Appendix O: Transportation Resources Technical Report

For Programmatic Environmental Impact Statement on Utility-Scale Wind Energy Facilities in Washington State

By

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For the

Shorelands and Environmental Assistance Program

Washington State Department of Ecology

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Acronyms and Abbreviations List

AGL	above ground level
BESS	battery energy storage systems
BMP	best management practice
BNSF	Burlington Northern-Santa Fe
CFR	*Code of Federal Regulations*
DoD	U.S. Department of Defense
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
I-	Interstate
MW	megawatt
NOAA	National Oceanic and Atmospheric Administration
NPIAS	National Plan of Integrated Airport Systems
PEIS	Programmatic Environmental Impact Statement
RCW	Revised Code of Washington
ROC	Radar Operations Center
STIP	State Transportation Improvement Program
UP	Union Pacific
USACE	U.S. Army Corps of Engineers
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

Summary

This technical resource report describes the conditions of transportation in the study area. It also describes the regulatory context, potential impacts, and measures that could avoid or reduce impacts.

Several different modes of transportation serve communities in the study area. Three major interstate highways are located centrally within the study area and are therefore accessible by truck or rail from many different locations. Four additional National Highway System highways serve the study area, along with 58 state highways. Burlington Northern-Santa Fe (BNSF) and Union Pacific (UP) operate railways in the study area and transport high-tonnage, oversize, and high-value cargo. Two Class I railways (BNSF and UP), 27 Class III railways, and 11 intermodal or transload facilities that serve rail exist in the study area. The study area also contains 10 major cargo service airports. The Pacific Ocean, Puget Sound, the Salish Sea, and marine highway M-84 provide water transport and connections to several ports, transload facilities, and intermodal facilities. These transport modes are vital to farming and other agricultural operations, workers, and residents.

Impacts to transportation could occur from traffic related to worker commutes and materials transport and road development. There would be a temporary increase in traffic on roads during construction and decommissioning, and operations would result in a small increase in vehicle trips caused by employees traveling to the site. No long-term road closures or interruptions to traffic patterns or volumes are expected. No substantial damage to roadways or related infrastructure (e.g., culverts or bridges) or transit, rail, air, or water transportation would occur. General aviation impacts could also occur due to the height of the wind turbines; however Federal Aviation Administration authorization is required for any structure over 200 feet tall.

Through compliance with laws and permits and with the implementation of measures that could avoid and reduce impacts, construction, operation, and decommissioning would likely result in **less than significant** impacts on transportation.

No significant and unavoidable adverse impacts related to transportation resources would occur.

Crosswalk with Transportation Resources Technical Report for Utility-Scale Solar Energy

Two Programmatic Environmental Impact Statements (PEISs) are being released at the same time, one for utility-scale solar energy facilities and one for utility-scale onshore wind energy facilities. This crosswalk identifies the areas with substantial differences between the transportation resources technical reports for each PEIS.

Utility-Scale Solar Energy PEIS	Utility-Scale Onshore Wind Energy PEIS (this document)
• Differences in construction impacts from transportation of facility components • Some differences in measures to avoid and reduce impacts	• Differences in construction impacts from transportation of facility components • Some differences in measures to avoid and reduce impacts

1 Introduction

This technical resource report describes transportation in the study area and assesses probable impacts associated with types of facilities (alternatives) and a No Action Alternative. Chapter 2 of the State Environmental Policy Act Programmatic Environmental Impact Statement (PEIS) provides a description of the types of facilities evaluated (alternatives).

This section provides an overview of the aspects of transportation evaluated in this technical resource report and lists relevant regulations that contribute to the evaluation of potential impacts.

1.1 Resource description

This technical resource report analyzes the following transportation topics: transportation systems (roads, air travel, radar and airport facilities, and waterway freight corridors), traffic (transit, water, and rail), parking, and movement/circulation of people and goods.

Transportation issues relate primarily to transporting equipment, supplies, materials, and workers to and from the study area. This technical resource report evaluates impacts of four types of utility-scale onshore wind facilities. No transportation or traffic modeling was completed for this programmatic-level review. Transportation impacts for future utility-scale onshore wind facilities would be based in part on the size of the project site, number of turbines, specific location and access details, and other aspects of each proposed project.

The following resources could have impacts that overlap with impacts to transportation. Impacts on these resources are reported in their respective technical resource reports:

- **Public services and utilities:** Impacts to air navigation for aerial firefighting capabilities and emergency response are discussed in the *Public Services and Utilities Technical Resource Report* (Appendix P).

1.2 Regulatory context

Table 1 lists laws, plans, and policies relevant to evaluating potential impacts on transportation. For local regulations, Table 1 lists categories of laws, plans, and policies that could apply depending on the local jurisdiction in which a project is proposed.

Table 1. Applicable laws, plans, and policies

Regulation, Statute, Guideline	Description
Federal	
49 *Code of Federal Regulations* (CFR) 77, Federal Aviation Administration (FAA) Obstruction to Navigation Federal Regulation	Requires FAA approval of any facility higher than 200 feet (61 meters) in height.
49 *United States Code* 5101 et seq., Hazardous Materials Transportation Act	Empowered the Secretary of Transportation to designate as hazardous material any "particular quantity or form" of a material that "may pose an unreasonable risk to health and safety or property." Title 49 regulations pertain to all forms of surface transportation and transportation security, including pipelines, railroads (passenger and freight), waterways, cars, etc. Hazardous material or hazardous waste handlers, shippers, carriers, or freight forwarders must comply with Title 49 regulations, which cover requirements for markings, labels, placards, shipping papers, training, emergency response, and performance-oriented packaging standards.
Fixing America's Surface Transportation Act	Established a new National Highway Freight Network, which requires states to improve the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas.
Metropolitan Transportation Planning and Programming, 23 CFR 450.306	Requires metropolitan planning processes including projects, strategies, and services to address productivity, safety, security, mobility, resiliency, and other environmental and mobility goals.
Federal Highway Administration (FHWA) Office of Infrastructure Interstate System Access Informational Guide (FHWA 2010)	Provides background on how the Washington State Department of Transportation (WSDOT) assesses requests for new or modified access to the Interstate System. Provides information and methods for analyzing access requests by considering the needs of the system on a national, state, and local levels.
FHWA Final Rule to 23 CFR 625, Design Standards for Highways	Modifies regulations governing new construction, reconstruction, resurfacing, restoration, and rehabilitation projects on the National Highway System (including the Interstate System).
14 CFR 77 Safe, Efficient Use, and Preservation of the Navigable Airspace	Establishes: 1) requirements to provide notice to FAA of certain proposed construction or alteration of structures; 2) standards used to determine obstructions to air navigation, and navigational and communication facilities; 3) the process for aeronautical studies of obstructions to air navigation or navigational facilities; and 4) the process to petition FAA for discretionary review of determinations, revisions, and extensions of determinations.
Federal Land Policy and Management Act of 1976, As Amended (FLPMA), Title VI Rights-of-Way	Authorizes the granting of rights-of-way for facilities on federally managed lands, such as systems for generation, transmission, and distribution of electric energy, and roads and highways. Requires the entity applying for right-of-way access to submit a plan of construction, operation, and rehabilitation for such right-of-way in compliance with the applicable federal agency's regulations.
Federal agency road design manuals and handbooks	Describes steps, guidelines, and requirements for designing roads on federally managed lands. Each agency maintains its own guidelines and standards.
Federal-Aid Highway Act of 1944	Created the Interstate System.

Regulation, Statute, Guideline	Description
Federal-Aid Highway Act of 1956	Established the program for funding and building the Interstate System.
Roadless Rule of 2001	Establishes prohibitions on road construction, road reconstruction, and timber harvesting on inventoried roadless areas on National Forest System lands. The intent of the Roadless Rule is to provide lasting protection for inventoried roadless areas within the National Forest System in the context of multiple-use management.
State	
Chapter 47.06 Revised Code of Washington (RCW), Washington State System Plans: Highway, Freight, Aviation, Marine, and Public Transportation	Ensures that the transportation system in Washington supports and enhances the movement of people and goods; addresses federal and state policies and meets federal and state planning requirements (WSDOT 2016, 2017a, 2017b, 2022a). Includes RCW 47.06.050 related to state-owned facilities and RCW 47.06.040, the statewide multimodal transportation plan.
WSDOT Draft 2024 Highway System Plan (WSDOT 2024a)	Implements RCW 47.06.040 and ensures that the highway system in Washington supports and enhances the movement of people and goods; addresses federal and state policies and meets federal and state planning requirements.
Washington Statewide Transportation Improvement Program (STIP; WSDOT 2024b)	The STIP is a 4-year prioritized multimodal transportation program including state, local, Tribal, and public transportation projects involving highways, streets, roads, rail, transit-hubs, park and rides, bridges, sidewalks, bike lanes, trails, and safety. It is developed annually, submitted to FHWA and the Federal Transit Administration in December, and approved in January.
Forest Practices Act, Chapter 76.09 RCW, and Forest Practices Rules, Title 222 Washington Administrative Code (WAC)	The Washington Department of Natural Resources administers rules that govern forest practices activities on non-federal and non-Tribal forestland in Washington state.
Guidelines for Forest Roads, Section 3 (DNR 2013)	Provides guidance related to forest practices and Forest Roads.
Transportation System Policy Goals, RCW 47.04.280	Contains six transportation system policy goals, including the maintenance, preservation, and extension of the life and utility of prior investments in transportation systems and services and the predictable movement of goods and people throughout Washington state, including congestion relief and improved freight mobility.
Water Quality Standards for Surface Water (Chapter 173-201A WAC)	Establishes water quality standards for surface waters, implementing Title 90 RCW (Chapter 90.48 RCW, Water Pollution Control Act). Freshwater designated uses and associated criteria are specifically identified in WAC 173-201A-200. Applicable to proposed new or improved roads and associated runoff.
Guide for Planning, Evaluating, and Designing Part-Time Shoulder Use as a Traffic Management Strategy (FHWA 2016)	Describes planning, design, implementation, and day-to-day operation of shoulder use. Part-time shoulder use is the conversion of shoulders to travel lanes during some hours of day as a congestion relief strategy.

