Appendix A: Measures to Avoid, Reduce, and Mitigate Impacts

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

Shorelands and Environmental Assistance Program

Washington State Department of Ecology

Olympia, Washington

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DEPARTMENT OF ECOLOGY
State of Washington

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Acronyms and Abbreviations List

BESS	battery energy storage system
BMP	best management practice
DAHP	Washington State Department of Archaeology and Historic Preservation
dBA	A-weighted decibel
DNR	Washington State Department of Natural Resources
DoD	U.S. Department of Defense
Ecology	Washington State Department of Ecology
EDNA	Environmental designation for noise abatement
FAA	Federal Aviation Administration
GIS	geographic information systems
IPaC	Information for Planning and Consultation
KOP	key observation point
LNTE	low noise trailing edge
NFPA	National Fire Protection Association
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PEIS	Programmatic Environmental Impact Statement
PPV	peak particle velocity
RCW	Revised Code of Washington
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	stormwater pollution prevention plan
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WISAARD	Washington Information System for Architectural and Archaeological Records Data
WSDOT	Washington State Department of Transportation

Crosswalk with Utility-Scale Onshore Wind 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 substantial differences between the measures to avoid, reduce, and mitigate impacts for each PEIS.

Utility-Scale Solar Energy PEIS	Utility-Scale Onshore Wind Energy PEIS (this document)
• Additional or different recommended measures for water resources, biological resources, environmental health and safety, and aesthetics/visual quality	• Additional required measure for public services and utilities • Additional or different recommended measures for earth resources, biological resources, energy and natural resources, environmental health and safety, aesthetics/visual quality, transportation, and public services and utilities • Additional or different mitigation measures for potential significant impacts for noise and vibration and public services and utilities

1 Introduction

This appendix lists all the measures included in the Programmatic Environmental Impact Statement (PEIS) for utility-scale onshore wind facilities to avoid, reduce, and mitigate project impacts. This section briefly describes how the measures are organized and how the measures might be used by project developers. Section 4.1 of the PEIS provides additional information regarding use of the PEIS at the project level.

The measures to avoid, reduce, and mitigate impacts are grouped into five categories:

- **General measures:** The general measures, in Section 2, apply to all projects using the PEIS.
- **Recommended measures for siting and design:** These measures, in Sections 3 through 17, are recommended for siting and design in the early phases of a project.
- **Required measures:** These measures, in Sections 3 through 17, 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, in Sections 3 through 17, 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.

To facilitate environmental review of a project using the PEIS, the following general steps are recommended for project developers when selecting and implementing the measures :

1. As early as possible in the project process—ideally before selecting a site—incorporate the general measures and the recommended measures for siting and design for each resource to avoid and reduce potential impacts.
2. As project plans develop, incorporate the required measures, as applicable. Also incorporate the recommended measures into planning for construction, operation, and decommissioning phases.
3. Conduct impact analyses to determine if potential significant impacts to resources may result from the project.
4. If the project may result in potential significant impacts to resources, consider whether any recommended measures that were not previously incorporated might be incorporated and whether any recommended measures that were previously incorporated might be incorporated more rigorously to avoid or reduce potential significant impacts.
5. If, after the previous steps, the project still may result in potential significant impacts, develop a mitigation plan using the applicable mitigation measures for potential significant impacts to reduce the impacts to a nonsignificant level. Final significance determinations will be made by the lead agency.

In limited instances, measures to avoid, reduce, and mitigate impacts may conflict with one another. Balance the extent to which the conflicting measures are implemented based on consideration of project- and site-specific information. Resolve any conflicting measures in coordination with the State Environmental Policy Act lead agency.

2 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 (WDFW), 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 Tribal rights, interests, and resources

3.1 Recommended measures for siting and design

- Site and design projects to avoid impacts to Tribal rights, interests, and resources.
- Contact potentially affected Tribes early in the siting process, ideally before land is acquired for a project or before permit applications are developed, and offer information relevant to Tribal technical staff to help identify potential impacts to Tribes.
- Include Tribal treaty-reserved rights, Tribal reservations, off-reservation rights, trust lands, other Tribal-owned land, and other areas of significance to Tribes in consideration of potential impacts and mitigation.
- Consider including a Tribal monitor from each potentially affected Tribe on archaeological survey crews to provide input on Traditional Cultural Properties, sacred sites, and culturally significant sites.
- Tribal preferred aesthetic or visual quality mitigation practices may vary from those considered for other visual quality mitigation; consult with potentially affected Tribes on any aesthetic or visual quality mitigation practices.

3.2 Required measures

There are no specific permit requirements that pertain to Tribal rights, interests, and resources. Other PEIS technical appendices identify potentially required permits for other resources, such as cultural and historic resources, biological resources, water resources, and land use, which may include elements related to Tribal rights, interests, and resources.

3.3 Recommended measures for construction, operation, and decommissioning

- Maintain open Tribal access routes during construction, operations, and decommissioning and consider timing of activities to avoid disrupting Tribal access to sites and resources.

Many of the general measures and recommended measures for construction, operation, and decommissioning listed for other resources may apply to Tribal rights, interests, and resources. Additional project-specific measures would be determined after engagement and consultation with Tribes.

3.4 Mitigation measures for potential significant impacts

The significance of impacts to Tribal rights, interests, and resources can only be understood from within the cultural context of an affected Tribe. This will depend on the project and the potentially affected Tribes. Determining if mitigation options would reduce or eliminate impacts

below significance would be dependent on the specific project and site. Project-specific mitigation actions to be determined after engagement and consultation with Tribes.

4 Environmental justice

4.1 Recommended measures for siting and design

- Site and design projects to avoid adverse impacts to populations with environmental justice considerations and overburdened community areas.
- Use available information, including the latest Washington state guidance, and mapping tools to identify people of color populations, low-income populations, and overburdened community areas potentially affected by a proposed project.
- Engage potentially affected communities and local community service providers early in the process to understand concerns, identify potential impacts, and consider preferred mitigation options.

4.2 Required measures

This section lists required measures for use of the PEIS, as applicable. There are no specific permit requirements that pertain to environmental justice.

- Ensure engagement and communications practices comply with Title VI and federal and state accessibility requirements and are culturally effective, linguistically appropriate, and accessible. Strategies include:
    - Engage with communities on how they prefer to receive information and tailor communications accordingly.
    - Use a variety of media tailored to affected communities, such as local print, online publications, and radio.
- Comply with local plans, such as comprehensive plans and sustainability plans, which may include environmental justice elements.

4.3 Recommended measures for construction, operation, and decommissioning

- Develop and implement public information sharing to provide technical project and environmental health information, including information on potential impacts and proposed mitigation, directly to potentially affected populations, overburdened communities, local agencies, and representative groups.

4.4 Mitigation measures for potential significant impacts

- To address disproportionate effects on historic and cultural resources, Tribes and Tribal communities, biological resources, land use, aesthetics/visual quality, public services and utilities, noise and vibration, and environmental health and safety, develop Community Benefit Agreements, Tribal Benefit Agreements, community investments, or other

agreements in coordination with potentially affected communities and Tribes to address impacts through mutually agreed upon mitigation. Examples of agreement outcomes could include measures to support local labor, such as workforce development opportunities, or measures to support community facilities and services.

***Rationale*:** The process of developing agreements in coordination with local communities and Tribes allows people impacted by a project to participate in discussions that affect them. Such agreements can reduce the negative impacts of a project, especially to already overburdened communities, and promote broadly shared benefits.

