



# **State Environmental Policy Act Final Programmatic Environmental Impact Statement**

## **For Utility-Scale Solar Energy Facilities in Washington State**

**Shorelands and Environmental Assistance Program**

Washington State Department of Ecology

Olympia, Washington

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## Publication Information

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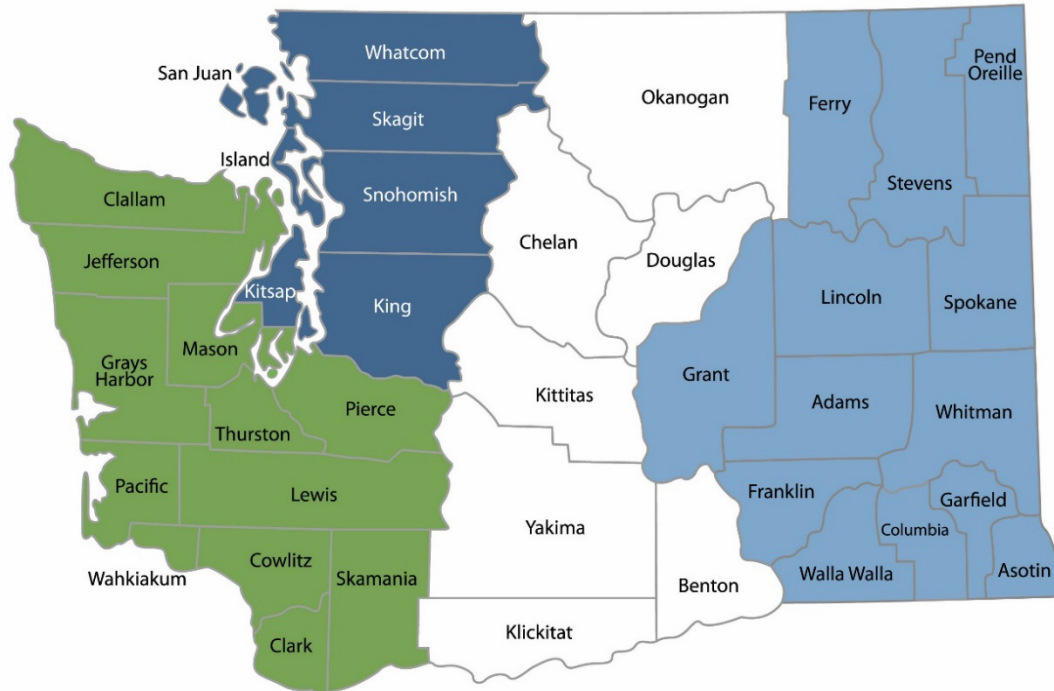
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<sup>1</sup> <https://climate.wa.gov/>

<sup>2</sup> [www.ecology.wa.gov/contact](https://www.ecology.wa.gov/contact)

# Department of Ecology's Regional Offices

## Map of Counties Served



**Southwest Region**  
360-407-6300

**Northwest Region**  
206-594-0000

**Central Region**  
509-575-2490

**Eastern Region**  
509-329-3400

Region	Counties served	Mailing Address	Phone
<b>Southwest</b>	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
<b>Northwest</b>	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	PO Box 330316 Shoreline, WA 98133	206-594-0000
<b>Central</b>	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
<b>Eastern</b>	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
<b>Headquarters</b>	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

# Fact Sheet

## Title

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

## Brief description of proposal

The Washington State Legislature directed the Washington State Department of Ecology (Ecology) to prepare a nonproject environmental review of utility-scale solar energy facilities in Washington by June 30, 2025. Revised Code of Washington (RCW) [43.21C.535](https://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.535)<sup>3</sup> requires Ecology to assess and disclose the probable significant adverse environmental impacts and related mitigation measures for utility-scale solar energy facilities. Ecology prepared this Final Programmatic Environmental Impact Statement (PEIS) to evaluate potential impacts and mitigation at a broad level. This Final PEIS was prepared in compliance with the Washington [State Environmental Policy Act](https://apps.leg.wa.gov/wac/default.aspx?cite=197-11) (SEPA).<sup>4</sup>

The PEIS is intended to:

- Support the state's transition to clean energy while protecting the environment, Tribal rights and resources, and local communities.
- Identify the range of probable significant adverse environmental impacts utility-scale solar energy projects can pose.
- Provide information about facility siting and design that may be used to help avoid or minimize adverse environmental impacts for proposed projects.
- Identify general potential mitigation measures for impacts.
- Provide information for lead agencies to consider when conducting environmental reviews for utility-scale solar energy projects.

The PEIS evaluated the following types of utility-scale solar energy facilities as well as a No Action Alternative:

- **Utility-scale solar facilities:** solar energy facilities capable of generating between 20 and 1,200 megawatts of energy on sites between 200 to 12,000 acres in size.
- **Utility-scale solar facilities with battery energy storage systems:** facilities that also include one or two battery energy storage systems, each capable of storing up to 500 megawatts of energy.

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<sup>3</sup> <https://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.535>

<sup>4</sup> <https://apps.leg.wa.gov/wac/default.aspx?cite=197-11>

- **Utility-scale solar facilities that include agricultural uses:** dual-use facilities where agriculture would occur during facility operations and may include raising or modifying the solar panels to allow for agricultural land use.
- **No Action Alternative:** agencies would continue to conduct environmental review and permitting for utility-scale solar facilities under existing state and local laws on a project-by-project basis without using this PEIS as a reference.

## Location

The geographic scope for the solar PEIS includes areas throughout the State of Washington where utility-scale solar facilities are likely to be developed based on available solar energy, the topographic slope, and proximity to transmission lines.

## Responsible official contact

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## Required permits, licenses, and approvals

Numerous regulations, plans, and laws guided or influenced the development of this PEIS. Because this is a programmatic EIS for a nonproject action, and the specific nature of projects that would be proposed is not yet known, it is not possible to present a complete list of permits, licenses, and approvals that could be required for future facilities.

Implementation of the types of utility-scale energy facilities evaluated in the PEIS would require compliance with regulations, rules, and plans at federal, state, and local levels. For purposes of this PEIS, the term “laws and permits” includes any of the items listed below. Examples of those that could be associated with utility-scale solar energy facilities include:

### Federal

- Bald and Golden Eagle Protection Act
- Clean Water Act, Section 404 Permit
- Coastal Zone Management Act Consistency
- Determination of No Hazard to Air Navigation
- Endangered Species Act, Section 7 Consultation and Section 10 Review
- Federal Communications Commission filing

- Magnuson-Stevens Fishery Conservation and Management Act
- Migratory Bird Treaty Act
- National Environmental Policy Act
- National Historic Preservation Act, Section 106
- U.S. Department of Defense Clearance for Radar Interference
- U.S. Department of Transportation Act of 1966, Section 4(f) Review

## **State**

- Access Connection Permit and General Permit, Washington State Department of Transportation
- Aquatic Use Authorization
- Archaeological Site Alteration and Excavation Permit
- Clean Water Act, Section 401 Water Quality Certification
- Clean Water Act, Section 402 National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit
- Clean Water Act Section 402 NPDES Individual Permit
- Clean Water Act Section 402 NPDES Industrial Stormwater Permit
- Chapter 90.48 Revised Code of Washington waters of the state authorizations
- Electrical Permits
- Forest Practices Act application/notification
- Hydraulic Project Approval
- Notice of Intent to Construct or Decommission a Well
- Overweight/Oversize Permits
- Sand and Gravel General Permit
- Shoreline Management Act
- State Environmental Policy Act
- State Waste Discharge Permit
- Surface Mining Reclamation Permit
- Water Right Authorization
- Utility Accommodation Permits and Franchises

## **Local**

- Air Quality Permits
- Blasting Permits
- Construction and Development Permits (e.g., road access, grading, building, mechanical, lights, signage)
- Environmental Permits (e.g., Critical Areas, Shorelines)
- Floodplain Development Permit
- Land Use Permits (e.g., Comprehensive Plan Amendments, Conditional Use Permit/Special Use Permit, or Zoning Amendments)
- Local utility connection permits/approvals
- Road Haul Agreement

## Authors and principal contributors

This document has been prepared under the direction of Ecology. All chapters and appendices have been prepared for and approved by Ecology. Key authors and principal contributors to the PEIS analyses are listed below:

- Washington State Department of Ecology
- Washington Department of Fish and Wildlife
- Washington State Department of Natural Resources
- Washington State Department of Archaeology and Historic Preservation
- Washington State Department of Transportation
- State of Washington Energy Facility Site Evaluation Council
- Anchor QEA
- Environmental Science Associates
- Hammerschlag LLC

## Date of Final PEIS issuance

June 30, 2025

## Subsequent environmental review

The PEIS considers potential impacts from general types of utility-scale solar energy facilities; it is not site-specific or for a specific project. Implementation of the types of facilities evaluated in the PEIS would require additional, more detailed, project-level environmental review prior to implementation.

RCW 43.21C.538 requires SEPA lead agencies to consider the utility-scale solar PEIS for applicable facilities. Agencies must use the information in the PEIS, along with other publicly available information and site-specific details, to support their evaluation of proposed actions, alternatives, environmental impacts, and mitigation for a proposed project. Potential impacts not addressed in the PEIS will need to be evaluated by the SEPA lead agency in the project-level environmental review.

## Document availability

The Final PEIS is posted on the following websites:

- [SEPA Register website](https://apps.ecology.wa.gov/separ/Main/SEPA)<sup>5</sup>
- [Ecology's PEIS website](https://ecology.wa.gov/regulations-permits/sepa/clean-energy/programmatic-eis)<sup>6</sup>

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<sup>5</sup> <https://apps.ecology.wa.gov/separ/Main/SEPA>

<sup>6</sup> <https://ecology.wa.gov/regulations-permits/sepa/clean-energy/programmatic-eis>

## Location of background materials

The Final PEIS and associated appendices developed specifically for this environmental review are available on Ecology's PEIS [website](#).<sup>7</sup>

## Changes in the Final PEIS

A 33-day public comment period for the Draft PEIS was conducted from 12:00 p.m., September 25 through 11:59 p.m., October 28, 2024. Ecology received 16 written comment submissions from a total of 13 persons, agencies, or Tribes. The Draft PEIS has been revised to include updated information, address comments, and provide clarity. Comments are included in Appendix S, along with responses to those comments.

Key changes from the Draft PEIS include the following:

- The analysis showed potential impacts from small to medium utility-scale facilities are similar in most cases to impacts from large utility-scale facilities, so these types of facilities have been combined in the technical resource reports (Appendices B-Q) to improve readability of the document.
- The Final PEIS includes an appendix that compiles measures to avoid, reduce, and mitigate impacts for all resource areas, and ties the impacts to the mitigation measures with potentially significant impacts (Appendix A: *Measures to Avoid, Reduce, and Mitigate Impacts*). Further reorganization of the measures was done based on implementation workshops held with developers, Tribes, organizations, and local governments.
- Additional maps were added to the *Biological Resources Technical Report* (Appendix G) and *Recreation Resources Technical Report* (Appendix M) to respond to public comments and illustrate additional examples of the types of information available.
- The *Response to Comments* was added as Appendix S.

## Cost of copy of PEIS

To obtain a CD or printed copy of the Final PEIS (for the cost of production), follow the instructions provided on the Ecology [“Publications & Forms” webpage](#).<sup>8</sup>

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<sup>7</sup> <https://ecology.wa.gov/regulations-permits/sepa/clean-energy/programmatic-eis>

<sup>8</sup> <https://ecology.wa.gov/footer-pages/online-tools-publications/publications-forms>

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Washington State Department of Ecology  
Olympia, WA

**June 2025 | Publication 25-06-002**



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

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- Appendix E. Air Quality and Greenhouse Gases Technical Resource Report**
- Appendix F. Water Resources Technical Report**
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- Appendix H. Energy and Natural Resources Technical Report**
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- Appendix O. Transportation Resources Technical Report**
- Appendix P. Public Services and Utilities Technical Resource Report**
- Appendix Q. Cumulative Impacts Technical Report**
- Appendix R. Scoping Summary Report**
- Appendix S: Response to Comments**

## Acronyms and Abbreviations List

AC	alternating current
BESS	battery energy storage system
BLM	Bureau of Land Management
BMP	best management practice
CCA	Climate Commitment Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	Compatible Energy Siting Assessment
CETA	Clean Energy Transformation Act
CO <sub>2</sub> e	carbon dioxide equivalent
CSZ	Cascadia Subduction Zone
DAHP	Washington State Department of Archaeology and Historic Preservation
dBA	A-weighted decibel
DC	direct current
DNR	Washington State Department of Natural Resources
DOC	Washington Department of Commerce
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EDNA	environmental designation for noise abatement
EFSEC	State of Washington Energy Facility Site Evaluation Council
EHS	environmental health and safety
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FTA	Federal Transit Administration
GHG	greenhouse gas
GHI	global horizontal irradiance
GMA	Growth Management Act
HVAC	heating, ventilation, and air conditioning
KOP	key observation point
kV	kilovolt
kWh	kilowatt-hour
kWh/m <sup>2</sup> /day	kilowatt-hour per square meter per day
LCA	life-cycle assessment
MW	megawatt
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration/Act

PEIS	Programmatic Environmental Impact Statement
PPE	personal protective equipment
PV	photovoltaic
RCW	Revised Code of Washington
RFFA	reasonably foreseeable future action
ROW	right-of-way
SEPA	State Environmental Policy Act
SFMO	State Fire Marshal's Office
SMP	Shoreline Management Plan
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	stormwater pollution prevention plan
TCP	Traditional Cultural Property or Places
UGA	urban growth area
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WISAARD	Washington Information System for Architectural and Archaeological Records Data
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
WSRRI	Washington Shrubsteppe Restoration and Resiliency Initiative

# Crosswalk with PEIS for 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 the areas with substantial differences between the documents.

Section	Utility-Scale Solar Energy PEIS (this document)	Utility-Scale Onshore Wind Energy PEIS
1: Introduction and Background	<ul style="list-style-type: none"> <li>Different summary of types of facilities and geographic areas evaluated</li> </ul>	<ul style="list-style-type: none"> <li>Different summary of types of facilities and geographic areas evaluated</li> </ul>
2: Utility-Scale Solar/Onshore Wind Energy Facilities	<ul style="list-style-type: none"> <li>Descriptions of typical components and phases of utility-scale solar energy facilities</li> <li>Some differences in alternatives considered but not carried forward</li> </ul>	<ul style="list-style-type: none"> <li>Description of typical components and phases of utility-scale onshore wind energy facilities</li> <li>Some differences in alternatives considered but not carried forward</li> </ul>
3: Scope of Study	<ul style="list-style-type: none"> <li>Description and map depicting scope of study for utility-scale solar energy facilities</li> </ul>	<ul style="list-style-type: none"> <li>Description and map depicting scope of study for utility-scale onshore wind energy facilities</li> </ul>
4: Affected Environment, Potential Impacts, and Mitigation (Introduction)	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>
4.1: Introduction	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>
4.2: General measures	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>
4.3 Tribal rights, interests, and resources	<ul style="list-style-type: none"> <li>Differences in specific impact drivers associated with facilities</li> </ul>	<ul style="list-style-type: none"> <li>Larger study area includes consideration of additional geographic regions and steeper sloped/more mountainous areas</li> <li>Differences in specific impact drivers associated with facilities</li> </ul>
4.4 Environmental justice and overburdened communities	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>
4.5 Earth	<ul style="list-style-type: none"> <li>Some differences in measures to avoid and reduce impacts</li> </ul>	<ul style="list-style-type: none"> <li>Larger study area includes consideration of different affected environment areas (e.g., overlap with tsunami inundation zones and additional faults)</li> <li>Differences in landslide and erosion risks from potential for facilities to be on steeper slopes</li> </ul>

Section	Utility-Scale Solar Energy PEIS (this document)	Utility-Scale Onshore Wind Energy PEIS
		<ul style="list-style-type: none"> <li>Some differences in measures to avoid and reduce impacts</li> </ul>
4.6 Air quality and greenhouse gases	<ul style="list-style-type: none"> <li>Different specific air emission estimates</li> <li>Differences in the estimates for greenhouse gas life-cycle assessments</li> </ul>	<ul style="list-style-type: none"> <li>Different specific air emission estimates</li> <li>Includes evaluation of air quality for repowering facilities instead of decommissioning</li> <li>Differences in the estimates for greenhouse gas life-cycle assessments</li> </ul>
4.7 Water resources	<ul style="list-style-type: none"> <li>Differences in which WRIAs and aquifers the study area overlaps</li> <li>Different impacts related to impervious surfaces</li> <li>Includes potential water use for washing solar panels</li> </ul>	<ul style="list-style-type: none"> <li>Differences in which WRIAs and aquifers the study area overlaps</li> <li>Different impacts related to impervious surfaces</li> </ul>
4.8 Biological resources	<ul style="list-style-type: none"> <li>Differences in specific impact drivers associated with facilities</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>	<ul style="list-style-type: none"> <li>Larger study area includes consideration of additional ecoregions, marine and nearshore habitats and species, and estuarine wetlands</li> <li>Differences in specific impact drivers associated with facilities</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>
4.9 Energy or natural resources	<ul style="list-style-type: none"> <li>Different specific energy and natural resource use estimates and resulting different ranges of potential impacts</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>	<ul style="list-style-type: none"> <li>Includes the potential for facilities to affect adjacent wind resource availability</li> <li>Different specific energy and natural resource use estimates and resulting different ranges of potential impacts</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>
4.10 Environmental health and safety	<ul style="list-style-type: none"> <li>Some differences in specific hazardous materials, health and safety hazards, and wildfire risks</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>	<ul style="list-style-type: none"> <li>Some differences in specific hazardous materials, health and safety hazards, and wildfire risks</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>
4.11 Noise and vibration	<ul style="list-style-type: none"> <li>Differences in the types of facility noise-and vibration-generating activities</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>	<ul style="list-style-type: none"> <li>Differences in the types of facility noise-and vibration-generating activities</li> <li>Larger distance at which potential impacts from facilities could occur</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>

Section	Utility-Scale Solar Energy PEIS (this document)	Utility-Scale Onshore Wind Energy PEIS
4.12 Land use	<ul style="list-style-type: none"> <li>Additional agricultural information in affected environment from Least-Conflict Solar Siting Study for the Columbia Plateau</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>	<ul style="list-style-type: none"> <li>Decommissioning considers potential impacts from repowering wind facilities</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>
4.13 Aesthetics/ visual quality	<ul style="list-style-type: none"> <li>Different specific visual quality, light, and glare conditions associated with facilities, and resulting different ranges of potential impacts</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>	<ul style="list-style-type: none"> <li>Different specific visual quality, light, and glare conditions associated with facilities, and resulting different ranges of potential impacts</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>
4.14 Recreation	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>
4.15 Historic and cultural resources	<ul style="list-style-type: none"> <li>Differences in specific impact drivers associated with facilities</li> </ul>	<ul style="list-style-type: none"> <li>Larger study area includes consideration of additional geographic regions</li> <li>Differences in specific impact drivers associated with facilities</li> </ul>
4.16 Transportation	<ul style="list-style-type: none"> <li>Differences in construction impacts from transportation of facility components</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>	<ul style="list-style-type: none"> <li>Differences in construction impacts from transportation of facility components</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>
4.17 Public services and utilities	<ul style="list-style-type: none"> <li>Differences in specific impacts on public service and utility providers</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>	<ul style="list-style-type: none"> <li>Potential for significant adverse impacts on fire response related to turbines</li> <li>Potential for significant adverse impacts on solid waste and recycling during decommissioning or repowering</li> <li>Some differences in measures to avoid and reduce impacts</li> </ul>
5: Cumulative Impacts	<ul style="list-style-type: none"> <li>Some differences in cumulative impacts on biological resources, noise and vibration, aesthetics/visual quality, and public services and utilities</li> </ul>	<ul style="list-style-type: none"> <li>Some differences in cumulative impacts on biological resources, noise and vibration, aesthetics/visual quality, and public services and utilities</li> </ul>
6: Consultation and Coordination	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>
7: Permits and Approvals	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>
8: List of Preparers and Contributors	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>
9: Distribution List	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>	<ul style="list-style-type: none"> <li>No substantial differences</li> </ul>

# 1 Introduction and Background

## 1.1 PEIS overview

This Washington State Environmental Policy Act (SEPA) Programmatic Environmental Impact Statement (PEIS) was prepared to evaluate utility-scale solar energy facilities in Washington state. A PEIS is a type of nonproject environmental review used for planning; it is not an evaluation of a specific project. This PEIS considers potentially significant adverse environmental impacts at a broad level. It analyzes general types of facilities—but not individual projects—to identify probable significant adverse environmental impacts and possible ways to avoid, minimize, or mitigate those impacts.

The PEIS is intended to:

- Support the state’s transition to clean energy while protecting the environment, Tribal rights and resources, and local communities.
- Identify the range of probable significant adverse environmental impacts utility-scale solar energy projects can pose.
- Provide information about facility siting and design that may be used to help avoid or minimize adverse environmental impacts for proposed facilities.
- Identify general potential mitigation measures for impacts.
- Provide information for lead agencies to consider when conducting environmental reviews for utility-scale solar energy facilities.

The PEIS does not approve, authorize, limit, or exclude future facilities. Proposed utility-scale solar energy facilities will need individual environmental review under SEPA and other applicable laws using project- and site-specific information as determined by the lead agency.

### Environmental Review Terminology

**Lead agency:** Agency responsible for preparing the environmental review under state law.

**State Environmental Policy Act (SEPA):** Washington State law intended to ensure that environmental values are considered early and during decision-making actions by state and local agencies.

**Programmatic Environmental Impact Statement (PEIS):** Fact-based nonproject environmental review used for planning. It is not an evaluation of a specific project. A PEIS considers potentially significant adverse environmental impacts at a broad level as well as possible ways to avoid, minimize, or mitigate those impacts. Local, state, and federal agencies may use PEISs to help evaluate proposed actions, alternatives, environmental impacts, or mitigation for proposed projects.

## 1.2 Background and history

The Washington State Legislature directed the Washington State Department of Ecology (Ecology) to prepare nonproject environmental reviews of utility-scale onshore wind energy facilities, utility-scale solar energy facilities, and green electrolytic and renewable hydrogen facilities in Washington by June 30, 2025. The reviews are being prepared pursuant to SEPA.

This PEIS focuses on utility-scale solar energy facilities. A separate PEIS was prepared for utility-scale onshore wind energy facilities. Solar and onshore wind environmental reviews are being developed at the same time, so this report includes a crosswalk for comparison purposes in the previous section. A PEIS that focuses on green electrolytic and renewable hydrogen facilities is being developed separately and is not discussed further in this document. Information on all three processes is available on [Ecology's webpage for clean energy PEISs](#).<sup>9</sup>

Ecology developed this PEIS to analyze potential impacts and mitigation at a broad level. The agency issued a Determination of Significance and opened an extended comment period on the scope of the PEIS on utility-scale solar facilities in Washington state on September 27, 2023. The PEIS was prepared under Revised Code of Washington (RCW) 43.21C.030(2)(c) per Chapter 197-11 Washington Administrative Code (WAC) procedures. The Determination of Significance and Scoping Notice for the PEIS initiated Ecology's environmental review process. Scoping helps determine the focus of the PEIS evaluation by seeking input from Tribes, agencies, members of the public, and interested parties on the contents of the PEIS. More information about the scoping process is available in Appendix R, *Scoping Summary Report*.

The Draft PEIS was released on September 25, 2024. A 33-day public comment period was conducted from 12:00 p.m., September 25, through 11:59 p.m., October 28, 2024. Ecology received 16 written comment submissions from a total of 13 persons, agencies, or Tribes. The Draft PEIS has been revised to include updated information, address comments, and provide clarity. Comments received on the Draft PEIS, along with responses, are included in Appendix S, *Response to Comments*.

The Washington State Legislature enacted [legislation](#)<sup>10</sup> that set a series of limits on the emission of greenhouse gases (GHGs) within the state. Emissions of GHGs in Washington from human activities must be limited to achieve the following reductions:

- By 2020, reduce overall emissions of GHGs to 1990 levels, or 90.5 million metric tons.
- By 2030, reduce overall emissions of GHGs to 45% below 1990 levels, or 50 million metric tons.
- By 2040, reduce overall emissions of GHGs to 70% below 1990 levels, or 27 million metric tons.

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<sup>9</sup> <https://ecology.wa.gov/regulations-permits/sepa/clean-energy/programmatic-eis>

<sup>10</sup> [https://app.leg.wa.gov/rcw/default.aspx?cite=70A.45&full=true#:~:text=\(iii\)%20By%202040%2C%20reduce,five%20percent%20below%201990%20levels.](https://app.leg.wa.gov/rcw/default.aspx?cite=70A.45&full=true#:~:text=(iii)%20By%202040%2C%20reduce,five%20percent%20below%201990%20levels.)

- By 2050, reduce overall emissions of GHGs to 95% below 1990 levels, or 5 million metric tons, and achieve net-zero GHG emissions.

The [2021 State Energy Strategy](#)<sup>11</sup> provides a roadmap for meeting the state’s GHG emission limits and identifies a path to a clean energy economy. Increased demand for electricity will come from electrifying passenger, truck, and freight vehicles and transitioning buildings and industry from use of fossil fuels for electricity to use of clean energy for electricity. Proposals for new clean energy facilities are expected that will address this increased demand for electricity.

In 2019, the Legislature passed the [Clean Energy Transformation Act \(CETA\)](#),<sup>12</sup> which requires all of Washington’s electric utilities to meet 100% of their retail electric load using non-emitting and renewable resources by January 1, 2045. CETA requires electric utilities to eliminate coal-fired resources by December 31, 2025, and make all retail sales of electricity GHG-neutral by January 1, 2030.

### 1.3 Types of solar facilities evaluated

The PEIS focuses on utility-scale solar energy facilities as directed by the Washington State Legislature. As used in this PEIS, utility-scale means a facility capable of providing at least 20 megawatts (MW) of electricity directly to the state’s electrical grid. Ecology published the [Scoping Document](#)<sup>13</sup> in September 2023 that included information on possible types of facilities that could be analyzed in the PEIS.

Facility types that did not meet definitions of the utility-scale solar energy facilities to be analyzed in the legislative direction were eliminated from further consideration and are discussed in Section 2.8. For example, distributed solar, community solar, and home rooftop solar systems are not utility-scale facilities and are not evaluated in the PEIS. Fossil-fuel energy facilities and other clean energy facilities are considered in the cumulative impact analysis.

After consideration of comments and input received during scoping, Ecology identified three types of utility-scale solar energy facilities and a No Action Alternative to be evaluated in this PEIS. The facility types are as follows, and detailed descriptions are in Chapter 2:

- **Utility-scale solar facilities:** solar energy facilities capable of generating between 20 and 1,200 MW of energy on sites between 200 to 12,000 acres in size.
- **Solar facilities with battery energy storage systems:** facilities that also include one or two battery energy storage systems (BESSs), each capable of storing up to 500 MW of energy.

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<sup>11</sup> <https://www.commerce.wa.gov/growing-the-economy/energy/2021-state-energy-strategy/>

<sup>12</sup> <https://lawfilesexternal.wa.gov/biennium/2019-20/Pdf/Bills/Session%20Laws/Senate/5116-S2.SL.pdf>

<sup>13</sup> [https://fortress.wa.gov/ecy/ezshare/sea/Clean Energy Coordination/Solar\\_ScopingDocument\\_PEIS\\_PublicFinal\\_092723corrected.pdf](https://fortress.wa.gov/ecy/ezshare/sea/Clean%20Energy%20Coordination/Solar_ScopingDocument_PEIS_PublicFinal_092723corrected.pdf)

- **Solar facilities that include agricultural uses:** dual-use facilities where agriculture would occur during facility operations and may include raising or modifying the solar panels to allow for agricultural land use.

It is important to note that this PEIS does not limit the types of facilities that could be proposed or built in Washington. The facilities evaluated in this PEIS are intended to capture the types of facilities most likely to be proposed based on current and best available information.

## 1.4 PEIS scope of analysis

Ecology considered the potential for impacts from these types of facilities, as well as comments received during scoping, to determine the scope of the PEIS. The PEIS focuses on probable significant adverse impacts, with some information provided on other impacts. This is reflected in the level of detail provided for resources in the sections and appendices, with more information provided for potentially significant impacts. The introduction to Section 4 has more information on the types of impacts considered.

[RCW 43.21C.535](https://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.535)<sup>14</sup> states that “the scope of a nonproject environmental review shall be limited to the probable, significant adverse environmental impacts in geographic areas that are suitable for the applicable clean energy type.” Based on this legislative direction, and considering comments received during scoping, the geographic scope of study was developed (Figure 1-1).

Ecology identified the following assumptions in determining the geographic area for analysis:

- Areas with a global horizontal irradiance (GHI) of 3.5 kilowatt-hours per square meter per day (kWh/m<sup>2</sup>/day) or greater
- Flat to moderately sloped ground surfaces with 15% or less slopes
- Areas within 25 miles of existing transmission lines that can handle the energy generation of utility-scale facilities (230 kilovolt [kV] or greater lines)
- An area in eastern Washington with existing utility-scale solar energy facilities that does not meet the criteria above was included in the study area because the area has sufficient solar energy availability and other potentially favorable characteristics for utility-scale developments.