Regulation, Statute, Guideline	Description
Written notice to U.S. Department of Defense (DoD) for renewable energy projects (RCW 35.63.270, 35A.63.290, and 36.01.320; WAC 365-16-475)	Requires local governments to provide DoD with written notice for alternative-energy permit applications.
Regional	
Regional transportation and transit agency plans	Set forth goals, policies, and future plans related to transportation, traffic, and transit within regions.
Regional airport plans	Set forth goals, policies, and future plans related to regional airports.
Water port plans	Set forth goals, policies, and future plans related to water ports.
Local	
Local governments' transportation plans or comprehensive plan transportation elements	Set forth goals, policies, and future plans related to transportation and traffic.
Local governments' zoning and municipal codes regarding stormwater management	Provide requirements for including adequate stormwater quantity and quality controls for construction and development activities, including new or improved roads, and outline associated local government review and permitting procedures.

2 Methodology

This section provides an overview of the process for evaluating potential impacts and the criteria for determining the occurrence and degree of impact.

2.1 Study area

The study area for transportation is the geographic extent of analysis of transportation impacts associated with the construction, operation and maintenance, and decommissioning of the types of facilities analyzed in this PEIS. The study area includes transportation routes (e.g., roads, intersections, railroad mainlines, air travel paths, and waterway freight corridors) and parking or staging areas used by vehicles or displaced by equipment for the types of facilities analyzed in this PEIS.

Figure 1 shows the roads and railroads and Figures 2a and 2b show ports, major air cargo airports, and navigable waters. Figure 3 shows all port facilities and Federal Aviation Administration (FAA)-designated airports.

The PEIS geographic scope of study includes various federal, state, and locally managed lands; however, Tribal reservation lands; national parks, wilderness areas, and wildlife refuges; state parks; and areas within cities and urban growth areas were excluded. Some of these areas adjacent to the PEIS geographic scope of study are considered if they contain transportation resources that may be impacted by facilities

