local officials, a review of other military activities, literature review, and other available information. These actions were reviewed to determine if they should be considered further in the cumulative impact analysis. Factors considered when identifying other actions to be included in the cumulative impacts analysis included the following:

- Whether the action is likely or probable (i.e., reasonably foreseeable), rather than merely possible or speculative.
- The timing and location of the other action in relationship to proposed construction, training, and testing activities.
- Whether the other action and each alternative would affect the same resources.
- The current conditions, trends, and vulnerability of resources affected by the other action.
- The duration and intensity of the impacts of the other action, and whether the impacts have been truly meaningful, historically significant, or identified previously as a cumulative impact concern.

4.2.7 ANALYZE POTENTIAL CUMULATIVE IMPACTS

The combined impacts of all other actions, including the current aggregate impacts of past and present actions described in the baseline, were characterized and summarized. The incremental impacts of Alternatives 1 and 2 were then "added to" the combined impacts of all other actions to describe the cumulative impacts that would result if Alternatives 1 and 2 were implemented. The cumulative impact analysis considered additive, synergistic, and antagonistic impacts. A qualitative analysis was conducted in most cases based on the available information. The analysis in Chapter 3 indicates that the direct and secondary impacts of Alternatives 1 and 2 would not be materially different. Therefore, the cumulative impacts discussions below apply to both alternatives.

4.3 OTHER ACTIONS ANALYZED IN THE CUMULATIVE IMPACTS ANALYSIS

4.3.1 OVERVIEW

Table 4-1 lists the other actions and other environmental considerations that were identified for the cumulative impacts analysis and Figure 4-1 highlights each project's geographic relation to NWSTF Boardman. Descriptions of each action and environmental consideration carried forward for analysis are provided in the following sections.

Table 4-1: Other Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis

Name of Action	Lead Agency or Proponent	Location	Timeframe	Retained for Further Analysis?
Portland General Electric Boardman Plan Emissions Controls	Portland General Electric	Morrow County	Ongoing, Future	Retained
Portland General Electric Carty Generating Station	Portland General Electric	Morrow County	Future	Retained
Gas Transmission Northwest Carty Lateral Project	Portland General Electric	Morrow County	Ongoing, Future	Retained
Cascade Crossing Transmission Line	Portland General Electric	Gilliam and Morrow County	Future	Retained
Boardman-Hemingway Transmission Line	Idaho Power	Morrow and Umatilla County	Future	Retained
Umatilla Electric Cooperative Transmission Line	Umatilla Electric Cooperative	Morrow County	Future	Retained
Leaning Juniper Wind Power Facility	Iberdrola Renewables, Inc.	Gilliam County	Past, Ongoing, Future	Retained
Montague Wind Power Facility	Iberdrola Renewables, Inc.	Gilliam County	Past, Ongoing, Future	Retained
Shepherds Flat Wind Farm	GE - Caithness	Gilliam County	Past, Ongoing, Future	Retained
Saddle Butte Wind Power Facilities	Saddle Butte Wind LLC	Morrow County and Gilliam County	Ongoing, Future	Retained
Baseline Wind Energy Facility	First Wind	Gilliam County	Future	Retained
Rock Creek Wind Power Facility	Rock Creek Wind Power, LLC	Gilliam County	Future	Retained
Echo Windfarms (eight built inside 5701)	Oregon Wind Farms, LLC	Morrow and Umatilla County	Past	Retained
Threemile Canyon Wind Farm	John Deere Wind Energy	Morrow County	Past, Ongoing, Future	Retained
Poplar Wind Farm	First Wind	Morrow County	Ongoing, Future	Retained

1 **Table 4-1: Other Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)**

Name of Action	Lead Agency or Proponent	Location	Timeframe	Retained for Further Analysis?
Ward Butte Wind Farm	American Wind	Umatilla County	Future	Retained
Sullivan's Wind Farm (Horned Butte)	Invenergy	Gilliam County	Ongoing, Future	Retained
Butter Creek Projects (1-9)	Intelligent Wind Energy	Morrow and Umatilla County	Past, Ongoing, Future	Retained
Multi- Species Candidate Conservation Agreement – Habitat Conservation	Threemile Canyon Farms, Portland General Electric, The Nature Conservancy, and the Oregon Department of Fish and Wildlife	Morrow County	Past, Ongoing, Future	Retained
U.S. Army Umatilla Chemical Depot Base Redevelopment Plan	Department of Defense	Morrow and Umatilla County	Past, Ongoing, Future	Retained
U.S. 730 Corridor Refinement Plan (2007);	Oregon Department of Transportation	Umatilla County	Past, Ongoing, Future	Retained
I-84 Transportation Plan, Intersection Study	Morrow County	Morrow County	Past, Ongoing, Future	Dismissed because of negligible to minor impacts on resources affected by the Proposed Action.
Boardman Airport Pavement Improvements	Oregon Department of Aviation	Morrow County	Past, Ongoing, Future	Dismissed because of negligible to minor impacts on resources affected by the Proposed Action.
Umatilla County Westland Road/I-84/I-82 Interchange Area Transportation Plan (2004)	Umatilla County	Umatilla County	Past, Ongoing, Future	Dismissed because of negligible to minor impacts on resources affected by the Proposed Action.
Port of Morrow Sustainable Agriculture and Energy Center (SAGE)	Port of Morrow	Boardman County	Ongoing, Future	Dismissed because of negligible to minor impacts on resources affected by the Proposed Action.

1 **Table 4-1: Other Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)**

Name of Action	Lead Agency or Proponent	Location	Timeframe	Retained for Further Analysis?
Port of Morrow Sustainable Agriculture and Energy Center (SAGE)	Port of Morrow	Boardman County	Ongoing, Future	Dismissed because of negligible to minor impacts on resources affected by the Proposed Action.
Additional routes of the Oregon Trail	U.S. Park Service	Umatilla, Boardman, Gilliam, and Sherman Counties	Future	Dismissed because action involves only planning and policy-related activities; specific future actions are speculative.
Building 39 Replacement	U.S. Navy	NWSTF Boardman	Future	Retained
Implementation of INRMP	U.S. Navy	NWSTF Boardman	Past, Ongoing, Future	Retained

Notes: U.S. = United States, U.S. Navy = United States Department of the Navy, NWSTF = Naval Weapons Systems Training Facility, INRMP = Integrated Natural Resources Management Plan, I-84 (82) = Interstate 84 (82), GE = General Electric, Inc. = Incorporation, LLC = Limited Liability Company

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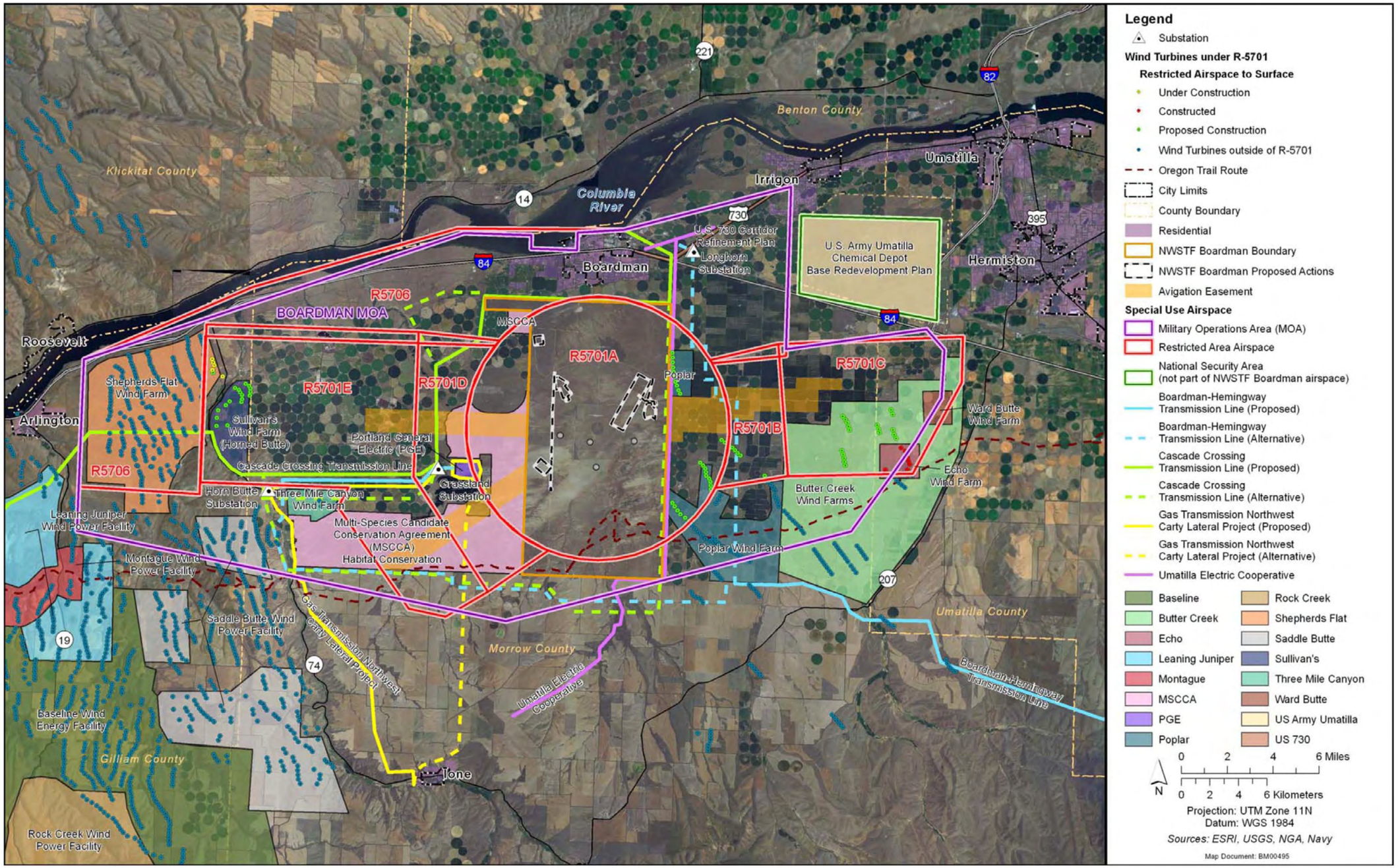

Figure 4-1: Locations of Other Actions and Other Environmental Considerations Identified and Retained for the Cumulative Impacts Analysis

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4.3.2 PORTLAND GENERAL ELECTRIC BOARDMAN PLANT EMISSIONS CONTROLS

The Portland General Electric (PGE) Boardman Plant is a 585-megawatt (MW) coal-fired electricity generating plant located about 2.5 miles (mi.) (4.0 kilometers [km]) west of NWSTF Boardman. As part of the new operating plan for the Boardman Plant, PGE has installed or will install the following new emissions controls at the plant:

- New low-nitrogen oxide burners and modified overfire air ports were installed in the spring of 2011 to comply with Best Available Retrofit Technology standards for oxides of nitrogen.
- An activated carbon injection system to allow capture and removal of mercury from the plant's emissions was installed in the spring of 2011.
- A separate dry sorbent injection system to comply with Best Available Retrofit Technology standards for sulfur dioxide is required to be operational by 2014. Portland General Electric also expects to switch to a coal supply that contains less sulfur.