5 Earth

5.1 Recommended measures for siting and design

- Conduct detailed geotechnical engineering, soil, and hydrologic studies to characterize site conditions and bearing capacity for onshore wind facility siting and foundation design. Use these studies to identify options for siting and reducing impacts from earthwork.
- Avoid geologic hazard areas such as mapped seismic hazards, landslide hazard areas, surface fault rupture hazard areas, and volcanic flow hazard areas to reduce risk of erosion or damage.
- Identify the level of seismic design, material types, and development strategies needed based on the potential risk of earthquakes. Design facilities to account for current seismic design parameters and building codes.

5.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Earth Resources Technical Report* (Appendix D) for more detailed information on potentially required permits and approvals.

- Clean Water Action Section 402 National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit (Washington State Department of Ecology [Ecology])
- Construction and Development Permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency)
- Sand and Gravel General Permit (Ecology)
- Surface Mining Reclamation Permit (Washington State Department of Natural Resources [DNR])
- Design new roads based on agency requirements and local climate conditions, soil moisture, and erosion potential.
- Develop an Erosion and Sediment Control Plan to prevent transportation of soil materials, particularly into surface waters or wetlands. The plan must be approved by applicable state and local agencies. Plan measures could include:
    - Construct and maintain erosion control in all disturbed areas and along roadways (e.g., silt fences, sediment traps, erosion control surfaces, stabilized road entrances and exit points).
    - Implement vegetative cover or mulching to stabilize exposed soil and reduce erosion risks.
    - Implement regular monitoring and maintenance programs to assess soil erosion, sedimentation, and soil stability throughout the facility life cycle. Promptly implement corrective actions or repairs to address any soil-related issues identified during monitoring activities.

- Develop a Spill Prevention, Control, and Countermeasure (SPCC) Plan if the project has an aggregate storage capacity of oil greater than 1,320 gallons or is located where a discharge could reach a navigable waterbody.

5.3 Recommended measures for construction, operation, and decommissioning

5.3.1 Utility-scale onshore wind facilities

- Implement grading and excavation techniques that minimize soil disturbance and compaction, such as level grading or cut-and-fill operations with minimal earthmoving.
- Avoid creating potentially unstable slopes during excavation and blasting operations.
- Minimize vegetation removal. Where vegetation or trees are removed, leave root systems intact to minimize soil disturbance and prevent erosion.
- Surface access roads, on-site roads, and parking lots with aggregate with hardness sufficient to prevent vehicles from crushing the aggregate and causing excessive dust or compacted soil conditions.
- Develop an Emergency Response Plan that includes measures to address project-specific geologic hazards, such as landslides or seismic events.
- Utilize weight dispersion mats or weight dispersion equipment in sensitive areas to reduce disturbances to native soil structure and vegetation.

5.3.2 Facilities with co-located BESS

- Implement secondary spill and leak containment measures around battery energy storage system (BESS) components for all battery types to prevent or minimize the spread of hazardous materials in the event of a failure. Examples include reinforced storage facilities and containment barriers to contain spills and leaks.
- Include spill response measures for BESS failure in the Emergency Response Plan and stormwater pollution prevention plan (SWPPP).
- Develop and implement water quality and soil monitoring plans to monitor for contaminants in the event of a BESS failure.

5.3.3 Facilities combined with agricultural land use

- Integrate soil conservation practices into the management of agricultural activities, such as employing no-till farming techniques around wind turbines to maintain soil structure, lessen erosion risks, and support soil fertility.
- Use cover crops with robust root systems to enhance soil health.
- Optimize facility design to address planting requirements like sunlight penetration.

5.4 Mitigation measures for potential significant impacts

- No potential significant impacts identified.

6 Air quality and greenhouse gases

6.1 Recommended measures for siting and design

- Conduct a life-cycle assessment of potential greenhouse gas emissions and design the facility and incorporate into project planning ways to minimize use of fossil fuels to reduce greenhouse gases and other air emissions.
- Consider options to reduce embodied carbon when selecting construction and operations materials and equipment.

6.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Air Quality and Greenhouse Gases Technical Resource Report* (Appendix E) for more detailed information on potentially required permits and approvals.

- Air Quality Permits (Ecology, Energy Facility Site Evaluation Council, local agency)

6.3 Recommended measures for construction, operation, and decommissioning

6.3.1 Utility-scale onshore wind facilities

- Surface access roads, on-site roads, and parking lots with aggregate with hardness sufficient to prevent vehicles from crushing the aggregate and causing excessive dust.
- Minimize vehicle and equipment exhaust emissions by:
  - Using efficient transportation routing
  - Using hybrid or zero-emission equipment, electric maintenance trucks or service vehicles, and/or latest-model-year vehicles and equipment
  - Maintaining vehicles and equipment in good condition
  - Limiting engine idling time and shutting down equipment when not in use
  - Encouraging carpooling among construction workers to minimize construction-related traffic and associated emissions
  - Using ultra-low-sulfur diesel fuel with a sulfur content of 15 parts per million or less for all diesel engines
  - Applying add-on pollution control technologies to construction generators
- Implement best management practices (BMPs) identified in the "Guide to Handling Fugitive Dust from Construction Projects," as published by the Associated General Contractors of Washington or updated guidance recommended by the local air agency. Example measures to minimize fugitive dust emissions include:
  - Monitor wind speeds and suspend all soil disturbance activities and travel on unpaved roads during periods of high winds.

    - Use water, water-based environmentally safe dust suppression materials, or other fugitive dust-abatement measures for dust control in compliance with state and local regulations.
    - Cover construction materials that could be a source of fugitive dust during transportation or storage.
    - Limit traffic speeds on unpaved roads.
- Use offsets to reduce the amount of greenhouse gases in the atmosphere. Offset projects are intended to result in greenhouse gas reductions that are real, permanent, quantifiable, verifiable, and enforceable.

6.3.2 Facilities combined with agricultural land use

- During operations in high wind and dry conditions, limit the amount of soil or unpaved surface disturbances and use wind barriers or covers to minimize windblown dust.
- Consider ways to reduce air emissions during agricultural operations, such as through maintaining equipment in good condition, reducing the number of passes by equipment, and integrating advanced technologies to reduce equipment operation overlap.

6.4 Mitigation measures for potential significant impacts

- No potential significant impacts identified.

7 Water resources

7.1 Recommended measures for siting and design

7.1.1 Utility-scale onshore wind facilities

- Conduct a hydrologic study of the site to understand the local surface water and groundwater hydrology. Identify site surface runoff and drainage patterns and groundwater levels and flow direction.
- Conduct site reconnaissance to identify the potential presence of wetlands, seeps, and intermittent or ephemeral waters, including seasonally flowing drainageways and vernal pools, that may be present on the site.
- Perform a wetland delineation on the wetlands present on the project site, including access roads and gen-tie line corridors. Delineations need to identify and map the boundaries of wetlands present on the site and indicate where wetlands continue off the site. Assess wetland functions and rate all on-site wetlands using the appropriate Washington Wetland Ratings System method to determine their category and local buffer requirements. Examine adjacent properties for the presence of off-site wetlands that could be affected by project construction and operation, map their locations, and identify any off-site connections to surface waters.
- Identify sources of water for project water needs, including for firefighting. Examine existing water rights and alternative sources of water. Water availability for new water rights varies dramatically across the state. Many areas have administrative rules that close or limit water sources for new consumptive water rights. Contact Ecology's water rights program early for new or modified water rights. Some Water Resource Inventory Areas have more restrictive administrative groundwater permit exemptions, which the developer should verify for the project location early in the planning process. Local water purveyors may have existing water right capacity to serve.
- Avoid siting structures and roads within waterbodies, wetlands, associated buffers, shorelines of the state, mapped floodplains and other frequently flooded areas, and critical aquifer recharge areas. Where these areas cannot be avoided, span waterbodies (e.g., road bridges or aboveground lines) or use horizontal directional drilling to cross beneath (e.g., underground lines).
- Design structures located within floodplains or other frequently flooded areas to not restrict or redirect flows from their natural flow path.
- Avoid siting structures in areas of known soil or groundwater contamination, or in proximity to impaired receiving waters.
- Avoid alteration of existing drainage patterns, especially in sensitive areas such as erodible soils or steep slopes.
- Avoid creating hydrologic conduits between two aquifers (Chapters 173-200 and 173-201A Washington Administrative Code [WAC]).