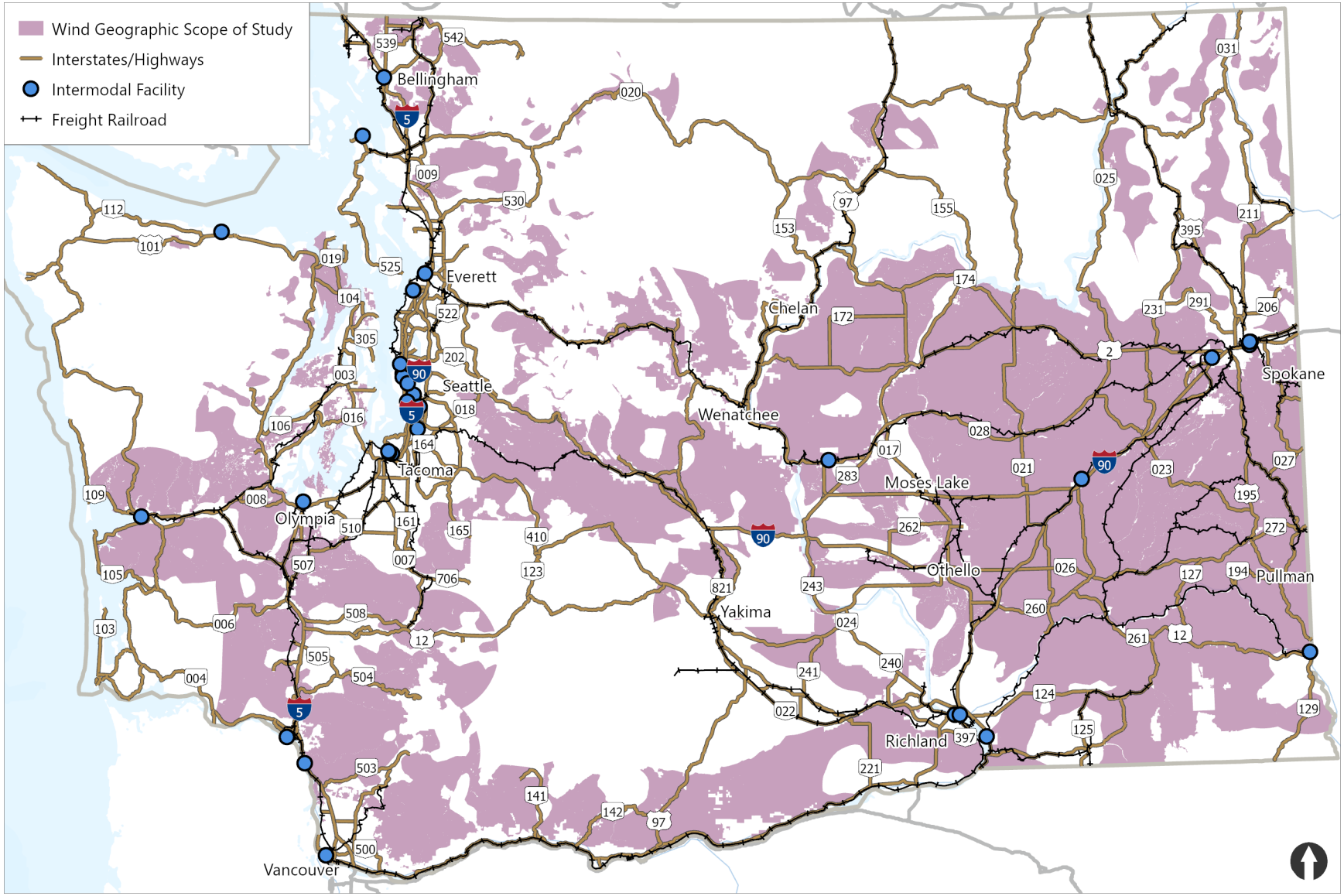

Figure 1. Roads, intermodal facilities, and railroads

Data sources: WSDOT 2024c, 2024d, 2024e

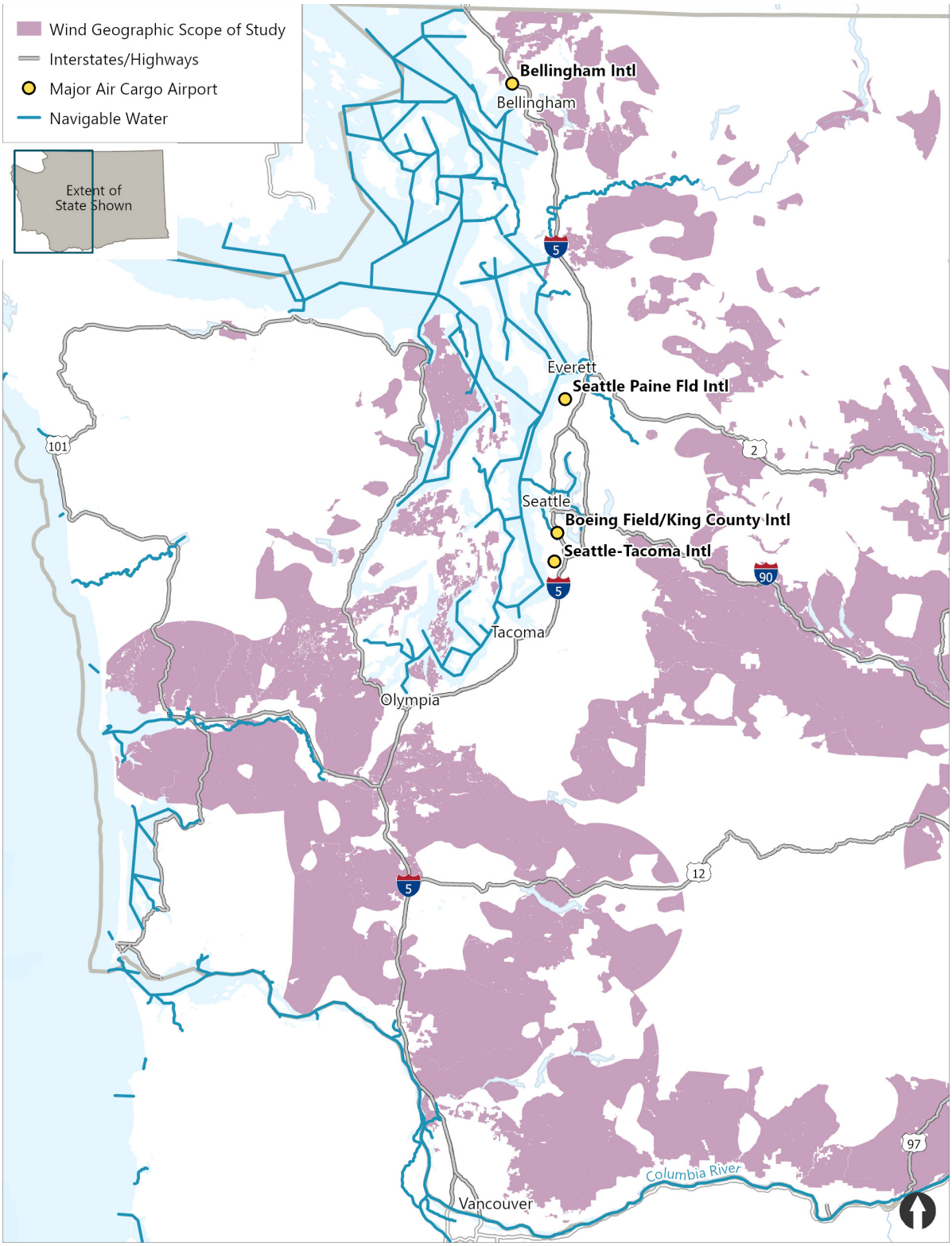

Figure 2a. Major cargo airports and navigable waters, western Washington

Data sources: FAA 2024a; USDOT 2024
Note: Navigable waterways are defined in this report as waterways by which freight transportation occurs by barge.

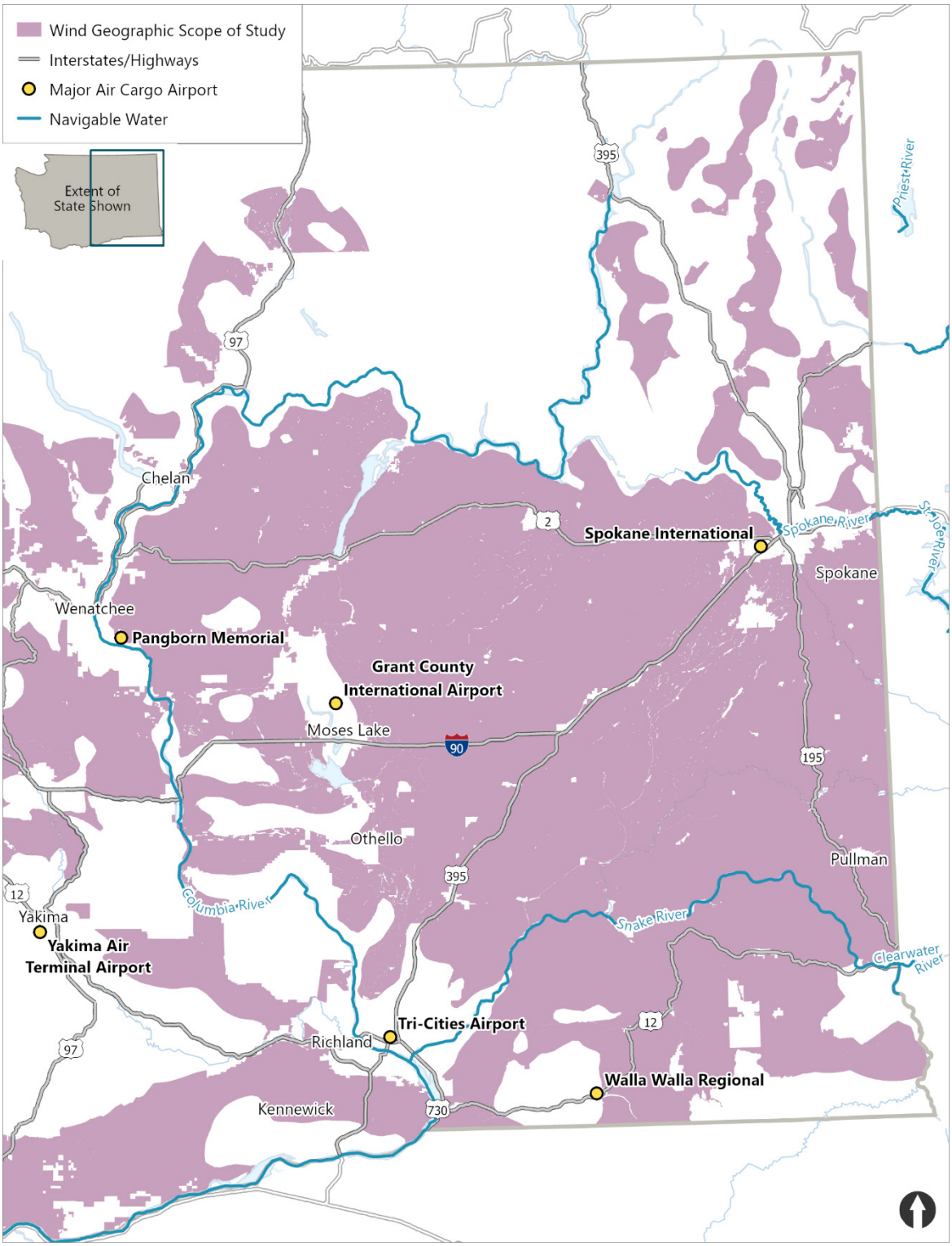

Figure 2b. Major cargo airports and navigable waters, eastern Washington

Data sources: FAA 2024a; USDOT 2024
Note: Navigable waterways are defined in this report as waterways by which freight transportation occurs by barge.

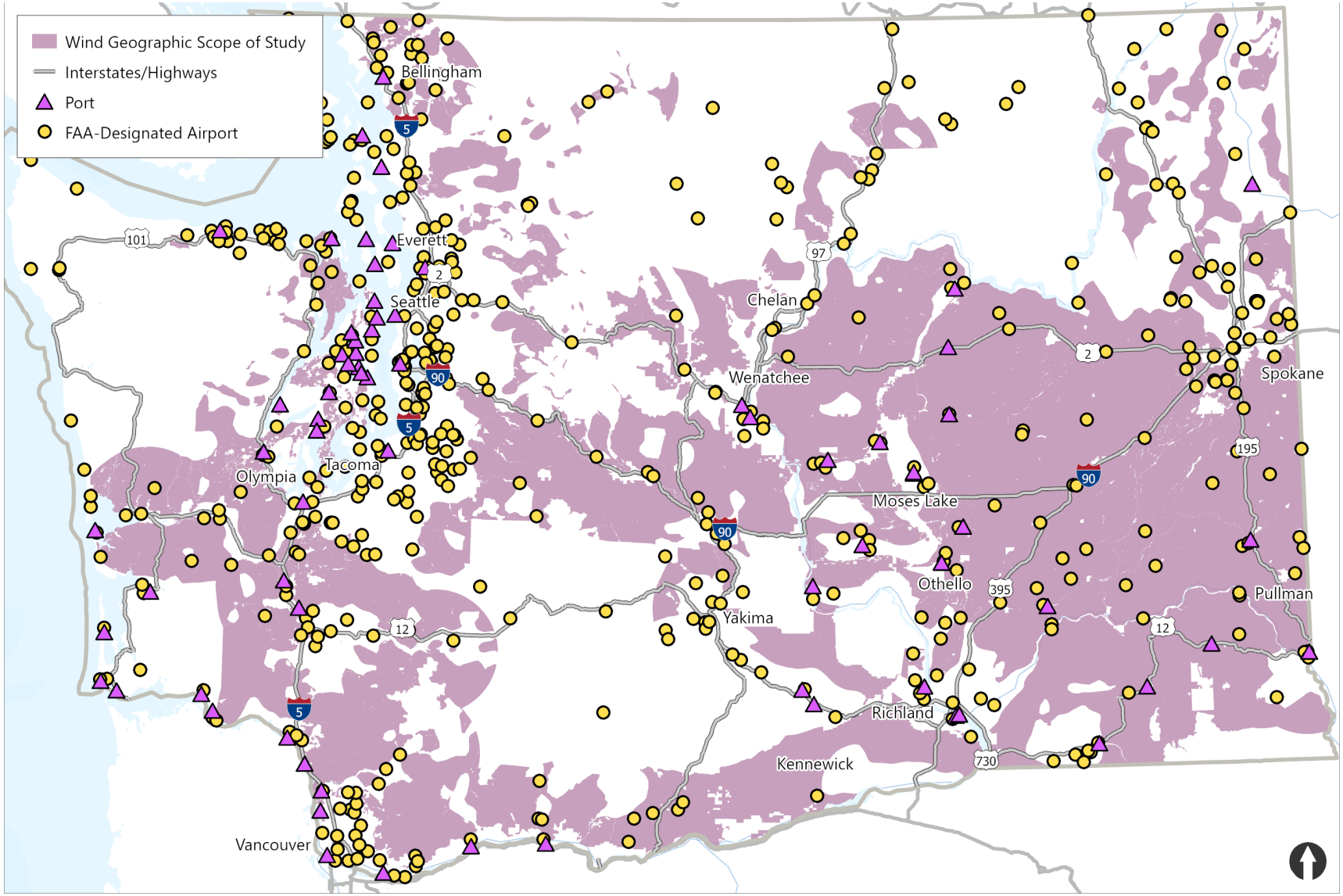

Figure 3. Ports and FAA-designated airports

Data sources: FAA 2024a; USDOT 2024; WPPA 2024

2.2 Technical approach

The approach for this technical resource report involved gathering existing information about transportation in the study area, including roadways, railways, air travel, and navigable waterways. This technical resource report also presents information about existing travel and commuting patterns and movements of goods and services. Information gathered is from existing sources; no new information or data were collected.