Portland General Electric has agreed to end the use of coal at the Boardman Plant by 31 December 2020. They are evaluating potential options to replace the power from the Boardman Plant—or convert the existing plant to a different fuel—as part of its integrated resource planning process. New emissions controls at the Boardman Plant are expected to reduce nitrogen oxide emissions by about 50 percent and permitted levels of sulfur dioxide emissions by 75 percent (Table 4-2). State rules also require new controls to reduce the plant's mercury emissions by 90 percent. All coal-related emissions from the Boardman plant would be reduced to zero with the end of coal-fired operations in 2020.

Table 4-2: Air Pollutant Emissions Estimates for Portland General Electric Boardman Plant and Proposed Carty Generating Station

Emissions Source	Criteria and Precursor Air Pollutant Emissions in Tons/Year				
	CO	NO_x	VOC	SO_x	PM_{10}
Boardman Plant-2011	8,881	11672	92	30,450	1,056
Boardman Plant-July 1, 2012	8,881	7105	92	30,450	1,056
Boardman Plant-July 1, 2015	8,881	5836	92	3,045	346
Boardman Plant-July 1, 2018	8,881	1776	92	3,045	346
Proposed Carty Generating Station	99.1	124.8	23.7	22.7	94.9

Notes: CO = carbon monoxide, NO_x = nitrogen oxides, SO_x = sulfur oxides, PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter, VOC = Volatile Organic Compounds.

4.3.3 PORTLAND GENERAL ELECTRIC CARTY GENERATING STATION

Portland General Electric's 2009 Integrated Resource Plan calls for the company to build or buy power from a baseload natural gas-fired plant by 2015. As part of this process, the company is proposing to build a new 300- to 500 MW natural-gas-fired power plant adjacent to its existing Boardman Plant. If the Carty proposal is chosen, the plant's construction would create up to 500 jobs over three years, with 20 new permanent positions once completed. It also would add significant capital investment to the Morrow County tax base (PGE 2011). Estimated air pollutant emissions from the plant are provided in Table 4-2.

Later this year, PGE expects to issue a request for proposals, which will allow PGE and other parties to propose different options to meet this need. As part of this process, PGE will propose building the Carty Generating Station, a 300 to 500 MW natural gas-fired plant adjacent to the existing Boardman Plant.

The Oregon Public Utility Commission will review final resource decisions to confirm the options selected are in the best interests of PGE customers.

4.3.4 GAS TRANSMISSION NORTHWEST CARTY LATERAL PROJECT

Gas Transmission Northwest proposes to construct, own, and operate a natural gas pipeline lateral that would connect to its existing mainline system in Morrow County, Oregon. The project would be capable of delivering approximately 200 million cubic feet (ft^3) a day of natural gas to the Carty Generating Station proposed by PGE (Section 4.3.3). The project would consist of (Gas Transmission Northwest 2011):

- Approximately 24.4 mi. of 20-inch-diameter natural gas pipeline installed underground,
- One metering station,
- One pig launcher and one receiver,
- One mainline valve, and
- Related pipeline facilities.

The targeted in-service date for the pipeline is 1 November 2014. The proposed route would begin at the Ione compressor station on Gas Transmission Northwest's mainline and run north-northwest to the southwestern corner of the Boardman Conservation Area, and follow the western boundary of the Boardman Conservation Area. The proposed route would then cross agricultural land on Threemile Canyon Farms and terminate at the proposed Carty Generating Station (Gas Transmission Northwest 2011).

Gas Transmission Northwest intends to file an application with the Federal Energy Regulatory Commission for authorization under Section 7(c) of the Natural Gas Act (15 U.S. Code [U.S.C.] § 717f(c)) and Part 157 of Federal Energy Regulatory Commission regulations (18 C.F.R. Part 157). A Draft Applicant-Prepared Environmental Assessment for the Carty Lateral Project was completed in December 2011 to support the authorization process (Gas Transmission Northwest 2011). Potential impacts identified in the Draft Environmental Assessment are primarily related to construction of the project and include:

- Impacts associated with wetland and water body crossings.
- Temporary disturbance and permanent loss of grassland and shrub-steppe vegetation.
- Disturbance of wildlife and wildlife habitat, potentially including the Washington ground squirrel, long-billed curlew, and other special status species.
- Noise and air pollutant emissions.

4.3.5 CASCADE CROSSING TRANSMISSION LINE

Cascade Crossing is a transmission project PGE is proposing to construct, maintain, and operate to help meet Oregon's growing energy needs, enable development of more renewable power projects and enhance reliability of the region's electrical grid. The project would connect new and existing electricity power sources east of the Cascades to the Willamette Valley. Portland General Electric is proposing to construct, maintain and operate a new electric transmission system consisting of approximately 23 mi. (37.0 km) of single circuit and 193 mi. (310.6 km) of double circuit 500 kilovolt (kV) transmission line from Boardman to Salem. The existing corridor terminates at the Boardman Plant, whereas the proposed and alternative routes would extend to the Coyote Springs Generating Plant in Oregon. Portland General Electric's proposed route is just to the north and west of NWSTF Boardman. One

alternative route, the "Dalreed Option," is similar to the proposed route but it extends further west before turning south along the west side of NWSTF Boardman. The other alternative route is on NWSTF Boardman, just within the northern and western boundaries. Single circuit towers, with an average height of 150 ft., are proposed from the Coyote Springs Plant, northeast of Boardman, to the Boardman Plant, southwest of the city. Double circuit towers, with an average height of 185 feet, are proposed for the remainder of the main line, from the Boardman Plant to Salem. Tower widths could range from 30 to 50 ft. (9.1 to 15.2 m). The current project design estimates about five towers per mile. If the NWSTF Boardman property was deemed feasible and operationally compatible to host a portion of the transmission line, a right of entry agreement would have to be provided by the Navy prior to construction. The U.S. Forest Service is the lead federal agency for the project and is conducting a NEPA analysis in accordance with 2009 Memorandum of Understanding (MOU) between nine federal agencies (including the Bureau of Land Management [BLM] and Department of Defense [DoD]) regarding siting of transmission lines on federal land. The NEPA analysis will address all federal lands, resources under federal jurisdiction outside of federal lands (e.g., wetlands and waterbodies under the jurisdiction of the U.S. Army Corps of Engineers), as well as the connected action of the entire project on state and private lands. The Navy is participating in the process.

Potential impacts within the geographic area identified for cumulative impacts under the NWSTF Boardman EIS would primarily occur during construction of the project and are expected to include:

- Impacts associated with wetland and water body crossings.
- Temporary disturbance and permanent loss of grassland and shrub-steppe vegetation.
- Disturbance of wildlife and wildlife habitat, potentially including the Washington ground squirrel, long-billed curlew, and other special status species.
- Noise, air pollutant emissions, and aesthetics.

4.3.6 BOARDMAN-HEMINGWAY TRANSMISSION LINE

Idaho Power Company is proposing to construct, operate, and maintain a single-circuit 500 kV overhead electric transmission line and facilities. The proposed transmission line would be constructed between the existing Hemingway Substation, located near Melba in Owyhee County, Idaho, and the planned Grassland Substation adjacent to the Boardman Generating Plant, located near Boardman in Morrow County, Oregon. The proposed Boardman to Hemingway (B2H) route is about 300 mi. (482.7 km) long and would cross federal, state, and private lands in six counties in Oregon and Idaho. The proposed route from the Boardman Generating Plant bypasses the NWSTF Boardman range via a path along the southern border of the installation. The alternative route follows a path to the east of NWSTF Boardman and ties into the Longhorn Substation (between the cities of Boardman and Irrigon). The current project design currently proposes the use of single and double circuit towers, and steel lattice and tubular towers. The typical heights range from 100 to 185 ft. (30.5 to 56.4 m). If the NWSTF Boardman property was deemed feasible and operationally compatible to host a portion of the transmission line, a right of entry agreement would have to be provided by the Navy prior to construction. In accordance with the 2009 MOU on siting transmission lines on federal land, the Bureau of Land Management is conducting a NEPA analysis on the entire transmission line and the Navy is participating in the process. Potential impacts are primarily related to construction of the project and include:

- Impacts associated with wetland and water body crossings.
- Temporary disturbance and permanent loss of grassland and shrub-steppe vegetation.

- Disturbance of wildlife and wildlife habitat, potentially including the Washington ground squirrel, long-billed curlew, and other special status species.
- Noise and air pollutant emissions.

4.3.7 UMATILLA ELECTRIC COOPERATIVE TRANSMISSION LINE

Umatilla Electric Cooperative (UEC) is proposing to construct, maintain, and operate a new north-south 230-kV transmission line between the proposed Longhorn Substation and the Juniper Canyon area. Much of the route would be along the east side of Bombing Range Road, immediately adjacent to NWSTF Boardman. The project would parallel UEC's existing 30 kV and 115kV distribution lines, some of which would be converted to underground circuits with the same construction project. Structure heights and span lengths for the new transmission line are being designed to meet Navy height constraints in and adjacent to R-5701 and the existing run-in easement south of Homestead Lane. The present design calls for a mix of 100-, 70-, and 130-foot structure heights (monopole and H-frame). Potential impacts are primarily related to construction of the project and include:

- Impacts associated with wetland and water body crossings
- Impacts to existing agricultural activities, primarily crop circles
- Temporary disturbance and permanent loss of grassland and shrub-steppe vegetation
- Disturbance of wildlife and wildlife habitat, potentially including the Washington ground squirrel, long-billed curlew, and other special status species
- Noise and air pollutant emissions

4.3.8 WIND ENERGY PROJECTS

In general, the potential impacts associated with wind energy projects in the NWSTF Boardman region include:

- Temporary disturbance and permanent loss of grassland and shrub-steppe vegetation.
- Disturbance of wildlife and wildlife habitat.
- Noise and air pollutant emissions.

4.3.8.1 Leaning Juniper Wind Power Facility

The Leaning Juniper Wind Power Facility is located southwest of Arlington, in Gilliam County, which is west of NWSTF Boardman and began operation in June of 2011. The facility boundary is adjacent to the Arlington city limit boundary and immediately east of the Boardman Military Operations Area (MOA). The Facility is split into two portions, with Leaning Juniper North having 40 turbines and Leaning Juniper South consisting of 93 turbines. The applicant proposed a "maximum turbine number" layout of 133 GE 1.5 MW turbine. The site certificate applied for (May 2007) by Iberdrola Renewables, Inc. limits the total number of turbines to 133 and the total peak generating capacity to 279 MW. The GE 1.5-MW turbines would have a rotor diameter of approximately 77 m (253 ft.). They would be mounted on tubular steel towers with a hub height of approximately 80 m (262 ft.). The site certificate would allow the certificate holder to select other turbine types, not exceeding 3.0 MW turbines with a rotor diameter of approximately 100 m (328 ft.) and a tower hub-height of 100 m (328.1 ft.). The facility includes a substation located adjacent to the Bonneville Power Administration Jones Canyon Switching Station. An aboveground transmission line less than 400 ft. (121.9 m) in length carries the power from the substation to a Bonneville Power Administration switching station and an interconnection with the regional transmission grid through Bonneville Power Administration's McNary-Santiam 230 kV transmission line.