7.1.2 Facilities with co-located BESS

- BESS facilities and associated infrastructure should be located so as to prevent contamination of surface waters, floodplains, and wetlands, as well as buffer areas, from runoff that may contain chemicals released from a fire and/or integrated fire suppression agents.

7.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Water Resources Technical Report* (Appendix F) for more detailed information on potentially required permits and approvals.

- Clean Water Act Section 401 Water Quality Certification (Ecology/U.S. Environmental Protection Agency [USEPA]/Tribes)
- Clean Water Act Section 404 Permit (U.S. Army Corps of Engineers [USACE])
- Clean Water Act Section 402 NPDES Construction Stormwater Permit (Ecology)
- Clean Water Act Section 402 NPDES Industrial Stormwater Permit (Ecology)
- Clean Water Act Section 402 NPDES Individual Permit (Ecology)
- Chapter 90.48 Revised Code of Washington (RCW) authorization to work in waters of the state (Ecology)
- Coastal Zone Management Act Consistency (Ecology)
- Environmental Permits (e.g., Critical Areas, Shorelines) (local agency)
- Floodplain Development Permit (local agency)
- Hydraulic Project Approval (WDFW)
- Notice of Intent to Construct or Decommission a Well (Ecology)
- State Waste Discharge Permit (Ecology)
- Water Right Authorization (Ecology)
- Develop an SWPPP.
- Develop an SPCC Plan if the project has an aggregate storage capacity of oil greater than 1,320 gallons or is located where a discharge could reach a navigable waterbody.
- Develop a water quality monitoring and protection plan.
- Impacts to both jurisdictional and non-federally regulated wetlands require a wetland mitigation plan developed in accordance with *Wetland Mitigation in Washington State*.
- Restore pre-construction contours, decompact soil, and replant native hydrophytic vegetation in surface waters and wetlands in temporarily disturbed areas.

7.3 Recommended measures for construction, operation, and decommissioning

7.3.1 Utility-scale onshore wind facilities

- Use highly visible fencing/flagging around streams, wetlands, and buffers to prevent unnecessary disturbance in sensitive areas and minimize the potential for downstream water quality impacts.
- Manage stormwater runoff from buildings, parking areas, and access roads. Properly maintain on-site sanitary wastewater systems to minimize water quality impacts on surface waters and wetlands from potential contaminants.
- Minimize impacts to water quality by working below the ordinary high water mark during the dry season when no rain is predicted.
- Implement water conservation techniques. Consider using soil stabilizers to reduce water needs for dust suppression. Avoid use of polyacrylamide dust-control methods where there is potential for it to enter surface waters.
- If construction occurs near or within groundwater recharge areas, monitor activities to reduce the potential for contamination.

7.3.2 Facilities with co-located BESS

- Implement secondary spill and leak containment measures around BESS components for all battery types to prevent or minimize the spread of hazardous materials in the event of a failure. Examples include reinforced storage facilities and containment barriers to contain spills and leaks.
- Include spill response measures for BESS failure in the Emergency Response Plan and SWPPP.
- Develop and implement water quality and soil monitoring plans to monitor for contaminants in the event of a BESS failure.

7.4 Mitigation measures for potential significant impacts

- No potential significant impacts identified.

8 Biological resources

8.1 Recommended measures for siting and design

- Follow WDFW's BMPs in their current guidelines for utility-scale onshore wind energy development in Washington state. The guidelines outline strategies for avoiding, minimizing, and mitigating impacts to wildlife and habitat resources from early project planning through operations. The guidelines include BMPs, compensatory mitigation, and technical survey requirements.

  WDFW's approach emphasizes close coordination with developers to ensure that guidelines are applied in a site-specific manner, based on the best available data for each project site. The WDFW guidelines are also designed to be adaptable and will be updated as new scientific information becomes available. Developers should coordinate with WDFW to implement the most current WDFW guidelines and BMPs.
- Contact applicable federal (e.g., U.S. Fish and Wildlife Service [USFWS] and National Oceanic and Atmospheric Administration [NOAA] Fisheries), state (e.g., WDFW and Ecology), and local agencies and use mapping resources early to identify potentially affected sensitive ecological resources, including special-status species and habitats, aquatic habitats, and wetland habitats.
- Use the mapping resources identified in the WDFW guidelines, including, for example, the following planning resources that support early siting considerations:
  - Conservation Biology Institute's Least Conflict Solar Siting Conservation Value Map
  - Washington State University Least-Conflict Solar Siting Study maps conservation layer
  - Washington Shrubsteppe Restoration and Resiliency Initiative Map Portal
  - The Nature Conservancy's Ecological Risk Assessment for Wind Energy Development in Eastern WA
  - WDFW's priority habitat and species online viewer
  - WDFW's Washington Habitat Connectivity Action Plan maps
  - USFWS Information for Planning and Consultation (IPaC) map viewer
- Site and design projects to avoid and minimize:
  - Impacts to special-status habitat or species, such as shrubsteppe habitat, aquatic habitat, wetlands, and wetland buffers
  - Habitat loss, fragmentation, and resulting edge habitat
  - Impacts to wildlife corridors and landscape connectivity
- Follow WDFW's suggested methodology for field surveys including for avian and bat surveys, wildlife surveys, rare plant surveys, and habitat and vegetation surveys, as requested by WDFW or other applicable agencies. Consult a county-level noxious weed list prior to conducting pre-construction vegetation surveys.
- Coordinate with WDFW and other applicable agencies to establish site-specific buffers around habitats and areas identified as critical to special-status species (e.g., nests) and exclude or modify facilities and activities within those areas.

- Avoid siting turbines near landscape features known to attract bats, such as cliffs, forest edge habitat, and water sources. Avoid siting turbines near known bat hibernation, breeding, and maternity/nursery colonies; in known migration corridors; or in known flight paths between colonies and feeding areas.
- Avoid siting access roads and facilities near open water or other areas known to attract a large number of birds. Coordinate with WDFW to determine project-specific siting distances from these areas.
- Avoid using permanent towers with guy-wires or use bird flight diverters on guy-wires to reduce the risk of collision.
- Minimize use of overhead gen-tie and collector lines, unless underground gen-tie and collector lines are not feasible due to environmental conditions (e.g., topography, soil conductivity) or cultural or Tribal resource concerns.
- Follow Avian Power Line Interaction Committee guidelines.

8.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Biological Resources Technical Report* (Appendix G) for more detailed information on potentially required permits and approvals.