Chapter 3 describes other factors considered for the geographic scope of study. It is important to note that the geographic scope of study does not show where a facility may or may not be sited; it is for impact analysis only. Facilities may be proposed within or outside of the geographic scope of study. Adjacent lands are used for various purposes and may be affected by utility-scale solar energy facilities. Therefore, some resources have study areas for the analysis of impacts that may extend beyond the geographic scope of study.

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<sup>14</sup> <https://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.535>

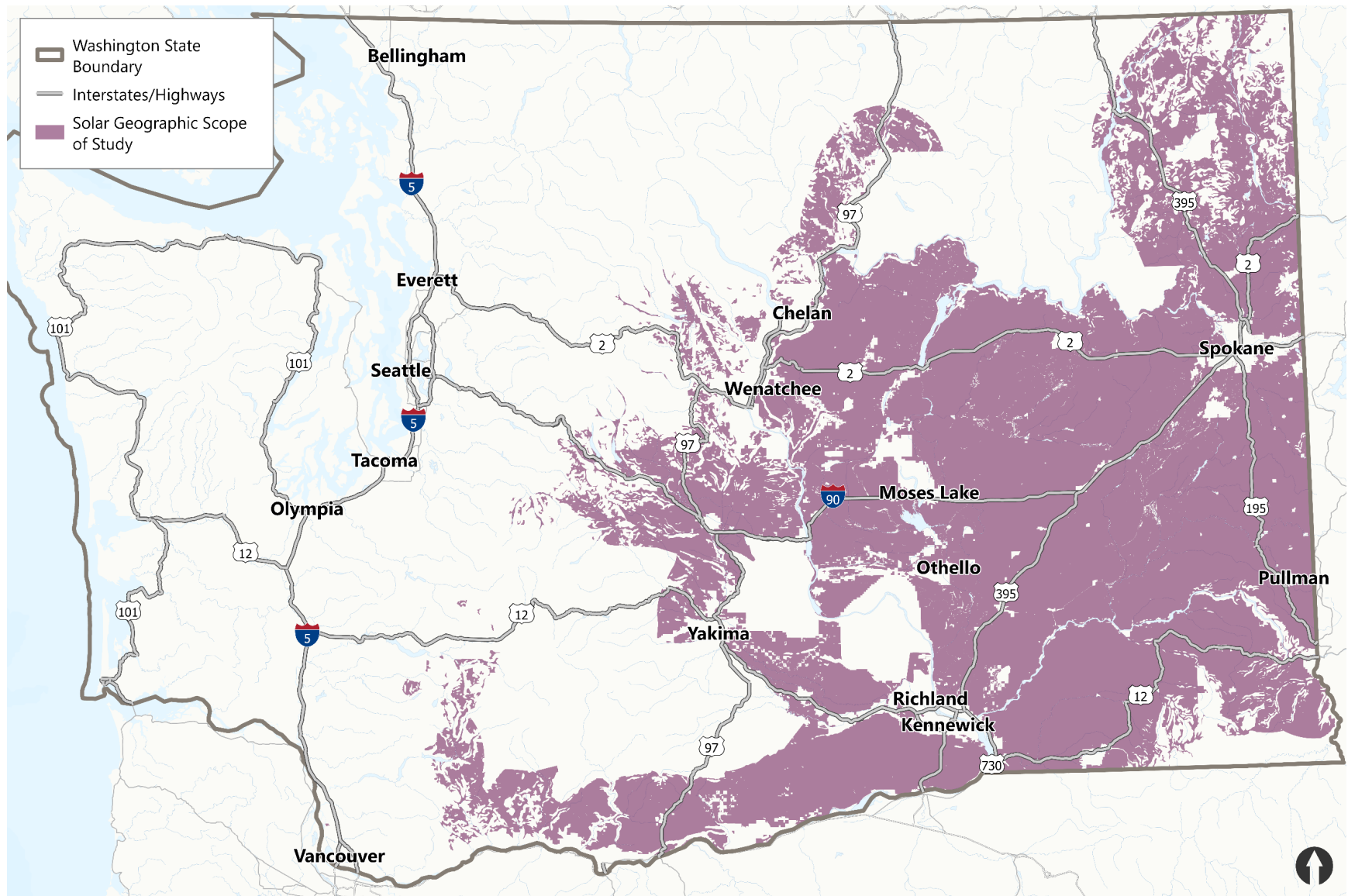


Figure 1-1. Utility-Scale Solar Energy Facilities PEIS – geographic scope of study

## 1.5 Relationship of PEIS to projects

Ecology prepared this PEIS in compliance with SEPA. The SEPA environmental review process provides a way to identify and assess the possible environmental effects of a proposal and how they could be avoided or mitigated. It helps decision-makers and the public understand how a proposed action could affect the natural and human environment.

The PEIS considers potential impacts from general types of solar energy facilities; it is not site-specific or for a specific facility. It evaluates environmental impacts over a broad geography and the lifetime of a project. The depth and detail of the impact analysis is general, focusing on major impacts in a qualitative manner. Mitigation is also identified at a high level.

SEPA analyses for specific solar energy facility proposals would tier to this PEIS. Tiering means a broad nonproject evaluation is later used during the evaluation of a specific facility. Tiering can result in a more effective environmental analysis process for subsequent solar energy development proposals (see Figure 1-2).

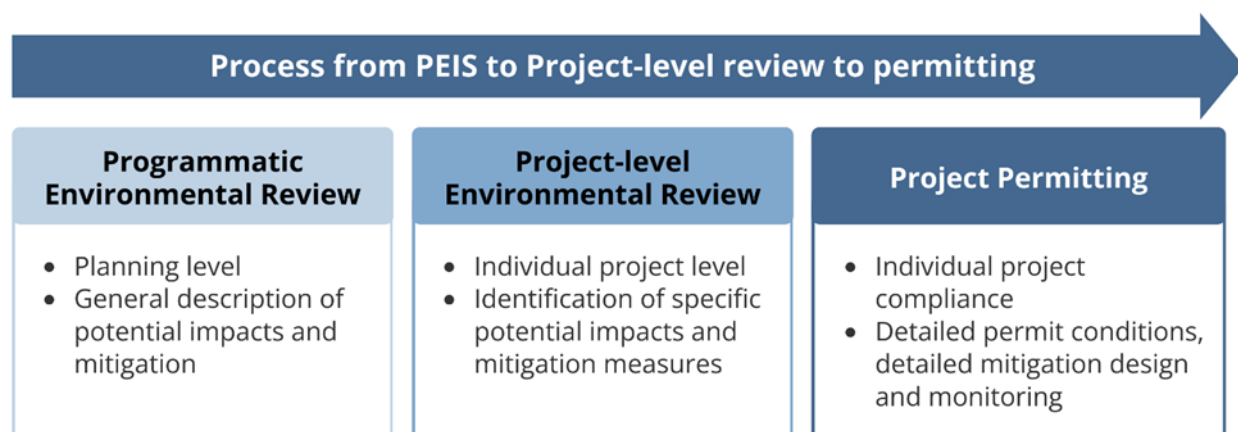


Figure 1-1. Planning, review, and permitting processes

This PEIS identifies probable significant adverse environmental impacts and relevant mitigation applicable to utility-scale solar energy development in general. The PEIS does not assess site-specific issues associated with any individual energy development facility. Location-specific factors vary considerably from site to site. These include factors such as the soil type, groundwater availability, water types, habitat, vegetation, the presence of threatened or endangered species, and the presence of Tribal and cultural resources. The effects of location-specific and project-specific factors cannot be fully anticipated or addressed in a programmatic analysis. The PEIS identifies potential impacts to be considered early and each solar facility proposal would be required to have its own SEPA environmental review. During that process, site-specific information and project-specific effects would be evaluated.

A PEIS does not approve or deny a proposed project. Federal, state, and local agencies may—and in some cases must, as explained below—use the information in the PEIS, along with other

publicly available information and site-specific details, to inform project-level environmental reviews and permitting.

[RCW 43.21C.538](https://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.538)<sup>15</sup> requires SEPA lead agencies to consider the PEIS for a proposed utility-scale solar project. Each agency would be responsible for determining which elements of the PEIS analysis are applicable in its evaluation of a proposed facility. Developers must conduct analysis to address project-specific elements and impacts not evaluated in the PEIS.

At the project level, this PEIS can be useful in a variety of ways:

- For project developers, this PEIS can help with:
  - Making siting and design decisions that avoid and reduce impacts
  - Identifying impacts that could be potentially significant and the type of information reviewing agencies will need for their evaluations
  - Identifying mitigation measures for potentially significant impacts that could be incorporated into a mitigation plan
- For local, state, and federal agencies, this PEIS can help with conducting environmental reviews and making permit decisions.
- For the public and Tribes, this PEIS provides information about project types, potential impacts, and measures to avoid, reduce, and mitigate impacts.

Section 4.1 provides additional information regarding use of the PEIS at the project level. A comprehensive list of measures to avoid, reduce, and mitigate impacts is provided in Appendix A.

## 1.6 PEIS organization

This PEIS is organized to provide information in three ways. The Summary provides brief, high-level information on key findings and probable significant adverse impacts. The PEIS chapters provide high-level information on the impact analysis and findings. Appendices B through Q contain the technical resource reports with detailed methods and technical information. For sections of this PEIS that have a related technical resource report, the report is the official technical documentation for this PEIS. If there is conflicting information between the Summary, PEIS chapters, or the technical resource report, the technical resource report is considered to be the controlling document. The PEIS is organized as follows:

- **Publication and Contact Information, Cover Letter, and Fact Sheet**
- **Summary**
- **PEIS:**
  - **Chapter 1: Introduction and Background** is contained in this chapter.

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<sup>15</sup> <https://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.538>

- **Chapter 2: Utility-Scale Solar Energy Facilities** describes the purpose and objectives of the PEIS, typical components and phases of utility-scale solar energy facilities, and the alternatives considered for the PEIS.
- **Chapter 3: Study Area** describes the geographic and temporal scope of study that was used for the PEIS analysis.
- **Chapter 4: Affected Environment, Potential Impacts, and Mitigation** summarizes the current conditions in the study area and probable significant adverse impacts for each element of the environment. This chapter also identifies potential mitigation measures that could be implemented to reduce potential effects. References are provided to appropriate appendices for more details.
- **Chapter 5: Cumulative Impacts** summarizes the evaluation of potential cumulative effects of the alternatives. Additional detail is provided in Appendix Q.
- **Chapter 6: Consultation and Coordination** summarizes the PEIS scoping process; the roles of Ecology, other agencies, and Tribal governments in the development of the PEIS; and Ecology's coordination with Tribes, other agencies, the public, and interested parties.
- **Chapter 7: Permits and Approvals** summarizes permits, licenses, and approvals that may be required for future proposed facilities.
- **Chapter 8: List of Preparers and Contributors** identifies federal and state agencies and consulting firms who participated in the evaluation.
- **Chapter 9: Distribution List** identifies agencies, Tribes, organizations, and others who will receive this PEIS.
- **Appendix A: Measures to Avoid, Reduce, and Mitigate Impacts** provides a comprehensive list of measures for all resources.
- **Appendices B–Q: Technical Resource Reports** with detailed information relevant to the evaluation provided in this PEIS.
- **Appendix R: Scoping Summary Report** with an overview of scoping comments.
- **Appendix S: Response to Comments** with comments received on the Draft PEIS and responses.

## 2 Utility-Scale Solar Energy Facilities

### 2.1 Purpose

As directed by the Legislature, this PEIS evaluates potential impacts and mitigation for utility-scale solar energy facilities in Washington state. Three types of utility-scale solar energy facilities (alternatives), and a No Action Alternative are assessed in this PEIS. The facility types include:

- **Utility-scale solar facilities:** solar energy facilities capable of generating between 20 and 1,200 MW of energy
- **Solar facilities with BESSs:** facilities with the addition of one or two BESSs, each capable of storing up to 500 MW of energy
- **Solar facilities that include agricultural uses:** dual-use facilities where agriculture would occur during facility operations and may include raising or modifying the solar panels to allow for agricultural land use

This chapter describes typical types of equipment and actions for site characterization, construction, operation, and decommissioning of these types of facilities, which are used for analysis in the PEIS.

This PEIS is expected to be used by energy facility developers in developing specific facilities. Project-level SEPA review must be completed for proposed projects and information from this PEIS must be considered by SEPA lead agencies.

### 2.2 Typical components of utility-scale solar energy facilities

This PEIS evaluates utility-scale solar energy facilities consisting of solar arrays made from photovoltaic (PV) cells, associated power and electrical equipment, access roads, and other supporting facilities. This section describes typical types of equipment and actions for site characterization, construction, operation, and decommissioning of these types of facilities, which are used for analysis in the PEIS. The PEIS evaluates a range of small to large facility sizes. The typical components of utility-scale solar energy facilities are similar for the small to medium and large facility types analyzed, with larger facilities including proportionally more components.

PV systems are based on the use of semiconductors, materials that absorb light's energy and generate small amounts of electric current. Silicon, the earth's most abundant material after oxygen, is the cheapest and most frequently used semiconductor.

To produce electricity at the utility scale, multiple individual solar cells are connected to form a module. Modules are combined to make individual solar panels, and solar panels are grouped into arrays producing direct current (DC) electricity. This modular nature allows flexibility in sizing facilities based on factors such as the amount of power needed or the amount of land area available. Figure 2-1 illustrates these components.

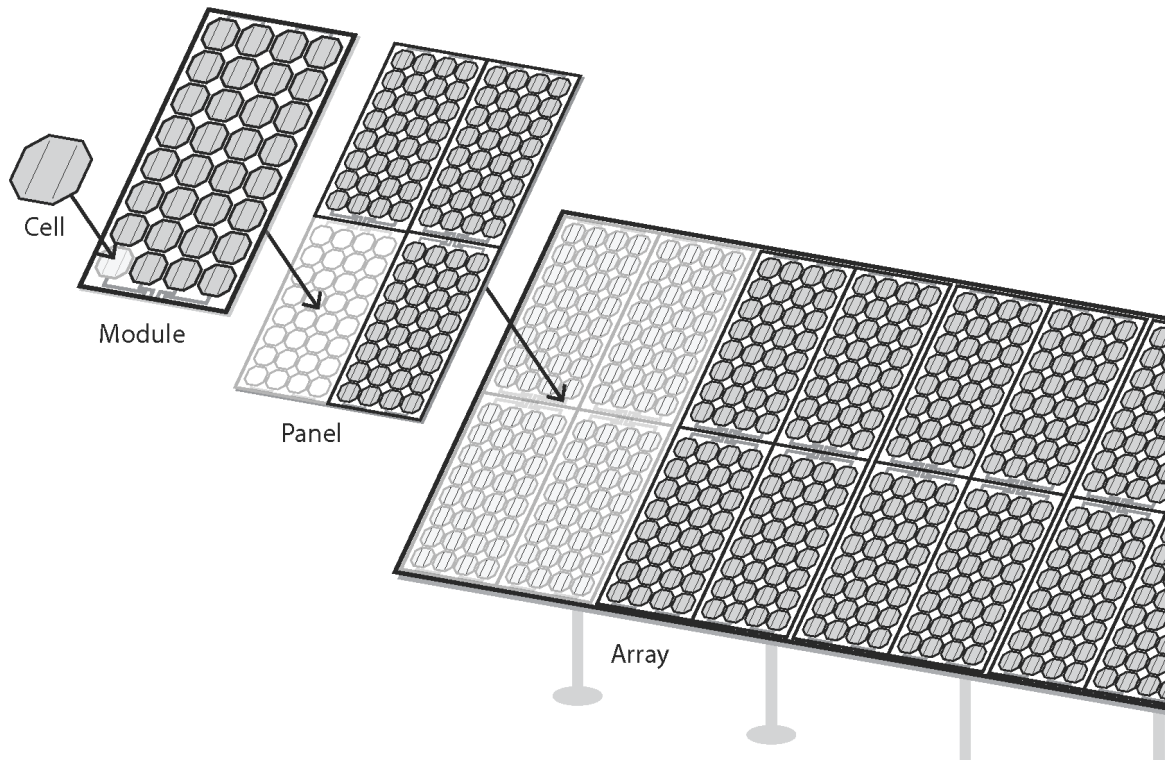


Figure 2-1. Solar cell, module, panel, and array

Solar energy facilities evaluated in this PEIS consist of two groups of equipment. The first is the solar field, which contains the solar array and may include a tracker system. The array is placed either in a fixed position optimal for capturing sunlight, or on a tracker system. A tracker system can be used to optimize electricity production by rotating the solar array to follow the path of the sun throughout the day.

The second group of equipment is the power collection system. This includes inverters to convert the produced DC power to alternating current (AC) power, transformers to increase voltage for feeding into the power grid, and a type of transmission line called a gen-tie line that connects the facility to the power grid.

One of the facility types analyzed in this PEIS includes a co-located BESS (refer to Section 2.3 for detailed discussion of this facility type). This type of facility would include a solar array and power collection system, along with batteries to store energy. This stored energy could be sent to the electrical grid at times other than when it is produced.

While the size of facilities would vary, for the purposes of this PEIS and based on examples of existing or permitted solar facilities in Washington, 10 acres for 1 MW of energy is used for estimating facility site size. The footprint for the solar array area would be within the facility site and would typically be about 10% to 15% of the total facility site size. Spacing is required between solar arrays and to allow for necessary infrastructure including access roads, operations and

maintenance facilities, BESSs (if applicable), and the power collection system. The rest of the site is typically not developed. Actual facility sizes would vary based on geography and design. Figures 2-2 and 2-3 illustrate typical components of utility-scale solar facilities.

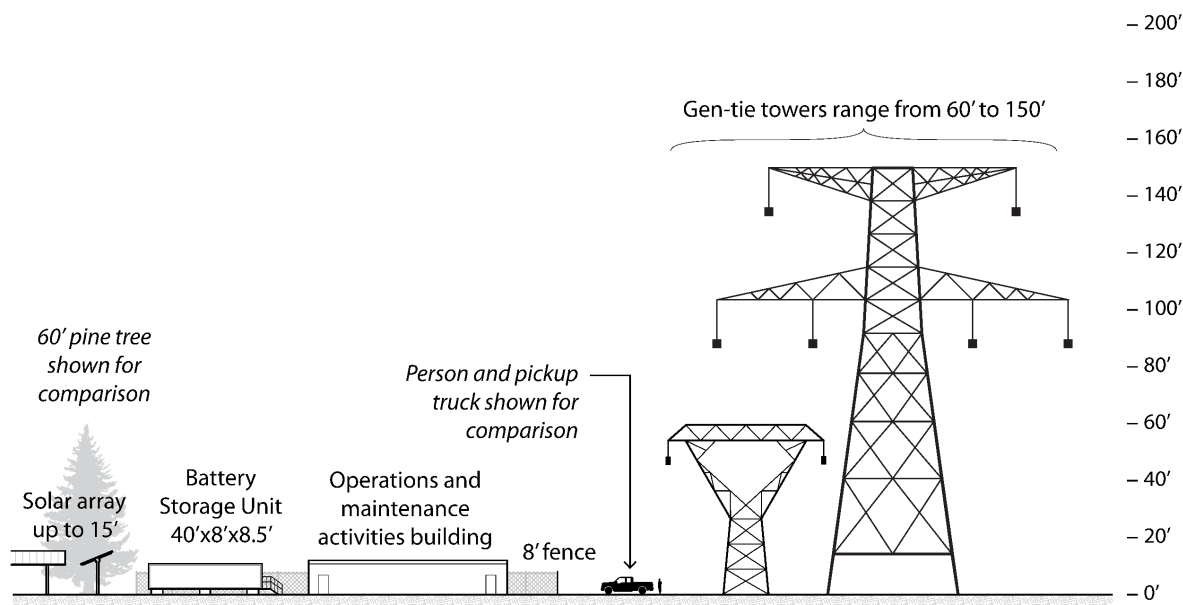


Figure 2-2. Relative scale of the typical components of a utility-scale solar facility

#### Example of a 194 MW solar facility



Photograph from [Business Wire](#)

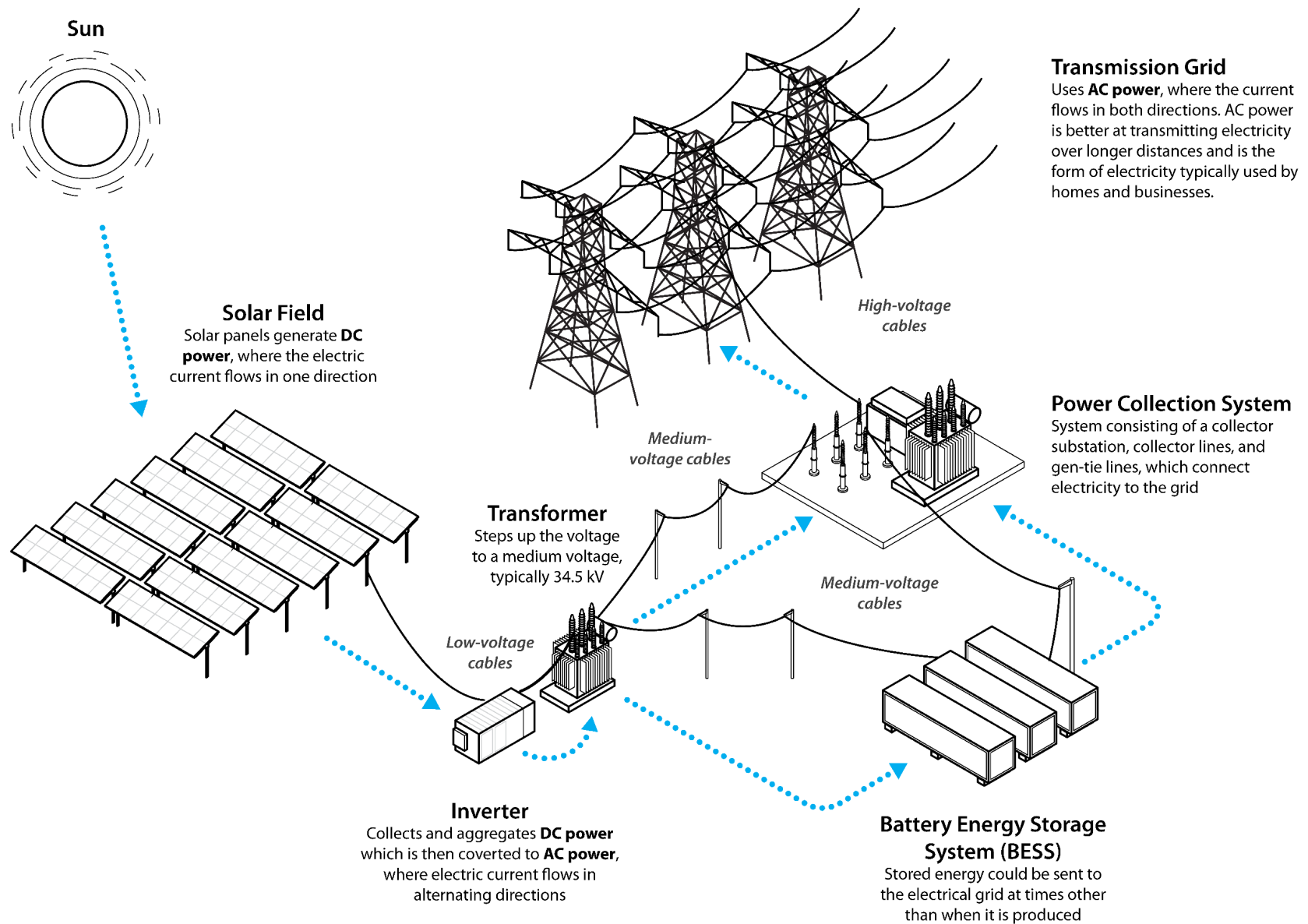


Figure 2-3. Typical components of utility-scale solar energy facilities

## 2.2.1 Solar array

For purposes of this analysis, a solar array consists of rows of solar panels, tracker system, posts, and cabling.

Developers may consider a range of options using this equipment in siting solar arrays. This includes micro-siting, where individual rows of solar panels are positioned to maximize the solar energy received and orientations may not be identical. The PEIS does not look at specific siting layouts for the solar array equipment but rather analyzes the overall facility.

### Example of solar panels installed in an array



Photograph from National Park Service Climate Change Response

### 2.2.1.1 Solar panels

Developers can choose from a variety of panels based on market conditions, availability, and environmental factors. For purposes of this PEIS, it is assumed mono- or poly-crystalline panels would be used to generate electricity by converting sunlight into DC electrical energy. Most solar panels are currently monofacial, which means that they have PV cells on one side, but bifacial solar panels, which have PV cells on both sides, are starting to become more common at utility-scale solar facilities.

Solar panels are made from many solar cells contained within anti-reflective glass and a metal frame. These panels are linked together with factory-installed wire connectors. The amount of electricity generated from a single panel varies by size and the number of cells per panel. Panels are connected in series to form long rows called arrays. The rows are then connected via cables

and sent to inverters and transformers. Multiple rows may be configured in different ways, depending on the equipment type and topography. The spacing between rows, mounting equipment, and other design criteria may also affect the layout.

Once operational, solar panels typically require minimal maintenance, described in Section 2.5.3.

#### **2.2.1.2 Solar tracker system**

Solar panels mounted on tracker systems optimize electricity production by rotating the solar panels to follow the path of the sun throughout the day. Trackers can be single axis, which means they can rotate east-west, or they can be dual axis, which means they can rotate east-west and north-south. The length of each tracker row varies by topography and the number of panels that the tracker can hold.

A drive unit for the tracker system can control a single row or multiple rows of panels through a series of mechanical linkages and gearboxes. As the solar panels tilt throughout the day, the height of their top edges shift accordingly. They may be up to approximately 15 feet high. The tracker system and associated posts would be designed to withstand wind, snow, and seismic loads anticipated at the facility site.

Post depth would vary depending on ground conditions (e.g., soil, rock), but posts are typically installed 4 to 10 feet below the surface and protrude up to 12 feet above grade. Posts at the end of the tracker rows are usually installed at a greater depth to help them withstand wind uplift. Post locations would be determined based on geotechnical investigations and installed in soil or in concrete foundations, depending on geological conditions. Depending on the ground conditions, concrete fill may be used for each post. Approximately 0.3 cubic yard of concrete would be required for each post. The actual number of posts and foundation methods would vary depending on the tracker system components, topography, height of the solar panels, and site-specific geological conditions.

#### **2.2.1.3 Cabling**

The electrical current produced by solar panels is in the form of DC power. Cables collect and aggregate the DC power. Low-voltage (voltage ranges are illustrated in Figure 2-4) cabling connects the solar panels of each row in a series and brings them together into a single combiner box, which then connects to an inverter. Cabling can be mounted to the tracker system, placed in cable trays aboveground, or buried underground.

#### **2.2.1.4 Inverters**

Inverters convert DC power to AC power. Inverters are typically co-located with transformers on the same concrete slab; however, string inverters may also be used, which are located at the end of each PV row throughout the array. Inverters must comply with the applicable requirements of the National Electric Code and Institute of Electrical and Electronics Engineers standards.

### 2.2.1.5 Transformers

Transformers receive the AC power from the inverters and increase the voltage to a medium voltage, typically around 34.5 kV. The transformers could be co-located with the inverters associated with each array, or centrally located. Transformers must comply with the applicable requirements of the National Electric Code and Institute of Electrical and Electronics Engineers standards.

Transformers are filled with oil, up to 600 gallons depending on the size. These are located on concrete pads and must have a system to contain the oil in the event of a spill. If a facility has an aggregate combined storage capacity of oil greater than 1,320 gallons or is located where a discharge could reach a navigable waterbody, either directly or indirectly, a Spill Prevention, Control, and Countermeasure (SPCC) Plan is required (*Code of Federal Regulations* Part 112).

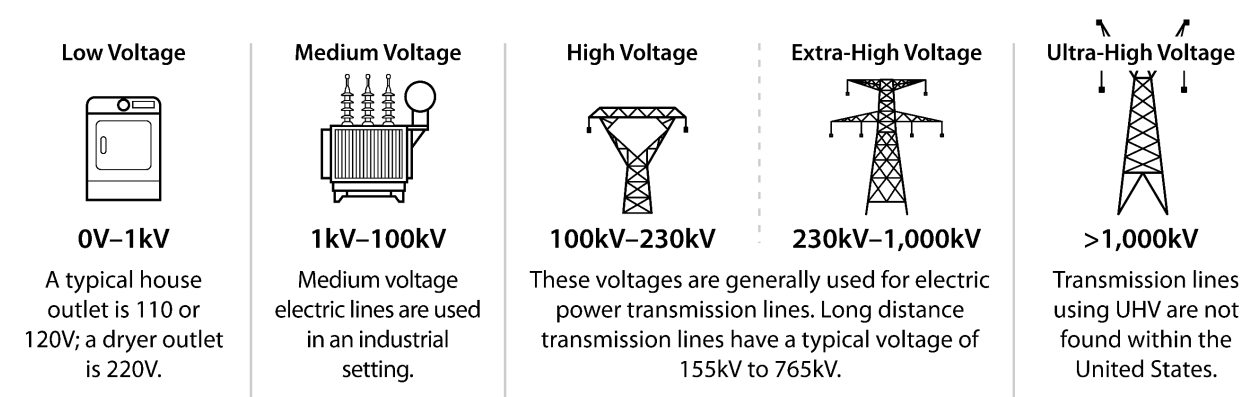


Figure 2-4. Voltage ranges

Note: Voltage measures the current strength or pressure that moves electricity from one point to another.