4.3.8.2 Montague Wind Power Facility

The Montague Wind Power Facility is a proposed wind energy facility that has not yet been constructed. Montague Wind Power Facility LLC (a wholly-owned subsidiary of Iberdrola Renewables, Inc.) filed a site certificate application in April 2010 and was granted a Site Certificate by Oregon Department of Energy in September 2010. The facility is located in Gilliam County, approximately 4 mi. (6.4 km) south of Arlington. The site overlaps with lands associated with the Leaning Juniper Wind Power Facility, and as such, lies immediately west of the Boardman MOA. The Montague Wind Power Facility would have a peak generating capacity of up to 404 MW. The average electric generating capacity would be up to 134.7 MW. In the application, the applicant has identified two turbines that represent the range of turbines that could potentially be used at the facility: the GE 1.5 MW turbine (described in 4.3.7.1) and the Vestas V100 3.0 MW turbine. The applicant has analyzed a possible "minimum turbine layout" of 134 3.0 MW turbines and a possible "maximum turbine layout" of 269 1.5 MW turbines. The Vestas V100 turbines would have a rotor diameter of approximately 100 m (328 ft.). They would be mounted on tubular steel towers with a hub height of approximately 100 m (328 ft.).

The applicant intends to connect the Montague Wind Power Facility to the regional transmission system through the Bonneville Power Administration's Slatt Substation. The applicant has proposed one preferred and two alternate 230 kV transmission line routes between Slatt and a facility substation in the central part of the facility. A second substation would be built to collect power from turbines in the western part of the project, and a 230-kV transmission line would connect the western area substation to the central substation.

4.3.8.3 Shepherds Flat Wind Power Facilities

In July 2008, the Oregon Department of Energy Energy Facility Siting Council issued a site certificate to Caithness Shepherds Flat LLC for the Shepherds Flat Wind Farm. The approved facility was a wind energy facility consisting of up to 338 GE2.5 XL turbines wind turbines, each with a peak generating capacity of 2.5 MW. The turbines would have a rotor diameter of approximately 100 m (328 ft.). They would be mounted towers with a hub height between 75 and 100 m (246 and 328 ft.). The Shepherds Flat Facility underlies restricted area R-5706 and the westernmost portion of R-5701B. Amendment #1 divided the Shepherds Flat Wind Farm into three separate facilities, each having an individual site certificate. The three approved facilities occupy the site boundary of the previously-approved Shepherds Flat Wind Farm and, combined, have the same number of turbines and the same peak generating capacity as the originally proposed Shepherds Flat Wind Farm. The Council approved site certificates for the three new facilities: Shepherds Flat North, Shepherds Flat Central, and Shepherds Flat South. A 230 kV transmission line to connect the facility to the regional transmission system at the Bonneville Power Administration's Slatt Substation is also planned. The 230 kV interconnection lines for Shepherds Flat North, Shepherds Flat Central, and Shepherds Flat South will be jointly owned. All three facilities will use the same transmission line corridor.

4.3.8.4 Saddle Butte Wind Power Facilities

The proposed Saddle Butte Wind Park would be a wind energy facility consisting of up to 171 wind turbines (the types and heights of which have not yet been determined) and related facility components (including a substation, a field workshop, meteorological towers, access roads, and aboveground and underground transmission lines). The facility would have a peak generating capacity of up to 565 MW. The proposed facility site is entirely on private lands located in Morrow County and Gilliam County approximately 20 mi. (32.2 km) south of the Columbia River between Eightmile Canyon and State

Highway 74. The northeast portion of the proposed wind farm underlies the southwest portion of the Boardman MOA.

The applicant intends to connect the facility to the regional transmission system through a Bonneville Power Administration substation adjacent to the Slatt Switching Station. The applicant has proposed a single transmission corridor running approximately 19 mi. (30.6 km) to the BPA Slatt interconnection facility. In the Notice of Intent, the applicant explains that alternate corridors are not proposed because the described corridor is the shortest route and reduces impacts by sharing transmission structures previously approved for the Shepherds Flat Wind Farm. In the site certificate application, the applicant may propose adjustments to the corridor. As of June 2011, the applicant requested an extension for up to a year and was granted to process this order. The extension order indicated that Navy and Air Force should be contacted to discuss airspace impacts/radar impacts; discussions with the Navy are ongoing.

4.3.8.5 Baseline Wind Energy Facility

The proposed Baseline Wind Energy Facility would have a peak generating capacity of up to 500 MW. The Notice of Intent does not state a range of possible turbine sizes, but assuming that the applicant would propose turbine sizes in the range of 1.5 MW to 3.0 MW, the Baseline Wind Energy Facility would consist of 166 to 333 wind turbines, either GE 82.5 or Vestas V112 turbines. The GE 82.5 turbine has a rotor diameter of 270.7 ft. (82.5 m) and the hub height is 262.5 ft. (80.0 m). The Vestas V112 3.0 MW wind turbine has a rotor diameter of 367.5 ft. (112.0 m) and a hub height of 308.4 ft. (94.0 m). Other facility components include up to four substations, an operations and maintenance facility, up to 10 meteorological towers, access roads, and aboveground and underground transmission lines. The proposed facility site is entirely on private lands located in Gilliam County approximately 7 mi. (11.3 km) south of Arlington and 12 mi. (19.3 km) north of Condon, completely outside of the Boardman MOA. As of 22 Dec 2011, the applicant submitted a preliminary application. The applicant (First Wind) intends to connect the Baseline Wind Energy Facility to the regional transmission system through a proposed new Bonneville Power Administration substation (the Diamond Butte Substation) located adjacent to the existing 500 kV Ash-Marion transmission line. Aboveground 230 kV transmission lines would connect the facility substations to the Bonneville Power Administration substation.

4.3.8.6 Rock Creek Wind Power Facility

The proposed Rock Creek Wind Power Facility would have a peak generating capacity of up to 550 MW. The applicant has not selected a turbine type, but the applicant is considering turbines ranging from 1.8 MW to 3.0 MW each. The total height of the turbine tower and blades (tip-height) is expected to be between 406 and 492 ft. (123.7 and 150 m). The Rock Creek Wind Power Facility would consist of 183 to 305 wind turbines. Other facility components include two substations, an operations and maintenance facility, up to 3 meteorological towers, access roads, and aboveground and underground transmission lines. The proposed facility site is entirely on private lands located in Gilliam County approximately 3.5 mi. (5.6 km) north of Condon. The turbine micrositing area would lie approximately 17 mi. (27.4 km) south of Arlington, completely outside the Boardman MOA.

The applicant intends to connect the Rock Creek Wind Power Facility to the regional transmission system either through a proposed Bonneville Power Administration substation (the Diamond Butte Substation) adjacent to the existing 500 kV Slatt-Buckley transmission line or through a proposed PGE substation (the Cedar Springs substation) adjacent to the proposed 500 kV Cascade Crossing transmission line. Portland General Electric has submitted a Notice of Intent to apply for a site certificate for the proposed Cascade Crossing transmission line. An aboveground 230 kV transmission line would connect the Rock Creek Wind Power Facility substations to the selected interconnection site. This wind

project is currently under a project order due to expire Aug 2012 unless a preliminary certificate is filed or an extension requested.

4.3.8.7 Echo Wind Farm (Oregon Wind)

The Echo Wind Farms are located in Umatilla County and Morrow County, Oregon. The Echo Wind Farms underlie the eastern portion of the Boardman MOA as well as portions of Restricted Area R-5701C. John Deere Wind Energy is the majority owner and operator. Oregon Wind Farms, LLC, was the project developer. PacifiCorp is purchasing energy from the project under a long-term power purchase agreement. The project is powered by 10 RePower MM92 turbines and 27 Vestas V82 turbines. The RePower MM92 towers are typically between 80 and 100 m (263 and 328 ft.) in height and have a blade length of approximately 46 m (151 ft.). Combined, the maximum height of these turbines can be approximately 146 m (480 ft.). The Vestas V82 towers are typically between 70 and 80 m (230 and 263 ft.) in height and a blade length of approximately 41 m (134.5 ft.). Combined, the maximum height of these turbines can be approximately 121 m (397 ft.). The wind farms have a total project capacity of 64.5 MW. Commercial operation of the Echo Wind Farms began in Spring 2009.

4.3.8.8 Threemile Canyon Wind Farm

The Threemile Canyon Wind Farm is located in Morrow County, Oregon, immediately south of the Restricted Area R-5701B, and underneath the Boardman MOA. John Deere Wind Energy is the owner and operator. PacifiCorp is purchasing energy from the project under a long-term power purchase agreement. The project is powered by Vestas 1.65 MW V82 turbines, The Vestas V82 towers are typically between 70 and 80 m (230 and 263 ft.) in height and a blade length of approximately 41 m (134.5 ft.). Combined, the maximum height of these turbines can be approximately 121 m (397 ft.). The wind farm consists of 6 turbines for a total project capacity of 9.9 MW. Operation of the Threemile Canyon Wind Farm began in Spring 2009.

4.3.8.9 Poplar Wind Farm

The Poplar Wind Farm is located immediately east of NWSTF Boardman, just north (Poplar North) and south (Poplar South) of the eastern avigation easement. Poplar North and portions of Poplar South underlie the Restricted Airspace R-5701A, and the remainder underlie the Boardman MOA. First Winds currently holds a developer easement for the construction of 35 turbines in 2012. There are 10 turbines scheduled for construction at Poplar North, and 25 scheduled for construction at Poplar South.

4.3.8.10 Ward Butte

The Ward Butte (Butter Creek 6) wind farm is approximately 7 mi. (11.3 km) east of the NWSTF Boardman facility, past the far eastern end of the east avigation easement and underlying R-5701 restricted airspace. American Wind currently holds a Umatilla county permit for the construction of 4 turbines planned for 2012.

4.3.8.11 Sullivan's Wind Farm (Horned Butte)

Invenergy (as Horn Butte Wind Energy LLC) is currently proposing to construct an additional 26 MW of wind power under the existing interconnection request. The location of the Horn Butte Wind Farm is to the west of NWSTF Boardman, underlying the westernmost portion of restricted area R-5701B. Construction of the Horn Butte Wind Farm is scheduled for 2013 and will consist of 17 GE 1.5 SLE wind turbines. These turbines are typically between 60 and 80 m (246 and 263 ft.) in height and have

a blade length of approximately 38 m (124.6 ft.). Combined, the maximum height of these turbines can be approximately 118 m (387 ft.).