- Bald and Golden Eagle Protection Act compliance (USFWS)
- Clean Water Act Section 401 Water Quality Certification (Ecology/USEPA/Tribes)
- Chapter 90.48 RCW authorization to work in waters of the state (Ecology)
- Coastal Zone Management Act Consistency (Ecology)
- Construction and Development Permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency)
- Endangered Species Act Section 7 Consultation (USFWS/NOAA)
- Endangered Species Act Section 10 Review (USFWS/NOAA)
- Environmental Permits (e.g., Critical Areas, Shorelines) (local agency)
- Floodplain Development Permit (local agency)
- Forest Practices Act application/notification (DNR or local agency)
- Hydraulic Project Approval (WDFW)
- Magnuson-Stevens Fishery Conservation and Management Act (NOAA Fisheries)
- Migratory Bird Treaty Act (USFWS)
- Where in-water work cannot be avoided, minimize impacts to aquatic species by working within the WDFW- and USACE-recommended in-water work windows, following applicable design guidelines (e.g., WDFW Water Crossing Design Guidelines).
- Implement a Wildlife Habitat Management Plan to avoid and minimize impacts to achieve no net loss of habitat functions and values. Develop the plan in coordination with WDFW and other applicable agencies.
- Implement a Bird and Bat Conservation Strategy and Avian Protection Plan in consultation with USFWS and WDFW.
- Implement a Vegetation Management Plan.

- Implement a Fire Prevention and Response Plan.
- Impacts to both jurisdictional and non-federally jurisdictional wetlands require a wetland mitigation plan developed in accordance with *Wetland Mitigation in Washington State*.

8.3 Recommended measures for construction, operation, and decommissioning

8.3.1 Utility-scale onshore wind facilities

- Designate a qualified biologist to be responsible for overseeing compliance with all measures related to the protection of ecological resources throughout all project phases, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species and important habitats.
- Follow WDFW's BMPs in *Guidelines for Utility-scale Solar & Onshore Wind Energy Development in Washington State*.
- Consult WDFW's guidelines and other appropriate federal, state, and local agencies for spatial and temporal buffers during construction and operations activities. Any buffers established would be based on site-specific factors determined during coordination with WDFW and other appropriate agencies.
- Conduct seasonally appropriate walkthroughs prior to any ground-disturbing activity to ensure that important or sensitive species or habitats are not present in or near facility sites. Conduct walkthroughs by a qualified biologist or team of biologists and include federal agency representatives, state natural resource agencies, and Tribal staff, as appropriate.
- Implement measures to protect bats, including curtailment (by slowing, stopping, or changing the direction of blade rotation) when bats are likely to be present (e.g., nighttime, seasonal, or other depending on the site) and lowering cut-in speeds to at least less than 5 meters per second.
- Reduce raptor use of the site by minimizing road cuts and maintaining either no vegetation or nonattractive plant species around the turbines.
- Avoid surface water or groundwater withdrawals that have potential to affect sensitive habitats (e.g., riparian habitats) and any habitats occupied by special-status species.
- Avoid causing changes in surface water or groundwater quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) or flow that result in the alteration of terrestrial plant communities or communities in wetlands, springs, seeps, intermittent streams, perennial streams, and riparian areas (including alterations of cover and community structure, species composition, and diversity).
- Employ noise reduction devices to minimize impacts on wildlife, especially special-status species. Avoid evening and nighttime construction activities to limit the impacts of construction noise on wildlife.
- Manage for low-maintenance vegetation (e.g., native shrubs, grasses, and forbs) and invasive species control, minimizing the use of herbicides near sensitive habitats,

including aquatic habitat and wetlands, and using only approved herbicides consistent with all regulations and safe application guidelines.
- Discourage the use of rodenticides to control rodent burrowing around turbine towers.

8.3.2 Facilities combined with agricultural land use

- Minimize use of artificial ground covers such as gravel that require application of herbicides and are not compatible with crops or pollinator plants.
- Select pollinator plants that are native to the area and compatible with wind facilities. Coordinate with WDFW and other applicable agencies to balance pollinator and avian use of the site.

8.4 Mitigation measures for potential significant impacts

- In coordination with WDFW and other applicable agencies, develop wildlife/habitat management and mitigation plans and mitigation measures. Use the most current WDFW *Guidelines for Utility-scale Solar & Onshore Wind Energy Development in Washington State* mitigation strategies for temporary and permanent impacts to wildlife and habitat.
    - Compensatory mitigation ratios and strategies in the WDFW guidelines provide baseline guidance, but these ratios may be adjusted on a project-by-project, site-specific basis or if specific mitigation recommendations have already been published by WDFW (e.g., Oregon white oak, ferruginous hawk). Such determinations would be based on best available science and the specific conditions of the site, considering the impacted habitat types, affected wildlife species, and mitigation areas.
    - The compensatory mitigation strategies and ratios for permanent impacts may be higher for some types of sensitive habitats and species. For example, impacts to shrubsteppe habitat may be higher because such a large percentage of the shrubsteppe landscape in Washington has already been lost.

  ***Rationale*:** A wildlife/habitat management and mitigation plan will outline necessary measures to mitigate impacts to achieve no net loss of habitat functions and values.

- Implement measures for operational monitoring and adaptive management, including, where appropriate, establishing a technical advisory committee to advise on adaptive management measures.

  ***Rationale*:** Monitoring operational activities can identify changing site conditions and adaptive management measures can be developed to address those changes.

9 Energy and natural resources

9.1 Recommended measures for siting and design

- Minimize electricity demand by using project power for operational needs whenever possible, using high-efficiency fixtures and appliances in operations buildings, and using high-efficiency security lighting.
- Site and design facilities to minimize wind wake on any adjacent wind development.

9.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Energy and Natural Resources Technical Report* (Appendix H) for more detailed information on potentially required permits and approvals.

- Electrical Permits (Washington State Department of Labor and Industries)
- Sand and Gravel General Permit (Ecology)
- Surface Mining Reclamation Permit (DNR)

9.3 Recommended measures for construction, operation, and decommissioning

- Minimize transportation and equipment fuels use by:
  - Encouraging carpooling or electric vehicle use by work crews or setting up ridesharing or shuttle programs
  - Using alternative fuel, electric, or latest-model-year vehicles as project service vehicles
  - Limiting engine idling time and shutting down equipment when not in use
- Minimize impacts to aggregate resources by reusing suitable excavated materials, identifying and securing commitments from commercial suppliers, and scheduling project construction to avoid simultaneous large demands on aggregate resources by other local projects.

9.4 Mitigation measures for potential significant impacts

- No potential significant impacts identified.

10 Environmental health and safety

10.1 Recommended measures for siting and design

10.1.1 Utility-scale onshore wind facilities

- Utilize wildland fire risk mapping to identify potential areas of risk. Use sources like DNR's wildland urban interface and the University of Washington's climate change prediction data to determine lower risk areas. In areas susceptible to wildfires, coordinate with local fire organizations early in the facility planning process to determine measures to incorporate into the design of the facility to achieve wildland fire resistance and prevent an increase in wildland fire frequency.
- In areas susceptible to wildfires, design facilities to reduce risk of ignitions from gen-tie lines or other project components, including potential setbacks. Determine appropriate setbacks in consultation with local, state, or federal land managers. Setback distances and right-of-way widths should consider factors such as proximity to residences, terrain, vegetation management clearance requirements for gen-tie lines, vegetation and natural communities on surrounding lands, and the need to maintain access for maintenance and emergency response.
- Consider underground gen-tie lines in areas with high-fire risk, unless underground lines are not feasible due to environmental conditions (e.g., topography, soil conductivity) or cultural or Tribal resource concerns.
- Design a minimum 20-foot, noncombustible, defensible space clearance around the project site fencing and around structures, particularly buildings, to serve as a fire break.
- Locate refueling areas on paved surfaces and away from surface water locations and drainages; add features to direct spilled materials to sumps or safe storage areas where they can be subsequently recovered.

10.1.2 Facilities with co-located BESS

- Design setback distances around each BESS to allow for maintenance, emergency access, and vegetation management. If there is a thermal runaway event, the required setback distances also prevent spread from one container to another.