## 2.2.2 Power collection system

A power collection system typically consists of electrical collector lines, a collector substation, and facility generation interconnect (gen-tie) lines. This system connects the electricity generated by the solar array to the electrical grid via a substation that connects to transmission lines.

### 2.2.2.1 Electrical collector lines

Electrical collector lines link transformers throughout the solar array to the collector substation. Collector lines are located within the facility site and are typically buried underground in trenches approximately 3 feet deep. However, lines may be located aboveground to avoid sensitive environmental or cultural areas, minimize ground disturbance, or avoid rocky or unstable areas that could require blasting. Aboveground lines would be installed on steel or wooden pole structures approximately 60 to 150 feet tall.

Electrical collector lines are typically 34.5 kV. Higher voltage overhead lines of 100 kV or above may be used for larger solar energy facilities or if the distance to the electrical substation is

long. In these cases, additional transformers would be required to increase the voltage from 34.5 kV to the required level.

### **2.2.2.2 Collector substation**

A collector substation includes one or multiple transformers that increase the voltage for transmission to the grid. A collector substation is surrounded by a 7-foot chain-link security fence topped with barbed wire as required by National Fire Protection Association (NFPA) and Occupational Safety and Health Administration (OSHA) standards to ensure public safety from exposure to electrical facilities. One or more collector substations are typically located close to the operations and maintenance building or area.

**Example of an electrical substation**



Photograph from University of California, Davis

### **2.2.2.3 Interconnector lines and gen-tie lines**

Interconnections are lines that carry electricity from the facility collector substation to a gen-tie line. The gen-tie lines then connect electricity to the power grid.

Lines must be constructed in compliance with codes and standards from the following: Washington regulations, National Electrical Safety Code (NESC), American National Standards Institute, National Electrical Manufacturers Association, American Society for Testing and Materials International, Avian Power Line Interaction Committee, as well as other applicable laws and construction codes.

Lines are installed on wood or steel towers that may be up to 150 feet in height. Tower types may include monopole, H-frame, lattice structures, or turning structures and are installed on concrete foundations. Ground clearances for the suspended portion of the line would conform to the NESC standards. The minimum clearance between the line and the ground (including local roadways and land used for agriculture) must be designed consistent with applicable standards identified above and not preclude or inhibit transportation or agricultural uses under the line.

The strip of land where gen-tie lines are built and operated is called a right-of-way (ROW). Local regulations usually require a minimum clearance distance for gen-tie lines based on the voltage of the line.

#### **2.2.2.4 Connection to grid transmission lines**

Utility-scale facilities typically connect to a main transmission line either through a substation or to a gen-tie line.

The length of these connections would depend on the distance from the site to existing transmission lines that have sufficient capacity to accept power from the facility. The distance from the grid connection point would vary by each facility and would be determined by the developer based on a selected site. The PEIS generally assumes the distance from a transmission line to the grid would be 25 miles or less for the analysis.

### **2.2.3 Buildings for operations and maintenance**

Buildings or trailers may be utilized for operations and maintenance activities and would vary in size based on proposed uses. Buildings may be used for offices, restrooms, kitchens, material and equipment storage, or remote monitoring. There may also be an onsite area for parking and an open staging area. Buildings are expected to be fenced for security. Lighting would be needed for security, and occasional work, and maintenance. Service roads and the parking area must have sufficient space for emergency response vehicle access.

Local utilities would provide primary electrical and telephone connections. A facility may include aboveground fuel tanks for generators to serve as backup power. Systems such as a site monitoring system, supervisory control and data acquisition system, and a solar meteorological data system are expected to be installed to provide data for operations and security.

Buildings must be equipped with fire extinguishers, smoke detectors, and basic firefighting equipment for use on site. This includes shovels, beaters (consisting of a piece of rubber at the end of a pole used for extinguishing minor fires), portable water containers for hand sprayers, and personal protective equipment (PPE). The equipment used within the buildings must meet National Electrical Code and Institute of Electrical and Electronics Engineers standards.

### **2.2.4 Stormwater, wastewater, and water supply**

Construction and operational stormwater management plans would be designed during the pre-construction engineering phase, and the developer would be required to obtain the

appropriate National Pollutant Discharge Elimination System (NPDES) permits. Stormwater runoff would primarily be generated from rain that falls on solar panels, buildings, access roads, and foundations. Sanitary wastewater would be managed through municipal wastewater systems, a permitted on-site septic system, or a portable restroom.

Water used for operations and maintenance could be from on-site wells, commercially available wells, water brought to the site, or a municipal water system. Water cisterns may be used to store non-potable water for fire suppression needs.

## **2.2.5 Access roads and fencing**

A facility site includes access roads, gates, and fencing. The road size and type would vary based on the facility location and expected use. Site entrances and main access roads leading to substations, parking areas, or operations and maintenance buildings are more likely to be paved two-lane roads, but interior roads are typically one-lane dirt or gravel roads. Access roads may be installed within the facility property to access certain areas and may also be needed outside of the facility to connect to the existing roadway system. Road widths would vary based on the type of road, use, and room for turning.

Fencing is expected to be installed around the solar array areas and include vehicle and pedestrian access gates. Depending on security needs and the potential presence of wildlife corridors in the area, fencing may consist of 7- or 8-foot-high security fence. Fences around electrical installations would meet National Electric Code requirements. Temporary fencing may also be used during construction.

## **2.3 Battery energy storage system (BESS)**

[RCW 43.21C.535](https://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.535)<sup>16</sup> requires this PEIS to consider facilities with co-located BESSs. A BESS stores and deploys energy generated by a facility. For purposes of the PEIS, the storage technologies evaluated are lithium-ion, flow, or zinc-hybrid batteries. These battery types would be stored in a series of self-contained enclosures located on a concrete pad or concrete piles over gravel within a fenced area, or within a warehouse-type enclosure.

Lithium-ion batteries are the most common type of utility-scale technology. They are a type of solid-state rechargeable battery in which lithium ions, suspended in an electrolyte, move from negative to positive electrodes and back when charging and recharging. Lithium-ion batteries have a typical lifespan of 5 to 15 years<sup>17</sup> and would experience a gradual performance degradation over time. Lithium-ion batteries have the potential to overheat due to damage or failure of battery management systems, which can cause fires and shocks if not safely handled and managed. State regulations require fire suppression and safety measures.

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<sup>16</sup> <https://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.535>

<sup>17</sup> <https://atb-archive.nrel.gov/electricity/2020/index.php?t=st>

Flow batteries are an emerging technology for utility-scale storage. Flow batteries use two electrolyte solutions, one with positive ions and the other with negative ions, where the movement of electrons from one solution to the other creates electricity. Flow batteries typically have a maximum lifespan of 10 to 20 years, and do not degrade over time like conventional batteries. During normal operations, the electrolyte solutions are recovered and reused during the recharging process and are generally not reactive or toxic substances.

Zinc-hybrid batteries store energy by using electricity to split zinc into water and oxygen. This process charges the zinc particles in the battery, which can hold a charge for weeks at a time. When needed, the charged zinc is combined with oxygen to release stored electricity. Zinc batteries have a life of almost 20 years with periodic replacement of some components. Zinc batteries are generally not flammable.

A BESS includes the following:

- Battery storage modules on racks or in containers with inverters, isolation transformers, and switchboards (which distribute power from one or more sources of supply to several smaller loads)
- Converters that convert AC power to DC power for storage
- High-voltage, medium-voltage, and low-voltage electrical systems (voltage ranges included in Figure 2-4; voltages have recently been advancing and may be as high as 1,500 volts)
- Heating, ventilation, and air conditioning (HVAC) units
- Building auxiliary electrical systems
- Fire suppression and prevention systems
- Control system, usually including data acquisition system

For this PEIS, it is assumed that BESSs would be installed within the solar facility site footprint. The BESSs can be distributed or consolidated, but are assumed to typically be in a single location, most likely near the collector substation. BESSs are typically installed in a graveled area where vegetation clearing and gravel surfacing would be required. Battery storage containers are typically 40 by 8 by 8.5 feet and installed on concrete foundations and designed to contain spills. A warehouse-type enclosure of a similar scale and size may also be used. A building must be constructed in compliance with state structural and electrical code requirements. BESSs must comply with the latest Washington State Building Code Council regulations for batteries.

**Example of a BESS exterior**



**Example of a BESS interior**



Photographs from Puget Sound Energy Glacier Battery Storage Innovation Pilot Project

## 2.4 Solar facilities that include agricultural uses (agrivoltaics)

One of the facility types considered in this PEIS is a utility-scale solar facility with co-located agricultural land uses. This could include facilities that maintain an existing agricultural use, change an agricultural type, or add new agricultural use developed with the solar facility. This may involve raising or modifying spacing of solar panels to allow for growing crops or grazing underneath. The use of land for both agriculture or grazing and solar PV energy generation is referred to as agrivoltaics, agrisolar, or dual-use solar. The U.S. Department of Energy (DOE) includes crop production, livestock grazing, and pollinator habitat in its [definition for agrivoltaics](#).<sup>18</sup>

Agrivoltaics is an emerging concept, and universities and federal agencies are conducting research throughout the country, including [in the Pacific Northwest](#).<sup>19</sup> [According to the U.S. Department of Agriculture](#),<sup>20</sup> agriculture and solar energy production can complement each other by allowing working lands to stay working, while helping farms diversify income. Potential benefits of agrivoltaics include a mutually beneficial “cooling” relationship when growing crops or grasses under solar panels. Plants growing under the diffused shade of PV panels are buffered from the day’s most intense rays and air temperature, and the amount of water evaporating from soils is reduced. The plants in turn give off water vapor that helps to naturally cool the PV panels from below, which [DOE reports](#)<sup>21</sup> can increase panel efficiency.

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<sup>18</sup> <https://www.energy.gov/eere/solar/agrivoltaics-solar-and-agriculture-co-location>

<sup>19</sup> <https://www.climatehubs.usda.gov/hubs/northwest/topic/agrivoltaics-pairing-solar-power-and-agriculture-northwest>

<sup>20</sup> <https://www.climatehubs.usda.gov/hubs/northeast/topic/agrivoltaics-coming-soon-farm-near-you>

<sup>21</sup> <https://www.energy.gov/eere/solar/articles/potential-agrivoltaics-us-solar-industry-farmers-and-communities>

### Examples of solar facilities that include agricultural uses



Photographs from National Renewable Energy Laboratory

## 2.5 Phases of utility-scale solar energy facilities

Project design and site selection are often done before a developer submits an application and begins the SEPA environmental review process. It is during siting and design that developers can conduct pre-application discussions with agencies, Tribes, and communities to identify project and site-specific issues, and consider the PEIS findings and measures to avoid and reduce impacts.

Phases of utility-scale solar facilities analyzed in the PEIS include site characterization, followed by construction, into operations, through decommissioning at the end of the facility lifespan (Figure 2-5).

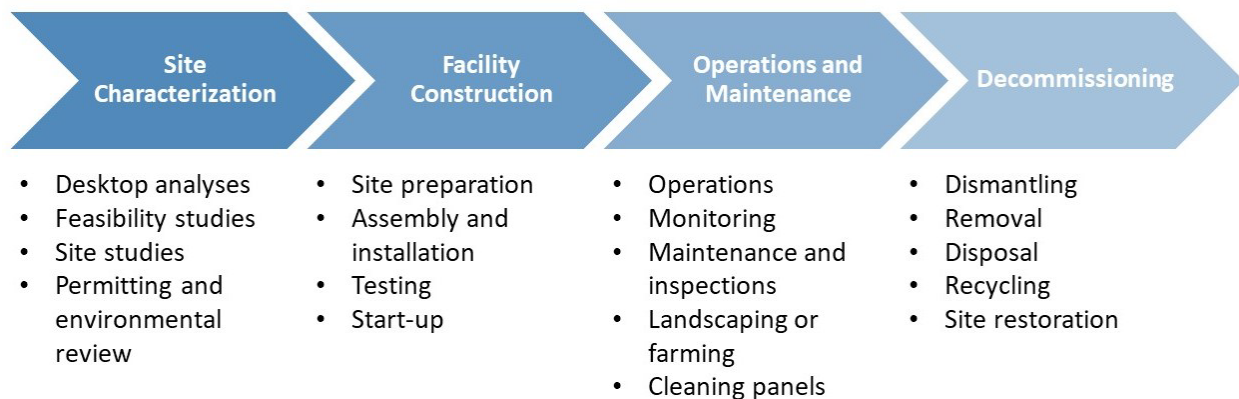


Figure 2-5. Phases of utility-scale solar facilities

### 2.5.1 Site characterization

It is assumed that developers would conduct desktop analyses and feasibility and site studies for characterization of potential sites, with agreement from the landowner(s) as needed. During site characterization, generally very little modification of a site would occur. Work would include conducting field surveys to gather data on biological, cultural, Tribal, and historical resources. Surveys would need to follow appropriate regulatory requirements and procedures.

Siting considerations typically include the availability of solar energy, the physical characteristics of the area, and access to electrical transmission lines. Considerations also include zoning requirements and identification of critical areas. Additional siting considerations are included for each resource in Chapter 4.

The following site characterization activities would involve minimal or no site disturbance:

- Assessment of baseline solar insolation level (availability of solar energy)
- Assessment of baseline climatic factors (e.g., wind speed and direction, precipitation type and amount, average snow or ice loads)
- Construction of meteorological (weather) stations, which may be towers approximately 30 to 70 feet in height or trailer-mounted portable equipment
- Land survey
- Mapping surface hydrology and floodplain
- Slope evaluation and soil stability studies
- Habitat mapping, including wetland identification
- Water type mapping, including identification of waters used by fish and fish passage barriers
- Species identification (plants and wildlife)
- Due diligence assessment for lands with previous industrial uses

- Evaluation of seismic stability
- Evaluation of potential storm event runoff
- Baseline air quality assessment
- Cultural resources surveys

The following site characterization activities could include ground disturbance:

- Soil sampling
- Cultural resources surveys

## 2.5.2 Construction

The time needed to construct a facility is expected to be between 6 and 18 months. Construction would generally be divided into two phases: a site preparation phase of relatively short duration (e.g., a few months) followed by a longer assembly, testing, and startup phase. The second phase may include building of arrays areas in steps so completed arrays could go online while others are being constructed.

General construction activities include the following:

- Finalizing pre-construction surveys or conducting additional surveys
- Marking sensitive areas for avoidance, and installing best management practices (BMPs) and other preventative measures such as erosion and sedimentation control measures
- Establishing site access, constructing internal service roads, and modifying public roads, if needed
- Clearing, grading, and constructing temporary staging and laydown areas
- Erecting security fencing and road access gates
- Constructing foundation posts or piles to support the solar arrays, including pile driving
- Assembling the solar array tracker system and installing solar panels
- Grading and constructing foundations for solar array inverter and transformer pads, buildings, collector substation, and BESSs
- Installing and connecting inverter/transformer and electrical components
- Constructing building(s), collector substation, BESSs, and other supporting components
- Installing temporary or permanent meteorological stations
- Constructing and connecting the electrical collector lines and overhead gen-tie lines to the collector substation
- If BESSs are included in the facility, connecting the BESSs to the collector substation
- Conducting revegetation, including temporary staging and laydown areas

Typical construction equipment includes bulldozers, front-end loaders, graders, portable generators, mobile cranes, pumps, pile drivers, and trucks. Concrete would either be delivered to facility sites via concrete trucks, or aggregate materials necessary to produce concrete would be delivered and concrete would be produced at on-site batch plants.

The number of people employed for the construction phase would vary but is expected to be between 100 and 400 workers for a 200 MW facility. Larger facilities may require approximately 300 to 800 workers. The number of workers on site daily would vary.

### 2.5.3 Operations

Solar energy facilities may not have staff on site on a daily basis. Facilities without daily on-site staff would be monitored remotely 24 hours a day. There would be periodic maintenance and inspection of a facility, such as mowing, landscape maintenance, and electrical maintenance activities. The number of people needed to operate and maintain the facility would vary based on the facility type but the PEIS assumes this would be about five people.

For this PEIS, a solar energy facility is assumed to have an operational life of 30 years. PV panels may need to be replaced during the lifetime of the facility.

Mowing and vegetation management at the site would likely occur a few times a year. Application of herbicides may also occur. If the developer has designed the facility for dual use with agriculture, then planting, harvesting, grazing, or other agricultural operations would occur and there would be additional people on site to support this dual use.

Washing of the solar panels is expected to occur approximately once every 6 months to optimize performance depending on site conditions and land uses of neighboring parcels. The Solar Energy Industries Association [reports](https://www.seia.org/initiatives/water-use-management#:~:text=Water%20use%20requirements%20for%20solar%20power%20plants%20depend,surfaces%20like%20mirrors%2C%20heliostats%2C%20and%20photovoltaic%20%28PV%29%20panels)<sup>22</sup> that washing solar panels can use up to 0.25 gallon of water per panel, per wash, or about 20 gallons per megawatt-hour. The PEIS assumes that no cleaning additives would be used in wash water. Depending on the site, water may be available from local water supplies, a well on site, or water could be trucked in from a commercial source. Waterless cleaning can also be achieved by manually using brushes or using autonomous robots to brush dust particles from the surface of solar panels. If water is used, wash water is expected to infiltrate into the ground surface at and near the point of application.

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<sup>22</sup> <https://www.seia.org/initiatives/water-use-management#:~:text=Water%20use%20requirements%20for%20solar%20power%20plants%20depend,surfaces%20like%20mirrors%2C%20heliostats%2C%20and%20photovoltaic%20%28PV%29%20panels>

### Example of autonomous robots cleaning solar panels



Photograph by Lindsay Mackinson

## 2.5.4 Decommissioning

A solar energy facility has a useful lifespan, which is expected to be approximately 30 years. [According to DOE](#),<sup>23</sup> solar panels have a lifespan of 30 to 35 years, though some panels may be replaced over time due to normal degradation, physical damage, or upgrades due to technological advances. Solar facility components may be incrementally replaced over time or replaced in major renovations, allowing a facility to extend its lifespan. Eventually, a solar energy facility may no longer be used and the site fully decommissioned.

A developer may prepare or be required to prepare a decommissioning plan as part of the proposal. Cities, counties, or the State of Washington Energy Facility Site Evaluation Council (EFSEC) may require a financial security as part of a decommissioning plan.

Decommissioning activities would be similar to construction, including the equipment required and the number of people employed. Decommissioning timeframes would be dependent on the restoration needed for habitat types.

Decommissioning actions include dismantling, removing, and disposing of aboveground solar array components and other aboveground components such as the collector substation, buildings, battery storage system, and overhead lines. Foundations may be removed to 3 feet

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<sup>23</sup> <https://www.energy.gov/eere/solar/end-life-management-solar-photovoltaics>

or more below the ground surface, while cables, lines, or conduit that are buried 3 feet below grade or may not to be removed. However, the depth to which facilities and infrastructure would be removed would depend on agreements with landowners and follow applicable regulatory requirements. Because transformers can include up to 600 gallons of oil, the removal of electrical substations would require inspection for contamination of the soil and decontamination if needed.

The facility site is assumed to be restored, which may include revegetation, to its pre-facility conditions unless the facility owners, permitting authority, and regulatory agencies agree on alternate actions. Service roads may be removed or may remain depending on agreements with the new or existing owner of the land.

The PV Module Stewardship and Takeback Program requirements in RCW 70A.510 will require manufacturers and distributors of PV modules to develop and implement a plan for managing disposal. Beginning January 31, 2031, PV panels are expected to be recycled by the applicable manufacturer at the end of their useful life.

## 2.6 Types of facilities considered for the PEIS

The types of facilities considered in this PEIS are described in Table 2-1.

### **Land requirements of utility-scale solar energy facilities**

The ranges of solar energy facility sizes (areas) include the total area of a perimeter surrounding all the arrays and associated equipment for the facility. However, the spacing between arrays could be large and the areas occupied by the arrays and other structures would typically be much smaller than the total perimeter area.

Table 2-1. Types of facilities (alternatives) considered in the PEIS

<b>Utility-scale solar energy facilities</b>
<b>Facility size (power-generation capacity)</b>
20 to 1,200 MW
<b>Facility size (areas)</b>
200 to 12,000 acres (0.31 to 18.75 square miles)
5- to 10-acre collector substation area
5,000-square-foot operations and maintenance buildings on up to 5-acre area
<b>Facility characteristics</b>
60,000 to 3,600,000 panels
6,500 to 540,000 posts
Approximately 30 to 90 inverter/transformer stations
Gen-tie lines to existing grid, suspended aboveground with monopole or wooden structures, up to 150 feet tall with typical 200-foot-wide ROW
<b>Utility-scale facilities with BESSs</b>
Facilities plus 1 or 2 BESSs, each capable of storing up to 500 MW
Each BESS would include multiple containers arranged in geometric rows. Container dimensions and number of BESS units per container vary by manufacturer.
Acreage for 200 MW BESSs proposed in Washington typically range from 10 to 20 acres. Acreage for a 500 MW BESS is assumed to range from 25 to almost 50 acres. The analysis in this PEIS assumes the upper end of the acreage range.
<b>Utility-scale facilities with agricultural uses</b>
Facilities with agricultural uses such as crops, rangeland, or pollinator habitat
Facilities could be located on lands with existing agricultural use that could continue, the type of agricultural use could change, or a site without prior agricultural use could add concurrent agriculture

## 2.7 No Action Alternative

Under the No Action Alternative, agencies would conduct environmental review and permitting for utility-scale solar energy development on a project-by-project basis without using this PEIS as a reference.

## 2.8 Alternatives considered but not evaluated in the PEIS

This PEIS focuses on utility-scale solar energy facilities as directed by the Legislature. Ecology is preparing separate PEISs that evaluate utility-scale onshore wind energy facilities and green electrolytic and renewable hydrogen facilities. The following alternatives were considered in screening, but for the reasons listed below were eliminated from further detailed study, and are not evaluated in this PEIS:

- **Other types of energy facilities.** Other types of energy facilities, including geothermal facilities or standalone utility-scale battery facilities, were suggested in scoping

comments. The Legislature, in [RCW 43.21C.535](#),<sup>24</sup> directed that the scope of the PEIS review be specific to designated clean energy types of [utility-scale solar, utility-scale onshore wind, and green electrolytic or renewable hydrogen](#)<sup>25</sup>; therefore, review of other types of clean energy facilities, standalone battery storage, or fossil-fuel energy facilities would not be appropriate as alternatives in this PEIS.

- **Distributed energy generation.** Distributed solar, community solar, and home rooftop solar systems are other ways that solar energy is generated in many communities. These methods typically do not generate the amount of energy needed for utility use, and would not meet the intent of the PEIS to evaluate utility-scale facilities; therefore, they are not considered as alternatives.
- **Specific facility sizes.** Various sizes and ranges of solar facilities were suggested in scoping and Draft PEIS comments, including different ranges of facility wattages and different areas or configurations for facilities. The types of facilities (alternatives) evaluated in this PEIS were modified to include a range of utility scales.
- **Facilities over water.** Scoping comments suggested consideration of utility-scale solar on waterways, including irrigation canals. There are a few pilot projects for this type of facility but not at utility-scale and the probable impacts from these are not well known; therefore, this type of facility is not analyzed in the PEIS.
- **Combined wind and solar facilities.** Scoping comments suggested evaluation of a facility type composed of wind and solar facility components on a single combined site. PEISs will provide information on solar and wind facilities separately but the impact analysis and potential mitigation can be used in various configurations by facility developers.
- **Analysis of build-out of all clean energy in Washington.** Scoping and Draft PEIS comments suggested analysis of all types of clean energy for the total amount of clean energy needed for Washington state to achieve its climate goals. The PEIS is evaluating a single type of energy facility and is not considering all energy types so this is out of scope.

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<sup>24</sup> <https://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.535>

<sup>25</sup> <https://ecology.wa.gov/regulations-permits/sepa/clean-energy/programmatic-eis>

### 3 Scope of Study

The scope of study for utility-scale solar energy development was defined considering areas where facilities could be built (geographic bounds) and the time period in which facilities may be constructed and operational (time scale or temporal bounds).

As described by the Legislature in [RCW 43.21C.535](#),<sup>26</sup> the scope of this PEIS is limited to the probable, significant adverse environmental impacts in geographic areas that are suitable for utility-scale solar facilities.

To develop the geographic scope of study for this PEIS, Ecology sought input from Tribes, agencies, members of the public, and interested parties.

#### 3.1 Geographic scope of study

The area shown in Figure 3-1 is the geographic scope of study for this PEIS, where existing conditions and potential environmental impacts were analyzed. The areas included in the geographic scope of study are based on the characteristics and considerations listed below.

- **Areas with GHI of 3.5 kWh/m<sup>2</sup>/day or greater.** GHI is the total solar radiation received on a horizontal surface and is used to calculate the amount of energy a solar array could produce.
  - GHI is based on [energy availability data](#)<sup>27</sup> from the DOE National Renewable Energy Laboratory.
  - The GHI of 3.5 kWh/m<sup>2</sup>/day is lower than assumptions used in similar studies elsewhere in the United States. Improved technology is assumed to continue to allow facilities to use lower solar energy levels for utility-scale projects, and discussions with industry confirmed that a lower GHI is applicable in Washington.
- **Areas with 15% slope or less.** Research and discussion with industry confirmed that newer technologies allow for utility-scale development on flat to moderately sloped ground surfaces.
- **Areas within 25 miles of a 230 kV or greater capacity transmission line.**
  - Facilities currently use transmission lines of this size; therefore, the assumption is that facilities would tie into transmission lines of this capacity or greater. The analysis does not evaluate or consider whether transmission lines have the ability to accommodate new utility-scale clean energy facilities. There may be improvements to existing transmission corridors that could result in increased capacity along current 230 kV lines in the future.
  - One exception to the 25-mile distance was made; an area of eastern Washington where there are existing utility-scale solar facilities was added to the geographic

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<sup>26</sup> <https://app.leg.wa.gov/RCW/default.aspx?cite=43.21C.535>

<sup>27</sup> <https://www.sciencedirect.com/science/article/pii/S136403211830087X>

scope. This area has sufficient solar energy availability and other potentially favorable characteristics for utility-scale developments.

The geographic study area is broader than where facilities are being built now. This is because new technologies could allow development of solar facilities in areas not considered before. The geographic study area identifies different levels of solar energy available to provide context, but all shaded areas in Figure 3-1 are included in the study area.

The study area excluded the following areas:

- Tribal reservation and trust lands
- Military installations
- DOE Hanford Site<sup>28</sup>
- National parks, monuments, wilderness areas, and wildlife refuges
- Washington state parks
- National scenic areas and trails and historic trails
- Unincorporated areas zoned as urban, residential, or rural residential 5-acre; areas inside city limits; and unincorporated urban growth areas (UGAs)<sup>29</sup>

The PEIS does not approve, authorize, limit, or exclude future facilities. Projects could be built on private, city, county, state, or federal lands with agreement from the landowner or manager. This PEIS does not limit the geographic extent of the state where facilities could be proposed. The purpose for the geographic scope of study is to identify the geographical areas where probable, significant adverse environmental impacts from utility-scale solar energy facilities are likely to occur.

For projects on Tribal reservation lands, each federally recognized Tribe would determine use of their lands. Tribal reservation lands are not included in the PEIS geographic scope of study.

For projects on state or federal lands, the responsible agency would make land use decisions. State and federal areas that meet the criteria above for utility-scale solar energy facilities are included in the geographic scope of study for this PEIS. The Bureau of Land Management (BLM) developed a National Environmental Policy Act PEIS for Utility-Scale Solar Energy Development on their managed lands and [approved amendments](#)<sup>30</sup> to their associated Resource Management Plan. BLM-managed lands that were identified for utility-scale solar energy development are included in the geographic scope of study for this PEIS if they also meet the

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<sup>28</sup> DOE has identified a small area of land at the Hanford Site as available for lease to develop utility-scale carbon pollution-free electricity facilities. This area is included in the study area, but the rest of the Hanford Site is excluded.

<sup>29</sup> Under the Growth Management Act, counties identify UGAs where “urban growth shall be encouraged and outside of which growth can occur only if it is not urban in nature” (RCW 36.70A.110) in consultation with cities in the county. UGAs include both unincorporated areas and areas within existing city boundaries and are intended to accommodate the projected population growth of cities and counties over the subsequent 20-year period.

<sup>30</sup> <https://eplanning.blm.gov/eplanning-ui/project/2022371/510>

criteria listed above. The Washington State Department of Natural Resources (DNR) has also pre-screened some state-managed lands for the potential for clean energy leasing.

While efforts have been made to ensure accuracy, discrepancies may exist due to the complexity of mapping, local codes, data sources, and the passage of time. Project developers will need to review current and site-specific data for specific project sites.