4.3.8.12 Butter Creek Projects

The Butter Creek projects, owned by Intelligent Wind Energy, comprise four wind farms, each of which is sized 10 MW. The four wind farms are High Plateau, Lower Ridge, Mule Hollow, and Pine City. The Butter Creek projects are set to be developed at the end of the 2012. Each of the four wind farms is proposed to have a capacity of 10MW each. All four wind farms propose to use the Sany 2 MW wind turbine. The Sany 2MW towers are typically 80 m (263 ft.) in height with a blade length of approximately 43.5 m (143 ft.).

4.3.9 Multi-Species Candidate Conservation Agreement with Assurances for Threemile Canyon Farms

The U.S. Fish and Wildlife Service (USFWS) approved a Multi-Species Candidate Conservation Agreement with Assurances (MSCCAA) with Threemile Canyon Farms, PGE, The Nature Conservancy, and the Oregon Department of Fish and Wildlife on 1 March 2004 (U.S. Fish and Wildlife Service 2011). The MSCCAA is effective for 25 years and provides conservation measures for the Washington ground squirrel, ferruginous hawk, loggerhead shrike, and sage sparrow (covered species) on a combined total of approximately 23,480 acres (ac.) (9,502 hectares [ha]) immediately west of NWSTF Boardman. The Nature Conservancy manages 22,600 ac. (9,146 ha), dedicated by Threemile Canyon Farms and protected under a conservation easement, with the intent of maintaining and improving native shrub-steppe and grassland habitats for the covered species and other associated wildlife. This area is referred to as the Boardman Conservation Area. The remaining 880 ac. (356 ha) are protected from development, and owned and managed for conservation purposes by PGE (David Evans and Associates 2003).

4.3.10 U.S. Army Umatilla Chemical Depot Base Redevelopment Plan

The Umatilla Chemical Depot (UCD) is located northeast of NWSTF Boardman and lies beneath the proposed Boardman Northeast B MOA (Figure 2-5), which itself overlies the current national security area that is above the Umatilla Army Depot. The Umatilla Army Depot National Security area has a zone of surface to 5,000 ft. (1,524 m) mean sea level (MSL). The National Security Area is only “active” during emergencies, all other times it is a recommended no-fly area. Originally listed in the 1988 Base Realignment and Closure process, the DoD ultimately recommended closure of UCD during the 2005 Base Realignment and Closure round of announcements. Chemical munitions incineration concluded in October 2011. Incinerator demolition and associated decontamination activities are expected to be complete in 2013 or 2014. For more than two decades county and regional leaders as organized by the State of Oregon and recognized by the DoD as the Umatilla Army Depot Reuse Authority, have been studying and preparing for the eventual closure of the Umatilla Army Depot. The redevelopment plan (Umatilla Army Depot Reuse Authority 2010) adopted by the Reuse Authority was submitted to the DoD for review and approval in August 2010. The redevelopment plan recommends the following future land uses:

- Agriculture–655 ac. (265 ha).
- Wildlife refuge–5,613 ac. (2,272 ha).
- Oregon National Guard (ORNG) military training–7,421 ac. (3,003 ha).
- Highway commercial industrial–1,077 ac. (436 ha).
- Oregon Department of Transportation Interstate corridor–91 ac. (37 ha).

- Industrial restricted–942 ac. (381 ha).
- Industrial unrestricted–1,115 ac. (451 ha).

Recommendations in the Redevelopment Plan were based on the assumption that USFWS would take ownership and manage the proposed wildlife refuge lands under the National Wildlife Refuge System. However, in a letter dated 15 November 2011, USFWS notified the U.S. Army that they are no longer in a position to pursue a land transfer agreement. However, it is still the intent of the Land Reuse Authority that the 5,613 acre parcel would be managed primarily for wildlife.

Chemical munitions disposal operations at UCD were successfully concluded in October 2011, and decommissioning efforts are expected to continue for approximately 2 to 3 years. Completion of the mission and closure of the UCD will result in economic impacts from lost jobs. In the long-term, these impacts might be mitigated through reuse of the property. Closure also means that the potential public health and safety risks from an accidental release of stockpiled materials have been eliminated. Air pollutant emissions associated with the disposal operations would also cease. Potential impacts associated with reuse include: temporary disturbance and permanent loss of grassland and shrub-steppe vegetation; disturbance of wildlife and wildlife habitat, potentially including the long-billed curlew, western burrowing owl, and other special status species; noise; and air pollutant emissions from construction, new industrial sources, and any associated increase in traffic.

4.3.11 US 730 CORRIDOR REFINEMENT PLAN

The US 730 Corridor Refinement Plan is specifically concerned with the section of US 730 from the east city limits of the City of Irrigon (MP 176.61) to the west city limits of the City of Umatilla (MP 182.54). In 2003, the Oregon Department of Transportation designated this section of US 730 as a Safety Corridor. This section of the highway is currently characterized as having a significant number of private-access driveways, a limited supporting roadway network and a significant amount of high-speed-truck and through traffic. The US 730 Corridor Refinement Plan identifies highway safety improvements along this section of US 730 over the next 20 years. Potential impacts are primarily related to construction of the project and include noise and air pollutant emissions.

4.4 CUMULATIVE IMPACTS ANALYSIS

4.4.1 SOILS

The analysis in Section 3.1, Soils, indicates that the No Action Alternative, Alternative 1, and Alternative 2 would result in long-term, minor, and localized impacts to soils. With the exception of replacement of building 39, none of the other actions listed in Table 4-1 would affect soils at NWSTF Boardman. Building 39 would be replaced in its existing footprint; therefore, impacts to soils would be negligible. Therefore, detailed analysis of cumulative impacts on soils is not warranted.

4.4.2 AIR QUALITY

4.4.2.1 Impacts of the Alternatives that Might Contribute to Cumulative Impacts

As discussed in Section 3.2, Air Quality, all of the Alternatives would result in air pollutant emissions and emissions would increase under Alternatives 1 and 2 (Tables 3.2-3 and 3.2-4). The increases in emissions would be attributable to mobile sources; primarily additional aircraft overflights and operation of vehicles and equipment on the new ranges. The air pollutants emitted in the greatest quantities would be nitrogen oxides (NOx), suspended particulate matter less than or equal to 10 micrometer (μm) in diameter (PM_{10}), suspended particulate matter less than or equal to 2.5 μm in diameter ($PM_{2.5}$), and

carbon monoxide (CO). In addition, construction projects proposed under Alternatives 1 and 2 would generate fugitive dust and combustion emissions during the construction phase. These emissions would not contribute to long-term changes in air quality because the emissions would be intermittent and temporary.

4.4.2.2 Impacts of Other Actions

Most of the other actions listed in Table 4-1 would result in some air pollutant emissions. Many of the other actions would involve construction. Construction projects would generate fugitive dust and combustion emissions during the construction phase, and would contribute incrementally to air quality impacts. However, these emissions would not contribute to long-term changes in air quality because the emissions would be intermittent and temporary.

Other actions that would result in long-term changes in air quality include the PGE Boardman Plant emissions controls, which would substantially reduce emissions of some pollutants (Table 4-2), and operation of the PGE proposed Carty Generating Station, which would increase emissions (Table 4-2). The net effect of these two projects would be long-term, substantial decreases in NO_x, sulfur oxides (SO_x), suspended particulate matter, and mercury emissions, and minor increases in CO and volatile organic compound (VOC) emissions.

Completion of the chemical demilitarization operation and closure of the UCD would result in a reduction in air pollutant emissions. Current emissions limits in the UCD Title V permit are (all values in tons per year): CO = 102, NO_x = 96, VOC = 39, SO_x = 39, PM_{10} = 20, and PM = 75. Actual reductions in emissions could be less because the limits are maximum allowable values, rather than actual emissions.

The *U.S. Army Umatilla Chemical Depot Base Redevelopment Plan* includes recommendations to reuse portions of the UCD for industrial development. The Redevelopment Plan was approved by the U.S. Department of Housing and Urban Development in August 2010. It is reasonable to assume that stationary sources of air pollutant emissions would be associated with at least some of the industrial development. However, sufficient information is not available to predict future air pollutant emissions. Any proposed major industrial sources of air pollutants would be subject to permitting by the Oregon Department of Environmental Quality under Title V of the Clean Air Act. A major source of air emissions has the potential to emit 100 tons of any criteria pollutant, 10 tons of any single hazardous air pollutant, or 25 tons of any combination of hazardous air pollutants. Minor sources of air pollutant emissions would be regulated by the Oregon Department of Environmental Quality under Air Contaminant Discharge Permits.

4.4.2.3 Cumulative Impacts on Air Quality

Construction projects proposed under Alternatives 1 and 2 and several of the other actions would generate fugitive dust and combustion emissions during the construction phase. While these emissions would not contribute to long-term changes in air quality, the potential for localized cumulative impacts exists if the projects were to overlap in time and space. The primary concern would be simultaneous generation of fugitive dust.

Construction projects that could generate fugitive dust in the immediate vicinity of NWSTF Boardman include the Carty Generating Station, Carty Lateral Project, Cascade Crossing Transmission Line, and Idaho Power B2H Transmission Line. The anticipated start date for construction of the range enhancements at NWSTF Boardman is 2015. Construction of the Carty Generating Station and Carty Lateral Project are not expected to overlap with construction of the proposed range enhancements

because the Carty projects are currently scheduled to be in-service by late 2014. Completion of the Cascade Crossing Transmission Line is expected in 2016 or 2017 and completion of the B2H Project is expected in June 2016. Therefore, timing for the construction phase of these projects could overlap with construction of proposed range enhancements at NWSTF Boardman. The potential for cumulative impacts would be higher if a portion of the Cascade Crossing route were sited on Navy property. It is anticipated that cumulative impacts from dust would be minimized on all projects by using best management practices such as wetting the construction site.

As summarized in Table 4-3, long-term increases in NO_x, SO_x, and suspended particulate matter associated with Alternative 1, Alternative 2, and the Cary Generating Station would be offset by long-term decreases achieved by emissions controls at the PGE Boardman Plant and completion of chemical demilitarization operations at UCD. Likewise, the increases associated with Alternative 1, Alternative 2, and the Cary Generating Station would negate some of the air quality benefits achieved by the Boardman Plant emissions controls. Alternative 1, Alternative 2, and the Cary Generating Station would increase CO and VOC emissions. Future stationary source emissions could also result from industrial reuse of UCD, but sufficient information is not available to predict future air pollutant emissions. Future industrial sources at UCD would be subject to Clean Air Act and Oregon Department of Environmental Quality permitting requirements, which would help to control the incremental contribution of these potential sources. An overall decrease in air pollutant emissions is expected when the Alternatives are considered in combination with past, present, and reasonably foreseeable future actions (Table 4-3). Therefore, significant cumulative impacts on air quality are not expected under any of the Alternatives.