10.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Environmental Health and Safety Technical Resource Report* (Appendix I) for more detailed information on potentially required permits and approvals.

10.2.1 Utility-scale onshore wind facilities

- Clean Water Act Section 402 NPDES Construction Stormwater Permit (Ecology)
- Clean Water Act Section 402 NPDES Industrial Stormwater Permit (Ecology)

- Clean Water Act Section 402 NPDES Individual Permit (Ecology)
- Construction and Development Permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency)
- Electrical Permits (Washington State Department of Labor and Industries)
- Land Use Permits (e.g., Comprehensive Plan Amendments, Conditional Use Permit/Special Use Permit, or Zoning Amendments) (local agency)
- Right-of-Way or lease (federal, state, or local agency)
- State Waste Discharge Permit (Ecology)
- If the project has an aggregate storage capacity of oil greater than 1,320 gallons or is located where a discharge could reach a navigable water body, an SPCC Plan is required to prevent spills during construction and operation and to identify measures to expedite the response to a release if one were to occur.
- Implement an Emergency Response Plan to address worker health and safety and a Fire Prevention and Response Plan to address fire safety. Develop plans in coordination with local fire and emergency service providers. The plans must meet applicable laws/codes, such as the following:
    - WAC 463-60-352(2) through 463-60-352(4), which address fire and explosion, hazardous materials release, and safety standards compliance
    - WAC 463-60-352(6), which describes emergency plans to ensure public safety and environmental protection
    - International Fire Code
- Implement a Hazardous Materials and Waste Management Plan to address the selection, transport, storage, and use of chemicals and hazardous materials during construction, operation, and decommissioning.
- Implement a Vegetation Management Plan to reduce wildfire fuel loads and prevent the establishment of non-native, invasive species on the facility site and along gen-tie line rights-of-way and roads.
- Implement a Health and Safety Plan to inform employees and others on site about what to do in case of emergencies, including rapid shutdown procedures, the locations of fire extinguishers and nearby hospitals, telephone numbers for emergency responders, first aid techniques, and readily accessible Material Safety Data Sheets for all on-site hazardous materials. Include other Occupational Safety and Health Administration (OSHA) measures to address issues such as crane and hoist safety, electrical safety, fall prevention, lockout/tagout, heat/cold stress, and personal protective equipment.

10.2.2 Facilities with co-located BESS

- Implement fire protection, prevention, and detection measures and design features in accordance with National Fire Protection Association (NFPA) 855, including requirements for providing redundant separate methods of BESS failure detection.
- Implement a detailed Emergency Response Plan specific to BESS operations to mitigate the consequences of potential damage or failure of battery management systems, and include protocols for containment, cleanup, and remediation in the event of soil contamination or environmental incidents.

- A hazard mitigation analysis may be required as part of NFPA 855 to evaluate any potential adverse interaction between the various energy systems and technologies.
- NFPA 855 requires an operations and maintenance manual be provided to both the BESS owner (or the authorized agent) and the system operator before the system is put into operation and specifies what is to be included in the manual. This includes requirements for system maintenance, training programs, and safety protocols for personnel involved in BESS operations and maintenance. Routine maintenance can help detect issues early, prevent failures, and minimize the risk of environmental contamination.

10.3 Recommended measures for construction, operation, and decommissioning

10.3.1 Utility-scale onshore wind facilities

- Coordinate with DNR and the U.S. Forest Service and monitor wildfire activity during project construction/decommissioning and operation. If necessary, modify or cease activities, change the schedule, or remove equipment.
- Minimize potential for ignition by:
  - Using diesel construction vehicles instead of gasoline vehicles to prevent potential ignition by catalytic converters
  - Prohibiting vehicles from idling in grassy areas
  - Restricting the use of high-temperature equipment in grassy areas
  - Equipping construction vehicles with fire extinguishers, spark arrestors, and heat shields, as appropriate
  - Restricting smoking to designated areas of the site as weather conditions permit
- Equip power transformers with an oil-level monitoring system. A decrease in oil level would be sensed by this system, and an alarm message would be sent to the central alert system.
- Implement lightning protection measures and grounding systems to protect facility equipment, as well as reduce the potential for wildfires.
- If blasting is conducted, clear vegetation from the evacuation zone and prepare water spray trucks and fire suppression equipment for use.
- Coordinate with the local fire marshal and applicable fire response agencies to ensure water is available during construction and operations for fire response. Water supply for firefighting may include water trucks, on-site wells, or other water storage, such as water cisterns.
- Conduct regular maintenance and testing for wind turbine generators, including electrical systems and safety devices for fire detection, automatic switch-off, and fire extinguishing systems in the nacelle of each wind turbine.

10.3.2 Facilities combined with agricultural land use

- Coordinate with agricultural operators to establish acceptable agricultural practices on the facility site during construction, operations, and decommissioning to protect the

health and safety of employees. Review and incorporate applicable measures for agricultural practices developed by OSHA and the National Association of State Public Health Veterinarians.

10.4 Mitigation measures for potential significant impacts

- Use predictive digital monitoring and systems.

  ***Rationale*:** Predictive digital monitoring and systems can identify fault indicators and reduce risks of equipment failure and fires.

- Coordinate with the local fire marshal, or equivalent authority, and DNR wildfire management staff on training for employees in wildfire response.

  ***Rationale*:** Providing training for employees can improve fire response and reduce risk of fire spread.

11 Noise and vibration

Noise and vibration impact distances identified in this programmatic analysis are based on proxy projects and unspecified existing conditions and locations of sensitive receptors. Developers would need to conduct facility- and site-specific modeling for each project to determine the applicable distances necessary to avoid a significant noise or vibration impact.

11.1 Recommended measures for siting and design

- Site noise sources to reduce impacts and take advantage of existing topography and distances.
- Model project-level noise and vibration for construction and operations activities and equipment to determine project-specific setback distances for noise and vibration-sensitive land uses and receptors. Model noise and vibration using estimates that address variations in equipment type selected in final project design.
- Use noise and vibration modeling results during siting and design and establish setback distances for construction and operations. Provision of a setback distance from noise-or vibration-sensitive receptors would reduce the need for additional mitigation measures. Examples of activities and equipment to consider when establishing setback distances include:
    - Sources of construction vibration
    - Construction vehicle routes
    - Immobile construction equipment (e.g., compressors and generators)
    - Permanent sound-generating facilities, including turbines, transformers, inverters, and substations
    - Blasting
- Incorporate low-noise systems (e.g., for pumps, generators, compressors, and fans) and select equipment with low noise emissions and/or without prominent discrete tones, as indicated by the manufacturer.

11.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Noise and Vibration Technical Resource Report* (Appendix J) for more detailed information on potentially required permits and approvals.

- Blasting Permits (local fire department or building authority)
- Land Use Permits (e.g., Comprehensive Plan Amendments, Conditional Use Permit/Special Use Permit, or Zoning Amendments) (local agency)
- Implement a worker hearing protection program for work areas with noise in excess of 85 A-weighted decibels (dBA) per OSHA standard 1910.95(c)(1).

11.3 Recommended measures for construction, operation, and decommissioning

- Implement noise reduction measures during construction, including:
  - Notify potentially affected residents in advance of noisy activities, such as blasting or pile driving, before and during the construction period.
  - Post warning signs at high-noise areas.
  - Schedule construction activity during normal working hours on weekdays.
  - Limit possible evening shift work to low-noise activities, such as welding, wire pulling, and similar activities.
  - Maintain tools and equipment in good operating order according to manufacturer specifications.
  - Ensure all heavy trucks and internal combustion engines are properly maintained and equipped with noise-control (e.g., muffler) devices, in accordance with manufacturer specifications.
  - Limit noise-producing signals, such as horns, whistles, or alarms, to safety warning purposes only. Prohibit nighttime (10 p.m. to 7 a.m.) blasting.