Utility-scale onshore wind energy projects would have specific needs due to the size and characteristics of the turbines and support equipment. Project-level evaluations for each proposed project would need to include the types, numbers, and trips of truck, rail, or barge delivery of equipment; specifics of equipment needed (e.g., cranes, bulldozers, graders, compactors, semi-truck/trailers, flatbed trucks); and the types, volumes, and origins of construction materials, such as gravel, sand, and water. The size and weight of the heavier components (e.g., turbines, towers, nacelles, rotors, substation equipment) would dictate the specifications for site access roads for required right-of-way, maximum grade, turning radii, and fortified bridges. Project operations would generally require smaller and fewer vehicles than during construction or decommissioning, with a possibility of large component transport when replacement equipment or equipment removal is necessary. Project-level evaluations for each proposed project would need to include information such as the size of the workforce, worker commutes, length of construction period, expected road detours or closures, and quantities and off-site sources of construction materials and disposal locations.

For the programmatic analysis of impacts in this technical resource report, ranges for project construction, operation, and decommissioning activities were estimated. The analysis of impacts did not include traffic modeling or engineering, level of service analysis, vehicle-miles traveled analysis, or other new modeling. Impacts on the transportation system were qualitatively assessed and based on an evaluation of existing, non-site-specific information consistent with a programmatic level of analysis. The technical resource report evaluates the following aspects of transportation:

- Traffic volumes and distances for construction and operation of facilities
- Potential waterborne, rail, and air traffic
- Potential new or improved access roads or parking/staging areas that developers could propose for construction, operation, and maintenance activities

2.3 Impact assessment approach

The PEIS analyzes a time frame of up to 20 years of potential facility construction and up to 30 years of potential facility operations (totaling up to 50 years into the future). To analyze impacts, the technical resource report qualitatively describes potential increases in traffic and transportation, the demand for freight transport service, and potential traffic hazards related to wide or heavy loads or slower vehicles. The analysis discusses relevant regulations, including those related to access limitations, and the process for obtaining necessary approvals.

Developers would likely consult with FAA to construct or alter certain objects of a certain height within navigable airspace. FAA may require lighting or marking the objects. Washington state has 140 public airports, as well as private airports and military facilities that use aircraft.

This analysis evaluates impacts relative to the effects of construction, operation, and decommissioning of types of facilities analyzed in this PEIS and from the No Action Alternative. For the purposes of this assessment, a potentially significant impact would occur if a project resulted in the following:

- Permanent, significant impacts on traffic patterns, volumes, hazards, or risks to other users, including commercial and military aircraft
- Long-term road closures or interruptions to traffic patterns or volumes, causing the movement of people and goods to be impacted in the long term
- Substantial damage to roadways or related infrastructure (e.g., culverts or bridges) that could not be safely used without major repairs or replacement to return to pre-impact conditions
- Substantial damage or change to transit, rail, air, or water transportation that could not be safely used without major repairs or replacement to return to pre-impact conditions

3 Technical Analysis and Results

3.1 Overview

This section provides an analysis of potential impacts on transportation that might occur for the utility-scale onshore wind energy facility types analyzed in the PEIS. This section also evaluates measures that could avoid, minimize, or reduce the identified impacts and potential unavoidable significant adverse impacts.

3.2 Affected environment

The affected environment represents the existing conditions at the time this study was prepared. This section presents information about existing transportation in the study area, including roadways, railways, air travel, and navigable waterways, existing travel and commuting patterns, and movement of goods and services. Wind turbines, towers, rotors, and nacelles are currently transported in the study area by rail, truck, or barge. Many freight transport and transportation options exist within the study area.

3.2.1 Roadways and travel patterns

Washington's road network spans more than 80,000 miles, with 764 interstate miles and 1,602 miles of U.S. highways connected by state routes, county roads, city streets, and other roadways (WSDOT 2022b).

Major highways in the study area include the following (see Figure 1):

- Interstate highways or other U.S. highways 2, 5, 12, 82, 90, 97, and 195
- State highways 3, 4, 6, 8, 9, 11, 14, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 31, 101, 104, 105, 106, 109, 124, 125, 127, 129, 141, 153, 155, 165, 172, 174, 194, 206, 211, 221, 231, 240, 241, 243, 260, 261, 262, 272, 283, 290, 291, 302, 395, 397, 410, 503, 504, 505, 507, 508, 530, 539, 542, 548, 821, and 971

The Interstate System serves interstate, regional, and intrastate traffic (FHWA 2024a). Interstate highways within the study area include Interstate 5 (I-5), I-90, and I-82 (see Figure 1). I-5 is the major north-south route through the state in western Washington. I-90 is the major east-west route and primary transportation corridor through Washington state. I-82 begins at I-90 near Ellensburg and extends south/southeast to Oregon. These corridors are principal freight arterials, moving regional and international cargo, and commute and recreation routes, providing access to nearby cities and outdoor recreational areas.

Both I-5 and I-90 are crucial to local, regional, national, and international trade. I-5 is the main north-south interstate highway on the west coast of the United States and extends 1,381 miles from Mexico to Canada. The portion of I-5 within the study area is 277 miles long, connecting

the cities of Vancouver, Longview/Kelso, Olympia, Tacoma, Seattle, Everett, Bellingham, Blaine, and other areas.

The portion of I-90 within the study area extends through the Washington cities of Ellensburg, Moses Lake, Ritzville, Sprague, and Spokane (FHWA 2024b). I-82 serves Washington (132 miles) and Oregon (11 miles), extending from Ellensburg through the Washington cities of Grandview, Kennewick, Sunnyside, and Yakima and through the Oregon city of Hermiston (FHWA 2024a). The Washington State Department of Transportation (WSDOT) is improving 15 miles of I-90 between Hyak and Easton, within the study area, as part of the I-90 Snoqualmie Pass East Project. The project is projected to be completed in 2029 (WSDOT 2024f). In addition, WSDOT has plans for capacity, paving, interchange, bridge, and other improvements to maintain I-90. No planned projects are currently identified for I-82.

Throughout the study area, I-5, I-90, I-82, state routes, county roads, and smaller roads serve residents and businesses. These roads are commercial, commuter, and recreation routes, providing access to nearby cities, employment centers, rural towns, and outdoor recreational areas. Communities rely on the ability to travel to obtain goods and services, healthcare, and access employment. The study area contains a few larger cities and several small towns and communities, and the road system is vital to these communities and their economies. Eighty percent of communities in Washington rely solely on trucks for their goods (WTA 2024).

Transportation of agricultural products within and through the study area is crucial to local and regional economies (NASS 2017). The road network handles the largest share of freight compared to other modes of transportation (i.e., rail or barge), with trucks moving more than half of all goods in Washington. Roads shown in Figure 1 support domestic and international trade movements and connect Washington's truck freight to other states, cities, and countries (WSDOT 2022b).

Roads that cross public lands throughout the study area may be used for recreation and to transport natural resources, such as timber, and agricultural products. Some forest road segments in the study area have existing authorized public access, whereas other segments include trust lands surrounded by privately owned lands; therefore, access to public parcels can require easements (DNR 2024).

Federally managed roads in the study area include those crossing national forests and scenic areas. Some federally managed roads are open for public access, while others are for administrative use only. Federal land management agencies such as the U.S. Fish and Wildlife Service, U.S. Forest Service, Bureau of Land Management, U.S. Army Corps of Engineers (USACE), and Bureau of Reclamation each have planning and guidance documents for road use and design.

3.2.2 Railways

Projects could utilize rail transport both in and outside of the study area. Wind turbines are most often transported via rail due to their substantial size and weight. To ship the onshore

wind energy equipment (typically oversize loads), railroads often hire logistics companies to ship wind components, such as turbines, directly from the manufacturer and then transport the components by rail to the nearest intermodal facility. At the intermodal facility, onshore wind energy components can be transported by truck over a shorter distance to the installation site (UP 2021). Turbines are transported by rail on more than 3,200 miles of freight railroad tracks in Washington state, two of which are Class I railroads operated by Burlington Northern-Santa Fe (BNSF) and Union Pacific (UP) and 27 of which are Class III railroads (short lines). Class III railroads may not have the capacity to transport wind turbines; however, BNSF and UP have the capacity to transport oversize loads.

Rail freight is typically used to transport high-tonnage, oversize, and high-value cargo, such as turbines. Rail transport can be up to four times more fuel-efficient than truck transport; trains can transport 1 ton of cargo approximately 470 miles on 1 gallon of diesel (FRA 2020). Trucks are still typically used to cover the first and last mile between cargo loading and delivery to the destination (WSDOT 2022b).

Rail transport is relatively energy efficient; effective for shipping raw goods and oversize and heavy loads; and ideal for long-distance transport. However, railroad transportation requires facilities to transfer loads to and from trucks and can be delayed by high demand or lack of capacity at terminals (WSDOT 2022a). In general, longer trains can create delays on state and local roads at at-grade signalized and unsignalized crossings. The study area contains many rural communities, which are more likely to have unsignalized rail crossings compared to urban areas.