Table 4-3: Predicted Change in Air Pollutant Emissions Associated with the Proposed Action and Other Actions (2011 to 2018)

Emissions Source	Change in Criteria and Precursor Air Pollutant Emissions in Tons/Year				
	CO	NO_x	VOC	SO_x	PM_{10}
Alternatives 1 and 2	57	657	13	25	48
Boardman Plant	0	-9,896	0	-27,405	-710
Proposed Carty Generating Station	99	125	24	23	95
Umatilla Chemical Depot Closure	-102	-96	-39	-39	-20
Net Change =	**54**	**-9,210**	**-2**	**-27,396**	**-587**

Notes: CO = carbon monoxide, NO_x = nitrogen oxides, VOC = volatile organic compounds, SO_x = sulfur oxides, PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter.

4.4.3 WATER RESOURCES

The analysis presented in Section 3.3, Water Resources, indicates that the No Action Alternative, Alternative 1, and Alternative 2 would have negligible impacts on water resources. Therefore, detailed analysis of cumulative impacts on water resources is not warranted.

4.4.4 ACOUSTIC ENVIRONMENT

The analysis presented in Section 3.4 indicates that sensitive receptors could be affected by acoustic stressors. Potential impacts include localized disturbances which are brief events after which normal environmental conditions would return quickly (ambient). The impacts of the No Action Alternative, Alternative 1, and Alternative 2 would be cumulative with other actions that cause acoustic disturbances to sensitive receptors. Based on the analysis presented in Section 3.4 and the reasons summarized below, the incremental contribution of Alternatives 1 and 2 to cumulative impacts would be low for the following reasons:

- Sound impacts from training activities under Alternative 1 are minor to negligible on lands outside of the Target Areas, and are partially mitigated by the training schedule.
- Aircraft training and demolition activities on NWSTF Boardman occur primarily during the day, whereas individuals are most sensitive to sound at night.
- The areas surrounding NWSTF Boardman are primarily agricultural and thus, very few members of the public are exposed to sound from training activities on NWSTF Boardman.

Future development, consisting of the specific projects listed in Section 3.4, along with regional growth of urban areas and regional increases in wind development, would incrementally increase average sound levels during construction as well as during operation (e.g., wind turbines). Construction related to new development would result in short-term increases in daytime sound levels in the vicinity of those projects. In rural portions of Morrow, Gilliam, and Umatilla Counties, vehicle noise from increased traffic on local roads and regional highways would be the largest sources of increased noise. Daytime sound levels would likely increase more than nighttime sound levels. Substantial increases in sources of intrusive sound are not expected.

While sound from wind turbines will increase the sound environment in their immediate vicinity, a expert panel review on wind turbine sound and health effects (American Wind Energy Association and Canadian Wind Energy Association 2009) determined that (1) sound from wind turbines does not pose a risk of hearing loss or any other adverse health effect in humans; (2) subaudible, low frequency sound and infrasound from wind turbines do not present a risk to human health; (3) some people may be annoyed at the presence of sound from wind turbines. Annoyance is not a pathological entity; and (4) a major cause of concern about wind turbine sound is its fluctuating nature. Some may find this sound annoying, a reaction that depends primarily on personal characteristics as opposed to the intensity of the sound level.

Overall, cumulative increases in long-term average sound levels in rural portions of Morrow, Gilliam, and Umatilla Counties from planned and proposed projects would not be significant. Additionally, the increase in training activities associated with the Proposed Action would not increase long-term community sound levels above 65 A-weighted decibels beyond the boundaries of NWSTF Boardman. Therefore, further analysis of cumulative impacts on the acoustic environment is not warranted.

4.4.5 VEGETATION

4.4.5.1 Impacts of the Alternatives that Might Contribute to Cumulative Impacts

Based on the analysis in Section 3.5, Vegetation, impacts to vegetation under all of the action alternatives that might contribute to cumulative impacts include loss or degradation of native vegetation communities, in particular grassland and shrub-steppe communities. Approximately 50 ac. (20 ha) would be converted from predominately native grassland and shrub-steppe communities to permanent development under Alternative 1 and Alternative 2, and approximately 30 ac. (12.1 ha) would be temporarily disturbed and revegetated in accordance with the post-construction restoration plan (Appendix F). Disturbances during construction and training activities could also exacerbate existing invasive plant problems, if not mitigated or controlled.

4.4.5.2 Impacts of Other Actions

Past actions have resulted in significant impacts on shrub-steppe and grassland habitats in the Columbia Plateau Ecoregion. The Columbia Plateau Ecoregion in Oregon has been subject to widespread agricultural conversion. Kagan et al. (2000) estimates that over 85 percent of the native shrub-steppe,

grassland, and riparian communities have been converted to agricultural uses or have been overtaken by exotic species.

Other future actions that could impact shrub-steppe and grassland communities include the Cascade Crossing Transmission Line, B2H Transmission Line, UEC Transmission Line, Carty Lateral Project, various wind energy projects, and reuse development at UCD. The type of impacts would be similar to those expected under Alternative 1 and Alternative 2; temporary disturbance, loss of some shrub-steppe and grasslands, and invasive plant problems. Impacts would occur during construction and some form of vegetation maintenance would likely be necessary over the long-term.

The Carty Lateral Project would impact about 147 ac. (59 ha) of natural vegetation, including shrub-steppe and grasslands, along the currently proposed route (Gas Transmission Northwest 2011). An alternative route being considered for the Carty lateral Project crosses the Boardman Conservation Area. However, it seems unlikely that this alternative route would be selected because this area is under a conservation easement, a MSCCAA is in place, and USFWS expressed concerns during the scoping process.

Johnson and Erickson (2011) estimated that 4,958 ac. (2,006 ha) of total land area would be directly impact by existing and proposed wind energy projects in the Columbia Plateau Ecoregion through 2015. They estimated that approximately 2,578 acres (1,043 ha) of non-agricultural vegetation types, primarily grassland and shrub-steppe vegetation, would be lost in the Ecoregion to wind energy development through 2015.

Impact estimates for the other projects are not yet available. Impacts of the Cascade Crossing and B2H projects on shrub-steppe and grassland communities will depend largely on the final route selected. Alternatives being considered include routes that would be on or near NWSTF Boardman. All of these projects are subject to established federal or state agencies environmental planning and review processes. Therefore, it is expected that all of these projects will include measures to avoid, minimize, and restore impacts.

Several ongoing and future actions in the region would provide long-term benefits for shrub-steppe and grassland communities:

- The MSCCAA described in Section 4.3.8 is protecting and enhancing shrub-steppe and grassland communities at the Boardman Conservation Area adjacent to NWSTF Boardman. The Nature Conservancy is currently implementing a restoration plan for the Boardman Conservation Area (Elseroad 2007, 2008), which includes eradicating invasive plants in degraded habitats and revegetating the areas with native plants.
- Implementation of the *NWSTF Boardman Integrated Natural Resources Management Plan* has and would continue to benefit native plant communities by controlling invasive plants, conducting restoration activities, and inventorying and monitoring plant communities on NWSTF Boardman. The Plan includes co-operative management of the Research Natural Areas on NWSTF Boardman by The Nature Conservancy and the Navy, and would be updated if the new ranges were built.
- The possible establishment of a wildlife refuge on the UCD as part of the Redevelopment Plan would protect approximately 5,613 ac. (2,272 ha) of shrub-steppe and grassland communities.
- Continued management of lands at the Lindsay Prairie Preserve by The Nature Conservancy would protect and enhance shrub-steppe and grassland communities.

- Continued management of lands at the Horn Butte Area of Critical Environmental Concern by the Bureau of Land Management would protect and enhance shrub-steppe and grassland communities.

4.4.5.3 Cumulative Impacts on Vegetation

As discussed above (Section 4.4.5.2), past conversion to agriculture resulted in significant impacts on shrub-steppe and grassland communities in the Columbia Plateau Ecoregion. Kagan et al. (2000) estimates that over 85 percent of the native shrub-steppe, grassland, and riparian communities have been converted to agricultural uses or have been overtaken by exotic species.

Cumulative impacts of future actions on shrub-steppe and grassland communities were considered in local (e.g., NWSTF Boardman and the contiguous Boardman Conservation Area) and regional (e.g., Columbia Plateau Ecoregion) contexts. Other than Alternative 1 or Alternative 2, no actions that would result in adverse effects on vegetation are currently proposed formally on NWSTF Boardman. However, two alternative routes that cross NWSTF Boardman are being considered for the Cascade Crossing Transmission Line. One alternative is along the eastern boundary and the other is along the northern boundary. The width of the permanent easement needed would be 250 ft. (76 m) wide.

Vegetation within the easement would be disturbed during construction, invasive plants could become established, and some form of long-term vegetation maintenance beneath the transmission line would be necessary. Establishment of an access road for maintenance and safety purposes might also be required. Specific information regarding the area of disturbance, area of permanently lost vegetation, and maintenance requirements are not currently available. However, a conservative assumption is that some degradation of vegetation communities within the entire 250 ft. (76 m) easement would occur. If selected, the area of vegetation potentially impacted would be 181 ac. (73 ha) along the northern boundary route or 364 ac. (147 ha) along the eastern boundary route. In comparison, the total area of disturbance for Navy and ORNG construction under Alternative 1 or Alternative 2 of this EIS would be about 92 ac. (37 ha). The combined area of impact on NWSTF Boardman for the Navy and ORNG construction plus the transmission line construction could range from 273 ac. (110 ha) to 456 ac. (185 ha) or about 0.6 to 1 percent of the NWSTF Boardman. Cumulative impacts to vegetation at NWSTF Boardman would increase substantially if the selected Cascade Crossing route included a segment on NWSTF Boardman. These impacts could be minimized through mitigation and long-term management of invasive plants, but specific management practices and mitigation measures have not yet been identified. Insufficient information is currently available to determine the significance of the cumulative impacts that could be associated with the Cascade Crossing Project.

As discussed above (Section 4.4.5.2), ongoing and future natural resources management activities on NWSTF Boardman would provide long-term benefits for shrub-steppe and grassland communities through invasive plant control and restoration. Proposed mitigation measures under Alternatives 1 and 2 would include restoring native plant communities in the southern portion of NWSTF Boardman, relocating Research Natural Area A to one or more appropriate locations, and modifying the fire break system. Other actions in the region such as continued management of the Boardman Conservation Area, Lindsay Prairie Preserve, and Horn Butte Area of Critical Environmental Concern, and possible establishment of a wildlife refuge at UCD would also protect shrub-steppe and grassland communities.

Future actions outside the boundaries of NWSTF Boardman, including the Carty Lateral Project, wind energy projects, the three transmission line projects, and reuse development at UCD are expected to impact shrub-steppe and grassland communities in the vicinity of NWSTF Boardman and in the region.