11.4 Mitigation measures for potential significant impacts

11.4.1 Utility-scale onshore wind facilities

- If project-specific construction noise modeling indicates potential significant impacts to noise-sensitive receptors, implement a Construction Noise Management Plan to reduce noise impacts.

  ***Rationale*:** A Construction Noise Management Plan can reduce the potential for construction noise impacts to noise-sensitive receptors.

- If project-level noise analysis for receiving properties indicates environmental designation for noise abatement (EDNA) threshold exceedances or an increase of 5 dBA over ambient noise levels in quiet rural areas, use noise reduction measures to reduce operations noise levels. These could include:
  - Manufacturer-provided acoustical enclosures for mechanical equipment
  - Acoustical barriers designed for a particular source or group of sources using acoustically rated materials
  - Low noise trailing edge (LNTE) technology and noise-reduced operation models for turbines

  ***Rationale*:** Use of acoustical enclosures or barriers can reduce operational noise impacts. A well-designed acoustical enclosure can reduce noise levels between 15 and 25 dBA. LNTE technology consists of the addition of plastic or metal sawtooth serrations that can be affixed to the blade's rear edge to reduce blade trailing edge noise. Application of noise-reduced operation modes limits the rotational speed of the turbines to reduce

their sound emissions. The need for manufacturer-provided options to reduce noise levels would not be required over an entire onshore wind facility but only to the extent needed to address impacts to affected noise-sensitive receptors.

- Establish a noise complaint resolution process and hotline.

  ***Rationale*:** A hotline can facilitate reporting of noise concerns and complaints. A noise complaint resolution process can be used to systematically address any noise complaints received.

- If project-specific construction vibration modeling indicates potential significant impacts to existing structures, implement a Construction Vibration Management Plan to reduce the potential for building damage. Measures and controls should be identified based on project-specific design and may include, but are not limited to, the following:
  - Installing cast-in-place concrete piles to minimize vibration.
  - Vibrating piles into place and installing shrouds around the pile-driving hammer.
  - Using nonvibratory, excavator-mounted compaction wheels and small, smooth drum rollers for final compaction of asphalt base and asphalt concrete. If needed to meet compaction requirements, use smaller vibratory rollers to minimize vibration levels during repaving activities where needed to meet vibration standards.
  - Using active or passive vibration isolation systems for equipment that may produce high levels of vibration.
  - Implementing a vibration, crack, and line and grade monitoring program for identified historic buildings in coordination with a geotechnical engineer and qualified architectural historian.
  - During blasting, calculating and maintaining the weight of explosives necessary to ensure that vibrations from blasting do not exceed a performance standard of 0.5 peak particle velocity (PPV) inches/second for conventional construction and 0.12 PPV inches/second for historic structures.

  ***Rationale*:** A Construction Vibration Management Plan can reduce the potential for building damage to occur during construction.

11.4.2 Facilities with co-located BESS

- If project-level noise analysis identifies noise level exceedances, additional measures include:
  - Acoustical enclosures or barriers for BESS containers
  - Utilizing a dispersed or distributed layout of BESSs

  ***Rationale*:** Use of acoustical enclosures or barriers can reduce operational noise impacts. The layout of BESSs can affect noise impacts. Compared to a consolidated layout of BESSs, a dispersed or distributed layout of BESSs may result in reduced noise impacts.

12 Land use

12.1 Recommended measures for siting and design

12.1.1 Utility-scale onshore wind facilities

- Consider the Washington State University Least-Conflict Solar Siting Study maps, and/or local, state, and federal agricultural lands mapping, to avoid areas identified as having highest ranchland and farmland values.
- If siting on DNR-managed lands, use DNR's Clean Energy Parcel Screening Tool[1] to see lands that may be good candidates for project development. Contact DNR to discuss the process and requirements for siting clean energy projects on state lands.
- Coordinate with federal, state, and local agencies; Tribes; property owners; and other interested parties as early as possible in the planning process to identify potential land use conflicts and issues, as well as state and local rules that govern project development.
- Contact the Federal Aviation Administration (FAA) early in the process to determine if there might be potential impacts on aviation and if mitigation might be required to protect military or civilian aviation use. Submit plans to the FAA for proposed construction of any facility that is 200 feet or taller or that is located in proximity to airports for evaluation of potential safety hazards.
- Contact the U.S. Department of Defense (DoD) early in the process if siting facilities near or within military training routes, military bases, or training areas to identify and mitigate potential impacts on military operations. Site design must consider military installations and air space needs. Use the Compatible Energy Siting Assessment mapping tool to determine whether projects are under military-utilized airspace. If so, submit plans to the DoD for review.
- Design roads in agricultural areas to include appropriate fencing, cattle guards, and signs.

12.1.2 Facilities combined with agricultural land use

- Design and site projects elements, including turbines and roads, to accommodate crops, agricultural equipment and worker access, and irrigation.

[1] https://www.dnr.wa.gov/cleanenergymap

12.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Land Use Technical Resource Report* (Appendix K) for more detailed information on potentially required permits and approvals.

- Construction and Development Permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency)
- Environmental Permits (e.g., Critical Areas, Shorelines) (local agency)
- Floodplain Development Permit (local agency)
- Forest practices permit (DNR or local agency)
- Land Use Permits (e.g., Comprehensive Plan Amendments, Conditional Use Permit/Special Use Permit, or Zoning Amendments) (local agency)
- Land Evaluation and Site Assessment (Natural Resource Conservation Service, local farm agency, or rural development agency)
- Right-of-Way or lease (federal, state, or local agency)
- Section 4(f) review (U.S. Department of Transportation)
- DoD Clearance for Radar Interference (DoD)
- Utility Accommodation Permits and Franchises (Washington State Department of Transportation [WSDOT] or local agency)

12.3 Recommended measures for construction, operation, and decommissioning

Many of the general measures and recommended measures for construction, operation, and decommissioning for other resources such as environmental justice, earth, water, noise and vibration, and aesthetics/visual quality may be used to avoid and reduce land use impacts. Additional project-specific measures would be determined during project environmental review and permitting with applicable agencies.

12.4 Mitigation measures for potential significant impacts

- When natural resource lands of long-term commercial significance are converted, co-locate natural resource land uses, including agriculture, with onshore wind projects.

  ***Rationale*:** Co-locating natural resource land uses with facilities can allow some of the facility site land to remain in natural resource use.