Two Class I railroads (BNSF and UP) and 11 Class III railroads currently operate in the study area (WSTC 2006; WSDOT 2022b). The Class I railway corridors connect Washington with the rest of the North American rail network, while Class III railroads offer collection and distribution services and access to key industries (WSTC 2006). The remaining 16 Class III railroads in Washington (WSDOT 2022b) could also serve certain facilities, depending on location.

There are 39 intermodal facilities in Washington allowing for the transfer of cargo between rail and other methods of transport (Figure 1). Transload of cargo between rail and trucks or semitrailers takes place at 22 facilities statewide operated by BNSF, UP, Cascade and Columbia River Railroad, and Tacoma Municipal Belt Railway. In addition, cargo is transferred between ships and rail at seven facilities statewide (WSDOT 2022b). Eleven intermodal facilities exist within 2 miles of the study area: the ports of Quincy, Pasco, Ritzville, Clarkston, Vancouver, Bellingham, Longview, and Kennewick; Spokane Intermodal Terminal; Spokane International Airport; and Tri-Cities Airport. Within the study area, transload of cargo between rail and trucks or semitrailers takes place at the Port of Quincy and at both Spokane intermodal facilities. Cargo is transferred between ships and rail at eight facilities within the study area and several more nearby (WP 2024).

BNSF has been transporting wind turbines in Washington state since 2000 and operates a transload facility in Pasco to transfer wind energy components from rail to trucks for shipment to wind facilities (BNSF 2015).

3.2.3 Air travel

Currently, air transport is not commonly used to transport components of a wind energy facility, but it may be used for smaller components. FAA has regulatory authority over aviation safety. The 2023–2027 National Plan of Integrated Airport Systems (NPIAS) lists 548 airports in Washington, including 415 airports for private use that are closed to the public and 133 airports for public use (FAA 2022a) (see Figures 2a and 2b and Table 2). Two hundred and thirty-four FAA-designated general aviation airports are located within 2 miles of the study area. These airports vary in size and use but are primarily small airports serving local uses, including private aviation and commercial agricultural operations.

Air cargo in Washington state is primarily generated by activity at Seattle-Tacoma International Airport, King County International Airport – Boeing Field, and Spokane International Airport. Non-hub and small commercial passenger airports within the state account for only 4% of the total air cargo volumes moved in 2016 (JTC 2018) (Table 2). Seattle-Tacoma International Airport, as an international air cargo hub, is a primary gateway for air freight from Asia and is currently studying options for expanding its cargo facilities. Spokane International Airport is the primary cargo airport for eastern Washington. The Grant County Airport in Moses Lake has significant airfield infrastructure that can accommodate wide-body freighters and is located near the crossroads of the emerging "Cascadia" transshipment region, which includes Washington, Oregon, Montana, Idaho, and British Columbia (JTC 2018).

Table 2. Major air cargo airports that could be used for onshore wind facility component transport

Airport Name	Location	NPIAS Classification	Number of Air Cargo Operators
Seattle-Tacoma International Airport	SeaTac	Large Hub	34
King County International Airport – Boeing Field	Seattle	Non-hub	7
Spokane International Airport	Spokane	Small Hub	5
Snohomish County Airport/Paine Field	Everett and Mukilteo	Reliever	4
Bellingham International Airport	Bellingham	Small Hub	3
Yakima Air Terminal/McAllister Field	Yakima	Non-hub	3
Pangborn Memorial Airport	East Wenatchee	Non-hub	3
Tri-Cities Airport	Pasco	Non-hub	2
Walla Walla Regional Airport	Walla Walla	Non-hub	2
Grant County International Airport	Moses Lake	General Aviation Airport	2

Notes:
Sources: WSDOT 2017c, 2019, 2024a; JTC 2018.

a. Sponsor determined using WSDOT (2017c, 2024a).
b. Airport Classification and Washington Aviation System Plan State Classification determined using WSDOT (2019).
c. Airport Classification Key: Airports are classified based on ownership and number of passenger boardings per year. Primary airports are commercial service airports with more than 10,000 annual enplanements; Reliever airports are designated by the Secretary of Transportation to relieve congestion at a commercial service airport and to provide more general aviation access to the overall community. General Aviation airports are public-use airports that do not have scheduled service or have scheduled service with fewer than 2,500 passenger boardings each year (FAA 2022b).

Washington also hosts several military bases, many of which have patterns of airspace use for logistics, training, testing, and transit. Figure 4 depicts military training routes near the study area, from the Compatible Energy Siting Assessment prototype map tool (Commerce 2024).

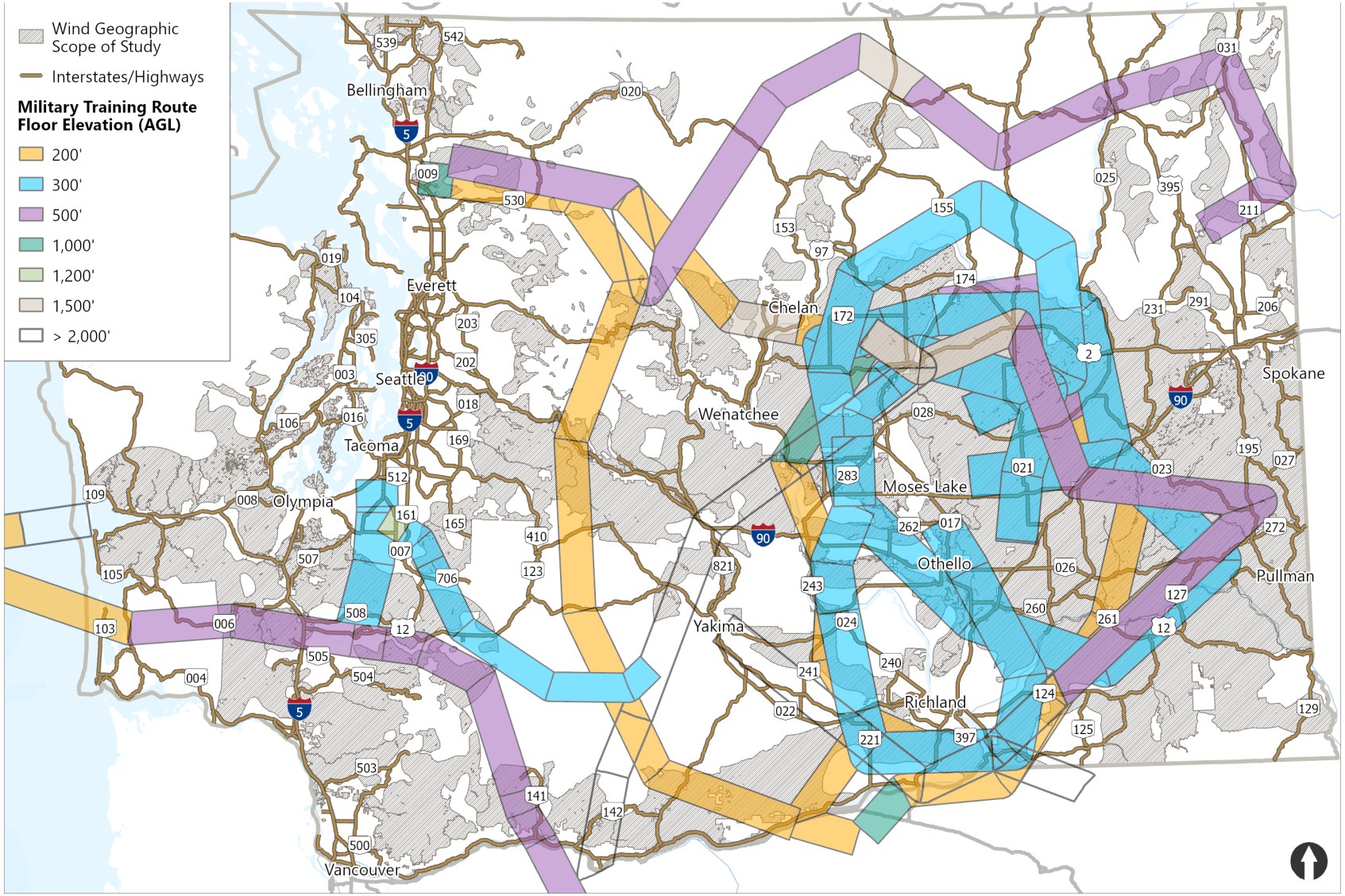

Figure 4. Military training routes in Washington state

Data source: Commerce 2024

3.2.4 Navigable waterways

Navigable waterways and ports could be used to transport onshore wind facility components. Waterways are currently used to transport wind facility components, such as turbine towers, rotors, and nacelles. The ports of Vancouver and Longview have received components for wind turbines and either shipped them by barge farther along the Columbia-Snake River System or transferred them to rail or truck (POV 2020; POL 2020). Navigable waterways, for the purpose of this report, are defined as waterways by which freight transportation occurs by barge. 33 *Code of Federal Regulations* (CFR) 329.4 defines Navigable Waters of the United States as:

> Waters that are subject to the ebb and flow of tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate of foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events which impede or destroy navigable capacity.