The Carty Lateral Project is expected to impact about 147 ac. (59 ha) of natural vegetation and approximately 2,578 acres (1,043 ha) of non-agricultural vegetation types, primarily grassland and shrub-steppe vegetation, would be lost in the Columbia Plateau Ecoregion to existing and proposed wind energy development through 2015. Estimating the area of shrub-steppe and grassland communities that would be impacted by the remaining actions is not possible based on available information. However, given the length of the proposed transmission lines and the width of the required easements (250 ft. [76 m]), the area of shrub-steppe and grasslands impacted is expected to be substantially larger than the Carty Lateral Project (147 ac. [59 ha]), which requires only a 50 ft. (15.2 m) easement. Sufficient information is not available to make conclusions regarding the significance of impacts associated with other actions. However, it is expected that other future actions would affect a relatively small percent of shrub-steppe and grassland communities in the Columbia Plateau Ecoregion (approximately 1.5 million ac. [Kagan et al. 2000]). Impacts of Alternative 1 or Alternative 2 on vegetation would be additive to the impacts of other actions that would adversely affect shrub-steppe and grassland communities in the region; however, the contribution would be small when considered relative to other actions such as wind energy development, electrical transmission lines, and historical habitat conversion to agricultural lands.

4.4.6 WILDLIFE

4.4.6.1 Impacts of the Alternatives that Might Contribute to Cumulative Impacts

The analysis presented in Section 3.6, Wildlife, concluded that the combined effects of noise, habitat loss and alteration, and general disturbance from human activities under Alternative 1 and Alternative 2 may have a significant impact on the Washington ground squirrel. Specific impacts include physiological and behavioral responses to noise or human activity, which could lead to reduced fitness of individuals and Washington ground squirrel population declines at NWSTF Boardman. Individuals of other wildlife species, including other mammals, birds, and reptiles, may also experience reduced fitness. However, populations of other wildlife species would not be adversely affected. Habitat loss and degradation would result from construction, training, and range maintenance activities. Noise levels that result in temporary or permanent abandonment of an area would also be considered as habitat loss or alteration.

4.4.6.2 Impacts of Other Actions

Other future actions that could impact wildlife include the Cascade Crossing Transmission Line, B2H Transmission Line, UEC Transmission Line, Carty Lateral Project, various wind energy projects, and reuse development at UCD. The expected impacts may include temporary disturbance, habitat loss and degradation, habitat fragmentation, and incidental mortality.

The Carty Lateral Project would impact about 147 ac. (59 ha) of natural vegetation, including shrub-steppe and grasslands, along the currently proposed route (Gas Transmission Northwest 2011a). Portions of the project area provide suitable habitat for the Washington ground squirrel and other special status species such as ferruginous hawk, long-billed curlew, loggerhead shrike, Swainson's hawk, and western burrowing owl. Washington ground squirrels were detected on a preliminary survey route during May 2011 field studies; however, the route was subsequently changed to avoid these areas (Gas Transmission Northwest 2011b). Un-surveyed portions of the proposed right-of-way could support Washington ground squirrels and surveys are planned for April–May 2012.

Johnson and Erickson (2011) evaluated the cumulative impacts of wind energy development projected to occur within the Columbia Plateau Ecoregion of eastern Washington and Oregon through 2015.

Approximately 2,578 ac. (1,043 ha) of non-agricultural vegetation types, primarily grassland and shrub-steppe vegetation, would be lost in the Columbia Plateau Ecoregion to existing and proposed wind energy development through 2015. This loss of vegetation corresponds to a loss of wildlife habitat. Wind turbines also cause bird and bat fatalities. For all birds combined, Johnson and Erickson (2011) estimate that total annual mortality in the Columbia Plateau Ecoregion would be 15,276 birds/year. The species composition of fatalities were estimated to be: 8.7 percent raptors; 69.5 percent passerines; 13.1 percent upland game birds; 3.8 percent doves and pigeons combined; 2.1 percent waterfowl, waterbirds, and shorebirds combined; 2.7 percent other bird types such as woodpeckers, nighthawks and swifts; and 4.5 percent non-protected European starlings, rock pigeons, and house sparrows. Total bat mortality in the Columbia Plateau Ecoregion was estimated at 7,638 per year, consisting of approximately 3,798 silverhaired and 3,670 hoary bat fatalities. The authors concluded that these fatalities are not likely significant to bird or bat populations.

Impact estimates for the other projects are not yet available. Impacts of the Cascade Crossing, B2H, and UEC projects on shrub-steppe and grassland communities and wildlife habitat will depend largely on the final route selected. Alternatives being considered include routes that would be on or near NWSTF Boardman. Wildlife surveys for the alternative alignments on NWSTF Boardman were initiated in spring 2012. In addition to the potential impacts associated with construction, the proposed transmission lines would introduce a potential electrocution and collision hazards for large birds. They would also provide perches for raptors, often in areas where none previously existed, thus potentially affecting small mammals by predation. If either transmission line were found feasible to site on NWSTF Boardman after operational compatibility review, the Navy would have to grant a right of entry for the segment of the transmission line on Navy property. All of these projects are subject to established federal or state agencies environmental planning and review processes. Therefore, it is expected that all of these projects will include measures to avoid and minimize impacts to wildlife, and restore wildlife habitat.

The ongoing and future actions listed above (Section 4.4.5.3) that would provide long-term benefits for shrub-steppe and grassland communities, would also benefit wildlife. These actions include MSCCAA for the Boardman Conservation Area, implementation of the *NWSTF Boardman Integrated Natural Resources Management Plan*, possible establishment of a wildlife refuge on UCD, and continued management the Lindsay Prairie Preserve and Horn Butte Area of Critical Environmental Concern.

4.4.6.3 Cumulative Impacts on Wildlife

As discussed above for vegetation (Section 4.4.5.3), past actions have resulted in significant impacts on shrub-steppe and grassland communities in the Columbia Plateau Ecoregion. Corresponding significant impacts to wildlife populations occurred as these habitats were converted to agriculture, grazing, and other human uses. Wildfire and noxious weed and invasive plant infestations have also contributed to the impacts on wildlife.

Cumulative impacts of future actions on wildlife were considered in local (e.g., NWSTF Boardman and the contiguous Boardman Conservation Area) and regional (e.g., Columbia Plateau Ecoregion) contexts. Other than Alternative 1 or Alternative 2, no actions that would result in adverse effects on wildlife are currently proposed formally on NWSTF Boardman. As discussed above for vegetation (Section 4.4.5.3), habitat impacted by a transmission line crossing could range from 181 ac. (73 ha) to 364 ac. (147 ha) depending on the route selected. These impacts on wildlife would contribute incrementally to those of Alternative 1 and Alternative 2, which may be significant based on the analysis presented in Section 3.6, Wildlife.

Ongoing and future natural resources management activities on NWSTF Boardman, Boardman Conservation Area Lindsay Prairie Preserve, and Horn Butte Area of Critical Environmental Concern would protect and benefit wildlife in the region, including the Washington ground squirrel and other special status species. Possible establishment of a wildlife refuge at UCD would protect important habitat for the western burrowing owl and other special status bird species. Washington ground squirrels are not known to occur on UCD.

Future actions outside the boundaries of NWSTF Boardman, including the Carty Lateral Project, wind energy projects, the two transmission line projects, and reuse development at UCD are expected to impact wildlife and wildlife habitat in the vicinity of NWSTF Boardman and in the region. Estimating the area of habitat that would be impacted by other actions is not possible based on available information. However, given the length of the proposed transmission lines and the width of the required easements (250 ft. [76 m]), the area impacted by the proposed transmission lines is expected to be substantially larger than the Carty Lateral Project (147 ac. [59 ha]), which requires only a 50 ft. (15.2 m) easement. Sufficient information is not available to make conclusions regarding the significance of impacts associated with other actions. However, it is expected that other future actions would affect a relatively small percent of shrub-steppe and grassland communities in the Columbia Plateau Ecoregion (approximately 1.5 million ac. [Kagan et al. 2000]). Impacts of Alternative 1 or Alternative 2 on wildlife habitat would be additive to the impacts of other actions that would adversely affect shrub-steppe and grassland communities in the region.

4.4.7 LAND USE AND RECREATION

4.4.7.1 Impacts of the Alternatives that Might Contribute to Cumulative Impacts

As discussed in Section 3.7, Land Use, lands underneath the northeast MOA would experience aircraft overflights under the No Action Alternative, Alternative 1, and Alternative 2. The typical flight path of aircraft in the northeast MOA is climbing from low altitude training over NWSTF Boardman to higher elevations (while within the northeast MOA) where they would turn back towards the center of NWSTF Boardman and reduce their altitude. Thus, at these higher elevations, it is not expected that there would be any changes to historical land uses or recreational activities in these areas.

4.4.7.2 Impacts of Other Actions

Most of the other actions, most notably construction actions, listed in Table 4-1 would result in some changes in land use. Construction projects contribute incrementally to land use impacts, most notably during the period of construction, rather than during operation. These impacts would not contribute to long-term changes in land use because the construction activities would be intermittent and temporary. For example, energy transmission line projects, such as the Cascade Crossing Transmission Line and Idaho Power B2H Transmission Line could potentially change area land use during construction, as there would be a temporary loss of usability. However, upon completion of the transmission lines, it is expected that the usability of the area would be restored.

The *U.S. Army Umatilla Chemical Depot Base Redevelopment Plan* includes recommendations to reuse portions of the UCD for industrial development. The Redevelopment Plan was approved by the U.S. Department of Housing and Urban Development in August 2010. Therefore, it is reasonably foreseeable that some form of industrial development would occur there in the future based on the extensive planning effort and stakeholder involvement that has occurred to date. Industrial development would not significantly alter the usability of the area for the public, as UCD was a controlled facility.

Construction and operation of the proposed wind farm projects have minimal cumulative impacts to land use as the wind farms are generally consistent with the land use patterns within the region. Since the projects will be primarily located on agricultural land, they are less likely to impact nearby residences or recreation areas. Impacts to agricultural land would be greatest during construction of the projects because additional acreage will be required for workspace and movement of equipment and material. However, these projects have been located to minimize loss of active agricultural land and interference with agricultural operations. The proposed projects should not interfere with future plans to develop land in the area for single family, residential, agricultural, or other uses permitted under the applicable zoning ordinances provided that the proposed future uses comply with applicable setback requirements established by each host municipality. It is important to note, however, that while the projects are compatible with land use patterns in the region, construction and operation of the wind farms can have cumulative impacts to local aviators, both military and civilian, as each new wind tower would represent a hazard for aviators to avoid and could pose a compatibility issue with regards to airspace use. For further detail on these particular impacts, see Section 4.4.9, Transportation.

4.4.7.3 Cumulative Impacts on Land Use and Recreation

Cumulative impacts to land use would be determined significant if proposed training, range enhancements, or other area projects alter or disrupt area land use to the extent that there is a loss of usability, routine activities would no longer be feasible, and would modify either the historical or designated land use. Under Alternative 1 and 2, there would be a moderate decrease in available airspace time for non-participating aircraft as well as a decrease in the availability in the available airspace time for non-participating aircraft in the northeast MOA. The Boardman Northeast MOA would overlie the current national security area that is above the Umatilla Army Depot. The Umatilla Army Depot National Security area has a zone of surface to 5,000 ft. (1,524 m) MSL. The National Security Area is only “active” during emergencies, all other times it is a recommended no-fly area. As the Boardman Northeast MOA is not a restricted area, local aviators have the ability to transit the airspace when not active; this decrease in availability is expected to be reduced to less than significant levels. The majority of regional projects only have temporary land use impacts during the construction phase. Additionally, the activities proposed typically are compatible with existing land uses and zoning in the region. The incremental contribution to impacts on regional land use or recreational use of the area would be temporary and would not be considered to be significant.