13 Aesthetics/visual quality

13.1 Recommended measures for siting and design

- Site and design facilities to avoid and minimize visual impacts.
- Conduct a detailed visual resource analysis during siting using a qualified visual resource specialist to identify and map landscape characteristics, key observation points (KOPs), and key viewsheds; prominent scenic, Tribal, and cultural landmarks; and other visually sensitive areas near the project location.
- Consult with the appropriate land management agencies, planning entities, Tribes, and the local public early to provide input on the identification of important visual resources near a project site and on the siting and design process.
- Use geographic information systems (GIS) and visual impact simulations for conducting visual analyses (including mapping), analyzing the visual characteristics of landscapes, visualizing the potential impacts of facility siting and design, and fostering communication.
- Conducts a shadow flicker study using appropriate siting software and procedures and site wind turbines to eliminate shadow flicker effects on nearby residences or other highly sensitive viewing locations or reduce them to the lowest achievable levels.
- Avoid siting facilities where the landscape setting observed from national historic sites, national trails, and cultural resources may be a part of the historic context contributing to its historic significance.
- Site projects outside the viewsheds of KOPs, highly sensitive viewing locations, and/or areas with limited visual absorption capability and/or high scenic integrity. If projects must be sited within view of KOPs, site them as far away as possible to reduce the visual impacts.
- Use topography and vegetation as screening devices to restrict views of the project from visually sensitive areas. Where screening topography and vegetation are absent, use natural-looking earthwork berms and vegetative or architectural screening to minimize visual impacts. Vegetative screening can be particularly effective along roadways.
- Minimize visual impacts by:
    - Designing the facility to comply with applicable land use regulations related to light, glare, building height, setbacks, vegetation screening, exterior storage, fencing, and any other requirements related to the visual appearance of the facility.
    - Avoiding siting near prominent landscape features (e.g., peaks and waterfalls).
    - Avoiding siting linear facilities, such as interconnector and gen-tie lines and roads, so that they bisect ridge tops or run down the center of valley bottoms.
    - Avoiding siting facilities on ridgelines, summits, or other locations where they would be silhouetted against the sky (skylining) from important viewing locations.
    - Configuring turbines to be visually compatible with the landscape, such as following local topography in rolling landscapes, or using geometric or linear configurations in flatter agricultural landscapes.

    - Separating long lines of turbines and inserting breaks or open zones to create distinct visual units or groups of turbines, while avoiding visual disruptions and perceived disorder, disarray, or clutter.
    - Using monopole turbine structures.
    - Siting linear features to follow natural land contours rather than straight lines, particularly up slopes. Avoid fall-line cuts. Site facilities to take advantage of natural topographic breaks and avoid siting on steep slopes.
    - Avoiding installation of gravel and pavement where possible to reduce color and texture contrasts with the existing landscape.
    - Using turbine and other ancillary facilities with visual uniformity in shape, color, and size.
    - Choosing low-profile structures to reduce their visibility.
    - Preserving existing rocks, vegetation, and drainage patterns and varying the slope to preserve trees and nonhazardous rock outcroppings.
- In forested areas or shrublands, site linear facilities to follow the edges of clearings rather than pass through their center. Locate openings in vegetation for facilities, structures, and roads to mimic the size, shape, and characteristics of naturally occurring openings. Include the feathering of cleared area edges (i.e., the progressive and selective thinning of trees from the edge of the clearing inward) combined with the mixing of tree heights from the edge in the vegetation-clearing design in forested areas.
- Locate interconnector and gen-tie line right-of-way crossings of roads, trails, streams, and other linear features to avoid KOP viewsheds and other visually sensitive areas and to minimize disturbance to vegetation and landforms. Locate rights-of-way so they cross linear features at right angles whenever possible to minimize the viewing area and duration.
- Minimize use of overhead gen-tie and collector lines, unless underground gen-tie and collector lines are not feasible due to environmental conditions (e.g., topography, soil conductivity) or cultural or Tribal resource concerns.
- Minimize light pollution, including using motion-activated security lights, using full-cutoff designs that minimize upward light scattering and use, and avoiding steady-burn high intensity lights. Use Dark Sky International's Five Principles for Responsible Outdoor Lighting to design outdoor lighting.

13.2 Required measures

There are no specific permit requirements that pertain to aesthetics/visual quality. Local land use development ordinances may require some form of design approval (e.g., in designated scenic corridors) or night sky exemption related to safety or obstruction lighting. Local land use permits may also require that projects demonstrate conformance with zoning and comprehensive plan designations, which may include areas of rural character. Federally managed lands also have planning requirements for the protection of visual resources and would evaluate visual effects from proposed projects during right-of-way or leasing processes.

13.3 Recommended measures for construction, operation, and decommissioning

- Mulch and spread slash from vegetation removal to cover fresh soil disturbances (preferred) or bury it in previously disturbed areas. Segregate topsoil from cut/fill activities and spread on freshly disturbed areas to reduce color contrast and aid rapid revegetation. Do not leave piles in sensitive viewing areas.
- Minimize signage. Paint or coat reverse sides of signs to reduce color contrasts with the existing landscape.
- Paint structures before or immediately after installation. Use materials and surface treatments that repeat and/or blend with the existing landscape.
- In compliance with FAA-requirements, select colors for turbines to reduce visual impact and apply uniformly to tower, nacelle, and rotor, unless gradient or other patterned color schemes are used.
- Use non-reflective materials or non-specular finishes and coatings on facilities to prevent glare.

13.4 Mitigation measures for potential significant impacts

- Consult with permitting agencies to develop visual mitigation strategies, which may include measures identified above and other actions to align with local plans.

  ***Rationale*:** Visual mitigation is dependent on project- and site-specific impacts. Consulting permitting agencies when developing mitigation strategies would identify the specific actions to address visual impacts.

14 Recreation

14.1 Recommended measures for siting and design

14.1.1 Utility-scale onshore wind facilities

- Consider recreation areas and uses when siting a facility. Contact recreational land managers as early as possible to discuss potential impacts and mitigation.
- Avoid siting facilities in areas valued for recreational opportunities, areas with unique recreation resources, areas that would divide existing recreation areas, or areas that would cause overuse of neighboring recreational activities. This includes both informal recreational areas and recreation in designated recreational areas.

14.1.2 Facilities with co-located BESS

- Site the BESS away from any recreational uses to further avoid and minimize potential noise or visual impacts.

14.2 Required measures

There are no specific permit requirements that pertain to recreation.

14.3 Recommended measures for construction, operation, and decommissioning

14.3.1 Utility-scale onshore wind facilities

- Notify recreationists of construction activities by means that would include posting signage, online postings, and press releases. Include a description of the project, expected hours of construction, and potential impacts on the recreational experience.

14.3.2 Facilities combined with agricultural land use

- Offer agritourism activities where agriculture use is co-located.

14.4 Mitigation measures for potential significant impacts

- Provide new opportunities for recreational activities. Facilities could be designed with biking or hiking trails, wildlife viewing areas, or be open to hunting during portions of the year.
    - Engage with land managers and statewide and local interest groups dedicated to conserving natural resources and recreation (for example, trail associations and environmental advocacy groups) regarding mitigation.

***Rationale*:** Providing new recreational opportunities can mitigate for loss of recreation resources or crowding of alternative recreational opportunities.

- If segmentation of existing recreational facilities (such as a severed trail connection) cannot be avoided, develop an alternate linkage to connect the remaining segments.

  ***Rationale*:** Providing an alternate linkage can mitigate the segmentation of recreational facilities by maintaining the overall connectivity of a recreational facility.

15 Historic and cultural resources

15.1 Recommended measures for siting and design

- Design and site projects to avoid impacts on cultural and historic resources. Begin with use of the Washington State Department of Archaeology and Historic Preservation's (DAHP's) Washington Information System for Architectural and Archaeological Records Data (WISAARD) (including the predictive model), then refine through the development of site-specific environmental and cultural context and Tribal coordination.
- Contact potentially affected Tribes early in the siting process, ideally before land is acquired for a project or before permit applications are developed, and offer information relevant to Tribal technical staff to help identify potential impacts on Tribes.
- Consider potential impacts on Tribal treaty-reserved rights, Tribal reservations, off-reservation rights, trust lands, other Tribal-owned land, and other areas of significance to Tribes during project design and in siting decisions.
- Conduct a site-specific cultural survey to evaluate potential impacts in accordance with DAHP and federal requirements and guidance. To expedite the review process, DAHP and the affected Tribes should be given the opportunity to review the cultural resource survey methodology.
- Consider requiring a Tribal monitor for survey crews to provide input on Traditional Cultural Properties, sacred sites, and culturally significant sites during site selection.
- Provide cultural resource survey results to potentially affected Tribes for early review.
- Use previously disturbed lands and lands determined by archaeological inventories to be devoid of historic properties.
- In areas where homesteading was a prevalent historic activity, contact the local assessor's office and historical museums to determine if the area includes known homestead sites.