USACE plans, constructs, operates, and maintains navigation channels, locks, and dams to maintain authorized channel depths in harbors and inland waterways.

USACE provides navigation along the Columbia River that follows the Oregon-Washington border and extends 106.5 miles from the mouth of the Columbia River to Vancouver, Washington, as well as along the lower 11.6 miles of the Willamette River. Columbia River navigation accommodates the current fleet of international bulk cargo and container ships as part of the Columbia and Lower Willamette Federal Navigation Channel, which in 2017 was used to transport 47.5 million tons of cargo (USACE 2024).

According to WSDOT's *Freight System Plan* (WSDOT 2022a), Washington's maritime freight transport network includes the Salish Sea, the Columbia-Snake River System, and the U.S. Pacific Coast.

The U.S. Department of Transportation has designated two marine highways that serve Washington. Marine highway M-5 includes the Pacific Ocean coastal waters and connects commercial navigation channels, ports, and harbors from San Diego to the U.S.-Canada border. Marine highway M-84 spans Oregon, Washington, and Idaho from Astoria, Oregon, to Lewiston, Idaho (MARAD 2025), and includes the Columbia, Willamette, and Snake rivers. The Columbia-Snake River System portion of marine highway M-84 transports 2.5 to 10 million tons of product per year.

Washington ranks fifth in the United States in terms of overall maritime volumes. There are 18 public ports, 158 marine terminals, 11 deepwater marine ports, and 57 inland ports in Washington. Roughly 27 million tons of freight is moved per year, primarily serving agricultural, energy, and manufacturing industries (WSDOT 2022b). Thirty-four ports are located within 2 miles of the study area (see Figure 3). While travel times by barge take longer than rail or truck, it provides a lower-cost option that is very efficient (WSDOT 2022b). According to the Pacific

Northwest Waterways Association, one tow (a towboat plus four barges) can move the same amount of freight as one freight train and 538 trucks (PNWA 2022).

3.3 Potentially required permits and approvals

The following permits related to transportation would potentially be required for construction, operation, or decommissioning of typical onshore wind energy facilities and activities:

- **Access Connection Permit and General Permit (WSDOT):** Required for vehicular access, and connection points of ingress to and egress from, the state highway system within unincorporated managed access areas that are under the jurisdiction of WSDOT. General permits are for constructing access approaches and access connection permits are for use of the access point.
- **Clean Water Act Section 402 National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit (Ecology):** Required for construction that disturbs more than 1 acre of land and has potential to discharge stormwater to state surface waters or construction disturbance of any size that has the potential to be a significant contributor of pollutants or may be expected to cause a violation of any water quality standard (including groundwater standards). May be required for road construction.
- **Construction and development Permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency):** Various project construction activities and placement of new or modification of existing facilities would be subject to local permits to ensure compliance with land use, grading and drainage, stormwater management, building standards, fire codes, etc.
- **Determination of No Hazard to Air Navigation, Form 7460-1 Notice of Proposed Construction or Alteration (FAA):** Required if the facility could affect navigable airspace. This approval ensures that the facility does not pose a hazard to air navigation, which is critical for tall structures. Required if FAA has requested one or if the proposed structure has the potential to do the following:
    - Exceed 200 feet above ground level (AGL)
    - Be located near an airport and exceed the slope ratio
    - Involve construction of a traverse way (e.g., highway, railroad, waterway) and, once adjusted upward with the appropriate vertical distance, would exceed a certain standard
    - Emit frequencies
    - Be in an instrument approach area
    - Be near a navigation facility and impact the assurance of navigation signal reception
    - Be on an airport or heliport

  Developers can use FAA's Notice Criteria Tool (FAA 2024b) to determine whether the proposed facility requires an FAA Form 7460-1. FAA may also request a Form 7460-1 filing. Advisory Circular 70/7460-1M, Obstruction Marking and Lighting, describes standards for marking and lighting structures such as buildings and supporting structures of overhead wires (FAA 2020).

- **Environmental permits (e.g., critical areas, shorelines) (local agency):** Must be obtained for construction and development activities within designated critical areas and shorelines regulated by local jurisdictions. Projects would be reviewed under local critical areas ordinances and Shoreline Master Programs.
- **Forest Practices Act application/notification (Washington Department of Natural Resources or local agency):** A permit is not required for every forest practice, but the forest practices rules must be followed when conducting all forest practices activities. A permit is required for timber removal and conversion of forested land to non-forest use, and one may be required for forest road construction activities.
- **Land use permits (e.g., comprehensive plan amendments, conditional use permit/special use permit, or zoning amendments) (local agency):** Required if changes to a comprehensive plan or zoning designation and/or if a conditional use permit, special use permit, or variance is required for the project.
- **Overweight/oversize permits (WSDOT):** Special motor vehicle permit regulations and conditions are required for oversize/overweight loads, including when curfew hours, escort requirements, or nighttime movements are necessary.
- **Road Haul Agreement (local agency):** Agreement with local road agency regarding project transportation haul routes and addresses impacts to locally managed roads.
- **Right-of-way or lease (federal, state, local agency):** Placement of facility infrastructure such as roads, generating facilities, and transmission lines on lands under federal, state, or local agency management jurisdiction requires approval from the applicable land manager.
- **U.S. Department of Transportation Act of 1996, Section 4(f) Review (U.S. Department of Transportation):** Required to ensure the protection of publicly owned parks, recreation areas, wildlife refuges, and historic sites.

3.4 Utility-scale onshore wind facilities

This section describes potential impacts on transportation due to the construction, operation, and decommissioning of utility-scale onshore wind energy facilities.

3.4.1 Impacts from construction and decommissioning

The location of an onshore wind energy project could have impacts on the local road network. Construction would require transporting resources and workers to a project site, potentially utilizing road, rail, air, or water (barge) transport. A temporary increase in demand for shipping services and a temporary increase in traffic on roads would therefore occur during construction. A small amount of worker traffic is also expected during the site characterization phase. This PEIS assumes that construction would last between 6 and 24 months.

Decommissioning actions include dismantling and removing the turbines and other aboveground components, such as the collector substation, buildings, and overhead lines. Service roads may be removed or remain depending on agreements with the new or existing landowners. When an onshore wind energy facility reaches the end of its design life,

repowering may also be an option instead of decommissioning. Repowering consists of replacing (partially or totally) the old wind turbines with more powerful and more efficient models using the latest technologies.

Worker traffic

Workers would likely drive to a site using existing local roads or site-specific newly constructed local access roads during site characterization, construction, and decommissioning. The construction workforce may be 100 to 2,000 workers, depending on facility size and the timing and schedule for construction. The number of workers on site daily would vary. The proximity of the site to major roads, the phasing of construction and decommissioning activities, the size of the facility, and the size of the construction workforce would determine the magnitude and extent of temporary disruptions to local traffic occur due to construction worker commuters. The number of daily worker trips could range from 320 to 370 trips or more and would vary depending on the size of the project and phase of construction (EFSEC 2007, 2023).

Workers could travel from larger cities in and near the study area, such as Ellensburg, Yakima, Wenatchee, the Tri-Cities, Spokane, cities along the I-5 corridor between approximately Everett and Vancouver, and cities near the coast, such as Aberdeen. Decommissioning may require fewer specialized, skilled workers compared to construction. The farther a project site is from urbanized areas with large construction labor forces, the longer the worker trips may be and the higher the likelihood that workers could choose to temporarily relocate near the project during the construction or decommissioning periods. Using the size of the study area and the location of labor markets within the study area, construction and decommissioning worker trips are assumed to range from 5 to 150 miles each way. The proximity of the site to major roads may determine whether traffic congestion occurs related to worker traffic. Major roads in general accommodate more traffic than local roads; therefore, a site closer to major roads may generate less congestion during construction and decommissioning.

Traffic related to components and materials transport

Wind turbine tower components (turbine sections and blades) would require oversize or overweight shipments, which would affect local traffic in the short term. For example, construction traffic could increase road congestion, which could affect use of roadways during planting and harvesting season. Up to 7,000 truck trips would be required, but the number of daily truck trips would vary throughout the construction and decommissioning periods depending on the activity. These large loads would be expected to cause temporary disruptions on primary and secondary roads used to access a facility site.

Some heavy equipment and materials needed for site access (road improvement), site characterization, site preparation, turbine foundation construction, and decommissioning or repowering are typical of other road construction projects and would not pose unique transportation considerations. Shipments of materials, such as gravel, concrete, and water, would not be likely to affect local primary and secondary road networks. Most of the anticipated construction equipment (e.g., heavy earthmoving equipment, cranes) would remain

at a project site for the duration of those activities. Such equipment is routinely moved on U.S. roads, and there will be a limited number of one-time shipments.

Components of onshore wind facilities are also often transported by water or rail. Smaller wind facility components could be shipped by air. The choice of transportation method for large wind components (e.g., turbine blades) would depend on the quantity of turbine towers, the manufacturer's location, and the final destination. If rail is used, equipment could be transported on a flatbed or container. Careful planning is required due to the size of the wind turbine components. Longer turbine blades may require specially designed railcars, and heights after blades are loaded may be too high for overpasses or tunnels. Rail loads of greater size or weight differ from typical rail shipments in that they move as non-scheduled, special trains. Teams analyze the dimensions and specifications of each shipment and identify the safest route from origin to destination (UP 2021). If trucks are used for transport between an intermodal facility and the site, flatbed trucks may be suitable for transporting large components such as turbine towers, rotors, and nacelles. A project-specific route between an intermodal station and an onshore wind energy facility site may travel through small towns on roads with tighter turning radii, which may require road improvement, as discussed below (Veritread 2022).