## **3.2 Study area for analysis of impacts**

The geographic scope of study shown in Figure 3-1 shows lands suitable for utility-scale solar energy facilities based on the criteria described in Section 3.1. These lands are adjacent to or surrounded by lands that are used for various purposes and that may be affected by utility-scale solar energy facilities proposed in the geographic scope of study. Therefore, where applicable, the study areas for the analysis of impacts to the elements of the environment (e.g., earth) may extend beyond the geographic scope of study. For example, the study areas may include natural and built areas next to lands on which utility-scale solar energy facilities may be constructed, operated, and decommissioned.

## **3.3 Time scale of study**

The PEIS considers utility-scale solar energy facilities that may be constructed after June 30, 2025, and before January 1, 2045. CETA requires all Washington's electric utilities to meet 100% of their retail electric load using non-emitting and renewable resources by 2045. For the PEIS, a solar energy facility is expected to have an operational life of 30 years, at which time the developments are expected to be decommissioned.

Therefore, an approximate 50-year time period (July 2025 through June 2075) is used for resource analyses. This includes when developments are likely to be constructed and operational.

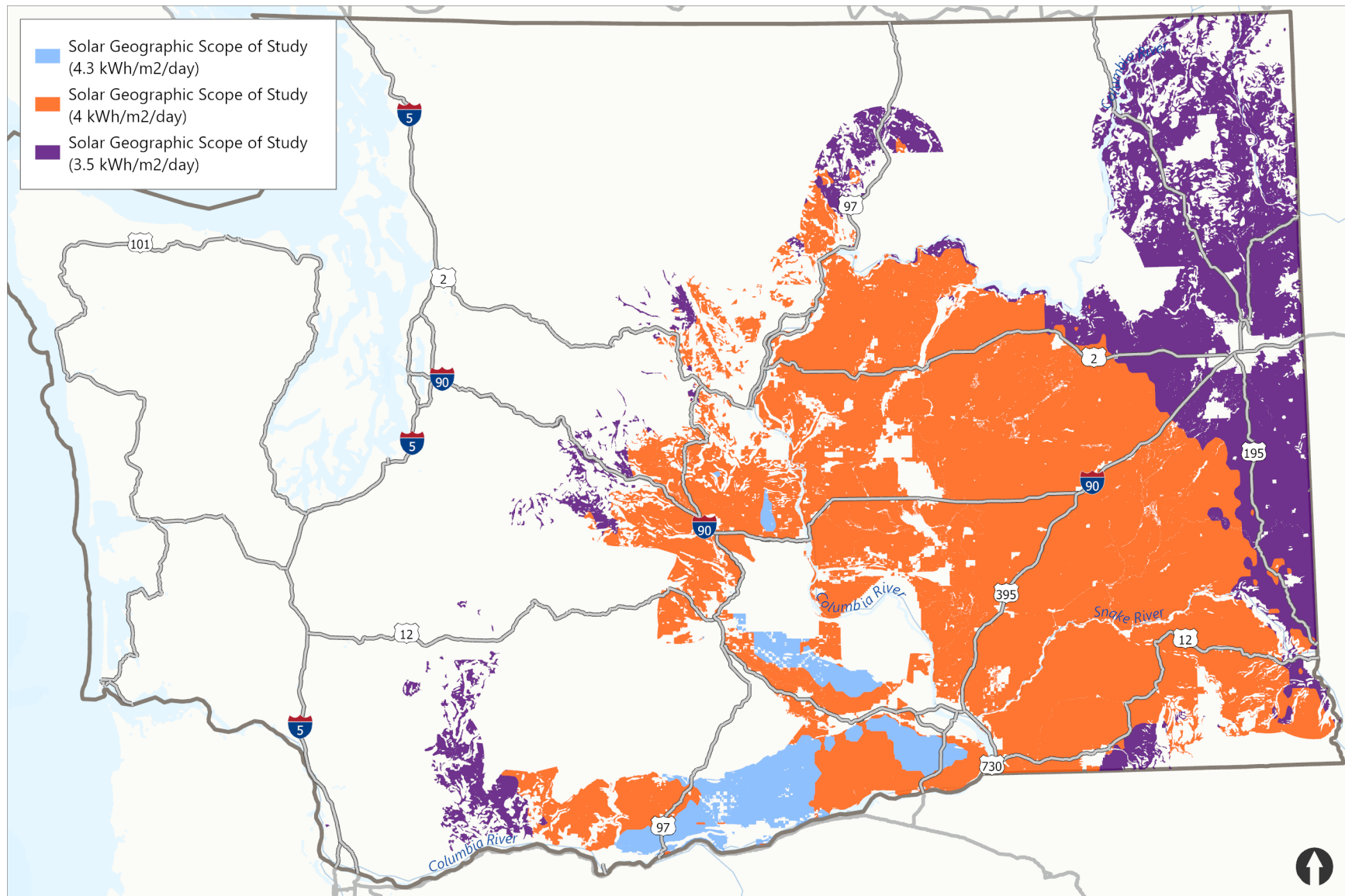


Figure 3-1. Geographic scope of study for utility-scale solar energy facilities PEIS

Note: The geographic scope of study includes all areas with solar energy levels depicted. Areas with GHI of 4 kWh/m²/day or greater and 4.3 kWh/m²/day or greater are shown to provide additional context for consideration of solar energy availability.

## 4 Affected Environment, Potential Impacts, and Mitigation

### 4.1 Introduction

This chapter describes the analysis and findings of this study. This initial section orients the reader to the sections that follow and explains how the PEIS can be used at the project level. Section 4.2 lists general measures that apply to all projects using the PEIS. For each of the resources evaluated by this PEIS, Sections 4.3 through 4.17 describe the affected environment, the potential impacts, and measures to avoid, reduce, and mitigate potential significant adverse impacts.

Sections 4.3 through 4.17 are summaries of the more detailed information contained in the technical appendices for the resources evaluated by this PEIS (Appendices B-P). These appendices are the official technical documentation for this PEIS.

This study incorporated best available science and other information, including:

- Studies, modeling, reports, and regulatory findings relevant to the study area
- Comments received through the scoping process (see Appendix R, *Scoping Summary Report*)
- Comments on the Draft PEIS (see Appendix S, *Response to Comments*)
- Input from interested parties and Tribes (see Sections 6.3 and 6.4)
- Expertise of state agency staff relevant to specific resources (see Section 6.5)

#### 4.1.1 Affected environment

The “affected environment” represents the current conditions within the study area for each of the resources evaluated. Figure 3-1 shows the geographic scope of study for this PEIS, which includes areas in Washington that are suitable for utility-scale solar energy facilities. The resources evaluated by this PEIS typically have a study area that corresponds to the geographic scope of study shown in Figure 3-1. However, some of the resources have a study area that extends beyond the geographic scope of study to consider the potential impacts within a larger community or landscape. Because this PEIS considers a very large geographic scope of study, descriptions of the affected environment are broad and qualitative.

#### 4.1.2 Potential impacts

“Impacts” are the effects or consequences of actions. For each resource evaluated, this PEIS identifies potential adverse impacts that could result from three types of utility-scale solar energy facilities and a No Action Alternative (see Section 2.7). The analysis of potential impacts considers all phases of a project’s life cycle, including site characterization, construction, operation, and decommissioning. Because this PEIS considers potential impacts over a very large geographic study area and over a time span of 50 years, descriptions of potential impacts

are broad and qualitative. If potential impacts could affect multiple resources, the related resources are identified.

As directed by SEPA, this PEIS focuses on “significant” adverse environmental impacts. “Adverse” means an impact would have a negative change in the condition of a resource. “Significant” means a reasonable likelihood of more than a moderate adverse impact on environmental quality. Determining if an impact is significant involves consideration of both the intensity of the impact (magnitude and duration) and the context of the impact, which can vary with the setting and existing conditions for a particular resource. Potential impacts that are less than significant are given less emphasis by this PEIS.

The process of identifying potential significant adverse environmental impacts for this PEIS consisted of three main steps. First, the potential impacts of the three types of utility-scale solar energy facilities on resources were evaluated. Second, the use of required permits and approvals, plans, and other measures (the “required measures” described in Section 4.1.3) for reducing the potential impacts identified in the first step was evaluated. Third, the significance of the remaining potential impacts was determined.

- **Less than significant impacts:** Impacts that are less than significant, or if impacts are potentially significant, but incorporation of the required measures would reduce the impacts to a non-significant level.
- **Potentially significant adverse impacts:** Impacts that are potentially significant after the required measures are considered. The PEIS identifies mitigation measures for potential significant impacts that may reduce impacts to a non-significant level.

In many cases, given the broad and qualitative nature of the evaluation, potential impacts are presented as a range inclusive of both categories. To determine the actual significance of impacts, additional project- and site-specific evaluation would be necessary.

As explained below in Section 4.1.3, this PEIS identifies a variety of mitigation measures that can help projects avoid potentially significant adverse impacts. However, in some cases, even with the application of mitigation measures, significant impacts may not be able to be mitigated to a non-significant level. These impacts are identified in this PEIS as **potentially unavoidable significant adverse impacts**.

#### **4.1.3 Measures to avoid, reduce, and mitigate impacts**

This PEIS identifies a variety of **measures to avoid, reduce, and mitigate impacts**. These measures are grouped into the following 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 early phases of a project.
- **Required measures:** These measures must be implemented, as applicable, to use the PEIS. These include permits and approvals, plans, and other regulatory requirements.

- **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 for resources for which potential significant impacts have been identified.

Section 4.2 lists the general measures. Each resource section includes measures to avoid and reduce impacts, and if there are potential significant impacts, possible mitigation measures for those. Chapter 7, Permits and Approvals, lists required permits and approvals. A compiled list of the measures to avoid, reduce, and mitigate impacts for all resources is provided in Appendix A. The technical appendices prepared for each of the resources evaluated by this PEIS (Appendices B–P) also include all the measures relevant to a particular resource.

#### 4.1.4 Using this PEIS at the project level

Figure 4-1 shows a generalized process for use of the PEIS at the project level.

Use of the PEIS starts as early as possible in the project process—ideally before site selection—with the developer reviewing the PEIS and using it as a key resource to inform project siting and design. At this stage, the developer considers the general measures and the recommended siting and design measures listed in the PEIS. As project plans progress, the developer incorporates the required measures, as applicable, considers the recommended measures for construction, operation, and decommissioning phases, and applies mitigation measures for potentially significant impacts, as needed. See the box titled “Use of this PEIS by project developers” that follows Figure 4-1 for more details.

Preapplication meetings provide the developer, the SEPA lead agency, and other regulatory agencies an early opportunity to discuss the proposed project and environmental review using the PEIS.

At the time of project application submittal for SEPA environmental review, the developer submits a SEPA checklist and may optionally submit PEIS supporting documentation. The lead agency then reviews the documents submitted for completeness and makes a threshold determination in accordance with SEPA procedures. More information, checklists, and templates will be available on Ecology’s PEIS [website](https://ecology.wa.gov/regulations-permits/sepa/clean-energy/programmatic-eis).<sup>31</sup>

Throughout the project process, Tribes, communities, and interested parties can use the PEIS as a resource for general information about potential impacts from the proposed utility-scale solar energy facility.

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<sup>31</sup> <https://ecology.wa.gov/regulations-permits/sepa/clean-energy/programmatic-eis>

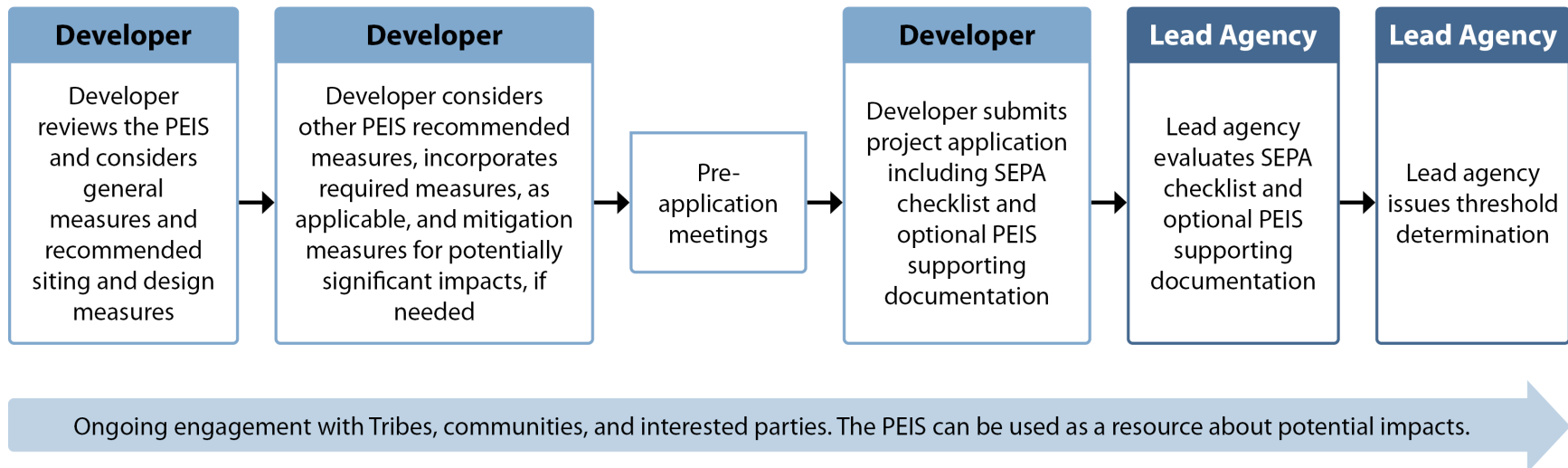


Figure 4-1. Generalized process for use of this PEIS at the project level

### Use of this PEIS by project developers

Developers can help improve the effectiveness of the environmental review process for a project by using the PEIS to complete the steps below as early as possible.

1. As early as possible in the project process—ideally before selecting a site—review the PEIS and consider 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 consider the recommended measures 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 if any recommended measures that were not previously incorporated might be incorporated. Also consider if any recommended measures that were previously incorporated might be implemented 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, if feasible. Final significance determinations will be made by the SEPA 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 SEPA lead agency.

## 4.2 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 ROWs 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.

## 4.3 Tribal rights, interests, and resources

### Key findings

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 federally recognized Tribes potentially affected. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site. Accordingly, the impact assessment and determinations of significance or non-significance would be done with engagement and in consultation with potentially affected Tribes at the project level.

Tribes are recognized as unique sovereign people that exercise self-government rights that are guaranteed under treaties and federal laws. Tribal rights, interests, and resources refer to the collective rights and access to traditional areas and times for gathering resources associated with an Indian Tribe's sovereignty since time immemorial. They include inherent rights or formal treaty rights associated with usual and accustomed territories. Tribal resources include Tribal cultural lands, archaeological sites, sacred sites, fisheries, and other rights and interests in Tribal lands and lands within which a Tribe or Tribes possess rights reserved or protected by federal treaty, statute, or executive order. Resources include plants, wildlife, or fish used for commercial, subsistence, and ceremonial purposes.

The analysis of impacts to Tribal rights, interests, and resources is different than for the impact analysis for environmental resources. Natural and built resources were analyzed in other technical resource reports to determine whether solar energy facilities could have significant impacts from a non-Tribal perspective and whether those impacts could be mitigated. For impacts to Tribal rights, interests, and resources, any determinations of significance or non-significance would be done with engagement and in consultation with each potentially affected Tribe at the project level. This would be done through the SEPA process or the federal National Historic Preservation Act Section 106 process.

The *Tribal Rights, Interests, and Resources Technical Report* (Appendix B) includes the full analysis and technical details used to evaluate Tribal rights, interests, and resources in this PEIS. This section contains a summary of the affected environment, how impacts were analyzed, and the key findings. This section uses information from the other resource sections later in this PEIS. Refer to other resource sections for additional information and impact analysis.

### 4.3.1 Affected environment

The range of resources considered for the affected environment includes biological resources, cultural and historic resources, environmental justice, water resources, recreation resources, environmental health and safety (EHS), noise and vibration, aesthetics and visual quality, transportation, air quality, and cumulative resources.

Historic and cultural resources are analyzed in Section 4.15 of this PEIS. This section focuses on cultural resources associated with Tribes. These include archaeological sites and objects and

historic sites and structures, representing people, events, and trends significant to the history of affected Tribes. These include ceremonial sites, sacred sites, places of funerary activity, and Traditional Cultural Properties (TCPs).

Many archaeological and ethnographic studies have been conducted in the study area and have inventoried archaeological sites and TCPs. This information may be public, but it may be sensitive information protected under state law. The Washington State Department of Archaeology and Historic Preservation's (DAHP's) predictive model classifies areas with different levels of risk of containing archaeological sites. However, only about 5% of the state has actually been surveyed for cultural resources. Therefore, it should not be assumed that a site has been intensively surveyed. Existing surveys may not account for all cultural resources that may be present within a particular area. Projects will need their own surveys for a specific site.

Natural resources of interest to Tribes include but are not limited to plants, animals, water, and natural settings. Built resources include transportation, noise, and visual quality. Resources can be used for food, medicine, recreation, or spiritual purposes. Areas important to traditional cultural practices and the resources associated with those practices include waterways, trails, plants, wildlife, or fish used for commercial, subsistence, and ceremonial purposes. Natural resources may also include landforms that have an important role in oral histories or use of the landscape.

Culturally significant plants are often used for medicine, food, clothing, basketry, structures, and aesthetic or ritual purposes. Plants and animals within the study area provide important subsistence and medicinal resources. Water plays an important role in the histories and oral traditions of Tribes. Tribal rights include recreation and access to traditional hunting, fishing, or gathering areas, or to areas where other traditional practices occur.

### **4.3.2 How impacts were analyzed**

The significance of resources can only be understood from within the cultural context of an affected Tribe. The impact assessment considered comments provided by Tribes on the *Tribal Rights, Interests, and Resources Technical Report* (Appendix B) and the Draft PEIS. Specific project impacts and determinations of significance or non-significance will be determined with engagement and in consultation with each potentially affected Tribe at the project level.

The analysis of impacts on Tribal resources considered the following:

- Construction and operation impacts on plant and animal species used by Tribal members, including disruption of terrestrial animals' use and migration patterns, which could affect Tribal hunting practices and access to first foods
- Loss of, or modifications to, habitats of species used by Tribal members
- Indirect impacts on species and habitats used by Tribal members, including fragmentation of habitats and impediments to migration
- Loss of access to a traditional hunting, fishing, or gathering area, or to an area where other traditional practices occur

- Impacts to archaeological sites and districts
- Impacts to TCPs
- Interruption of spiritual practices
- Loss of medicinal and traditional plants and foods
- Disruption and degradation of the health and mental wellbeing of Tribal members

### **4.3.3 Findings for all solar facility types evaluated in the PEIS**

#### **4.3.3.1 Impacts**

##### **Impacts from construction and decommissioning**

Most site characterization activities would involve little or no ground disturbance. However, some ground-disturbing activities could result in impacts on historic and cultural resources.

Activities that could impact Tribal resources during construction and decommissioning include ground disturbance, restricted access, and degradation of visual quality. Other activities could cause noise and interruption of the landscape, habitats, and species. Tribal spiritual practices could be interrupted by construction impacts to land areas and cultural or sacred sites. Access to traditional gathering areas for medicinal and traditional plants and foods could be restricted during construction or permanently lost. Impacts to archaeological sites, sacred sites, TCPs, burials, and specific habitats for culturally important species could result from clearing, grading, and excavation. These could also be affected from construction or decommissioning of facilities and associated infrastructure.

Potential impacts on habitats and species include alteration of species migration routes, loss of biodiversity, and habitat fragmentation. Construction and decommissioning could have impacts to plants and changes in water chemistry and soil compaction. Mortality of species and changes to habitats could impact wildlife and plants important to Tribes. These impacts could disrupt traditional first foods. Access to treaty-reserved fishing areas and food harvesting areas may be limited during construction. Construction could impact terrestrial wildlife associated with Tribal use and could interrupt hunting and other cultural practices.

Noise, aesthetics, and air quality impacts from constructing facilities and associated land disturbances may degrade settings associated with cultural resources and sacred landscapes. Increases of human access and disturbance of resources important to Tribes could result from the establishment of corridors or facilities in otherwise intact and inaccessible areas.

Ground disturbance may emit dust and result in erosion with potential to impact cultural and natural resources. Vehicle and equipment traffic has the potential to introduce invasive species to the area, and removal of infrastructure and site restoration could also disturb or cause the mortality of species.

Newly disturbed ground could create a visual contrast that could persist for several seasons before vegetation could begin to mature and restore the pre-facility visual landscape. For decommissioning, restoration of vegetation to pre-facility conditions may take much longer,

along with the return of species and functioning habitats. Invasive species may colonize newly and recently reclaimed areas and could produce visual contrasts.

### **Impacts from operation**

Ongoing operations and maintenance are not anticipated to include ground disturbance because the use of vehicles and equipment would generally be limited to access roads and facility areas developed during construction. Erosion, compaction, trampling, or exposure of Tribal resources could occur due to vehicles, equipment, workers, ongoing maintenance activities, and vegetation management or co-located agricultural activities, such as livestock grazing or farming. Ongoing ground disturbance could reveal previously unknown resources, such as archaeological sites.

Impacts that degrade fisheries, affect migration patterns of species, and reduce biodiversity and impacts to ecological communities from long-term vegetation management may impact Tribal resources. Air quality impacts from vehicle and dust emissions, ongoing noise and visual impacts, and facility fencing or other access restrictions may continue to impact Tribal rights and resources, including hunting. Facility security and fencing could restrict access to areas used for resource gathering, hunting, fishing, and cultural and spiritual practices.

#### **4.3.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

Site-specific mitigation measures would be developed during project-specific reviews and permitting for each facility proposed in the future. Project proposals may involve potential impacts to the rights, interests, and resources of multiple Tribes. Tribal engagement and government-to-government consultation with all potentially affected, federally recognized Tribes should begin early to provide information and identify potential project impacts. Timely and frequent communication about project changes should be provided to Tribes.

Mitigation may be developed through consultation with affected Tribes as part of the SEPA process. Mitigation may also be developed under federal Section 106 of the National Historic Preservation Act; this is a separate, federal process outside of the state's SEPA process.

### **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 TCPs, 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.

### **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.

### **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.

### **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.

## 4.4 Environmental justice

### Key findings

Solar energy development could have **disproportionate impacts** on historic and cultural resources, Tribes, and Tribal communities. The impact assessment and determinations of significance or non-significance would be determined through engagement and consultation with potentially affected Tribes and DAHP at the project level.

Impacts to biological resources such as plants and animals that provide important subsistence and medicinal resources to Tribal communities would be determined with engagement and in consultation with each potentially affected Tribe at the project level.

If a facility requires a conversion of natural resource lands of long-term commercial significance or conflicts with the rural character of an area containing a population of people of color or low-income population, this would potentially result in **disproportionate impacts**.

Depending on site location and facility design, long-term changes or reductions in visual quality would also potentially result in **disproportionate impacts** on people of color populations or low-income populations.

Impacts associated with increased wildfire risk or impacts to fire response capacity would also potentially result in **disproportionate impacts** on people of color populations or low-income populations.

Noise and vibration during operations would affect people of color populations or low-income populations located near a facility. If a facility is located near people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

If a facility is located near or frequented by current recreation users, this would potentially result in **disproportionate impacts** on people of color populations or low-income populations.

Impacts associated with land use, aesthetics/visual quality, public services and utilities, and environmental health and safety would potentially result in **significant and unavoidable disproportionate impacts** on people of color populations or low-income populations.

RCW 70A.02.010(8) defines environmental justice as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, rules, and policies.” The *Environmental Justice Technical Resource Report* (Appendix C) includes the full analysis and technical details used to evaluate whether potential impacts in this PEIS disproportionately affect people of color populations and low-income populations. The report also identifies where overburdened community areas are located in the study area. This section contains a summary of the affected environment, how impacts were analyzed, and the key findings. This section uses information from the other resource sections in this PEIS. Refer to other resource sections for additional information and impact analysis.

#### 4.4.1 Affected environment

Census Bureau 2018–2022 data were used to determine census tracts with people of color populations and low-income populations that overlap the study area. People of color were defined as all people who identify in the census as a race other than white alone and/or list their ethnicity as Hispanic or Latino. Of the 202 census tracts that overlap the study area, 49 (or 24%) are identified as a people of color population. Low-income populations were defined as those households with an income at or below twice the federal poverty level. Of the census tracts that overlap the study area, 134 (or 66%) contain a low-income population.

The census tracts overlapping the study area were also evaluated for whether or not they meet the criteria to be considered in an overburdened community area. An “overburdened community” is “a geographic area where vulnerable populations face combined, multiple environmental harms and health impacts, and includes, but is not limited to, highly impacted communities” (RCW 19.405.020). Of the census tracts that overlap the study area, 46% were identified as an overburdened community area. Overburdened community areas identified in the study area are primarily rural areas.

#### 4.4.2 How impacts were analyzed

The determinations of potential impacts and potential mitigation measures were reviewed for each element of the environment analyzed in the PEIS for each type of facility. Only resources that could affect people were considered in the analysis. Potential impacts that are less than significant are not anticipated to result in disproportionately adverse effects on people of color populations or low-income populations and are not discussed further in this section.

Potentially significant adverse environmental impacts were overlaid with census tracts with people of color populations and low-income populations. This was used to determine the relative type and severity of effects and the potential for environmental impacts to disproportionately affect those populations.

#### 4.4.3 Findings for utility-scale solar facilities

Solar energy development could have **disproportionate impacts** on historic and cultural resources and on Tribal rights, interests, and resources. The level of impact to these resources can only be understood from within the cultural context of an affected Tribe. Accordingly, the impact assessment and determinations of significance or non-significance would be done with engagement and in consultation with potentially affected Tribes and DAHP at the project level. For more information on these resources, see the *Historic and Cultural Resources Technical Report* (Appendix N) and the *Tribal Rights, Interests, and Resources Technical Report* (Appendix B).

##### 4.4.3.1 Impacts

##### Impacts from construction and decommissioning

##### *Land use*

Construction and decommissioning of facilities have the potential to result in impacts such as

increased dust, noise, traffic, and visual changes that could affect nearby land uses and people. People most likely to be affected by these impacts are those living in nearby areas or those whose work requires them to be near the construction area for long periods. The impacts of converting property to a utility-scale solar facility would depend on the existing use of the site. The siting of facilities could result in the long-term and permanent conversion of land uses, which would be a potentially significant adverse land use impact if natural resource lands of long-term commercial significance are converted.

*Findings*

If natural resource lands of long-term commercial significance are converted, this would be a potentially significant adverse impact on land use. If a facility is located near people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

*Aesthetics/visual quality*

Construction and decommissioning of facilities would involve a range of activities associated with potential visual impacts. Depending on the location and size of facility sites and visual characteristics of the construction activities, visual quality impacts would range from less than significant to potentially significant adverse impacts.

*Findings*

If construction or decommissioning of a facility results in significant adverse impacts on visual quality and is located near people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

*Biological resources*

Construction and decommissioning could cause fragmentation of ecological communities that may affect the diversity of plant and animal species and migration patterns of animals. Construction and decommissioning could also result in the direct or indirect mortality of species and changes to habitats. Plants and animals provide important cultural, subsistence, and medicinal resources to Tribal communities.

*Findings*

Construction and decommissioning impacts on biological resources used by Tribal communities would be determined with engagement and in consultation with each potentially affected Tribe at the project level.

*Public services and utilities and environmental health and safety*

Depending on the specific location, severity, and fire response capacity, construction or decommissioning would have potentially significant adverse impacts due to an increased risk of a wildfire. A facility would result in potentially significant adverse impacts to fire response if

activities required a large fire response in remote locations with limited response capabilities or if there are other unique aspects of a facility site.

#### *Findings*

If construction or decommissioning of a facility results in significant adverse impacts of increased wildfire risk or impacts to fire response capacity and is located near people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

#### *Noise and vibration*

If construction and decommissioning of facilities would occur within 1,000 feet of noise-sensitive receptors in quiet rural areas, this may result in a potentially significant adverse impact. Vibration from specific construction and decommissioning activities occurring at distances closer than 350 feet from residential land uses, or in close proximity to conventional or historic structures, would be a potentially significant adverse impact with respect to human annoyance or building damage.

#### *Findings*

If construction or decommissioning of a facility results in significant adverse impacts related to noise and vibration and is located near people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

#### *Recreation*

If a facility is built at or near current recreational uses, impacts would range from less than significant to potentially significant adverse impacts, depending on the specific uses impacted and whether there are other recreational sites near the facility.

#### *Findings*

If construction or decommissioning of a facility results in significant adverse impacts on recreation and is located in an area near or frequented by people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

### **Impacts from operation**

#### *Land use*

As described for construction and decommissioning, the operation of utility-scale solar facilities would result in the conversion of land uses to utility-related uses for the life of the facilities. The impacts of converting property to a utility-scale solar facility would depend on the existing use of the site. Many of the census tracts overlapping the study area that have people of color populations and low-income populations identified are also rural communities. For facilities located in rural areas, there is also the potential to result in change to the rural character of the surrounding area and/or perceptions of the rural character.