15.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Historic and Cultural Resources Technical Report* (Appendix N) for more detailed information on potentially required permits and approvals.

- Archaeological Site Alteration and Excavation Permit (DAHP)
- National Historic Preservation Act Section 106 consultation (federal agency and Advisory Council on Historic Preservation)
- A developer must develop an Inadvertent Discovery Plan. In the event that unrecorded archaeological resources are identified during project construction or operation, work within 30 meters (100 feet) of the find must be halted and directed away from the discovery until it can be assessed in accordance with steps in the Inadvertent Discovery Plan.

15.3 Recommended measures for construction, operation, and decommissioning

- Many of the general measures and recommended measures for construction, operation, and decommissioning for other resources such as earth, noise and vibration, and aesthetics/visual quality may apply to historic and cultural resources. Additional project-specific measures would be determined after engagement and consultation with Tribes and DAHP.

15.4 Mitigation measures for potential significant impacts

- Implement training/educational programs for workers. Incorporate adaptive management protocols in plans to address changes over the life of the project, should they occur.

  ***Rationale*:** Training/education programs can reduce occurrences of disturbances, vandalism, and harm to historic and cultural resources.

- If a project requires federal permits or affects federal lands, mitigation measures would be developed in consultation with Tribes under Section 106 of the National Historic Preservation Act to avoid, reduce, or mitigate the potential for adverse impacts on significant cultural resources, if present. Section 106 consultations between the federal agencies, DAHP, affected federally recognized Tribes, and other consulting parties would be required.

  ***Rationale*:** Federal Section 106 process would include identification of mitigation.

- Address impacts to cultural resources by following the best available guidance and strategies developed by federal, Tribal, and state governments, including, but not limited to, compensatory mitigation, formalized ongoing consultation between the state and Tribes to address new concerns and monitor long-term mitigation, and the development and maintenance of new technologies and geospatial analysis that help identify and avoid historic and cultural resources.

  ***Rationale*:** Consultation between agencies and Tribes will be used to address impacts.

16 Transportation

16.1 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.

16.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Transportation Resources Technical Report* (Appendix O) 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 (DNR or local agency)
- Land Use Permits (e.g., Comprehensive Plan Amendments, Conditional Use Permit/Special Use Permit, or Zoning Amendments) (local agency)
- NPDES 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.

16.3 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.

16.4 Mitigation measures for potential significant impacts

- No potential significant impacts identified.

17 Public services and utilities

17.1 Recommended measures for siting and design

- If siting is proposed on or near areas of high fire risk, coordinate with the local fire district, emergency management departments, U.S. Forest Service, and/or DNR during siting and design and throughout the life cycle of the project to identify and address fire response needs.
- Complete a communication interference report to evaluate interference in and around the project area for microwave signals, fixed station radio frequency facilities, land mobile/public safety radio transmitter stations, satellites, television broadcast facilities, and aircraft navigation.
- Design the facility to avoid communications interference in coordination with emergency response providers and emergency management districts. Examples of measures include selecting facility equipment with a frequency spectrum for electrical noise that does not interfere with communications systems and emergency response alerts.
- To minimize potential hazardous solid waste disposal during decommissioning, select nontoxic and/or recyclable turbine blades.

17.2 Required measures

This section lists permits and approvals, plans, and other required measures for use of the PEIS, as applicable. See Section 3.3 of the *Public Services and Utilities Technical Resource Report* (Appendix P) for more detailed information on potentially required permits and approvals.

17.2.1 Utility-scale onshore wind facilities

- Construction and Development Permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency)
- Electrical Permits (Washington State Department of Labor and Industries)
- Federal Communications Commission filing
- Land Use Permits (e.g., Comprehensive Plan Amendments, Conditional Use Permit/Special Use Permit, or Zoning Amendments) (local agency)
- Local utility connection permits/approvals (local utility)
- Right-of-Way or lease (federal, state, or local agency)
- Water Right Authorization (Ecology)
- U.S. Department of Defense (DoD) Clearance for Radar Interference
- Conform to all applicable building and fire code requirements pertaining to setback distances for public safety related to turbine failure or blade throw.
- In coordination with relevant authorities, develop plans and procedures to reduce risks specific to the project and regional conditions, including:
    - Fire Prevention and Response Plan, where required
    - Hazardous Materials and Waste Management Plan

    - SPCC Plan
    - Site Security Plan
    - Emergency Response Plan, including medical response procedures
- Implement measures to reduce utility service interruptions and conflicts, including, but not limited to, the following:
    - Mark and locate all underground utilities within the construction footprint prior to ground-disturbing construction activities.
    - Consult and coordinate with utility providers on design standards for utility connections and specify the extent and timing of proposed construction activities.
    - Ensure advance notification to residents and businesses where service interruptions may occur because of construction.

17.2.2 Facilities with co-located BESS

- When a battery reaches its end of life, follow Ecology's guidance for managing universal waste, which includes:
    - Sending the battery off site for recycling. Disposal is prohibited.
    - Storing lithium-ion batteries properly to prevent breakage and release of toxics to the environment.
    - Labeling waste containers.
    - Tracking accumulation start dates, as universal waste cannot be stored on site for more than 1 year.
    - Training employees in proper handling and emergency procedures.
    - Meeting the large quantity handler requirements if the site accumulates 11,000 pounds or more of universal waste at any time. This will depend on the size of the BESS.
- Incorporate BESS considerations into the project's Fire Prevention and Response Plan.

17.3 Recommended measures for construction, operation, and decommissioning

- Recycle all components of a facility that have the potential to be used as raw materials in commercial or industrial applications.

17.4 Mitigation measures for potential significant impacts

- Include a turbine blade end-of-life stewardship plan as part of the Decommissioning Plan. The plan would include:
    - Expected quantities and types of solid waste the onshore wind energy facility would generate, including but not limited to turbine blade waste
    - Expected destinations for waste
    - Specialized procedures for handling, transporting, management, and disposal of potentially hazardous materials

***Rationale*:** It is uncertain whether regulations will come into effect to require stewardship and takeback for turbine blades in future years within the decommissioning timeframe for the onshore wind energy facilities. Developing an end-of-life stewardship plan would reduce the overall quantities of potentially hazardous solid waste associated with onshore wind energy components.

- Coordinate with local fire departments and emergency management departments to provide specialized training and equipment caches during project operations.

  ***Rationale*:** Coordination can reduce risk and improve emergency response actions

- Maintain at least one water truck with sprayers for each 1 to 2 miles of access road for construction during the fire season. Install fire station boxes with shovels, water tank sprayers, and other firefighting equipment at multiple locations along roadways during the fire season.

  ***Rationale*:** Maintaining firefighting equipment at multiple locations at the facility site bolsters the firefighting resources available to emergency responders in remote locations with limited response capabilities or if there are other unique aspects of a facility site.

- Where not already required, develop a site-specific Fire Prevention and Response Plan.

  ***Rationale*:** A Fire Prevention and Response Plan can mitigate fire risks at a facility.

- Coordinate with local emergency responders to fund training and equipment to address fire risks.

  ***Rationale*:** Funding training and equipment to address fire risks can help local emergency responders in locations with limited response capabilities better prepare for and respond to a large fire.