One turbine blade can require a multi-axle trailer to accommodate the length and bulk of the blade. Seven flatbed trucks may be required to deliver one commercial wind turbine, which is typically broken down into three tower sections, a nacelle that holds the turbine's generator, a gearbox and electrical components (rotor), and three long wind turbine blades (Veritread 2022). Based on this estimated seven trucks per turbine (Veritread 2022), construction of 7 to 1,000 wind turbines with capacity to generate 1.5 megawatts (MW) of electricity or 2 to 250 wind turbines with 6.0 MW capacity would require 49 to 7,000 truckloads.

The oversize loads and carefully planned routes required for facility construction, decommissioning, or repowering could result in temporary impacts on traffic patterns or hazards experienced by other road users such as drivers, bicyclists, and pedestrians (due to temporary delays and construction hazards). Use of transportation modes for shipping components, supplies, and materials would be temporary. A shift from trucks to rail due to larger shipments would not substantially affect rail transportation due to the existing, established rail infrastructure and the capacity for rail freight transport throughout the study area. Equipment transported away from the site during decommissioning, for refurbishment or recycling, to sell as scrap, or deliver to a landfill, could be transported by truck rather than oversized load or rail if whole equipment parts are broken down into parts on site. Destinations would include recycling centers, landfills or scrap yards, other onshore wind facilities, or intermodal ports for transport elsewhere.

Due to the choices and availability of intermodal transportation within the study area, the highway, air, rail, and water transportation system in the study area could likely accommodate the demand.

Road improvements

Facility construction and decommissioning or repowering may include construction or improvement of local access roads, fortifying local bridges, reconstructing turning radii, adding acceleration or deceleration lanes on highways, or removal of obstructions to move the shipments. This would be determined on a site-specific basis. Depending on the number and complexity of required road improvements or new roads at a particular site, construction, decommissioning, or repowering impacts can be temporary but potentially disruptive to communities.

Although most conditions modified for construction or decommissioning (e.g., a temporary access road, widened turning radii, or a new acceleration lane) would be returned to existing conditions after construction, some may remain. The remaining modified conditions would represent a permanent impact to the transportation and traffic system but are not likely to result in significant adverse impacts to users. Policies, permitting requirements, and local design guidelines would be followed. Local transportation management plans and municipal code regulations would address additional temporary traffic volume increases, temporary detours, signage, and construction timing. Construction and decommissioning or repowering activities would not result in long-term road closures or interruptions to traffic patterns or volumes.

Jurisdictions having authority, such as WSDOT or the local county or city, would regulate construction activities and issue permits at their discretion for road construction or improvement, such as right-of-way permits, construction permits, and permits related to stormwater or utilities, if applicable. Local jurisdictions would also regulate signage and hours of construction.

Project developers may propose locating onshore wind facilities in remote or higher altitude areas, which could require the construction or improvement of forest roads. If roads are built during the construction period to gain access to a site, these new roads could also be required for operations, maintenance, and decommissioning or repowering of the facility. Onshore wind facilities and any related road construction or improvements proposed on state or federally managed lands would be regulated by state and federal policies, including requirements for environmental reviews, permits, and road design standards.

Facility developers would be required to transport equipment and supplies in compliance with transportation regulations and permits, which are designed to minimize substantial damage or change to transit, rail, air (including military flights), water transportation, and roadways or related infrastructure (e.g., culverts or bridges). Therefore, substantial damage to transportation modes and related infrastructure requiring major repairs or replacement to return to safe usage and pre-impact conditions would not be expected. As part of decommissioning, access roads built for construction would be removed from the site. Removal could involve excavating aggregate for reuse elsewhere and replacing soils to level the terrain.

Through compliance with laws and permits and with the implementation of measures that could avoid and reduce impacts, construction and decommissioning or repowering activities would likely result in **less than significant impacts** on transportation.

3.4.2 Impacts from operation

Operation would include a small increase in vehicle trips due to maintenance employees periodically traveling to the project site. When equipment requires replacement over the life of a project, that equipment may utilize road, rail, water (ship or barge), or air shipping. The number of people needed to operate and maintain the facility would vary but is assumed to be up to 20 people. No equipment, supplies, or materials would be expected to be shipped to or from a project on a regular basis. Deliveries of materials during operations could include water or fuel for backup generators or maintenance vehicles. Fuels are routinely shipped for other applications and pose no unusual hazards.

On-site operations would likely include travel within the project footprint for repairs and maintenance. Maintenance activities could include water use for dust suppression on roads and cleaning operations. If water is not available on-site during operations, water would need to be transported to the project.

The electrical interference of control systems with aircraft operations is not likely but should be evaluated for any new installation. The potential for interference is highly dependent on project design and location relative to aviation resources. Interactions with low-altitude aircraft avionics or communications could occur if corona discharges from the generation-tie transmission lines are not minimized and if specific electric frequencies are not avoided.

Wind turbines are anticipated to be 750 feet or taller with blades extended. Given the height of the structures, onshore wind energy facilities could introduce obstacles affecting air navigation for aerial firefighting capabilities and emergency response. Additional discussion on these hazards is discussed in the *Public Services and Utilities Technical Resource Report*.

Authorization from FAA is needed for any structure over 200 feet in height. FAA advisory guidelines for obstruction lighting and marking would apply to wind turbine siting and design. In addition, FAA has requirements to provide notice to FAA of the following: 1) certain proposed construction or alteration of structures; 2) standards used to determine obstructions to air navigation and navigational and communication facilities; 3) a process for aeronautical studies of obstructions to air navigation or navigational facilities; and 4) the process to petition FAA for discretionary review of determinations, revisions, and extensions of determinations.

No permanent changes to traffic patterns, volumes, hazards, or risks to other users are expected to occur from onshore wind energy facility operations in compliance with regulations. Air and marine transport are not expected to be needed during operations, except if bigger components require replacement. No long-term road closures or interruptions to traffic patterns or volumes are expected. No damage to roadways or related infrastructure (e.g., culverts or bridges) or transit, rail, air (including military flights), or water transportation would occur that would require major repairs or replacement to return to use and pre-impact conditions.

Through compliance with laws and permits and with the implementation of measures that could avoid and reduce impacts, the operations would likely result in **less than significant impacts** on transportation.

3.4.3 Measures to avoid, reduce, and mitigate impacts

The PEIS identifies a variety of measures to avoid, reduce, and mitigate impacts. These measures are grouped into five categories:

- **General measures:** The general measures apply to all projects using the PEIS.
- **Recommended measures for siting and design:** These measures are recommended for siting and design in the pre-application phase of a project.
- **Required measures:** These measures must be implemented, as applicable, to use the PEIS. These include permits and approvals, plans, and other required measures.
- **Recommended measures for construction, operation, and decommissioning:** These measures are recommended for the construction, operation, and decommissioning phases of a project.
- **Mitigation measures for potential significant impacts:** These measures are provided only in sections for which potential significant impacts have been identified.

3.4.3.1 General measures

- **Laws, regulations, and permits:** Obtain required approvals and permits and ensure that a project adheres to relevant federal, state, and local laws and regulations.

  Rationale: Laws, regulations, and permits provide standards and requirements for the protection of resources. The PEIS impact analysis and significance findings assume that developers would comply with all relevant laws and regulations and obtain required approvals.

- **Coordination with agencies, Tribes, and communities:** Coordinate with agencies, Tribes, and communities prior to submitting an application and throughout the life of the project to discuss project siting and design, construction, operations, and decommissioning impacts, and measures to avoid, reduce, and mitigate impacts. Developers should also seek feedback from agencies, Tribes, and communities when developing and implementing the resource protection plans and mitigation plans identified in the PEIS.

  ***Rationale*:** Early coordination provides the opportunity to discuss potential project impacts and measures to avoid, reduce, and mitigate impacts. Continued coordination provides opportunities for adaptive management throughout the life of the project.

- **Land use:** Consider the following when siting and designing a project:
  - Existing land uses
  - Land ownership/land leases (e.g., grazing, farmland, forestry)
  - Local comprehensive plans and zoning

- Designated flood zones, shorelines, natural resource lands, conservation lands, priority habitats, and other critical areas and lands prioritized for resource protection
- Military testing, training, and operation areas

***Rationale*:** Considering these factors early in the siting and design process avoids and minimizes the potential for land use conflicts. Project-specific analysis is needed to determine land use consistency.

- **Choose a project site and a project layout to avoid and minimize disturbance:** Select the project location and design the facility to avoid potential impacts to resources. Examples include the following:
  - Minimizing the need for extensive grading and excavation and reducing soil disturbance, potential erosion, compaction, and waterlogging by considering soil characteristics
  - Minimizing facility footprint and land disturbances, including limiting clearing and alterations to natural topography and landforms and maintaining existing vegetation
  - Minimizing the number of structures required and co-locating structures to share pads, fences, access roads, lighting, etc.