4.4.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The analysis presented in Section 3.8 indicates that increases in personnel at NWSTF Boardman and training activities would have a beneficial effect on the local economy due to an increase in spending by military personnel employed or training at NWSTF Boardman. Based on the analysis presented in Section 3.4 and the reasons summarized below, the contribution of Alternatives 1 and 2 to cumulative impacts would be low for the following reasons:

- Economic activity, such as local employment and materials purchasing associated with the proposed construction of new facilities under Alternatives 1 and 2, would provide short-term economic benefits to the local economy that would last for the duration of the construction; however, beneficial impacts from construction would be negligible on a regional scale.
- Other economic activity, such as the presence of non-local construction crews, would also provide short-term economic benefits to the local economy for the duration of the construction activities; however, beneficial impacts from this activity would be negligible on a regional scale.

- The presence of Guard and Navy training units would represent a minimal positive net economic impact on a regional scale since personnel associated with training activities will mainly remain within NWSTF Boardman.

Future development, consisting of the specific projects listed in Section 3.4, along with regional growth of urban areas and regional increases in wind development, would increase economic benefits, especially if the projects utilize local resources. Construction related to new development would result in short term increases in the utilization of local workforce. Overall, cumulative increases in long-term economic benefits in Morrow, Gilliam, and Umatilla Counties from planned and proposed projects would not be significant. Therefore, further analysis of cumulative impacts on socioeconomics is not warranted.

4.4.9 TRANSPORTATION

4.4.9.1 Impacts of the Alternatives that Might Contribute to Cumulative Impacts

The analysis in Section 3.9 indicates that the impacts of the No Action Alternative, Alternative 1, and Alternative 2 on transportation would be negligible. The nominal volume of additional traffic accessing NWSTF Boardman during operation of the proposed training ranges would have a less than significant impact on the level of service of Interstate 84 or Bombing Range Road.

The current Restricted Areas and proposed MOAs and Air Traffic Control Assigned Airspace (ATCAA) on NWSTF Boardman under the No Action Alternative, Alternative 1, and Alternative 2 limit the amount of commercial aviation traffic through the Special Use Airspace. However, flight publications and Notices to Airmen would allow general aviators the opportunity to plan around military readiness activities, general aviators would still be allowed to operate under Visual Flight Rules within the proposed MOAs. Further, military safety precautions restrict Low Altitude Tactical Training (LATT) training to daylight hours only, and further restrict it to the time periods of 2 hours after sunrise and 2 hours before sunset; outside of these hours, no LATT activities occur within the proposed MOA. Any impacts to non-military aviation activities would be less than significant impacts on commercial or general aviation activities as the airspace may be made available for use by nonparticipating aircraft when all or part of the airspace is not needed by the using agency.

4.4.9.2 Impacts of Other Actions

Construction and operation of the proposed wind farm projects have minimal cumulative impacts to transportation as the wind farms are generally consistent with the land use patterns within the region and do not alter local transportation routes. While the wind power projects would not cumulatively add to impacts to transportation in the region, construction and operation of the wind farms can have cumulative impacts to local aviators, both military and civilian, as each new wind tower would represent a hazard for aviators to avoid and could pose a compatibility issue with regards to airspace use. Project towers would also increase the chance of impact by low-flying aircraft. Such a collision could result in a fire (see Section 4.4.12.2). Appropriate marking and lighting of the towers would lessen the probability of occurrence. However, the probabilities and associated impacts would be proportional to the number of wind power projects and, thus, the number of towers constructed.

4.4.9.3 Cumulative Impacts on Transportation

Future actions outside the boundaries of NWSTF Boardman, most notably wind energy projects, are expected to decrease the availability of usable airspace (low-level) in the vicinity of NWSTF Boardman and in the region. It is expected that other future windfarm development could affect a percentage of

available low-level airspace in the region. Impacts of the No Action Alternative, Alternative 1, or Alternative 2 on airspace use would be additive to the impacts of other actions that would adversely affect airspace availability.

4.4.10 CULTURAL RESOURCES

The analysis in Section 3.10, Cultural Resources, indicates that the No Action Alternative, Alternative 1, and Alternative 2 would have no effect and no adverse effects on historic properties within the Area of Potential Effects (APE) for ground disturbing activities. Native American resources and traditional cultural properties may occur within the APE for noise and visual intrusion, which encompasses the smaller APE for ground disturbing activities. While no specific Native American resources or traditional cultural properties have yet been identified in the APEs, the Confederated Tribes of the Umatilla Indian Reservation identified the need to conduct a traditional cultural properties survey and the Navy is working with them to complete the survey. If Native American resources or traditional cultural properties are identified in the APEs, potential impacts would be evaluated in consultation with the affected tribes. If necessary, mitigation measures to avoid or minimize impacts would be developed in consultation with the tribes. Navy conclusions regarding impacts to cultural resources are pending completion of ongoing Native American consultations and National Historic Preservation Act Section 106 consultation with the Oregon State Historic Preservation Office. However, based on information available at this time, the alternatives are not expected to contribute to cumulative cultural resources impacts. Therefore, further analysis of cumulative impacts on cultural resources is not warranted at this time.

4.4.11 PUBLIC HEALTH AND SAFETY AND THE PROTECTION OF CHILDREN

The analysis in Section 3.11 indicates that the impacts of the No Action Alternative, Alternatives 1 and 2 on public health and safety would be negligible. Routine training activities conducted within NWSTF Boardman pose little risk to public health or safety outside of the training areas. Activities utilizing live ammunition do not project hazardous effects off site because of their size, and because safety zones are established specifically to control these effects. Aircraft sorties used during proposed training activities would increase, but public safety is expected to be maintained as air activities would be conducted in accordance with regulations for the use of aircraft targets, Restricted Areas, and MOAs/ATCAA scheduled by Naval Air Station Whidbey Island as well as through the continued issuance of Notice to Airmen. During flights, pilots avoid areas where obstructions to air navigation have been identified. Given the use of military training routes, vigilance by military pilots to avoid any obstructions or other planes, and the avoidance of flights over public areas, aircraft activities would have no significant impacts on public safety.

The Proposed Action and other activities performed and proposed by surrounding commercial, industrial, and recreational interests do not normally increase the risk of impacts on health and public safety resources. The incremental impacts of the Proposed Action do not represent any appreciable contribution to cumulative health and safety risks when added to other past, present, and reasonably foreseeable future actions. Therefore, further analysis of cumulative impacts on public health and safety and the protection of children is not warranted.

4.4.12 WILDFIRE

4.4.12.1 Impacts of the Alternatives that Might Contribute to Cumulative Impacts

The analysis in Section 3.12 indicates that fire originating on NWSTF Boardman could occur as a result of current training activities, such as the use of incendiary devices, tracer rounds, smoke grenades, a

projectile striking a metal object and causing a spark, or from heat generated by mechanical equipment, vehicles, or weapons. Fires resulting from construction or training activities would be expected to occur on the proposed Digital Multi-Purpose Training Range, Multi-Purpose Machine Gun Range, Convoy Live Fire Routes, mortar firing points and the Demolition Training Range. The Navy is currently revising, updating and expanding the specific portion of that plan applicable to NWSTF-Boardman. A summary of the measures contained therein are detailed in Appendix H. Key elements focus on reducing and preventing fires by: (a) prohibiting the use of tracer ammunition during high fire risk periods; (b) requiring pyrotechnic devices, such as smoke grenades, to be used in metal containments during high fire risk periods; (c) keeping vehicles away from vegetation; (d) educating soldiers regarding smoking, fire danger, procedures for fire reporting, and vehicle use; (e) quick identification, reporting, and response to new fires; and (f) enforcing bans on smoking, off-highway vehicle use, and other high-fire risks. In addition, military personnel would monitor for fire at all times during range operations from observation towers and while on patrols. Post-operation fire monitoring would be conducted by range operators while conducting range clearance duties. Oregon National Guard would have a trained, dedicated fire crew and a wildland fire truck on-site during weapons training during times of high fire risk. The ORNG also would have CH-47 or CH-60 helicopter aerial firefighting capability available during high fire risk seasons. These actions serve to further reduce or prevent fires from military readiness activities.

4.4.12.2 Impacts of Other Actions

Other future actions that could impact the potential for wildfire include the Cascade Crossing Transmission Line, B2H Transmission Line, Carty Lateral Project, Umatilla Electric Cooperative transmission line, various wind energy projects, and reuse development at UCD. Fires could occur as a result of construction or from heat generated by mechanical equipment or vehicles. However, the proposed projects implement fire protection plans which reduce the potential for wildfire ignition. For example, as part of the development of plans for PGE's new 300 to 500 MW natural-gas-fired power plant adjacent to its existing Boardman Plant consultation regarding potential impacts on law enforcement services and fire protection services is planned with Morrow County Sheriff's Office, Boardman Rural Fire Protection District, and Oregon State Police. Construction of the facility would also require compliance with detailed state and local standards such as fire protection, road use, and building codes, which will minimize the potential for wildfire.

Gas Transmission Northwest proposes to construct, own, and operate a natural gas pipeline lateral that would connect to its existing mainline system in Morrow County, Oregon. The U.S. Department of Transportation is mandated to provide pipeline safety under Title 49 of the U.S.C., Chapter 601. The Pipeline and Hazardous Materials Safety Administration's Office of Pipeline Safety administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Under section 192.615 of the U.S. Department of Transportation, each pipeline operator must also establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters, and establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response. Implementation of these plans serve to reduce the potential for wildfire.

Portland General Electric is proposing to construct, connect , maintain, and operate new and existing electricity power sources east of the Cascades to the Willamette Valley. Project plans developed as part

of preparing the Cascade Crossing Power Transmission Line will provide a framework for construction phase management of personnel, rules of behavior, identification of local police and fire protection resources, and emergency response procedures to be used or followed throughout the five counties crossed, all which serve to reduce the potential for wildfire ignition as well as identify wildfire suppression efforts.

The risk of fire from wind power projects would be a concern during construction, operation, and decommissioning. The degree to which the project-specific fire risk would contribute to the cumulative fire risk in the general geographic area would depend on which development scenario was selected and the extent to which the identified mitigation measures were implemented. Construction and decommissioning timing, relative to the other wind power projects and other development in the area, would also be a factor influencing the degree of the cumulative fire risk. Simultaneous construction of projects, for example, would raise the cumulative fire risk and increase the potential burden on emergency response organizations. The presence of turbine towers where now there are none, would likely increase the probability of lightning strikes and, despite the grounding systems that the wind power projects would employ, provide an increased likelihood of fire. The rate, extent, and direction of spread would be governed by the location of the fire, available fuel, temperature, wind speed and direction, presence/absence of fire breaks, and response time and capability of on-site personnel and emergency responders.