*Findings*

Changes to rural character resulting from operation of a new utility-scale energy facility would range from less than significant impacts to potentially significant adverse impacts depending on whether plans and development regulations are in place to protect rural character and how they consider utility-scale solar facilities. If a facility is located near people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

*Aesthetics/visual quality*

The operation of solar energy facilities and associated transmission lines, roads, and ROWs would have potentially significant long-term visual impacts. Depending on the facility size range and the nature of the facility structures, visual quality impacts would result in a range from less than significant impacts to potentially significant-adverse impacts.

*Findings*

If operation of a facility results in significant adverse impacts on visual quality and is sited near people of color populations or low-income populations, operations would potentially result in **disproportionate impacts** on these populations.

*Biological resources*

During operation, biological resources may be affected by continued fragmentation, vegetation maintenance and fire suppression, and increased traffic as well as increased potential to introduce invasive species. Plants and animals provide important subsistence and medicinal resources to Tribal communities.

*Findings*

Operation impacts on biological resources used by Tribal communities would be determined with engagement and in consultation with each potentially affected Tribe at the project level.

*Public services and utilities and environmental health and safety*

There is a potential that facility operation would have potentially significant adverse impacts related to wildfire risk. A facility would result in potentially significant adverse impacts to fire response if activities required a large fire response in remote locations with limited response capabilities or if there are other unique aspects of a facility site.

*Findings*

If operation of a facility results in significant adverse impacts of wildfire risk or impacts to fire response capacity and is located near people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

### *Noise and vibration*

Given the larger distances at which most sensitive receptors are assumed to be located from facilities, operation of many utility-scale solar energy facilities would result in a less than significant impact. Stationary equipment for solar facilities located closer than 350 feet from a noise-sensitive land use or closer than 1,100 feet from a noise-sensitive land use within a quiet rural setting would have a potentially significant adverse impact. Substations closer than 650 feet from a noise-sensitive receptor or closer than 2,000 feet from a noise-sensitive receptor in a quiet rural area would have a potentially significant adverse impact.

#### *Findings*

If a facility is located near people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

### *Recreation*

If a facility is built in an area used and valued for its recreational opportunities, it would result in a potentially significant adverse impact if the facility results in the loss of those recreational opportunities. Elimination of recreational opportunities that results in increased use of neighboring recreational opportunities that in turn results in overcrowding or overuse, as well as segmentation, would also be a potentially significant adverse impact.

#### *Findings*

If a facility is located in an area near or frequented by people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

#### **4.4.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

#### **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.

### **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.
- Comply with local plans, such as comprehensive plans and sustainability plans, which may include environmental justice elements.

### **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.

### **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.

## **4.4.4 Findings for facilities with co-located battery energy storage systems**

### **4.4.4.1 Impacts**

#### **Impacts from construction, operation, and decommissioning**

Impacts on land use, aesthetics/visual quality, biological resources, public services and utilities, EHS, noise and vibration, and recreation from facilities with co-located BESSs would be generally the same as for facilities without a BESS. The following additional impacts would occur:

- Land use: The addition of battery storage could generate a small amount of additional traffic during construction and decommissioning. This could be perceived as added

industrial-type facilities resulting in a greater change in rural character than for facilities without BESSs.

- Noise and vibration: BESSs could create additional noise during operations.

#### *Findings*

Impacts on land use, aesthetics and visual quality, biological resources, public services and utilities, EHS, noise and vibration, and recreation would be similar to findings for utility-scale facilities above. If a facility is sited near people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

#### **4.4.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of facilities with co-located BESSs would be the same as facilities without a BESS.

### **4.4.5 Findings for facilities combined with agricultural land use**

#### **4.4.5.1 Impacts**

##### **Impacts from construction, operation, and decommissioning**

Impacts for facilities co-located with agricultural uses would generally be the same as facilities without, but with some differences, including access limitations due to fencing, loss of recreation, and noise.

#### *Findings*

If a facility is sited near people of color or low-income populations, impacts on land use, aesthetics and visual quality, biological resources, public services and utilities, EHS, noise and vibration, and recreation impacts would potentially result in **disproportionate impacts** on these populations.

#### **4.4.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid and reduce impacts of agrivoltaic facilities would be the same as facilities without agricultural land use.

### **4.4.6 Findings for the No Action Alternative**

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar 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, operation, and decommissioning, depending on project size and design. Solar energy development could have **disproportionate impacts** on historic and cultural resources, Tribes, and Tribal communities. Some solar facilities could have significant adverse impacts on land use, aesthetics and visual quality, biological resources, public services and utilities, EHS, noise and vibration, and recreation. The No Action Alternative

would potentially result in **disproportionate impacts** on people of color populations and low-income populations.

#### **4.4.7 Unavoidable significant adverse impacts**

##### **4.4.7.1 *Tribal rights, interests, and resources and historic and cultural resources***

Solar energy development could have **disproportionate impacts** on historic and cultural resources, Tribes, and Tribal communities. The impact assessment and determinations of significance or non-significance would be done with engagement and in consultation with potentially affected Tribes and DAHP at the project level.

##### **4.4.7.2 *Land use***

Substantial changes to rural character and land use may be unavoidable for facilities located in rural areas. The impact on people of color populations and low-income populations would be determined at the project level. If a facility required a conversion of natural resource lands of long-term commercial significance depending on local plans and development regulations, or if it resulted in changes to rural character in an area containing a population of people of color or low-income population, this would potentially result in a **significant and unavoidable disproportionate impact**.

##### **4.4.7.3 *Aesthetics/visual quality***

Medium- or large-sized facilities may have a long-term change or reduction in visual quality, even with mitigation measures. If these impacts occur in an area with a population of people of color or low-income population, this would potentially result in a **significant and unavoidable disproportionate impact** on these populations.

##### **4.4.7.4 *Public services and utilities and environmental health and safety***

Impacts associated with wildfire risk may be potentially significant and unavoidable. A facility would result in potentially significant adverse impacts to fire response if activities required a large fire response in remote locations with limited response capabilities or if there are other unique aspects of a facility site. Depending on the specific location, severity, and fire response capacity, there is a potential for potentially significant adverse impacts due to an increased risk of a wildfire. If a facility is located near people of color populations or low-income populations, this would potentially result in **significant and unavoidable disproportionate impacts** on these populations.

##### **4.4.7.5 *Biological resources***

Impacts on terrestrial special-status habitats and species may be significant and unavoidable. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site. Mitigation to reduce impacts below significance for terrestrial special-status habitats or species may not be feasible. Plants and animals provide important subsistence and medicinal resources to Tribal communities. Impacts on biological

resources used by Tribal communities would be determined with engagement and in consultation with each potentially affected Tribe at the project level.

## 4.5 Earth

### Key findings

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities would likely result in **less than significant impacts** on earth resources (soil resources and geologic hazards).

**No potentially significant and unavoidable adverse impacts** related to earth resources would occur.

This section evaluates geologic resources and geologic hazards, referred to as “earth” in this PEIS. The *Earth Resources Technical Report* (Appendix D) includes the full analysis and technical details used to evaluate earth resources in this PEIS.

### 4.5.1 Affected environment

#### 4.5.1.1 Geography and topography

The study area is within several different regional environment types, each with unique ecological conditions. Central Washington is composed of the Cascade Mountain range, which is characterized by higher levels of precipitation on the western side and decreasing amounts of precipitation and vegetation density on the eastern side. Eastern Washington includes the Columbia River basin and plateau, the Blue Mountains in the south, and the Okanogan region in the north, which are generally higher in elevation and more arid. The northern half of the state is also characterized by historic glacial activity.

#### 4.5.1.2 Geology and seismicity

Geology is the study of the earth, the materials that make it up, their structure, and the processes that act upon them such as earthquakes, landslides, and erosion. Washington’s geologic history is characterized by continental tectonic forces, volcanic activity, uplift, and glaciation. In central and eastern Washington, the Missoula floods caused massive flooding events that created geologic features in the Columbia River drainage basin such as scablands. The Palouse region is also notable for its undulating landscape made of windblown silt, which is rich in nutrients and important for agriculture in the region. The state’s geology and effects of seismicity are highly variable between parts of the state and are largely affected by the Cascadia Subduction Zone (CSZ), the boundary of the Juan-de-Fuca plate and the North American Plate off the west coast.

There are several dense fault complexes throughout the state. The CSZ as well as several other fault systems in western Washington are capable of producing high-magnitude earthquakes and tsunamis. Central, southern, and southeastern parts of the state are also seismically active. Categories of surface geology in Washington and the study area are included in Figure 4-2.

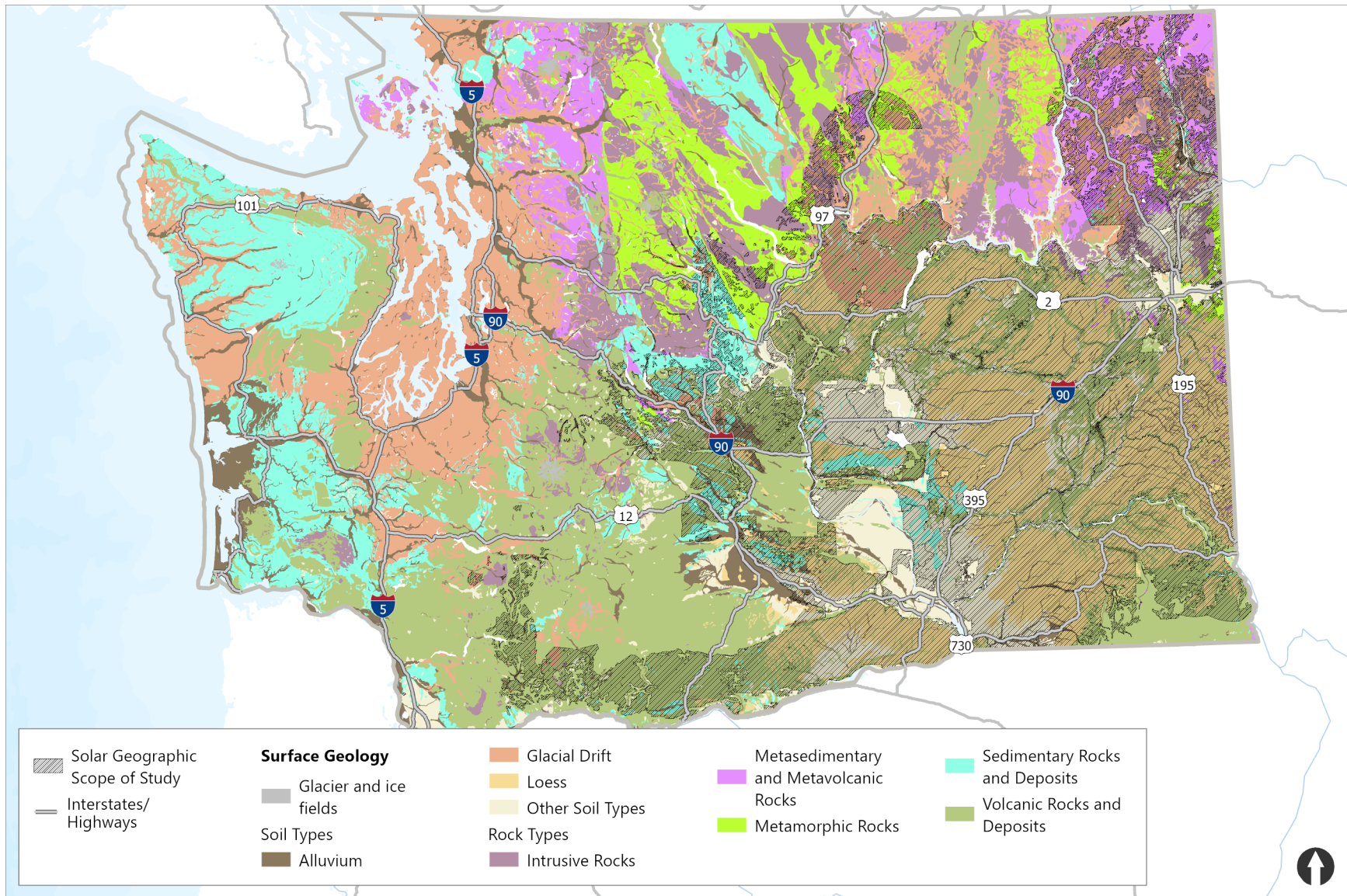


Figure 4-2. Surface geology categories

Data sources: DNR; Ecology.

#### **4.5.1.3 Surface soils**

The formation of soil is a long-term, complex interaction between climate, topography, ecology, and other characteristics of a given area. The study area encompasses several regions of the state that contain sensitive soil structures that play an important role in local ecology and if disturbed, can take a long time to recover. The study area contains agricultural and forested land types with unique soil attributes that may be federally protected. Studies to identify soil types on a site are expected to be done in researching project sites and during site characterization.

Exposed soils in central and eastern Washington, where it is characteristically dry and windy, lead to loss of soil and impacts to air quality, including from large dust storms that occur generally from spring through fall (see Section 4.6 for additional information on air quality).

#### **4.5.1.4 Geologic hazards**

Many regions in the study area are at risk from the following geologic hazards:

- **Fault ruptures** are a physical separation of opposite sides of a fault, which can cause damage to infrastructure.
- **Tsunamis and seiches** are waves caused by rapid displacement of water, generally resulting from seismic events; tsunamis occur in the ocean and seiches occur in contained bodies of water. The study area does not contain any tsunami inundation zones, and there are few areas adjacent to waterbodies where seiches would have an effect.
- **Liquefaction** is an event where water-saturated sediment temporarily loses strength and acts like a fluid. Earthquake hazard maps from DNR can be used to identify geologically sensitive areas, though areas susceptible to liquefaction may not be sufficiently identified.
- **Volcanic areas** in Washington include Mt. Saint Helens, Glacier Peak, Mt. Rainier, Mt. Adams, and Mt. Baker. Effects from an eruption could affect the study area. Effects could include airborne ash, lahars (mud or debris flows), lava flows, and pyroclastic flows (fast-moving gas and volcanic matter). Earthquakes caused by volcanoes could also occur.
- **Landslides** are the movement of a mass of rock, debris, or earth down a slope. Landslides can be natural or human-caused, and nature and various ecological factors contribute to an area's susceptibility. Generally, landslides are associated with areas containing slopes greater than 20%. Mapped landslide features are numerous in the study area.
- **Subsidence** is the gradual settling or sudden sinking of the Earth's surface due to removal or displacement of subsurface earth materials. Water withdrawals using groundwater sources could cause subsidence; however, water use must meet state law, which considers this effect.

## 4.5.2 How impacts were analyzed

The assessment of impacts was qualitative, and considered the following:

### Impacts on soil resources

- The potential for soil erosion from ground-disturbing activities, changes in drainage patterns, or addition of impervious surfaces
- Direct ground disturbance associated with soil and/or rock excavation and grading
- Slope instability from ground-disturbing activities, underground construction, or other activities that could increase local susceptibility to certain geologic hazards
- Subsidence related to tapping, withdrawal, or disturbance of groundwater reserves
- Borrow of construction materials (such as quarried rock, sand, and general fill)

### Impacts from geologic hazards

- Potential for a site to be affected by naturally occurring geologic or seismic hazards
- Potential for a site to be affected by geologic hazards that are influenced or altered by human activity

## 4.5.3 Findings for utility-scale solar facilities

### 4.5.3.1 Impacts

#### Impacts from construction and decommissioning

##### *Soil resources*

Site characterization activities done before construction would typically include field activities that would result in soil compaction, creation of ruts, and erosion due to the passage of vehicles and equipment. These activities would include site investigation, localized site clearing for belowground investigation, and limited earthwork associated with test pit excavations, if required. In steeper areas, site grading as well as removal of surface and belowground materials may be required if existing access routes are unavailable or unsuitable for the equipment.

Construction and decommissioning activities for facilities would include grading, vegetation removal, installation of underground infrastructure (e.g., foundations, pilings, utility trenches), stockpiling of site soils, bringing soils to the site, removing soils from the site, and placement and compaction of soils. Activities could also include development and decommissioning of an on-site concrete processing or batch plant, use of aggregate resources and concrete from local suppliers, and demolition. Impacts associated with these activities would include potential soil compaction, mixing of different layers of soil, surface erosion and runoff, sedimentation of nearby waterways, soil contamination, potential slope stability, and change in local drainage patterns. The potential loss of vegetation during clearing would reduce the ability of remaining plant root structures to resist the effects of wind and water resulting in increased soil erosion. The degree of impact from ground-disturbing activities would depend on site-specific factors such as surface soil properties, vegetation density and type, slope angle and extent, distance to waterways or water collection infrastructure, and weather.

Construction activities would include the potential for fluid (fuel, oil, hydraulic fluid, etc.) releases or spills and the potential application of herbicides and dust control stabilizers. These activities would introduce contaminants into local soils if not controlled with BMPs and other preventative measures. Spills to soil would likely be of small quantity and within containment areas, or able to be cleaned up.

Construction of access roads, post foundations, and belowground utility installation would require excavation of soil and rock materials, depending on the site, and excavated materials may need to be hauled off site. Additionally, development of a solar energy facility could require importing aggregate and/or soil. Impacts on aggregate resources are described in Section 4.9, Energy and Natural Resources.

In general, impacts during construction would be larger for large facilities due to the increased disturbance area and potentially greater number of larger vehicles and equipment.

Decommissioning impacts would be similar to construction impacts but may be smaller due to the more limited duration of activities.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on soil resources.

#### *Geologic hazards*

Solar energy facilities are expected to be built on relatively flat areas, with slopes less than 15%. The effects of geologic hazards during construction are associated with increasing slope instability and landslide risks. Construction activities that can potentially increase this risk include grading that results in steepening of slopes, cutting mid-slope or at the base of a slope (e.g., for an access road or building pad), and alteration of drainage patterns and water infiltration rates. These activities are mainly related to roads and would increase the potential likelihood of landslides, which would affect surface waters through diversion or sedimentation. Landslides could also affect surrounding buildings, infrastructure, or people. Landslide risks would increase with facility size.

The potential that regional geologic hazards would occur (e.g., earthquake or volcanic hazards) or local geologic hazards would be triggered (e.g., landslide) during construction or decommissioning is low. A geologic event midway through construction or decommissioning may result in collapse of temporary support systems or toppling of unsecured equipment or materials. This would also increase the potential for limited fluid (fuel, oil, hydraulic fluid, etc.) releases or spills, including any herbicides and dust control stabilizers that are stored on site. These types of impacts are further discussed in the *Environmental Health and Safety Technical Resource Report* (Appendix I).

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** from geological hazards.

## **Impacts from operation**

### *Soil resources*

Impacts from operations and maintenance of solar energy facilities are anticipated to be minimal. The use of maintenance vehicles and equipment would generally be limited to access roads and designated areas that were developed during construction, and little to no new ground disturbance is anticipated. Vehicles, equipment, and site management would include the potential for fluid releases or spills. Spills to soil would likely be of small quantity and within containment areas, or able to be cleaned up. Roads, parking areas, buildings, or other on-site developments, where runoff or wind is channeled around impermeable elements, would result in increased soil erosion.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** on soil resources.

### *Geologic hazards*

While a utility-scale solar facility is required to be designed to some level of seismic performance, if earthquake ground shaking intensity were to exceed design standards, damage to facility infrastructure may occur. Additionally, ground shaking may dislodge or topple materials stored on site in support of operations and maintenance activities, which could result in a small-scale fluid release or spill.

Volcanic hazards such as pyroclastic flows (fast-moving gas and volcanic matter) or lahars (mudflow or debris flow from a volcano) are less likely to affect facilities within the study area because they are often confined to existing drainage features. Ashfall from an erupting volcano would affect facilities in the study area. An extensive seismic activity monitoring network has been installed at active volcano sites throughout the region to provide advance warning of a potential volcanic eruption, which may allow for safe relocation of select equipment and personnel. The impacts associated with ashfall on a facility are highly dependent on wind conditions. Impacts may include ash accumulation; potential corrosion of surfaces, including solar collection panels; damage to ventilation systems; damage to facility equipment and electronics; and temporarily reduced or suspended operations.

While it is possible to avoid mapped landslide hazards during siting, the potential exists for sloughing of near-surface soils, on cut and fill slopes, during sustained or extreme rainfall events. Such instances would result in maintenance activity to clean up and repair slopes but are not expected to result in damage to a facility or impair general facility operation.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** from geologic hazards.

#### **4.5.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

##### **Recommended measures for siting and design**

- Conduct detailed geotechnical engineering, soil, and hydrologic studies to characterize site conditions 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.

##### **Required measures**

- Clean Water Act Section 402 NPDES Construction Stormwater Permit (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 (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.
- 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.

##### **Recommended measures for construction, operation, and decommissioning**

- 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.

#### **Mitigation measures for potential significant impacts**

- No potential significant impacts identified.

### **4.5.4 Findings for facilities with co-located battery energy storage systems**

#### **4.5.4.1 Impacts**

Environmental impacts for facilities with BESSs would be similar to the impacts considered for facilities without BESSs related to site characterization, construction, operation, and decommissioning. Specific differences are summarized in the following sections.

#### **Impacts from construction, operation, and decommissioning**

##### *Soil resources*

A BESS requires storage facilities, spill containment, additional electrical infrastructure, and operational management systems. BESSs would be installed on gravel or concrete pads designed for secondary containment. A warehouse-type enclosure may also be used. This means a larger overall footprint and more soil disturbance.

NFPA 855 and state regulations require fire and spill containment measures for spills and fires for certain battery types with liquid electrolytes. Additionally, lithium-ion BESSs that are not listed under UL 9540 require a hazard mitigation analysis that includes an evaluation of potential energy storage system failures and safety-related impacts.

Although the likelihood is remote, in the event of a BESS failure, there is a risk of environmental contamination to soil. Emergency responders would not typically use water for battery fires, so soil contamination would be limited to the BESS site. However, firefighting water may be used on adjacent facility components to prevent fire spread. Spill response measures would be included in the project's Emergency Response Plan and the BESS operations and safety manual as required by NFPA 855. Secondary containment measures would consider the volume of water to be contained, and the methods and materials used for containment and treatment.

Cleanup actions include removal and proper disposal of contaminated soils. Decommissioning of BESS components may necessitate soil testing to determine if failure or contamination has occurred. If contamination is identified, soil remediation efforts would be necessary.

Section 4.10, Environmental Health and Safety, includes more information on impacts on human health from these types of facilities.

### *Geologic hazards*

The risk of impacts from ashfall would increase for facilities with BESSs. Impacts would include equipment vulnerability due to ash particle infiltration, insulation challenges from ash accumulation, and air intake blockages affecting cooling systems.

### *Findings*

Impacts from construction, operation, and decommissioning of a facility with a BESS would be similar to those described for facilities without a BESS, with a slight increase due to the increased total disturbed area and increased activities. Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities would likely result in **less than significant impacts** on earth resources.

#### **4.5.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid and reduce impacts of facilities with co-located BESSs would be the same as facilities without a BESS, with the following additional measures.

#### **Recommended measures for construction, operation, and decommissioning**

- 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 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.

### **4.5.5 Findings for facilities combined with agricultural land use**

#### **4.5.5.1 Impacts**

Environmental impacts from solar facilities combined with agricultural land use would be similar to the impacts considered for utility-scale facilities related to site characterizations, construction, operation, and decommissioning. Specific differences are summarized in the following sections.

#### **Impacts from construction, operation, and decommissioning**

##### *Soil resources*

During construction, the installation of solar panels and associated infrastructure may disrupt soil structure and compaction, potentially affecting soil fertility and productivity by reducing nutrient availability, altering water drainage patterns, and disturbing beneficial microbial communities. During operations, the design and orientation of solar panels may affect sunlight penetration, altering soil moisture levels and microbial activity. Additionally, certain crops—

particularly those with shallow root systems or sparse canopy cover—or grazing practices can increase soil erosion on sloped terrain by reducing soil stability and protection against runoff. Grazing can also result in soil compaction, which can decrease moisture absorption and increase runoff as well as limit germination.

#### *Geologic hazards*

Geologic hazards for facilities combined with agricultural land use would be similar to the impacts considered for utility-scale facilities and large facilities related to site characterizations, construction, operation, and decommissioning.

#### *Findings*

Impacts from construction, operation, and decommissioning would be similar to those described for facilities without agricultural land use. Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities would likely result in **less than significant impacts** on earth resources.

#### **4.5.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid and reduce impacts of agrivoltaic would be the same as facilities without agricultural land use, with the following additional measures.

#### **Recommended measures for construction, operation, and decommissioning**

- Integrate soil conservation practices into the management of agricultural activities, such as employing no-till farming techniques beneath solar panels 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.

#### **4.5.6 Findings for the No Action Alternative**

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar 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, operation, and decommissioning, depending on project size and design, and would likely result in **less than significant** impacts.

#### **4.5.7 Unavoidable significant adverse impacts**

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, or decommissioning activities would have **no potentially significant and unavoidable adverse impacts** related to earth resources.

## 4.6 Air quality and greenhouse gases

### Key findings

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities would likely result in **less than significant impacts** on air quality and GHG emissions.

**No potentially significant and unavoidable adverse impacts** on air quality or GHG emissions would occur.

Air quality refers to the condition of the breathable air and the presence of pollutants or particles. The *Air Quality and Greenhouse Gases Technical Resource Report* (Appendix E) includes the full analysis and technical details used to evaluate air quality and GHGs in this PEIS.

### 4.6.1 Affected environment

Pollutants can be local and affect a small area, or regional, such as ozone. Pollutants are regulated under state and federal laws. National Ambient Air Quality Standards and Washington Ambient Air Quality Standards are established for common “criteria pollutants.” In general, if potential emissions from stationary sources exceed certain thresholds, they must get a Notice of Construction permit before beginning construction. The following common criteria pollutants have standards set by the U.S. Environmental Protection Agency (USEPA):

- Particulate matter 10 microns or less in diameter (PM<sub>10</sub>)
- Particulate matter 2.5 microns or less in diameter (PM<sub>2.5</sub>)
- Ozone
- Sulfur dioxide (SO<sub>2</sub>)
- Nitrogen dioxide (NO<sub>2</sub>)
- Carbon monoxide (CO)
- Lead

Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from the sun as it is reflected back into the atmosphere from the Earth, like a greenhouse does. Increasing amounts of GHGs trap more solar radiation and decrease the amount that is reflected back into the atmosphere, resulting in an increased global average temperature and climate change impacts to people and the environment. The Washington Legislature set new GHG emission limits (RCW 70A.45.020) to combat climate change. By 2050, the state must achieve net-zero GHG emissions. CETA requires all electric utilities in Washington to have 100% of electricity generated from renewable or non-emitting resources by 2045.

Due to the large solar study area, existing air pollutant concentrations vary. Ambient air quality standards are met everywhere within the study area, though there are areas of concern for particulate matter and ozone. The Tri-Cities area (Kennewick, Pasco, and Richland) is an area of concern for ozone. Sunnyside, Toppenish, Yakima, Omak, and Colville are all areas of concern for particulate matter. Some areas in Washington are in “maintenance” status, meaning that

they were previously designated as nonattainment for one or more National Ambient Air Quality Standards and have been redesignated to attainment status. There are 15 former nonattainment areas in Washington. Each area has an approved maintenance plan and 20-year planning period for air quality that includes specific requirements for the area. At the end of 2025, there will be only two maintenance areas that are still within the 20-year planning period. These areas (Tacoma and Ferndale) are outside of the geographic scope of study.

Any location in the study area may experience occasional severe deterioration of air quality due to wildfires (usually during July to September), depending on wind patterns and the location of the fire(s). In addition, seasonal dust storms (usually during dry periods in spring and summer), particularly in eastern and central Washington, can increase levels of particulate matter in the air. This decreases air quality and leads to reduced visibility.

Ecology monitors the air using Washington's Air Monitoring Network, and permitting regulations are in place to ensure air pollution levels do not increase to concentrations outside of ambient air quality standards. New sources of air pollution must obtain an air quality permit.

Carbon dioxide equivalent, or CO<sub>2</sub>e, is the number of metric tons of CO<sub>2</sub> emissions with the same global warming potential as 1 metric ton of another GHG. In 2019, Washington produced about 102.1 million metric tons of CO<sub>2</sub>e. Transportation is the largest source, at 40% of the state's GHG emissions, followed by residential, commercial, and industrial energy use at 31%, and electricity consumption at 21%. The remaining 8% of emissions are from agriculture, waste management, and industrial processes.

## **4.6.2 How impacts were analyzed**

This analysis evaluated how solar facilities could affect air quality and contribute to GHG emissions. The primary emission sources include fuel combustion by equipment and vehicle traffic during construction and decommissioning. Disturbed soils from land-clearing activities also result in airborne dust. Emissions and dust would be also generated by vehicles traveling on facility access roads to perform operations and maintenance functions.

Construction and operation emissions were estimated by reviewing emissions data from similar proposed and completed solar facilities in Washington and California and determining a scaled emissions rate in tons per MW to apply to this analysis. Projected emissions from each facility phase were compared to state and federal laws, policies, guidance, and permitting thresholds for context and to evaluate impacts. Dust was considered qualitatively for how it may impact biological resources or water quality.

GHG life-cycle emissions estimates were derived using GHG life-cycle assessments (LCAs) developed by the National Renewable Energy Laboratory. These assess the overall GHG impacts of the entire life cycle of solar facilities, from facility material production, to use, to disposal.