  ***Rationale*:** Project sites and layouts may differ substantially in their potential for environmental impacts. Thoughtful selection of a project site and careful design of a facility layout can avoid and reduce environmental impacts.

- **Use existing infrastructure and disturbed lands and co-locate facilities:** During siting and design, avoid and minimize impacts by:
  - Using existing infrastructure and disturbed lands, including roads, parking areas, staging areas, aggregate resources, and electrical and utility infrastructure
  - Co-locating facilities within existing rights-of-way or easements
  - Considering limitations of existing infrastructure, such as water and energy resources

  ***Rationale*:** Using existing infrastructure and disturbed lands and co-locating facilities reduces impacts to resources that would otherwise result from new ground disturbance and placement of facilities in previously undisturbed areas.

- **Conduct studies and surveys early:** Conduct studies and surveys early in the process and at the appropriate time of year to gather data to inform siting and design. Examples include the following:
  - Geotechnical study
  - Habitat and vegetation study
  - Cultural resource survey
  - Wetland delineation

***Rationale*:** Conducting studies and surveys early in the process and at the appropriate time of year provides data to inform siting and design choices that avoid and reduce impacts. This can reduce the overall timeline as well by providing information to agencies as part of a complete application for environmental reviews and permits.

- **Restoration and decommissioning:** Implement a Site Restoration Plan for interim reclamation following temporary construction and operations disturbance. Implement a Decommissioning Plan for site reclamation at the end of a project. Coordinate with state and local authorities, such as the Washington Department of Fish and Wildlife, county extension services, weed boards, or land management agencies on soil and revegetation measures, including approved seed mixes. Such plans address:
  - Documentation of pre-construction conditions and as-built construction drawings
  - Measures to salvage topsoil and revegetate disturbed areas with native and pollinator-supporting plants
  - Management of hazardous and solid wastes
  - Timelines for restoration and decommissioning actions
  - Monitoring of restoration actions
  - Adaptive management measures

  ***Rationale*:** Restoration and decommissioning actions return disturbed areas to pre-construction conditions, promote soil health and revegetation of native plants, remove project infrastructure from the landscape, and ensure that project components are disposed of or recycled in compliance with all applicable laws and regulations.

- **Cumulative impact assessment:** Assess cumulative impacts on resources based on reasonably foreseeable past, present, and future projects. Identify measures to avoid, reduce, and mitigate cumulative impacts. Consider local studies and plans, such as comprehensive plans.

  ***Rationale*:** Cumulative impacts can result from incremental, but collectively significant, actions that occur over time. The purpose of the cumulative impacts analysis is to make sure that decision-makers consider the full range of consequences under anticipated future conditions.

3.4.3.2 Recommended measures for siting and design

- Consider traffic routes and peak hour traffic volumes when designing access roads.
- Design any new access roads to the appropriate standard, no higher than necessary for the intended function.
- Assess potential transportation impacts in coordination with appropriate state and local agencies, and consult land use plans, transportation plans, and other local plans.
- Coordinate with agencies, Tribes, and interested parties if facility design proposes a change in interstate access or a new interstate access. Consider proposed access changes in the context of statewide and local transportation and land use planning because they can affect local and regional traffic circulation.

- Design the facility to comply with applicable FAA regulations, including lighting and painting requirements, to avoid or minimize potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.
- Coordinate with FAA and DoD early to identify and reduce impacts on military and civilian airport and airspace use.
- Coordinate with local planning authorities regarding general traffic, public transit routes and stops, school bus routes and stops, and emergency providers and hospitals.

3.4.3.3 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 for more detailed information on potentially required permits and approvals.

- Access Connection Permit and General Permit (WSDOT)
- Construction and development permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency)
- Determination of No Hazard to Air Navigation, Form 7460-1 Notice of Proposed Construction or Alteration (FAA)
- Environmental permits (e.g., critical areas, shorelines) (local agency)
- Forest Practices Act application/notification (Washington Department of Natural Resources or local agency)
- Land use permits (e.g., comprehensive plan amendments, conditional use permit/special use permit, or zoning amendments) (local agency)
- National Pollutant Discharge Elimination System Construction Stormwater General Permit (Ecology)
- Overweight/oversize permits (WSDOT)
- Road Haul Agreement (local agency)
- Right-of-way or lease (federal, state, or local agency)
- Section 4(f) Review (U.S. Department of Transportation)
- Implement a Transportation Management Plan in coordination with WSDOT and/or the local jurisdiction for traffic management during construction and for access approaches from rights-of-way. Examples of items to address include the following:
    - Evaluation of alternative transportation modes, including rail or waterway freight
    - Routes and haul schedules, including evaluation of the routes for bridges, grade crossings, and potential overhead obstructions
    - The transport of main assembly cranes, transport of turbine components, and other large pieces of equipment and acceleration, deceleration, and turn lanes on routes with site entrances
    - Advance notice to adjacent landowners and residents of construction to reduce access disruptions
    - How lane closures would occur and how evacuation procedures would be followed in the event of an emergency
    - Minimizing hazards and congestion on local traffic flow
    - Proximity to rail crossings and coordination with railway operators

- If a Haul Route Agreement is needed, coordinate with the local jurisdiction to identify a qualified third-party engineer who would document road conditions prior to construction and again after construction is complete. Ensure post-construction road restoration to conditions as good or better than pre-construction.
- Ensure that fill brought to a facility site would be suitable for its intended use and delivered in accordance with the Transportation Management Plan.

3.4.3.4 Recommended measures for construction, operation, and decommissioning

- To minimize impacts on local commuters related to the daily commute of construction workers, include local road improvements, provide multiple site access locations and routes, stagger work schedules for different work functions, shift work hours to facilitate off-peak commuting times, or implement a ridesharing or shuttle program.
- Incorporate inspection and monitoring measures into facility planning to monitor and respond to transportation impacts during construction, operations, and decommissioning.

3.4.3.5 Mitigation measures for potential significant impacts

- No potential significant impacts identified.

3.4.4 Unavoidable significant adverse impacts

Through compliance with laws and permits and with the implementation of measures to avoid, reduce, and mitigate impacts, construction, operation, or decommissioning would have **no significant and unavoidable adverse impacts** on transportation.

3.5 Onshore wind facilities with battery energy storage systems

3.5.1 Impacts from construction, operation, and decommissioning

This section describes potential impacts on transportation due to the construction, operation, and decommissioning/repowering of utility-scale onshore wind energy facilities with battery energy storage systems (BESSs). Impacts would be similar to facilities described in Sections 3.4 and 3.5, except that more truck trips (assumed 10 or fewer additional trips for the BESS construction, beyond truck trips required based on project size) would be required to transport the battery systems during construction and decommissioning. Some of the additional trips can be expected to be oversize or overweight loads. BESSs are typically constructed in gravel areas, meaning that additional gravel may need to be transported to a project with co-located BESSs.

Maintenance and operation of the BESS would contribute very few trips to overall facility impacts. Impacts due to operation and decommissioning would be similar to facilities without a BESS.

Through compliance with laws and permits and with the implementation of measures that could avoid and reduce impacts, construction, operations, and decommissioning activities would likely result in **less than significant impacts** on transportation.

3.5.2 Measures to avoid, reduce, and mitigate impacts

Measures to avoid, reduce, and mitigate impacts would be the same as those included in Section 3.4.3.

3.5.3 Unavoidable significant adverse impacts

Through compliance with laws and permits and with the implementation of measures to avoid, reduce, and mitigate impacts, construction, operation, or decommissioning of facilities with co-located BESS would have **no significant and unavoidable adverse impacts** on transportation.

3.6 Onshore wind facilities that include agricultural uses

3.6.1 Impacts from construction, operation, and decommissioning

This section discusses potential impacts on transportation due to the construction, operation, and decommissioning of onshore wind energy facilities that include agricultural uses. Impacts during construction and decommissioning would be similar to facilities described in Sections 3.4 and 3.5. Construction and decommissioning schedules, including truck trips and deliveries, may need to be coordinated with seasonal agricultural activities, such as grazing, planting, or harvesting. Other available measures to avoid and reduce temporary impacts from construction would be the same as those identified for facilities without agricultural land use.

Impacts due to operation would be similar to facilities without agricultural land use, although the agricultural uses of these facilities would require more operations and maintenance-related truck trips. Maintenance activities may need to be coordinated with seasonal agricultural activities. The number of trips would vary by project and specific type of agricultural uses.

Through compliance with laws and permits and with the implementation of measures that could avoid and reduce impacts, construction, operations, and decommissioning activities would likely result in **less than significant impacts** on transportation

3.6.2 Measures to avoid, reduce, and mitigate impacts

Available measures to avoid, reduce, and mitigate impacts would be the same as those identified in Section 3.4.3.

3.6.3 Unavoidable significant adverse impacts

Through compliance with laws and permits and with the implementation of measures to avoid, reduce, and mitigate impacts, construction, operation, or decommissioning of facilities with agricultural use would have **no significant and unavoidable adverse impacts** on transportation.

3.7 No Action Alternative

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale onshore wind energy facilities under existing state and local laws on a project-by-project basis. The potential impacts would be similar to the impacts for the types of facilities described above for construction, operations, and decommissioning, depending on project size and design, and would likely result in **less than significant impacts**.

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