As part of the site certification process for wind energy projects, the Oregon Department of Energy includes specific facility conditions based on the representations in the site certificate application and supporting record. Typically, the certificate holder shall implement a fire control plan for construction and operation for wildfire suppression within the mitigation area, include in the plan appropriate fire prevention measures, methods to detect fires that occur and a protocol for fire response and suppression. Specific protocols could include coordination with local fire districts, establishment of project roads that serve as fire-breaks, presence of fire-fighting personnel, presence of earthmoving equipment, or presence of water trucks.

All of these projects are subject to established federal or state agencies environmental planning and review processes. While the potential exists for fires to occur as a result of construction or operation, it is expected that all of these projects will include measures to avoid and minimize wildfire potential.

4.4.12.3 Cumulative Impacts on Wildfire

Cumulative impacts of future actions on wildfire were considered in local and regional contexts. Other than Alternative 1 or Alternative 2, no actions that would result in increase potential for wildfire are currently proposed formally on NWSTF Boardman. As discussed above, wildfire could occur from construction or operation of other projects. These impacts on wildfire would contribute incrementally to those of Alternative 1 and Alternative 2.

Any potential for short- or long-term, negative effects to vegetation or wildlife from fires caused by constructing and operating the proposed training ranges on NWSTF Boardman would increase under the action alternatives. However, the area potentially burned by accidental fires is expected to be relatively small based on implementation of the *Integrated Wildland Fire Management Plan*. Wildfires caused by military training activities at NWSTF Boardman could result in significant short- and long-term effects to vegetation, wildlife, and air quality under Alternative 1 and 2. However, with current training practices and the implementation of the *Integrated Wildland Fire Management Plan*, these effects would be reduced and localized.

Future actions outside the boundaries of NWSTF Boardman, including the Carty Lateral Project, wind energy projects, the two transmission line projects, and reuse development at UCD are expected to increase the potential for wildfire in the vicinity of NWSTF Boardman and in the region. Estimating the area that would be impacted by other actions is not possible based on available information. However, it is expected that other future actions could affect a relatively small percent of vegetation or wildlife in the region. Alternative 1 or Alternative 2 would contribute incrementally to the potential for wildfire in the region.

4.5 CLIMATE CHANGE

4.5.1 INTRODUCTION

Climate change is a global issue, and greenhouse gas emissions are a concern from a cumulative perspective because individual sources of greenhouse gas emissions are not large enough to have an appreciable impact on climate change. This greenhouse gas analysis considers the incremental contribution of Alternatives 1 and 2 to total estimated U.S. greenhouse emissions as compared to the No Action Alternative.

Greenhouse gases are compounds that contribute to the greenhouse effect. The greenhouse effect is a natural phenomenon in which these gases trap heat within the surface-troposphere (lowest portion of the earth's atmosphere) system, causing heating (radiative forcing) at the surface of the earth. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in greenhouse gas emissions from human activities (U.S. Environmental Protection Agency 2009). The climate change associated with this global warming is predicted to produce negative environmental, economic, and social consequences across the globe. The average global temperature since 1900 has risen by 1.5°F (0.8°C) and is predicted to increase by up to 11.5°F (6.4°C) by 2100 (Karl et al. 2009).

Predictions of long-term negative environmental impacts due to global warming include sea level rise; changes in ocean pH and salinity; changing weather patterns with increases in the severity of storms and droughts; changes to local and regional ecosystems (including the potential loss of species); shrinking glaciers and sea ice; thawing permafrost; a longer growing season; and shifts in plant and animal ranges.

4.5.2 REGULATORY FRAMEWORK

Federal agencies address emissions of greenhouse gases by reporting and meeting reductions mandated in laws, executive orders and policies. The most recent of these are Executive Order (EO) 13514 *Federal Leadership in Environmental, Energy, and Economic Performance* of 5 October 2009 and EO 13423 *Strengthening Federal Environmental, Energy, and Transportation Management* of 26 January 2007.

Executive Order 13514 shifts the way the government operates by (1) establishing greenhouse gases as the integrating metric for tracking progress in federal sustainability; (2) requiring a deliberative planning process; and (3) linking to budget allocations and Office of Management and Budget scorecards to ensure goal achievement.

The targets for reducing greenhouse gas emissions discussed in EO 13514 for Scope 1 (direct greenhouse gas emissions from sources that are owned or controlled by a federal agency) and Scope 2 (direct greenhouse gas emissions resulting from the generation of electricity, heat, or steam purchased by a federal agency) have been set for the DoD at a 34 percent reduction of greenhouse gas from the 2008 baseline by 2020. Scope 3 targets (greenhouse gas emissions from sources not owned or directly controlled by a federal agency but related to agency activities such as vendor supply chains, delivery

services, and employee travel and commuting) were set at a 13.5 percent reduction. EO 13514 *Strategic Sustainability Performance Plan* submitted to the CEQ on 2 June 2010 contains a guide for meeting these goals.

EO 13423 established a policy that federal agencies conduct their environmental, transportation, and energy-related activities in support of their respective missions in an environmentally economic way. It included a goal of improving energy efficiency and reducing greenhouse gas emissions of the agency through reduction of energy intensity by 3 percent annually through the end of fiscal year 2015, or 30 percent by the end of fiscal year 2015, relative to the baseline of the agency's energy use in fiscal year 2003.

The Navy is committed to improving energy security and environmental stewardship by reducing reliance on fossil fuels. The Navy is actively developing and participating in energy, environmental, and climate change initiatives that will increase use of alternative energy and help conserve the world's resources for future generations. The Navy Climate Change Roadmap identifies actions the Environmental Readiness Division is taking to implement EO 13514 (U.S. Department of the Navy 2010). The Navy's Task Force Energy is responding to the Secretary of the Navy's energy goals through energy security initiatives that reduce the Navy's carbon footprint. The Climate Change Roadmap (5-year roadmap) action items, objectives, and desired impacts are organized to focus on strategies, policies and plans; operations and training; investments; strategic communications and outreach; and environmental assessment and prediction.

4.5.3 GREENHOUSE GAS EMISSIONS IN THE UNITED STATES

Greenhouse gas emissions occur from both natural processes and human activities. The primary long-lived greenhouse gases directly emitted by human activities are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Although CO_2, CH_4, and N_2O occur naturally in the atmosphere, their concentrations have increased by 38 percent, 149 percent, and 23 percent, respectively, from the pre-industrial era (1750) to 2007-2008 (U.S. Environmental Protection Agency 2009).

To estimate total greenhouse gas emissions, each greenhouse gas is assigned a global warming potential; that is, the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a global warming potential of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis (Intergovernmental Panel on Climate Change 2007). To simplify greenhouse gas analyses, total greenhouse gas emissions from a source are often expressed as CO_2 Eq. The CO_2 Eq. is calculated by multiplying the emissions of each greenhouse gas by its global warming potential and adding the results together to produce a single, combined emission rate representing all greenhouse gases. While CH_4 and N_2O have much higher global warming potentials than CO_2, CO_2 is emitted in much higher quantities, so it is the overwhelming contributor to CO_2 Eq. from both natural processes and human activities. Global warming potential-weighted emissions are presented in terms of equivalent emissions of CO_2, using units of teragrams (Tg) (1 million metric tons, or 1 billion kilograms) of carbon dioxide equivalents (Tg CO_2 Eq.).

In 2009, the United States generated an estimated 6,633.2 Tg CO_2 Eq. (U.S. Environmental Protection Agency 2011). The 2009 inventory data (U.S. Environmental Protection Agency 2011) show that CO_2, CH_4, and N_2O contributed from fossil fuel combustion processes from mobile and stationary sources (all sectors) include approximately

- 5,505.2 Tg of CO_2
- 686.3 Tg CH_4
- 295.6 Tg N_2O

The 6,633.2 Tg CO_2 Eq. generated in 2009 is a decrease from the 7,263.4 Tg CO_2 Eq. generated in 2007 (U.S. Environmental Protection Agency 2011). Among domestic transportation sources, light-duty vehicles (including passenger cars and light-duty trucks) represented 64 percent of CO_2 emissions, medium- and heavy-duty trucks 20 percent, commercial aircraft 6 percent, and other sources 9 percent. Across all categories of aviation, CO_2 emissions decreased by 21.6 percent (38.7 Tg) between 1990 and 2009. This includes a 59 percent (20.3 Tg) decrease in emissions from domestic military operations. To place military aircraft in context with other aircraft CO_2 emissions, in 2009, commercial aircraft generated 111.4 Tg CO_2 Eq., military aircraft generated 14.1 Tg CO_2 Eq., and general aviation aircraft generated 13.3 Tg CO_2 Eq. Military aircraft represent roughly 10 percent of emissions from the overall jet fuel combustion category.

4.5.4 CUMULATIVE GREENHOUSE GAS IMPACTS

Table 4-4 presents greenhouse gas emissions estimates for the Proposed Action and compares the values to U.S. 2009 greenhouse gas emission. Greenhouse gas emissions would increase as result of increased fixed-wing aircraft overflights, vehicle and equipment use on the new ranges, and the associated increases in fuel consumption in the Study Area. Greenhouse gas emissions from the No Action Alternative, Alternative 1, and Alternative 2 would represent a very small percentage of total U.S. greenhouse gas emissions.

Table 4-4: Comparison of Greenhouse Gas Emissions for Training and Testing Activities at Naval Weapons Systems Training Facility Boardman to United States 2009 Greenhouse Gas Emissions

Alternative	Annual Greenhouse Gas Emissions (teragrams CO_2 Eq.)	Percentage of U.S. 2009 Greenhouse Gas Emissions
No Action Alternative	0.012	0.0002%
Alternative 1	0.038	0.0006%
Alternative 2	0.038	0.0006%
U.S. 2009 Greenhouse Gas Emissions	6,633	

Note: CO_2 Eq. = carbon dioxide equivalent.
Source: U.S. Environmental Protection Agency 2011.

4.6 SUMMARY OF CUMULATIVE IMPACTS

The analysis presented in this chapter and Chapter 3, Affected Environment and Environmental Consequences, indicate that the incremental contribution of the No Action Alternative, Alternative 1, or Alternative 2 to cumulative impacts on soils, water resources, acoustics, socioeconomic resources, public health and safety, and cultural resources would not rise to the level of significance. When considered with other actions, the No Action Alternative, Alternative 1, or Alternative 2 would contribute to the cumulative impacts on air quality, vegetation, wildlife, transportation, and wildfire. Cumulative impacts on wildlife would be considered significant because impacts of Alternative 1 or Alternative 2 have been determined to be significant. Cumulative impacts to vegetation are also considered significant based on losses of native shrub steppe and grassland habitats to past actions including conversion agricultural and grazing. Cumulative impacts to other resources would not be significant. The No Action Alternative, Alternative 1, or Alternative 2 would also make an incremental contribution to greenhouse gas emissions, representing approximately 0.0002, 0.0006, and 0.0006 percent of U.S. 2009 greenhouse gas emissions, respectively.

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