## 4.6.3 Findings for utility-scale solar facilities

### 4.6.3.1 Impacts

#### Impacts from construction and decommissioning

Air emissions associated with site characterization, construction, and decommissioning activities would be generated by construction equipment, haul-truck trips, worker trips, vehicle travel on paved and unpaved surfaces, and dust from material handling. Emission rates would be assumed to increase in relative proportion to the size of the facility. Estimated construction emissions for 600 MW and 1,200 MW facilities are provided in Table 4-1. Air emissions associated with decommissioning activities are expected to be similar to or less than the emissions generated from construction. Based on estimated emissions generated by facilities, emissions are not anticipated to exceed the significance thresholds for any criteria pollutant.

Table 4-1. Estimated construction emissions for types of facilities analyzed in this PEIS (tons)

Emission type	600 MW facility	1,200 MW facility	Threshold (tons per year)
Volatile organic compounds	5.8	11.7	100
Nitrogen oxides	42.0	84.0	100
Carbon monoxide	37.2	74.3	100
Particulate matter smaller than 10 microns in diameter	11.6	23.1	100
Particulate matter smaller than 2.5 microns in diameter	3.4	6.8	100
Sulfur dioxide	0.2	0.3	100

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on air quality.

#### Impacts from operation

Operations would generate exhaust and dust emissions from vehicles used for facility maintenance. Emission rates are assumed to increase in relative proportion to the size of the facility, as larger facilities are assumed to require more maintenance. Estimated operations emissions for 600 MW and 1,200 MW facilities are provided in Table 4-2. Operations are not anticipated to produce emissions at a level that would exceed any criteria pollutant thresholds.

Table 4-2. Estimated operations emissions for types of facilities analyzed in this PEIS (tons)

Emission type	600 MW facility	1,200 MW facility	Threshold (tons per year)
Volatile organic compounds	2.7	5.3	100
Nitrogen oxides	17.8	35.7	100
Carbon monoxide	14.9	29.8	100
Particulate matter smaller than 10 microns in diameter	3.3	6.6	100
Particulate matter smaller than 2.5 microns in diameter	1.4	2.9	100
Sulfur dioxide	<0.01	<0.01	100

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** on air quality.

### **GHG LCA**

The operation of solar energy facilities would reduce overall GHG emissions compared to a fossil-fuel power plant that would otherwise be in operation to supply the same amount of electricity. Overall, GHG emissions would be reduced if solar energy production replaces fossil-fuel energy production over the next 20 years. Washington State law requires utilities to have net-zero GHG emissions by 2045.

Federal studies by the National Renewable Energy Laboratory evaluated the life-cycle GHG emissions for the full lifespan of a solar energy facility, including upstream, downstream, and operational processes. Upstream processes include the raw material extraction and construction of PVs and associated components, along with the construction of the solar plant. Operational processes include vehicle exhaust emissions from maintenance activities. Downstream processes include decommissioning and disposal of the solar installation.

The resulting operational facility GHG emissions for a 30-year life cycle are estimated to be up to 71,040 metric tons of CO<sub>2</sub>e or up to 2,368 metric tons of CO<sub>2</sub>e annually. For comparison, the emissions for the same size of coal facility are estimated to be up to 9.19 million metric tons of CO<sub>2</sub>e or up to 306,425 metric tons of CO<sub>2</sub>e annually. Emissions for a natural gas facility of the same size are estimated to be up to 4.1 million metric tons of CO<sub>2</sub>e or up to 136,850 metric tons of CO<sub>2</sub>e annually.

Offsets could be used to reduce the amount of GHGs in the atmosphere.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** on GHGs.

#### **4.6.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

##### **Recommended measures for siting and design**

- Conduct an LCA 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.

##### **Required measures**

- Air Quality Permits (Ecology, EFSEC, local agency)

##### **Recommended measures for construction, operation, and decommissioning**

- 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.
- Implement 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.
- 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.

##### **Mitigation measures for potential significant impacts**

- No potential significant impacts identified.

#### **4.6.4 Findings for facilities with co-located BESS**

##### **4.6.4.1 Impacts**

##### **Impacts from construction, operations, and decommissioning**

Air emissions for facilities with BESSs would be slightly higher than the impacts considered for utility-scale facilities without a BESS related to site characterization, construction, operation,

and decommissioning. This is due to more construction equipment and vehicles. The total construction and decommissioning emissions from a facility with a co-located BESS are not anticipated to exceed any criteria pollutant thresholds (Table 4-3).

No emissions of air pollutants or GHGs other than those related to refrigerants (e.g., chlorofluorocarbons, hydrofluorocarbons, perfluorinated chemicals, or sulfur hexafluorides) are expected from BESS operation. Operation of a facility and co-located BESSs would generate similar emissions as those analyzed for facilities without a BESS.

If a thermal runaway event due to damage or a battery management system failure were to occur for facilities with lithium-ion BESSs, there could be risk of hazardous air emissions to emergency responders that include toxic gases. Impacts related to fires and explosions are included in Section 4.10, Environmental Health and Safety, and Section 4.17, Public Services and Utilities.

Table 4-3. Estimated construction emissions for a 1,200 MW solar energy facility and two 500 MW co-located battery energy storage systems

Emission type	Estimated emissions (tons)	Threshold (tons per year)
Volatile organic compounds	13.4	100
Nitrogen oxides	98.7	100
Carbon monoxide	81.6	100
Particulate matter smaller than 10 microns in diameter	23.6	100
Particulate matter smaller than 2.5 microns in diameter	7.3	100
Sulfur dioxide	0.3	100

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities with a co-located BESS would likely result in **less than significant impacts** on air quality.

#### **GHG LCA**

The GHG emissions for facilities with a co-located BESS would be greater than the range described above, with the addition of upstream and downstream LCA emissions from the BESS. Applying studied percentage increases in GHG life-cycle emissions for a case study in Texas where a 500 MW BESS was added to wind and solar applications, the GHG emissions for two 500 MW BESSs would range from 2,096 to 4,192 metric tons of CO<sub>2</sub>e a year depending on the size of the facility.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, facilities with a co-located BESS would likely result in **less than significant impacts** on GHGs.

#### **4.6.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid and reduce impacts of facilities with co-located BESSs would be the same as facilities without a BESS.

### **4.6.5 Findings for facilities combined with agricultural land use**

#### **4.6.5.1 Impacts**

##### **Impacts from construction, operations, and decommissioning**

Air emissions resulting from site characterization, construction, and decommissioning of facilities combined with agricultural land use would be similar to the impacts considered for facilities without agricultural uses. Emissions generated by the construction and decommissioning of solar energy facilities that include agricultural land use are not anticipated to exceed the significance thresholds for any criteria pollutant.

Operation of agrivoltaic facilities would generate similar emissions as solar facilities that do not include agricultural land use, with the addition of emissions from equipment for agricultural operations. The overall emissions footprint of an agricultural operation is highly variable, dependent on the types of crops or livestock, number of tilling operations per year, age of equipment being used, and many other variables. This may include emissions from operation of diesel-powered equipment, livestock operations, and fertilizer operations. However, it is not anticipated that the scale of agricultural operation that would be combined with solar facilities would cause an emissions threshold to be exceeded.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities with co-located agricultural use would likely result in **less than significant impacts** on air quality.

#### **GHG LCA**

The GHG emissions for agrivoltaic facilities would likely be similar to the range described for utility-scale facilities that do not include agricultural land use but would vary based on the type of land use and amount of land. An LCA would need to be conducted to estimate GHGs for each project based on its specific design.

Offsets could be used to reduce the amount of GHGs in the atmosphere.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, agrivoltaic facilities would likely result in **less than significant impacts** on GHGs.

#### **4.6.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid and reduce impacts of agrivoltaic facilities would be the same as facilities without agricultural land use, with the following additional measures.

#### **Recommended measures for construction, operations, and decommissioning**

- 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.

#### **4.6.6 Findings for the No Action Alternative**

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar 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, operation, and decommissioning, depending on project size and design, and would likely result in **less than significant impacts**.

#### **4.6.7 Unavoidable significant adverse impacts**

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, or decommissioning activities would have **no potentially significant and unavoidable adverse impacts** related to air quality or GHGs.

### **4.7 Water resources**

#### **Key findings**

A project developer would need to ensure that there is sufficient water available for a project, both physically and legally. The amount of water available will vary based on a project and its location, and this study does not evaluate specific sites. If the water needed for a project to be built and operated is not available, the project would not be feasible.

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities would likely result in **less than significant impacts** on water resources (surface water, groundwater, wetlands, and floodplains).

**No potentially significant and unavoidable adverse impacts** related to water resources would occur.

This section evaluates surface water, groundwater, wetlands, and floodplains. This section evaluates the following features related to water resources: water quality, water quantity (flows and levels), and water availability and water rights.

The *Water Resources Technical Report* (Appendix F) includes the full analysis and technical details used to evaluate water resources in this PEIS.

## **4.7.1 Affected environment**

### **4.7.1.1 Surface water**

Surface water includes streams, rivers, lakes, reservoirs, estuaries, and marine waters. Wetlands are also surface waters and are discussed in Section 4.7.1.4. The study area encompasses land along surface waters ranging in size from the Columbia River to unnamed smaller creeks with only seasonal flow. Seven of the eight hydrologic sub-regions in Washington as identified by the U.S. Geological Survey (USGS) are found within the study area. The study area also falls within 40 of Washington's 62 Water Resource Inventory Areas (WRIAs; Figure 4-3). WRIAs provide a framework for water resources management in the state.

Water quality is a key element of surface water regulation and management in Washington. Water quality conditions across the study area vary by location and are affected by physical conditions of the waterbody (width, depth, flows), underlying soils and geology, and human influences. In general, surface water quality conditions are typically better higher in a watershed, upstream of intensive land uses. Common water quality issues that affect some waters within Washington and the study area include elevated temperature, low dissolved oxygen, high turbidity, bacteria, and toxics and other pollutants from industrial activities and stormwater runoff.

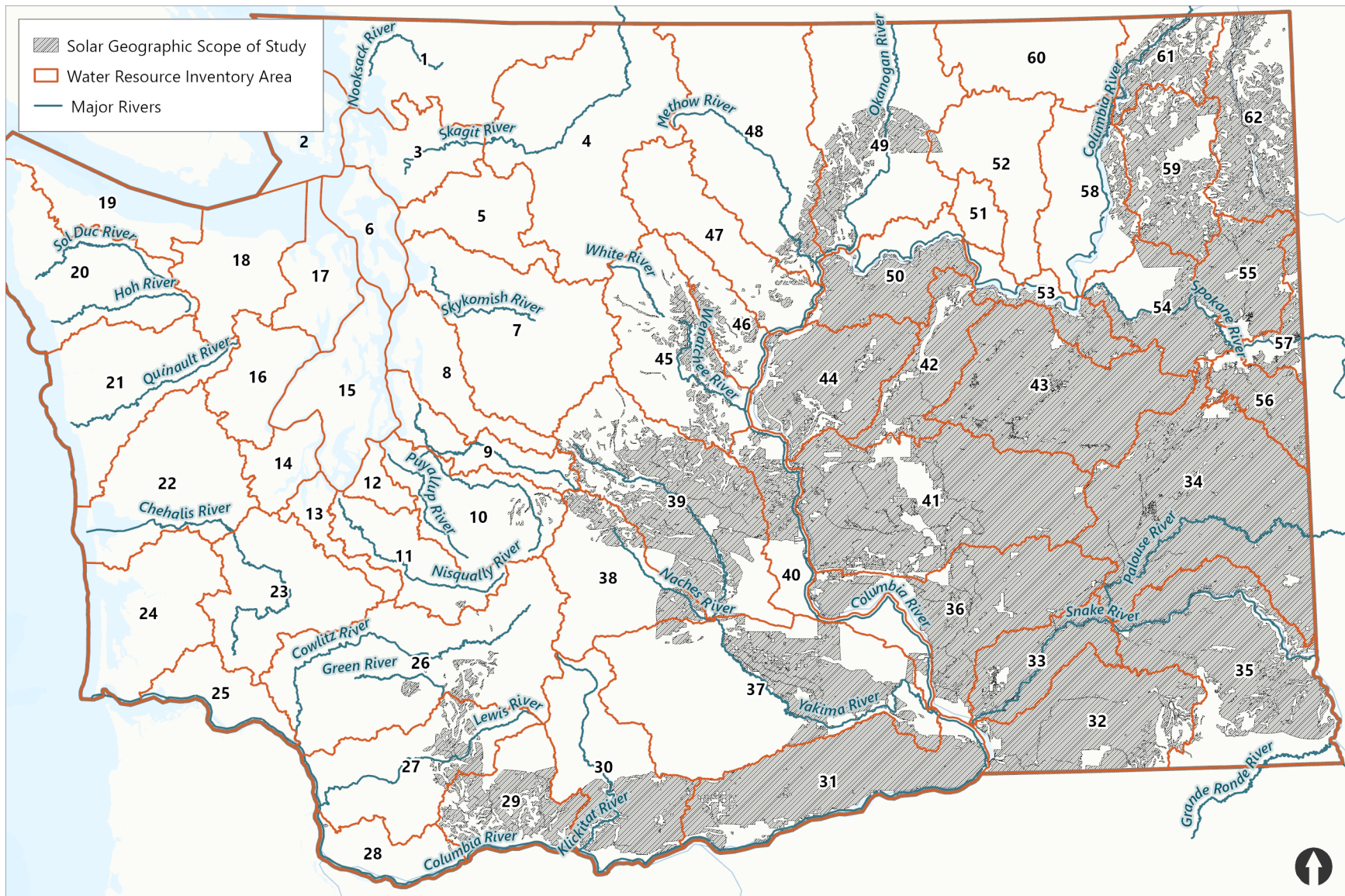


Figure 4-3. Water Resource Inventory Areas (WRIAs)

#### **4.7.1.2 Groundwater**

Groundwater is the water found in a saturated zone beneath the ground surface. A saturated soil or rock layer with spaces that allow water to move through it is called an aquifer. There are seven main aquifers in Washington as identified by USGS. The study area includes land over portions of most of these aquifers.

Sole source aquifers are defined as aquifers that supply at least 50% of the drinking water for its service area and for which there are no reasonably available alternative drinking water sources if the aquifer becomes contaminated. USEPA has designated 13 sole source aquifers in Washington, and three of them overlap the study area: the Lewiston Basin, Spokane Valley Rathdrum Prairie Aquifer, and the Cedar Valley Aquifer.

Cities and counties in Washington protect groundwater resources by establishing critical aquifer recharge areas, as required by the state's Growth Management Act (GMA). Development activities within critical aquifer recharge areas are regulated by city and county critical area ordinances and codes.

#### **4.7.1.3 Water availability and water rights**

Water availability is dependent upon physical availability and legal availability. This is based on instream flow requirements and water rights held by others within each watershed, sub-basin, aquifer, or similar body of water. Across the study area, water availability varies by location and is dependent on many factors such as local hydrology and climate conditions, land uses, and existing water rights. Ecology has responsibilities for managing waters of the state, including issuing rights to use water while protecting water resources for public benefit. Nearly 80% of the state's overall water use is for irrigation and public supply with more water used for public supply on the west side of the state, and more water used for irrigation on the east side of the state. In addition to water rights for withdrawal, water availability is also influenced by the requirement to maintain minimum instream flows. These requirements are in place to protect fish and wildlife, Tribal resources, water quality, recreation, aesthetics, and navigation. Ecology considers instream flow requirements and closed waterbodies when reviewing new water rights applications.

All surface diversions and many groundwater withdrawals in Washington require a permit prior to water use. However, the groundwater code provides a qualified exemption to groundwater withdrawal permitting for certain uses including water for industrial purposes not exceeding 5,000 gallons per day. Daily limits may be less, or water may not be available based upon local conditions.

#### **4.7.1.4 Wetlands**

Wetlands are waters of the state and are a specific type of water resource that often occur in transitional areas between terrestrial and aquatic systems. They include areas that are commonly referred to as swamps, marshes, bogs, and fens. Wetlands can occur in and adjacent to stream and river channels, on floodplains, in low-lying areas and depressions, around the edges of ponds and lakes, and on slopes. Wetlands occur throughout the study area; however,

there is no detailed single source that identifies the presence of all wetlands. Developers would be required to conduct wetland determinations or delineations to determine wetland presence. In Washington, wetlands are rated and categorized using Ecology's Washington State Wetland Rating System. Under this system, wetland categories range from Category I wetlands, which are a unique or rare wetland type, are more sensitive to disturbance, or are relatively undisturbed, to Category IV wetlands, which have the lowest levels of function and are often heavily disturbed. State law requires wetland mitigation plans to ensure no net loss of function.

#### **4.7.1.5 Floodplains**

A floodplain is any land area susceptible to being inundated by floodwaters from any source. Frequently flooded areas are floodplains and other areas subject to flooding. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps identify flood hazard areas regulated under the National Flood Insurance Program. Special flood hazard areas are areas that would be inundated by a flood event that has a 1% chance of occurring in any year (i.e., the "100-year" flood). These special flood hazard areas generally are the basis for floodplain management regulations. Flood risks vary across the study area based on location and setting. Information on flood risks for a given site should be evaluated using FEMA's Risk Mapping, Assessment, and Planning program tools available on the [FEMA website](https://www.fema.gov/flood-maps/tools-resources/risk-map).<sup>32</sup> Local critical area ordinances include requirements to define and protect frequently flooded areas, and some local governments may require greater protection from floods.

### **4.7.2 How impacts were analyzed**

The assessment of impacts considered the following:

- Alterations to the course of surface water
- Changes in surface water quality
- Disruption of the groundwater flow regime (including groundwater recharge)
- Changes in groundwater quality
- Alterations to water availability or rights
- Wetland area alteration or loss
- Wetland function alteration or loss
- Wetland buffer area alteration or loss
- Alterations to floodplain functions and/or any loss of floodplain storage

The assessment of impacts was qualitative, and potential impacts considered applicable laws and regulations (e.g., water quality standards, water rights laws, and wetland regulations).

A developer would need to ensure that there is sufficient water available for a project, both physically and legally. Water availability will vary based on the project and location. If water is needed for a project and is not available, a project would not be able to operate. A developer

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<sup>32</sup> <https://www.fema.gov/flood-maps/tools-resources/risk-map>

would need to have sufficient water rights for a project to be feasible, so the PEIS assumes adequate water is available.

### **4.7.3 Findings for utility-scale solar facilities**

#### **4.7.3.1 Impacts**

##### **Impacts from construction and decommissioning**

Facilities would require a water supply during construction for dust control, equipment cleaning, and potentially for concrete production. Construction of utility-scale solar energy facilities would require supplying drinking water to an estimated 100 to 400 construction workers. Water could also be needed to irrigate site restoration plantings for some period after structures are removed and grading is complete, until successful plant establishment.

##### *Surface water*

Site characterization, construction, and decommissioning activities could impact surface water flows for facilities that involve elements within or adjacent to waterbodies. Streamflows could be temporarily re-routed from their natural channels by diversions needed to construct access road crossings. Permanent alterations to streams could occur if culvert installations are needed at access road crossings. These impacts would be minimized by following design guidelines and adhering to water crossing regulations including WDFW's Water Crossing Guidelines for fish-bearing streams.

Ground disturbance could impact flow rates and volumes of surface runoff reaching nearby waterbodies. Vegetation clearing and soil compaction in site investigation and construction areas would reduce the potential for land to absorb and infiltrate precipitation, potentially leading to increases in stormwater peak flows. Construction of operations and maintenance buildings and service roads would add impervious surface area. The addition of impervious surfaces would increase surface water runoff from those areas and, depending on how stormwater drainage is managed, could permanently change the amount and timing of surface flows reaching nearby waterbodies. Grading, installation of access roads, and installation of utility trenches all affect how surface runoff moves across a site to nearby waterbodies. Additionally, the solar arrays themselves could impact local drainage patterns by redirecting where precipitation falls on the land and how it infiltrates or flows to surface waters.

Site characterization, construction, and decommissioning activities could adversely affect surface water quality in several ways. In-water construction for elements such as new stream crossings for roads could temporarily elevate stream turbidity levels from soil disturbance and temporary water management (e.g., bypassing and then re-introducing flows). Soil disturbance from establishing initial site access for geotechnical surveys, installing meteorological towers, structure and access road removal, and from site grading could temporarily increase erosion potential and soil transport to receiving waters in runoff or by wind, contributing soil and associated pollutants such as metals and organics. The erosion potential of the soils, the proximity of disturbance to surface waters, and the size and nature of construction activity would all influence the potential for water quality issues from ground disturbance.

Revegetation of temporarily disturbed areas would limit the length of time soils are exposed. Structure removal during decommissioning would be expected to restore pre-facility drainage patterns.

The presence of construction equipment and materials could increase the potential for associated pollutants to enter surface waters during in-water construction or through stormwater runoff from areas of upland construction or demolition. Potential pollutants from operating such equipment would include fuel (gasoline and diesel fuel), oil, grease, coolant, and hydraulic fluid. Hazardous material storage requirements and federal requirements for facilities storing more than 1,320 gallons of petroleum fuel would require secondary containment. For these types of quantities, spills would likely be to secondary containment or nearby soil and able to be cleaned up. EHS impacts are discussed in Section 4.10. Developers would be required to be in compliance with applicable permits such as an NPDES construction permit and implement erosion control plans. Implementation of permit requirements would reduce impacts on surface water. Any blasting adjacent to waters, including wetlands, would also require site-specific BMPs.

Construction would include on-site concrete mixing and pouring and could also include concrete production at on-site batch plants. Concrete work could create the potential for introducing high-pH discharges to surface waters. Demolition of concrete pads and foundations could result in water coming into contact with freshly exposed concrete surfaces and debris/dust, which could lead to elevated water pH levels. Discharge of construction wastewater could increase flow rates, temperature, dissolved oxygen, or turbidity of receiving surface waters. Activities such as concrete work must meet water discharge requirements.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on surface water.

#### *Groundwater*

Site characterization includes groundwater or geotechnical drilling and testing to gather information. Construction of foundations for solar energy facilities, including buildings and electrical substations, includes belowground excavation and fill and concrete work, which could potentially require dewatering during construction. Such activities would depend on the site, but could locally affect shallow groundwater flows, to approximately the depth of the drilling or excavation.

The construction of new impervious surfaces in the form of facility buildings and access roads would locally change surface-to-groundwater interactions and reduce groundwater recharge capability within those footprints. These make up a small portion of a facility site. The installation of new solar panels would reduce precipitation reaching the ground directly below the panels but would maintain the infiltration capabilities of the underlying ground. Wells using

groundwater may be used for construction of solar energy facilities and result in localized water table drawdown. These would require a water right.

At decommissioning, removal of structures and their foundations, access roads, and solar panel arrays, and restoration to more natural, pre-facility conditions would allow surface-groundwater interactions, including infiltration of rain and snowmelt and groundwater recharge.

#### *Findings*

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

#### *Water availability and water rights*

Depending on the site, water may be available from existing municipal sources, transported to the site by truck, or could require water from new surface water diversions or groundwater withdrawals.

Diversions of surface water for construction or decommissioning would require obtaining a water right prior to diversion. Groundwater pumping would also require a water right if withdrawals were to exceed groundwater permit exemption thresholds of 5,000 gallons per day for industrial uses. Water used to produce concrete and for other construction activities could likely exceed 5,000 gallons per day; this would require a water right.

Water availability and the likelihood of obtaining new water rights for construction or decommissioning vary by location in the study area. Water rights may not be granted in watersheds that are over-appropriated and subject to closures or instream flow requirements that are often not met. If water is not physically and legally available, a water right will not be issued. If water is needed for a project and is not available, a project would not be able to operate.

#### *Findings*

A developer would need to have sufficient water rights for a project to be feasible, so the PEIS assumes adequate water is available. With this assumption, through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on water availability or water rights.

#### *Wetlands*

Impacts to areas and functions of wetlands could occur during the site characterization, construction, and decommissioning phases. Wetlands and regulated buffers may need to be cleared and/or filled for the construction of meteorological towers, staging/laydown areas, roads, solar array fields, gen-tie line corridors, and other supporting facilities. Roads and other

infrastructure constructed near wetlands could introduce invasive plant species, change surface drainage patterns, and/or introduce soils or pollutants into adjacent wetlands via runoff.

The removal of solar arrays, supporting infrastructure, access roads, and culverted road crossings from wetlands (or areas adjacent to wetlands) during facility decommissioning could introduce invasive plant species and temporarily increase erosion potential and soil compaction in those areas. Such impacts would be minimized by the implementation of erosion control measures and BMPs and via prompt revegetation and decompaction of disturbed soils.

Wetlands and regulated buffers may be present on a facility site, and the types of wetlands would be identified as part of the site characterization phase. The type, size, and extent of wetlands would determine the degree of potential impacts. If wetland or regulated buffer impacts are likely, project developers would need to comply with a mitigation sequencing process in order to achieve the state goal of no net loss of wetland acreage and function. As part of the agency review process, a mitigation plan will need to be submitted that explains how wetland impacts will be compensated for ecologically and appropriately. The mitigation plan would need to be approved by regulatory agencies before permits would be issued.

#### *Findings*

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

#### *Floodplains*

Site characterization, construction, and decommissioning activities could impact floodplains for solar energy facilities that involve elements within or adjacent to waterbodies, such as for a facility access road crossing of a stream. The majority of a solar energy facility would not include construction of impermeable areas and would not be likely to affect floodplain functions.

Permanent alterations to waterbodies could occur with culvert installations at access road crossings, which could restrict natural surface water flow and floodplain functions for flood storage, soil transport, and large wood transport and could also restrict aquatic species movements. Projects would be required to meet state and local standards for culverts, which would require they pass flows for a 100-year flood. Temporary work activity and ground disturbance in the floodplain could result in temporary impacts on floodplain functions. City and county floodplain development permits are required to prevent development that would lead to alteration of floodplain functions, loss of storage, increase hazards, or cause a net rise in flood elevation during a 100-year flood. During decommissioning, floodplain functions could be restored to pre-facility conditions following structure and road removal and restoration grading and planting.

### *Findings*

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

## **Impacts from operation**

### *Surface water*

Operations and maintenance would involve the on-site storage and use of potential pollutants including oil for electrical transformers and fuel and oil for generators to provide backup power. Transformers typically contain 600 gallons of oil or less. Fuel is expected to be stored in aboveground storage tanks with containment. If more than 1,320 gallons is stored on site, a facility must have a plan to prevent, control, and respond to spills. For these types of quantities, spills would likely be to secondary containment or nearby soil and able to be cleaned up. EHS impacts are discussed in Section 4.10, Environmental Health and Safety.

Impervious surfaces for buildings and access roads, on-site oil and fuel storage, and the periodic presence of maintenance vehicles and equipment would create some potential for pollutants in stormwater discharges. Maintenance of facilities could also involve periodic use of herbicides to manage unwanted vegetation, which could impact water quality in receiving streams if not applied properly. A study performed on electric vehicle fires by the Washington State Patrol identified runoff of contaminated firefighting water can affect water quality in surface and groundwaters. Depending on proximity and soil surface conditions, water used in firefighting or from post-fire runoff may contain chemicals released from burned facilities that could impact receiving waterbodies.

Maintenance of solar panels could involve periodic washing of the panels with water to remove particulates that accumulate on the surface of the panels. Runoff from panel washing could cause localized erosion and increase the potential for soil transport to nearby waterbodies. It is assumed that no surfactants would be used in panel washing.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** on surface water.

### *Groundwater*

On-site storage and use of generator fuel and transformer oil present some risk of spills or releases of pollutants to the subsurface and could present a potential source of groundwater contamination. Buildings for operation of solar energy facilities could include sanitary wastewater discharges (e.g., from restrooms) to the subsurface through on-site septic systems. Septic systems could present risks of bacterial contamination of groundwater if not designed and maintained in accordance with local codes. As described above under surface water, water

used in firefighting or from post-fire runoff may contain chemicals released from burned facilities that could impact groundwater.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** on groundwater.

#### *Water availability and water rights*

Water supply would be needed for use in buildings and potentially for periodic washing of solar panels. If water is used for solar panel washing, a utility-scale facility could use approximately 16,000 to 114,000 gallons per year, per MW. At the high end of water usage (including water for solar panel washing) for a 1,200 MW facility, this would total 136.8 million gallons of water per year. Water demand would vary based on panel size, soiling rates, and cleaning frequency. Facilities could also use dry cleaning methods, which would result in much lower overall facility water use. Water from municipal sources may be used or water may be trucked to the site. If an on-site well is proposed, it would require a water right based on the expected amounts needed. Waterless cleaning methods may be utilized by some facilities, but panel washing with water is common practice.

A developer would need to ensure there is sufficient water available for a project, both physically and legally. Water availability will vary based on the project and location. If water is needed for a project and is not available, a project would not be able to operate.

#### *Findings*

A developer would need to have sufficient water rights for a project to be feasible, so the PEIS assumes adequate water is available. With this assumption, through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on water availability or water rights.

#### *Wetlands*

Potential water quality impacts on wetlands and regulated buffers could occur during periodic washing of solar panels or rain events, which could create runoff that carries soils. Spills of pesticides, fuel, vehicle fluids, or other hazardous materials used or stored at the facility could impact nearby wetlands and regulated buffers if outside of containment. Runoff from parking areas, buildings, and other facility infrastructure or septic system discharges would also degrade water quality in adjacent wetland areas. Maintenance activities such as routine mowing, vegetation removal in gen-tie line corridors, and access road maintenance would also affect wetlands and regulated buffers. Developers would be required to complete operational activities with standard BMPs and spill prevention measures and in compliance with applicable permits. Implementation of permit requirements would reduce impacts to wetlands and regulated buffers.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** on wetlands.

#### *Floodplains*

Potential operations and maintenance impacts on floodplains would be similar to those described above for surface waters. Maintenance of facility elements within floodplains could interfere with floodplain functions. For example, if vegetation maintenance at facilities and along access roads were to prevent natural vegetation from re-establishing, it could affect vegetation support for floodplain functions for water quality, habitat, and restricting the speed of moving floodwater. Due to floodplain development permit requirements, facility operation is not expected to lead to alterations to floodplain functions and/or any loss of floodplain storage that would cause a net rise in flood elevation during a 100-year flood.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** on floodplains.

#### **4.7.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

##### **Recommended measures for siting and design**

- 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.
- 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 WAC).

#### **Required measures**

- Clean Water Act Section 401 Water Quality Certification (Ecology/USEPA/Tribes)
- Clean Water Act Section 404 Permit (U.S. Army Corps of Engineers)
- 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 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 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 an SWPPP.
- 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.

### **Recommended measures for construction, operation, and decommissioning**

- 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 runoff from panel-washing activities, and 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, including for dust control and panel washing. 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.

### **Mitigation measures for potential significant impacts**

- No potential significant impacts identified.

## **4.7.4 Findings for facilities with co-located BESS**

### **4.7.4.1 Impacts**

#### **Impacts from construction, operation, and decommissioning**

The potential impacts on water resources for facilities with BESSs would be similar to the impacts described for facilities without BESSs for site characterization, construction, operation, and decommissioning.

Co-locating BESSs with solar energy facility development would require additional construction-related ground disturbance and an increased building footprint relative to facilities with no BESS. A BESS at a solar energy facility would add another stormwater consideration to a facility, from the container and concrete foundation, and potentially another regulated element to be included in an Industrial SWPPP. Specific stormwater management controls during construction, operation, and decommissioning for each facility would be dependent on the facility design and project site.

NFPA 855 and state regulations require fire and spill containment measures for spills and fires for certain battery types with liquid electrolytes. Additionally, lithium-ion BESSs that are not listed under UL 9540 require a hazard mitigation analysis that includes an evaluation of potential energy storage system failures and safety-related impacts. Although the likelihood is remote, in the event of a BESS failure, there is a risk of environmental contamination from firefighting water. Emergency response actions are to allow the fire to burn to prevent water contaminated with pollutants to affect surface water and groundwater quality. However,

firefighting water may be used on adjacent facility components to prevent fire spread. Firefighting water and post-fire runoff may be contaminated with hazardous materials, such as lithium, cobalt, and electrolytes. The potential for impacts from runoff increases if BESSs are located close to surface waters, wetlands, or floodplains.

Spill response measures would be included in the project's SWPPP, Emergency Response Plan, and the BESS operations and safety manual as required by NFPA 855. Secondary containment measures would consider the volume of water to be contained, and the methods and materials used for containment and treatment. Impacts to earth resources are discussed in the *Earth Resources Technical Report* (Appendix D) and hazardous materials are discussed in the *Environmental Health and Safety Technical Resource Report* (Appendix I).

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities with a co-located BESS would likely result in **less than significant impacts** on water resources.

#### **4.7.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid and reduce impacts of facilities with co-located BESSs would be as facilities without a BESS, with the following additional measures:

##### **Recommended measure for siting and design**

- 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.

##### **Recommended measures for construction, operation, and decommissioning**

- 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.

## 4.7.5 Findings for facilities combined with agricultural land use

### 4.7.5.1 Impacts

#### Impacts from construction, operation, and decommissioning

The potential impacts on water resources for facilities combined with agricultural land use would be similar to the impacts described for utility-scale facilities related to site characterization, construction, operations, and decommissioning.

There are some ways the impacts on water resources from facilities combined with agricultural land use would differ from facilities without agricultural land use:

- A facility growing crops would have a higher demand for water than the same facility without agricultural use. For sites with an existing agricultural use, the increase in water demand would only result from the addition of a solar facility. For sites with changed agricultural types or the addition of an agricultural use where there was not one previously, the demand for water could be higher for a site with irrigated crop production, and lower for a site with livestock grazing. These changes could increase the importance of considering water availability and water rights issues, depending on the specifics of the facility design and site considerations.
- Substances commonly associated with farm operations such as pesticides, fertilizers, and livestock waste could lead to increased pollutants in stormwater runoff.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities with a co-located agricultural use would likely result in **less than significant impacts** on water resources.

### 4.7.5.2 Measures to avoid, reduce, and mitigate impacts

Measures to avoid and reduce impacts for agrivoltaic facilities would be the same as facilities without agricultural land use.

## 4.7.6 Findings for the No Action Alternative

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar 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, operation, and decommissioning, depending on project size and design, and would likely result in **less than significant impacts**.

#### 4.7.7 Unavoidable significant adverse impacts

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

### 4.8 Biological resources

#### Key findings

Through compliance with laws and permits and with the implementation of measures to avoid, reduce, and mitigate impacts, some construction, operation, and decommissioning activities would result in **less than significant impacts** on terrestrial habitats and vegetation, including special-status habitats and vegetation. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability or disrupt habitat continuity along migration routes would result in **potentially significant adverse impacts** on terrestrial habitats and vegetation.

Through compliance with laws and permits and with the implementation of measures to avoid and reduce impacts, some construction, operation, and decommissioning activities would result in **less than significant impacts** to terrestrial wildlife, including special-status species. Activities that affect species viability and the mortality of any individual species or disturbance that disrupts successful breeding and rearing behaviors would result in **potentially significant adverse impacts** on terrestrial wildlife.

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operations, and decommissioning activities would result in **less than significant impacts** on aquatic habitat and species and wetlands.

Construction, operation, and decommissioning activities may result in **potentially significant and unavoidable adverse impacts** on terrestrial special-status habitats and species if activities cause the permanent degradation, loss, or conversion of suitable habitat that is critical to habitat or species viability; affect the mortality of any individual species or create a disturbance that disrupts successful breeding and rearing behaviors; or disrupt habitat continuity along migration routes. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site. Mitigation to reduce impacts below significance for terrestrial special-status habitats or species may not be feasible.

This section evaluates potential impacts and mitigation related to aquatic and terrestrial species and habitats. The *Biological Resources Technical Report* (Appendix G) includes the full analysis and technical details used to evaluate biological resources in this PEIS. This section contains a summary of how impacts were analyzed and the key findings.

## 4.8.1 Affected environment

### 4.8.1.1 Terrestrial habitats and species

Terrestrial habitats refer to non-aquatic or upland areas of the landscape that support plants and wildlife. Examples include forests, shrubsteppe, grasslands, deserts, shorelines, agricultural lands, and underground habitats like caves and burrow systems. Terrestrial species are plants or animals that live on or use these habitats for the majority of their life functions. Examples of terrestrial plants include trees, shrubs, wildflowers, forbs, mosses, and grasses that prefer upland or riparian habitats. Examples of terrestrial wildlife include mammals, birds, bats, invertebrates, and reptiles.

Terrestrial habitats within the study area encompass diverse landscapes such as mountains, deserts, forests, and agricultural lands. These areas provide critical habitats for a wide range of species. There are many state and federal resources with maps and data on habitats and species. These are described in the *Biological Resources Technical Report* (Appendix G) and *Cumulative Impacts Technical Report* (Appendix Q). Figure 4-4 is an example of the type of information available about specific habitats that should be considered during siting and design to avoid impacts and for evaluation in project-level reviews. This map describes priorities for dry shrubsteppe habitat from the Washington Shrubsteppe Restoration and Resiliency Initiative (WSRRI).

The study area for solar energy development in Washington includes multiple distinct ecological regions (Figure 4-5), including the following:

- **Cascades:** Steep mountain ranges, volcanoes, and diverse coniferous forests.
- **Eastern Cascades Slopes and Foothills:** Dry climate, coniferous forests, and susceptibility to wildfires.
- **Columbia Plateau:** Arid sagebrush steppe, grasslands, and extensive agricultural use.
- **Blue Mountains:** Volcanic mountain ranges with coniferous forests and prairie ecosystems.
- **Northern Rockies:** Mountainous region with boreal forests, alpine meadows, and riparian woodlands.
- **North Cascades:** High, rugged mountains with active alpine glaciers and diverse forest types.

Wildlife migration corridors and landscape-scale habitat connectivity are critical for species movement. The study area is part of the Pacific Flyway, one of the four main north-south migratory routes in North America. Ungulate (small hooved mammals) migration corridors within the study area span broad landscapes, including the Northern Rockies, North Cascades, Eastern Cascades Slopes and Foothills, Cascades, and Columbia Plateau. Species include elk, moose, deer, bighorn sheep, mountain goats, and pronghorn antelope. Seasonal migration between distinct summer and winter ranges is common among ungulate herds. The *Biological Resources Technical Report* (Appendix G) and *Cumulative Impacts Technical Report* (Appendix Q) include information on reports and websites with these data and maps.

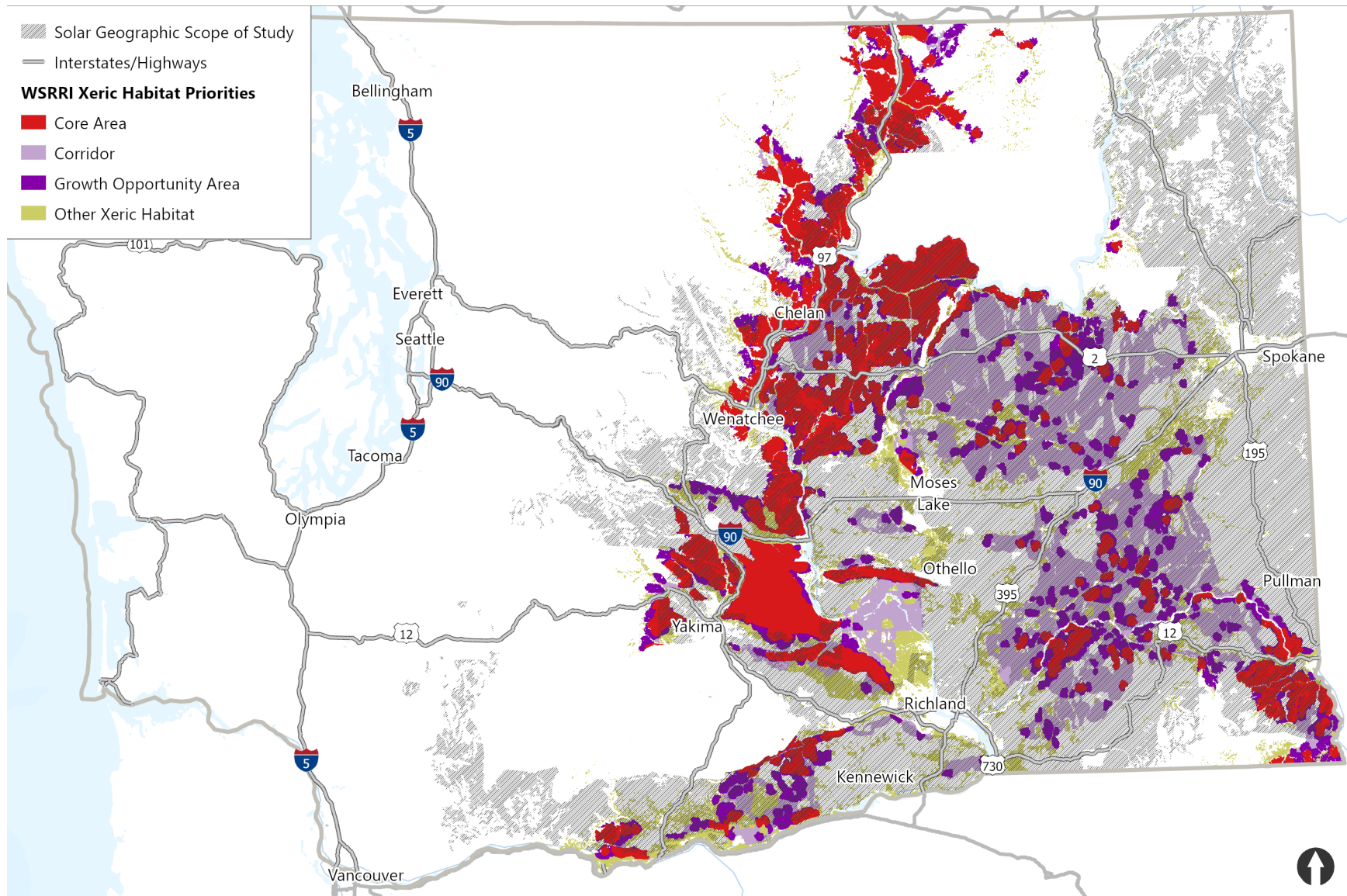


Figure 4-4. Example WSRRI priority map for a dry (xeric) ecosystem

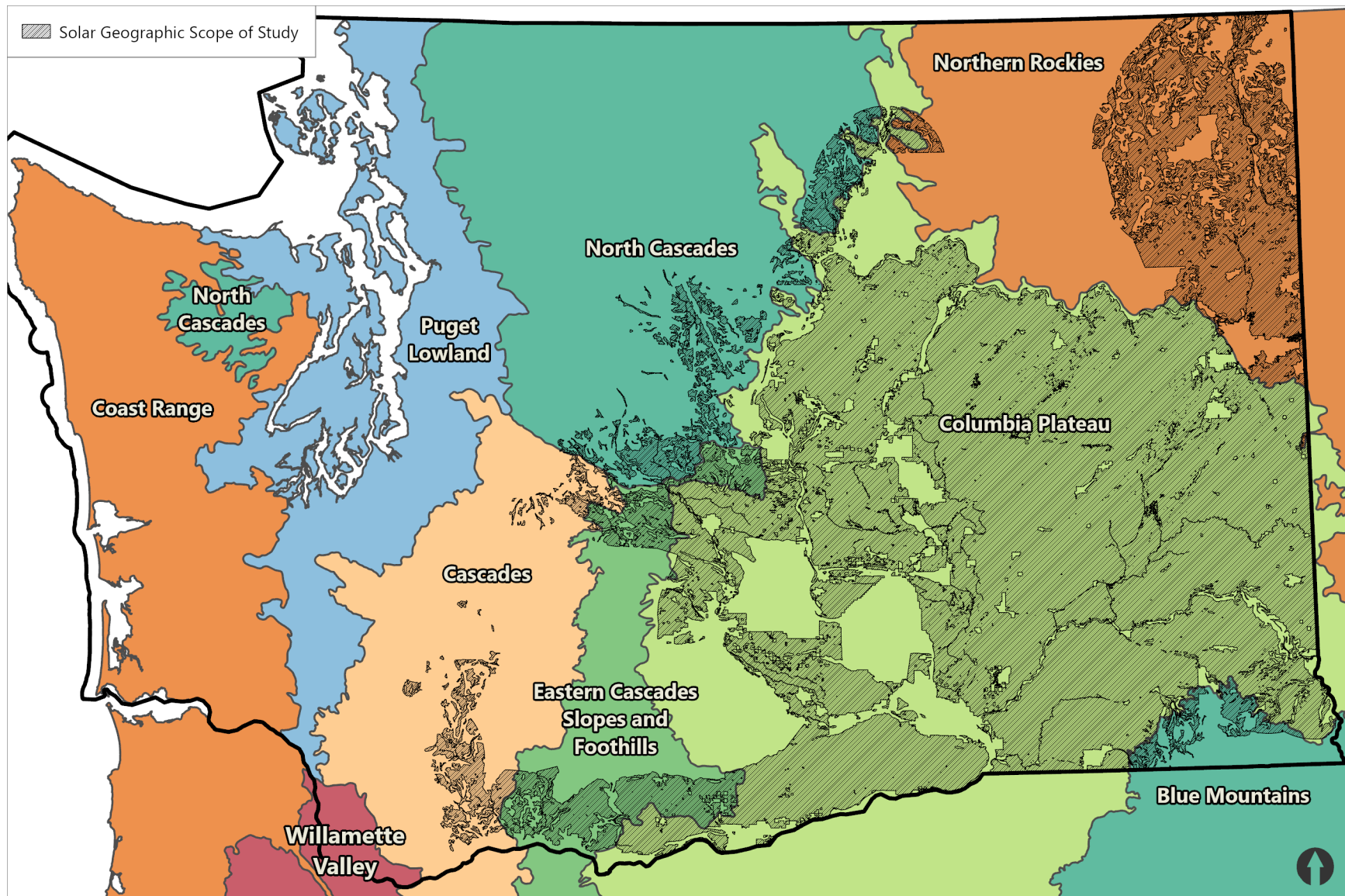


Figure 4-5. Level III Ecoregions

#### **4.8.1.2 Aquatic species and habitats**

Aquatic species are those that require water for some or all of their life cycles. Aquatic species that could be present in the study area include fish, amphibians, turtles, mollusks, and crustaceans. Aquatic habitat includes areas that have flowing or still surface water either year-round (perennial), seasonally (intermittent), or for short periods after rainfall or snowmelt events (ephemeral). Aquatic habitats commonly include rivers, streams, lakes, ponds, and wetlands. Human-created water systems and storage features such as ditches, irrigation canals, or water retention ponds can provide habitat for aquatic species although they often lack important habitat elements and may be lower quality. Instream, fresh deepwater, and freshwater wetland habitats occur throughout all six ecoregions present in the study area. Persistent snowpack in the mountain regions creates snowmelt-dominated waterbodies, which provide cold aquatic habitat. In contrast, large portions of the eastern, semi-arid ecoregions that lack high-altitude water sources are characterized by low precipitation and higher water temperatures in summer and fall.

#### **4.8.1.3 Wetlands**

Wetlands are a specific type of habitat that often occur in transitional areas between terrestrial and aquatic systems. Wetlands are areas frequently inundated or saturated by surface or groundwater and supporting wetland vegetation and functions. They include areas that are commonly referred to as swamps, marshes, bogs, and fens. Wetlands can occur in and adjacent to stream and river channels, on floodplains, in low-lying areas and depressions, around the edges of ponds and lakes, on slopes, and in estuaries and coastal areas. Wetlands provide numerous ecological functions, including water filtration, flood control, and habitat for a wide range of species. Wetlands typically support vegetation that is specifically adapted to growing in saturated or flooded soil conditions, including herbs, shrubs, vines, and trees.

Wetlands occur throughout the study area, but not all wetlands have been identified at a site level. Developers would be required to conduct wetland determinations or delineations to determine if wetlands are present. If wetlands are impacted, a mitigation plan will be required to ensure there is no net loss of wetland functions.

### **4.8.2 How impacts were analyzed**

The assessment of impacts was qualitative, and considered the following:

- Terrestrial species and habitats, including:
  - Terrestrial species (including waterfowl) listed under the Endangered Species Act (ESA), Birds of Conservation Concern identified as at-risk species by the U.S. Fish and Wildlife Service (USFWS), Washington State species of concern (listed and candidate species), and those listed by county-specific code ordinances identifying species of local importance
  - Unique, priority, and culturally important terrestrial species and habitats
  - Wildlife migration routes
- Aquatic and amphibious species and habitats, including:

- Aquatic and amphibious species listed under the ESA, Washington State species of concern (listed and candidate species), and those listed by county-specific codes or ordinances identifying species of local importance
- Unique, priority, and culturally important aquatic and amphibious species and habitats
- Salmon, steelhead, trout, and other fish migration routes
- Wetland habitats
- Special-status species and habitats, including:
  - ESA-listed species
  - Species listed as endangered, threatened, or sensitive in Washington by WDFW
  - Species designated as candidates for listing as endangered, threatened, or sensitive in Washington by WDFW
  - Priority species identified by WDFW
  - Species of Greatest Conservation Need identified in the State Wildlife Action Plan

The assessment of impacts in this PEIS was qualitative, and potential impacts considered applicable laws and regulations.

### **4.8.3 Findings for utility-scale solar facilities**

#### **4.8.3.1 Impacts**

##### **Impacts from construction and decommissioning**

Site characterization, construction, and decommissioning of solar energy facilities would occur mainly in upland areas. Gen-tie lines, roads, and fencing may cross wetlands, streams, or rivers, and sites may include wetlands. Development could affect a wide variety of species in the areas where it occurs. In general, impacts would increase proportionally with the size of the facility because they are expected to occur over a larger area of habitat and affect a greater number of individual species as well as population levels.

##### *Terrestrial habitats*

Impacts on terrestrial habitats associated with construction of solar facilities include fragmentation, degradation, or loss of habitat associated with site characterization and site preparation. This includes infrastructure, access and service roads, and associated construction for solar fields, power collection systems, buildings, and fencing. Land clearing and grading can alter existing habitats or habitat connectivity and may introduce invasive species. The reduction of habitat can also isolate communities, which could affect population sizes and movement. A facility could disrupt habitat continuity along migration routes for species such as birds, bats, elk, and deer.

Adjoining habitats may also be affected by habitat fragmentation, degradation, or loss. Disturbances from humans and construction-related noise, dust, and nighttime lighting could also affect nearby habitat. Development could also result in erosion, dust, changes in hydrologic regimes, increased human access, spills, soil compaction or removal, or sedimentation.

Activities would reduce plant growth and reproduction and could cause plant loss. They could reduce opportunities for wildlife species to use the habitat for shelter, food, and breeding.

Impacts on special-status habitats would be similar to those for non-special-status habitats. However, because of the more sensitive nature of special-status habitats and the special-status species those habitats support, the impacts would be greater.

The magnitude of impacts would depend on the number, configuration, and overall size of solar fields and associated infrastructure as well as the location and extent of access roads and ROWs for gen-tie line corridors. Facility lighting, noise, and dust generation would also affect the level of impacts.

During decommissioning, it is assumed that habitat disturbance would primarily occur in the previously disturbed areas. The degree of impact would vary depending on how much the previously disturbed habitat had recovered during the operational phase.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, some construction and decommissioning activities would result in **less than significant impacts** to terrestrial habitats, including special-status habitats.

Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability or disrupt habitat continuity along migration routes would result in **potentially significant adverse impacts** on terrestrial habitats.

#### *Terrestrial species*

Construction of facilities may adversely affect terrestrial wildlife species, depending on the types of wildlife and the stressors associated with specific site characterization and construction activities. Wildlife may be affected by site clearing and grading, solar field and associated infrastructure construction, and access road and gen-tie line corridor construction. It may also be affected by construction noise, visual disturbance, and the movement of construction vehicles and equipment. Vehicle collisions could result in wildlife injury or mortality.

The magnitude of potential impacts on wildlife depends on how long construction takes, if activities happen in the day or night, and the season of wildlife activity (e.g., nesting, wintering, migration). The type of impacts associated with construction activities are generally related to habitat disturbance or conversion and wildlife disturbance, injury, or mortality.

More mobile wildlife would avoid areas where activities are occurring. Terrestrial wildlife species that are less capable of avoiding disturbance include non-winged invertebrates, reptiles, juvenile mammals, burrowing species, and nesting birds. These would be more severely affected than more mobile wildlife species by site characterization, construction, or decommissioning activities.

Construction of solar facilities may require the removal of most vegetation in the solar field and for roads and gen-tie ROWs. Construction may also increase the risk of invasive species introduction and changes in species composition and distribution. It could also result in erosion, dust, altered drainage patterns, increased human access, spills from construction-related chemicals or fuel, soil compaction or removal, or sedimentation.

Impacts on special-status species would be greater than those described for non-special-status species because special-status species vitality and populations are more sensitive to impacts, and these populations are often geographically restricted.

Decommissioning activities would be similar to construction. Vegetation would be removed or damaged in areas of disturbed soil, and these areas would require the re-establishment of plant communities. However, the disturbance of vegetation would be expected to primarily occur in areas previously disturbed by construction. Wildlife could be affected by changes to existing habitats depending on the extent of infrastructure that would need to be removed, generation of waste materials and accidental spills, future land use, and the amount of required site restoration (e.g., regrading, revegetation). Restoring a site to pre-project conditions could take several years and for some habitat types, such as sagebrush-dominated shrubsteppe, restoration could take several decades.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, some construction and decommissioning activities would result in **less than significant impacts** to terrestrial vegetation, including special-status plants. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability would result in **potentially significant adverse impacts** on terrestrial vegetation.

Through compliance with laws, permits, and with the implementation of measures to avoid and reduce impacts, some construction and decommissioning activities would result in **less than significant impacts** to terrestrial wildlife, including special-status species. Activities that affect species viability, the mortality of any individual species, or disturbance that disrupts successful breeding and rearing behaviors would result in **potentially significant adverse impacts** on terrestrial wildlife.

#### *Aquatic habitats and species*

Utility-scale solar facilities are unlikely to be sited in aquatic areas and most aquatic impacts can be avoided or minimized. Construction may affect aquatic habitats and species through site clearing and grading, installing permanent meteorological towers, constructing access roads, excavating and installing solar field and associated infrastructure, and gen-tie line corridor construction.

During construction and decommissioning, aquatic habitats and species could be affected by a temporary increase in erosion during the building and removal of access roads and culverts.

They can also be affected by soil compaction, vehicle and foot traffic through aquatic habitat, release of hazardous materials, introduction of invasive plant species, and disturbance. Removal of facility infrastructure and access roads could also alter drainage patterns on the site, potentially affecting aquatic habitat nearby. Installing and removing buried cables could introduce sediments into adjacent waterbodies through runoff and erosion. Such impacts could be minimized by the implementation of erosion control, soil decompaction, and hazardous material management plans and BMPs. Impacts could be minimized by implementing erosion control measures, BMPs, and safe equipment and hazardous material management.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on aquatic habitats and species.

#### *Wetlands*

Wetlands may need to be cleared and/or filled for the construction of staging/laydown areas, access roads, gen-tie line corridors, and other supporting facilities. Roads and other infrastructure constructed in the vicinity of wetlands could change surface drainage patterns and/or introduce sediments or pollutants into those areas via runoff. Building or removing access roads and culverted road crossings from wetlands could temporarily increase erosion potential. This would disturb species in the vicinity.

State law and executive order require a mitigation plan be developed and approved to ensure there is no net loss of wetland functions for wetlands and wetland buffers. A facility would require an approved wetland mitigation plan before permits are issued.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would result in **less than significant impacts** to wetlands.

#### **Impacts from operation**

Operation of solar energy facilities would likely occur mainly in upland areas. Gen-tie lines, roads, and fencing may cross wetlands, streams, or rivers, and sites may include wetlands. Operations could cause ongoing or repeated disturbance of terrestrial and aquatic habitats.

#### *Terrestrial habitats*

Impacts on terrestrial habitats associated with the operation of utility-scale facilities include impacts from the long-term effects of habitat fragmentation, degradation, or loss associated with the facility ongoing operations and maintenance activities. Adjacent habitats may also be affected by the long-term effects of habitat fragmentation, degradation, or loss, as well as by disturbances from human activities and noise and movement from maintenance vehicles.

The introduction and spread of invasive vegetation from vehicle and human disturbance could result in long-term impacts on terrestrial habitats. Vehicle movements and trampling by humans may lead to soil erosion.

Migration routes and wildlife corridors could be anywhere from 200 meters to several miles wide depending on the species. Migratory species that may be affected include birds, deer, pronghorn, and elk species. Solar energy development may affect the long-term persistence of existing wildlife migration corridors, particularly where herds use relatively narrow corridors.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, some operation activities would result in **less than significant impacts** to terrestrial habitats, including special-status habitat. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability or disrupt habitat continuity along migration routes would result in **potentially significant adverse impacts** on terrestrial habitats.

#### *Terrestrial species*

Operations could affect the viability of plant communities within and near facilities as a result of mowing and vegetation maintenance. Impacts could also occur from use of herbicides, trampling and soil compaction from humans and vehicles, and from fire suppression.

The introduction and spread of invasive vegetation could also result in long-term impacts on plant communities. The increase in edge habitats, vehicle movements, and trampling by humans can create gaps in vegetation and allow exotic, non-native plant species to become established and displace native species over time. In addition, changes to wildlife diversity could affect pollinators for plants. These factors could lead to loss of native plant species and vegetation communities.

Operations could result in adverse effects to wildlife depending on number, sizes, and locations of the solar fields and gen-tie lines in relation to bird and bat activities. Birds and bats are at risk of collisions with gen-tie lines and vehicles, and all wildlife may be potentially affected by noise, vehicle traffic, hydrologic changes, and runoff.

Specific impacts would depend on the types of habitats affected, the amount of habitat disturbance over time, the amount and type of infrastructure present, and the occurrence and use of those areas by special-status species. Impacts could be avoided through siting and design of a facility. Impacts on special-status species could result from the following:

- Long-term effects from reduced species use of habitat due to changes such as mowing or vegetation management
- Collision with solar panels, gen-tie lines, and facility fences
- Noise from solar energy support machinery, motorized vehicles, and mowing equipment

- Periodic habitat disturbance within the gen-tie line ROWs and along the access roads from maintenance activities, including the risk of oil or other contaminant spills and the continued spread of invasive species
- Altered migration routes
- Disturbance to foraging, breeding, and nesting behaviors due to placement of facilities or increased human activities
- Altered fire regimes that negatively impact fire-adapted species

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, some operation activities would result in **less than significant impacts** to terrestrial wildlife. Activities that affect species viability would result in **potentially significant adverse impacts** on terrestrial wildlife.

#### *Aquatic habitats and species*

During operations, potential impacts from the use of motorized equipment and runoff of surface soils would be minimized by limiting the amount of maintenance activities occurring near riparian and aquatic habitat. The risk of waterbody contamination from hazardous materials used in site maintenance would be minimized through restriction of machinery use and herbicide and pesticide application near waterways. If water drainage patterns, sediment delivery to waterbodies, riparian area function, or water quality are changed during construction, those impacts could continue to affect aquatic habitat and species during the operational period.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** on aquatic habitats and species.

#### *Wetlands*

Operations could affect wetland plant communities as a result of mowing and vegetation maintenance, application of herbicides, and soil compaction from humans and vehicles. Activities could affect native amphibian species dispersal into and out of wetland breeding habitats. Wetland impacts could be minimized through the proper management of wastewater systems and safe use and management of hazardous materials.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** on wetlands.

#### **4.8.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

##### **Recommended measures for siting and design**

- Follow WDFW's BMPs in their current guidelines for utility-scale solar 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., 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.
- 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 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.
- Review and implement latest recommendations and BMPs for reducing solar panel collision risk for birds and bats.
- 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.

- 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.

### **Required measures**

- 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)
- ESA Section 7 Consultation (USFWS/NOAA)
- ESA 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 U.S. Army Corps of Engineers-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*.

### **Recommended measures for construction, operation, and decommissioning**

- 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 WDFWs BMPs in *Guidelines for Utility-scale Solar & Onshore Wind Energy Development in Washington State*.

- Consult WDFW 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 project 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.
- 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.

### **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. 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.

## **4.8.4 Findings for facilities with co-located BESS**

### **4.8.4.1 Impacts**

#### **Impacts from construction, operation, and decommissioning**

The potential impacts on biological resources for facilities with co-located BESSs would be similar to the impacts considered for utility-scale facilities related to site characterization, construction, operations, and decommissioning.

Co-locating BESSs would require some additional construction-related ground disturbance and an increased building footprint. The presence and use of a BESS at a solar energy facility would add another stormwater consideration to a facility due to the container and concrete foundation. BESSs require HVAC units, which could generate increased noise that may disturb wildlife.

BESSs are not expected to substantially add to the overall level of impact on terrestrial habitats and species if BMPs are implemented. In addition, during normal operations, BESSs are unlikely to release reactive or toxic substances, so it is unlikely the BESS would additionally impact terrestrial habitats and species.

#### *Findings*

Impacts on biological resources would be similar to findings for utility-scale solar facilities above.

### **4.8.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of facilities with co-located BESSs would be the same as facilities without a BESS.

## **4.8.5 Findings for facilities combined with agricultural land use**

### **4.8.5.1 Impacts**

#### **Impacts from construction, operation, and decommissioning**

The potential impacts on biological resources for solar facilities that include combined agricultural use would be similar to the impacts considered for solar facilities without agricultural uses related to construction, operations, and decommissioning.

Impacts for agrivoltaic facilities would differ from facilities without combined agricultural land use as follows:

- Because the solar panels for agrivoltaic facilities could be raised or modified to allow for growing crops, creating pollinator habitat, or grazing underneath them, the impact of the panels on local surface water hydrology, infiltration, and groundwater recharge may be reduced. With raised or movable panels, more rain and snow would likely reach the ground directly beneath the panels.
- The solar panels may be organized in a more dispersed way to allow for enhanced agricultural activities and grazing, which may provide additional corridors for some species.
- Agricultural activities could include maintenance of existing or addition of new infrastructure, roads, fences, gates, and traffic, which could have proportionately increased impacts on habitats and species.
- Human use at a site would increase for agrivoltaic facilities due to continued or new agricultural use and would result in an increase in noise, herbicide and pesticide use, crop rotation, and livestock activities that would impact habitats and species.

#### *Findings*

Impacts on biological resources would be similar to findings for utility-scale solar facilities above.

#### **4.8.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of agrivoltaic facilities would be the same as facilities without agricultural land use, with the following additional measures.

#### **Recommended measures for construction, operations, and decommissioning**

- Minimize use of artificial ground covers such as gravel that require application of herbicides and are not compatible with crops or pollinator plants.
- Select crops that are successful in the area and compatible with growing under solar arrays.
- Select pollinator plants that are native to the area and compatible with growing under solar arrays.

#### **4.8.6 Findings for the No Action Alternative**

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar 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 previously for construction, operation, and decommissioning, depending on project size and design, and would likely range from **less than significant impacts to potentially significant adverse impacts**.

### 4.8.7 Unavoidable significant adverse impacts

Construction and operation of solar facilities may result in **potentially significant and unavoidable adverse impacts** on terrestrial special-status habitats and species if activities cause the permanent degradation, loss, or conversion of suitable habitat that is critical to habitat or species viability, affect the mortality of any individual species, cause a disturbance that disrupts successful breeding and rearing behaviors, or disrupt habitat continuity along migration routes. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site. Mitigation to reduce impacts below significance for terrestrial special-status habitats or species may not be feasible.

## 4.9 Energy and natural resources

### Key findings

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities would likely result in **less than significant impacts** on energy and natural resources.

**No potentially significant and unavoidable adverse impacts** on energy and natural resources would occur.

This section describes sources and availability of energy and natural resources and the amount that would be required by the facilities considered in this PEIS. Impacts on public service or utility providers are described in the public services and utilities resource section. Emissions associated with use of energy and natural resources are described in the air quality and greenhouse gases section.

The *Energy and Natural Resources Technical Report* (Appendix H) includes the full analysis and technical details used to evaluate energy and natural resources in the PEIS. This section contains a summary of how impacts were analyzed and the key findings.

### 4.9.1 Affected environment

The type and quantity of energy and natural resources used in construction and operation can affect overall availability of these resources for other uses. The resources evaluated include electricity, fuels for transportation and equipment, and construction aggregate.

#### 4.9.1.1 Electricity

In 2023, Washington state used 88,702 million kilowatt-hours (kWh) of electricity, while it produced 98,726 million kWh.<sup>33</sup>

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<sup>33</sup> <https://www.eia.gov/electricity/data/browser/>

#### **4.9.1.2 Fuel for transportation and equipment**

Fuels include gasoline and diesel. In 2019, Washington consumed 2.8 billion gallons of gasoline and 950 million gallons of diesel fuel. Washington has several refineries and imports crude oil from Alaska and other locations and exports refined products. The state has a processing capacity of 648,000 barrels of crude oil per day, which produces 4.2 billion gallons of gasoline and 2.5 billion gallons of diesel annually. Much of this is exported.

#### **4.9.1.3 Construction aggregate**

Construction aggregate is a collective term for sand, gravel, and crushed stone. State production is monitored by USGS and surface mine permitting is handled by DNR. Though it is a non-renewable resource, construction aggregate is readily available in Washington. In 2023, the state produced 30.9 million metric tons of sand and gravel, and 14.4 million metric tons of crushed stone.

### **4.9.2 How impacts were analyzed**

The assessment of impacts was qualitative and considered if utility-scale solar facilities could result in increased demand for electricity, fuel, or construction aggregate that could require new mines or affect statewide annual production.

### **4.9.3 Findings for utility-scale solar facilities**

#### **4.9.3.1 Impacts**

##### **Impacts from construction and decommissioning**

##### *Electricity*

During site characterization, construction, and decommissioning activities, electricity would be needed to power tools, equipment, and lighting. This demand could either be met with diesel fuel from portable generators or with electricity provided by a utility.

##### *Fuel for transportation and equipment*

Facilities would consume fuels during construction and decommissioning for worker commuting, haul-truck trips, and site equipment. The combined fuel consumed by worker commuting, delivery, and site equipment would range from 140,000 to 6.42 million gallons based on the facility size. This represents 0.004% to 0.2% of the total annual fuel resource produced in the state for the 6- to 18-month construction period. Decommissioning would require similar amounts.

##### *Construction aggregate*

Construction of facilities would use aggregate for concrete foundations for the solar array, gen-tie lines, and buildings and for constructing access roads. Gravel would likely be used for parking areas and equipment storage areas.

Facilities would require between 5,750 cubic yards and 345,000 cubic yards of aggregate depending on the facility size. This is 0.01% to 0.76% of the total available resource produced

annually in the state. Aggregate may need to be obtained from multiple mines, depending on the facility location.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on energy and natural resources.

### **Impacts from operation**

#### *Electricity*

A facility would consume electricity during operations and for maintenance. Electricity would be used to power the panel array tracking system, buildings, sensors, lights, and other features. A facility may use energy either from its own generation or the local electric utility.

#### *Fuel for transportation and equipment*

Utility-scale facilities would consume gasoline and diesel fuels to power maintenance vehicles during operations. Demand for fuel during the operations phase would be estimated at about 58 gallons of diesel and/or gasoline per year, per MW. Depending on the facility size, a facility would require between 1,150 gallons and 69,000 gallons throughout the operations phase.

#### *Construction aggregate*

During operations and maintenance, only a small amount of construction aggregate would be needed to maintain maintenance roads. Assuming a new surface gravel would be required every 5 years to a thickness of 4 inches, the average annual demand would range between 500 to 31,000 cubic yards depending on facility size and access points.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operations activities would likely result in **less than significant impacts** on energy and natural resources.

### **4.9.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

#### **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.

### **Required measures**

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

### **Recommended measures for construction, operation, and decommissioning**

- Minimize transportation and equipment fuels 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.

### **Mitigation measures for potential significant impacts**

- No potential significant impacts identified.

## **4.9.4 Findings for facilities with co-located BESS**

### **4.9.4.1 Impacts**

Energy use for facilities with BESSs would be similar to the impacts considered for utility-scale facilities without BESSs related to site characterization, construction, operation, and decommissioning. Specific differences are summarized in the following sections.

#### **Impacts from construction, operation, and decommissioning**

##### *Electricity*

Electricity use may be more intensive for short periods during testing of the installed BESS equipment. The demand for energy during construction is not expected to require new or substantially modified production or energy transmission. Decommissioning of a facility with co-located BESS would require similar electricity as anticipated during construction.

##### *Fuel for transportation and equipment*

Adding BESSs to solar facilities would require additional hours for construction and installation, increasing demand for fuels to support worker commuting. Delivery of BESS components to the work site would increase demand for fuels to support materials and equipment delivery. The increase in fuel demand created by BESSs would be minimal compared to what is already demanded by the facility construction. Decommissioning would have approximately the same demand for fuels as construction.

##### *Construction aggregate*

A BESS would typically be installed on a concrete slab and/or a gravel area. The estimated aggregate required would be approximately 1,000 cubic yards per acre assuming a 9-inch slab thickness. These additional aggregate needs for the BESS during construction would not be a large increase relative to the amounts for utility-scale facilities without a BESS. Since the BESS would be co-located with the project, there would be no additional demands for aggregate

resources during operations. Because new foundations and infrastructure would not be created, decommissioning is not expected to require additional aggregate.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operations, and decommissioning activities with a co-located BESS would likely result in **less than significant impacts** on energy and natural resources.

#### **4.9.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid and reduce impacts of facilities with co-located BESSs would be the same as facilities without a BESS.

### **4.9.5 Findings for facilities combined with agricultural land use**

#### **4.9.5.1 Impacts**

Energy use for facilities co-located with an agricultural use would be similar to the impacts considered for utility-scale facilities not co-located with an agricultural use related to site characterization, construction, operation, and decommissioning. Specific differences are summarized below.

#### **Impacts from construction, operation, and decommissioning**

Agrivoltaics can be expected to increase solar energy production from the cooler air zone that would be created under modules. Agriculture uses can also draw significant amounts of electricity, in particular for running irrigation pumps. Agricultural uses would require additional transportation trips and associated fuel consumption. Agrivoltaics systems are also expected to demand less construction aggregate than for utility-scale facilities not co-located with an agricultural use because system design would maximize arable land and minimize incursions from access roads.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operations, and decommissioning activities with co-located agricultural use would likely result in **less than significant impacts** on energy and natural resources.

#### **4.9.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid and reduce impacts of agrivoltaic facilities would be the same as facilities without agricultural land use.

#### 4.9.6 Findings for the No Action Alternative

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar 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, operation, and decommissioning, depending on project size and design, and would likely result in **less than significant impacts**.

#### 4.9.7 Unavoidable significant adverse impacts

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

### 4.10 Environmental health and safety

#### Key findings

Through compliance with laws and permits, and with the implementation of measures to avoid, reduce, and mitigate impacts, most construction, operations, and decommissioning activities would likely result in **less than significant impacts** related to hazardous materials and health and safety.

Depending on the specific location, severity, and fire response capacity (described in Section 4.17), there is potential that construction, operations, and decommissioning of a project would have **less than significant to potentially significant adverse impacts** related to wildfire due to risk of ignition.

A thermal runaway event due to damage or battery management system failure at a co-located lithium-ion BESS would have a **potentially significant adverse impact** related to hazardous air emission risks for emergency responders.

If there are new ignition sources in remote locations with limited response capabilities, this may result in **potentially significant and unavoidable adverse impacts**. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site and local regulations and plans.

EHS refers to the risks or hazards that threaten the wellbeing of people or other elements of the environment. Impacts related to emergency response services are discussed in Section 4.17, Public Services and Utilities. The *Environmental Health and Safety Technical Resource Report* (Appendix I) includes the full analysis and technical details used to evaluate EHS in the PEIS.

## 4.10.1 Affected environment

Workplace accidents or system failures can result in EHS hazards, such as fires, explosions, hazardous material spills, injury, or structural damage. In this section, EHS includes hazardous materials and toxic substances exposure, health and safety, and wildfire hazards.

### 4.10.1.1 *Hazardous materials*

Hazardous materials include petroleum products, heavy metals, pesticides, fertilizers, solvents, compressed gases, and batteries. Large concentrations of these materials are found at industrial sites, commercial properties, and agricultural lands. Small quantities of hazardous materials may also be present along roads due to vehicular activity or illegal dumping.

Ecology regulates and monitors the storage, use, and disposal of hazardous materials. Active land uses in the study area that handle hazardous materials must document their presence. A large portion of these hazardous materials are associated with agricultural land uses in rural areas. Toxic substance cleanup sites are recorded in Ecology's Contaminated Site Register.

### 4.10.1.2 *Health and safety risks*

Hazardous materials may affect workers and emergency responders at utility-scale solar facilities. Solar panels and electrical components and structures may pose risks of electrical hazards and accidents during maintenance activities.

### 4.10.1.3 *Wildfire risk*

Wildfires pose significant risks of injury, loss of life, and damage. Wildfires can occur from either humans or natural causes. Washington has experienced extreme fire events, partly due to climate change and forest fire suppression practices, and this is expected to increase in the future. The combination of longer fire seasons, population growth, and declining forest health increases wildfire risks.

The landscape, weather conditions, and vegetation present can influence the degree of fire risk and fire behavior in an area. The region west of the Cascade Mountains receives more rain, while eastern Washington (where most of the study area is located) is drier and more prone to wildfires. Weather conditions such as wind, temperature, and humidity also influence fire behavior.

Wildfire risk is increasing in Washington due to climate change. Climate change impacts variables related to fire risk, including temperature, precipitation, humidity, and forest health. The University of Washington's climate resilience mapping projects a significant increase in high fire-danger days between 2040 and 2069. The region's most at-risk areas include the eastern slope of the Cascades, Okanogan Big Bend, northeastern Washington, and the Blue Mountains of the southeastern Palouse.

## 4.10.2 How impacts were analyzed

The assessment of impacts was qualitative, and considered the following:

- Release of hazardous materials that increases the risk of environmental contamination (e.g., air or water) or increased threat to human health and safety
- Increase in physical safety risks resulting in a high likelihood of harm to project workers or the public
- Increase in wildfire risk and associated hazard conditions

## 4.10.3 Findings for utility-scale solar facilities

### 4.10.3.1 Impacts

#### Impacts from construction and decommissioning

##### *Hazardous materials*

Hazardous materials may be present in solar modules, including cadmium telluride, copper indium diselenide, and copper indium gallium selenide. Hazardous materials in solar modules are typically only present in small amounts, and some modules do not contain hazardous materials or contain them in amounts small enough to not be classified as hazardous materials.

The International Energy Agency conducted a human health risk assessment and found 0.04% of solar panels may break during transport, installation, or during operations. It looked at impacts from runoff and exposure. The study found exposure from broken panels is below USEPA health screening levels for soil, air, and groundwater.

Hazardous materials are present in vehicles, construction equipment, transformers, and other materials used in utility-scale facility construction and decommissioning. These include petroleum products, hydraulic fluids, batteries, solvents, corrosion control coatings, and spent hazardous material containers. Solar facilities store and use these in small quantities. If more than 1,320 gallons of petroleum fuel is stored on site, an SPCC Plan would be required. In the case of accidents, equipment failure, or damage to construction materials, spills of small amounts of hazardous materials are possible. The Washington State Model Toxics Control Act regulates the handling and cleanup of these types of hazardous materials. Spills would need to be contained, assessed, and remediated, with hazardous waste transported and disposed of in line with state and federal regulations.

During decommissioning, remediation of the substation and electrical sites may be necessary due to the use of oils and other hazardous materials during energy facility operation. Decommissioning could involve a higher risk of releasing hazardous materials due to degradation of facility components or dismantling facility components. This phase would also include recycling and disposal of solid and hazardous waste. A substantial portion of the materials that make up solar energy facilities are recyclable, such as steel, aluminum, glass, copper, and plastic. Impacts to solid waste and recycling are discussed in Section 4.17, Public Services and Utilities.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** related to hazardous materials.

### *Health and safety*

Construction activities in the study area would present similar health and safety risks to workers as those that are present on other industrial construction sites. Common occupational health and safety risks include falls from facility structures, collisions with construction vehicles, and exposure to electricity, hazardous materials, fire, the elements, or noise. Impacts on the public are unlikely. Decommissioning could involve a higher risk of exposure for workers to hazardous materials, electricity, or fire due to degraded or malfunctioning facility components. Public access to portions of the facility would be restricted by fences, which would limit public exposure to potential hazards.

Facilities would follow Occupational Safety and Health Act (OSHA) regulations. Additional health and safety requirements would be established during site-specific, project-level planning to address hazards specific to the facility.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** related to health and safety.

### *Wildfire risk*

Construction and decommissioning of solar energy facilities could generate ignition risks from equipment or materials. The study area is likely to experience additional climate change effects by the time of decommissioning, with a projected increase in the number of high fire-danger days. The likelihood of a solar energy facility or related gen-tie lines igniting a wildfire is low. These risks are similar to other industrial facilities and require careful management, especially in areas of high fire risk. Fires from PV solar panels are rare. Facilities could alter the behavior of fire due to structures, mowing, and land use changes. Equipment would need to meet state and international building and fire code standards. Proactive planning with federal, state, and local wildfire and emergency response agencies and compliance with OSHA requirements would reduce construction-related ignition risks. See Section 4.17, Public Services and Utilities, for an evaluation of fire response capacity impacts.

### *Findings*

Depending on the specific location, severity, and fire response capacity, there is potential that construction and decommissioning activities would have **less than significant to potentially significant adverse impacts** related to wildfire due to risk of ignition.

## Impacts from operation

### *Hazardous materials*

Accidents or failures that could result in the release of hazardous materials are rare, and are typically small quantities that would not likely result in risk of environmental contamination or threats to human health and safety.

Hazardous materials present would be consistent to those used during construction. Operations and maintenance of a facility would require fewer on-site personnel and less-intensive labor than construction, which would result in lower use of vehicles and equipment that could accidentally release hazardous materials.

A facility's exposure to the elements and degradation over time could potentially increase the risk of damage or infrastructure failure. In the case of a wildfire that damages PV panels, exposure would likely be limited to on-site workers or emergency responders. Damaged PV modules would be disposed of under state and federal rules.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** related to hazardous materials.

### *Health and safety*

The types of occupational health and safety hazards during operation are similar to those during construction. However, the scale and intensity of on-site labor would be much less, reducing the risk of falls, vehicle collisions, and noise exposure. While accidents could occur, laws, regulations, and industry standards are in place to prevent health and safety hazards in the workplace. Additionally, public access to portions of the facility would be restricted.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** related to health and safety.

### *Wildfire risk*

The potential for solar energy facilities to contribute to wildfire risk considers ignition risk associated with operations activities, along with the change in the landscape due to the presence of the facility. Fires from PV solar panels are very rare. The presence and use of electrical equipment at the facilities, including gen-tie lines, would have risks of ignition. Most wildfires started by electrical power are caused by the contact of trees and surface fuels with power lines. All solar and electrical equipment would be required to conform to state and international building and fire code standards and these facilities and associated access roads would be regularly maintained and monitored to reduce ignition risks. Accidents and fires could still occur. There is a low likelihood of operations activities igniting a wildfire. Operations and

maintenance activities would also include regular mowing and trimming of trees to control vegetation on the facility sites and associated electrical corridors. While these activities reduce a fuel source, they also involve ignition risks that could generate sparks and cause wildfires, which could spread into the surrounding landscape. However, these risks can be reduced through appropriate implementation of an Operational Site Safety Management Plan. See Section 4.17, Public Services and Utilities, for an evaluation of fire response-capacity impacts.

#### *Findings*

Depending on the specific location, severity, and fire response capacity, there is potential that operation activities would have **less than significant to potentially significant adverse impacts** related to wildfire due to risk of ignition.

#### **4.10.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

##### **Recommended measures for siting and design**

- 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 ROW 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.
- Align solar arrays to reduce or avoid glare impacts on off-site areas.

## **Required measures**

- 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)
- ROW 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.
- 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 ROWs 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 OSHA measures to address issues such as crane and hoist safety, electrical safety, fall prevention, lockout/tagout, heat/cold stress, and personal protective equipment.

## **Recommended measures for construction, operation, and decommissioning**

- Coordinate with DNR and the U.S. Forest Service (USFS) 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.
- 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.

#### **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.

### **4.10.4 Findings for facilities with co-located BESS**

#### **4.10.4.1 Impacts**

##### **Impacts from construction, operations, and decommissioning**

##### *Hazardous materials*

Additional hazardous materials for construction of facilities with co-located BESSs include the following:

- Battery electrolytes, typically used in vehicle, equipment batteries, and BESSs
- Materials typically used in anti-conductive insulation for electric components, such as wires

This PEIS analyzes impacts from lithium-ion, iron-flow, and zinc-bromide batteries. Batteries from the BESS would contain toxic chemicals that could be hazardous in the event of a system failure, which could result in the battery leaking. If the batteries overheat or are damaged, they could leak toxic gases. This would be less likely during construction compared to operation because BESSs would not be storing energy generated on site, which would greatly reduce the likelihood of batteries failing due to overheating. There could be risk of hazardous materials leaks from batteries during operations due to the potential for batteries to leak or ignite if damaged and for failed batteries to overheat when used for energy storage. Similar to facilities without a BESS, the Model Toxics Control Act would dictate the handling and cleanup of these types of hazardous materials.

Flow batteries and zinc-bromide batteries are generally not flammable. Firefighting does not typically use water because it can increase exposure to toxic chemicals through smoke, vapor, or contaminated runoff. Once a fire has self-extinguished, there may be releases of flammable

or toxic gases. Spraying water on smoke or vapor released from the battery, whether burning or not, may cause skin or lung irritation. This is one additional reason for allowing the battery to burn in a controlled manner. The site should be entered only by trained firefighters wearing full protective gear.

NFPA 855 and state regulations require fire and spill containment measures for spills and fires for certain battery types with liquid electrolytes. Additionally, lithium-ion BESSs that are not listed under UL 9540 require a hazard mitigation analysis that includes an evaluation of potential energy storage system failures and safety-related impacts. Spill response measures would be included in the project's SWPPP, Emergency Response Plan, and the BESS operations and safety manual as required by NFPA 855. Secondary containment measures would consider the volume of water to be contained, and the methods and materials used for containment and treatment. Impacts to earth resources are discussed in Section 4.5 and impacts to water resources are discussed in Section 4.7.

Lithium-ion, zinc-hybrid, and flow batteries have lifespans that are shorter than a typical solar energy facility. At the end of their useful life, batteries would be stored, handled, and transported in accordance with either hazardous waste regulations or battery-specific disposal standards, which would reduce the risk of releases of hazardous material. Batteries can be recycled but are often disposed of as hazardous waste due to a lack of recycling service providers for batteries. Because of the growing use of lithium-ion batteries for energy storage and other purposes, USEPA has proposed rules to establish waste management regulations specific to the batteries. The Washington State Legislature has directed Ecology to assess and recommend options for collection and end-of-life management of large batteries, such as those used in BESSs. Regardless of whether the batteries are recycled or disposed of as hazardous waste at their end of useful life, the batteries would be stored, handled, and transported in accordance with either hazardous waste regulations or battery-specific disposal standards, which would reduce the risk of releases of hazardous material. Impacts to solid waste and recycling are discussed in Section 4.17, Public Services and Utilities.

#### *Health and safety*

Facilities with BESSs would largely include the same health and safety risks during construction, operations, and decommissioning as other utility-scale facilities without BESSs, with higher operating risks due to the health and safety risks associated with BESSs. The addition of BESSs could create hazards for workers with the possibility of explosions, flammable gases, toxic fumes, water-reactive materials, electrical shock, corrosives, and chemical burns that could affect human health and safety. Batteries in the BESS could impact worker health and safety if there was a release of hazardous materials or a fire. Exposure to toxic gases leaking from damaged batteries could cause irritation to the skin and lungs. Battery failures that could produce these health and safety impacts are rare. Compliance with requirements, regular maintenance, and proactive emergency plans would help mitigate risks. The Washington State Patrol, Ecology, and representatives from industry and local fire protection districts produced a study of electric vehicle fires, which identified best practices for battery incident response risk reduction.

### *Wildfire risk*

Facilities with co-located BESSs would largely include the same wildfire risks during construction, operations, and decommissioning as those described for other utility-scale facilities without BESSs. The BESSs present additional fire risk and risks to emergency responders, and utility-scale energy storage requires specialized and reliable equipment to perform firefighting operations; further details are available in the *Public Services and Utilities Technical Resource Report* (Appendix P).

Battery overheating events due to damage or failure of battery management systems are very rare for BESSs and, if properly installed and maintained, they are generally not flammable. Rooms and areas within buildings and walk-in units containing BESSs would be protected by an automatic fire protection system. Battery incidents require specialized response training for first responders due to risks from hazardous materials. Battery incidents can be difficult to extinguish, and some battery types can reignite above certain temperatures after being put out. WAC 51-54A-0322 requires lithium battery storage containers to include a fire protection system. As described above, an Emergency Response Plan would include emergency responses to be taken upon detection of a possible fire and including setback distances in siting and design would reduce risks of a fire spreading.

BESSs generally come equipped with remote alarms for operations personnel and emergency response teams, including voltage, current, or temperature alarms from the battery management system. Other protective measures include ventilation, overcurrent protection, controls to operate the batteries within designated parameters, temperature and humidity controls, smoke detection, and maintenance in accordance with manufacturers' guidelines.

### *Findings*

Most impacts on EHS would be similar to findings for utility-scale solar facilities above. Facilities with lithium-ion BESSs would have **potentially significant adverse impacts** due to hazardous air emission risks to emergency responders associated with the BESS.

#### **4.10.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of facilities with co-located BESSs would be the same as facilities without a BESS, with the following additional measures.

##### **Recommended measures for siting and design**

- 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.

##### **Required measures**

- Implement fire protection, prevention, and detection measures and design features in accordance with 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.

## 4.10.5 Findings for facilities combined with agricultural land use

### 4.10.5.1 Impacts

#### Impacts from construction, operations, and decommissioning

##### *Hazardous materials*

Hazardous materials for site characterization, construction, operations, and decommissioning would be the same as for utility-scale facilities without agricultural land use, but would also include agricultural machinery and equipment that may require use of petroleum and the use of fertilizers, herbicides, and pesticides. The use of farm vehicles or equipment could increase the risk of accidents that could release hazardous materials. Decommissioning would also include disposal of solid and hazardous waste.

The presence of agricultural operations does not greatly increase the risk of adverse impacts. Accidents or failures that could result in the release of hazardous materials are rare, and if they do occur, they are unlikely to result in environmental contamination or an increase in threats to human health and safety.

##### *Health and safety*

The types of health and safety hazards that people could be exposed to would largely be the same as those considered for utility-scale facilities without agricultural land use. Agricultural activities on site could increase the presence or risk of exposure to certain occupational health and safety hazards, such as potential exposure to fertilizers, pesticides, herbicides, livestock, biohazards associated with livestock, or other hazards associated with agricultural operations. Agricultural operations would not occur in active construction and decommissioning areas, but agricultural activities nearby could increase the risk of exposure to certain occupational health and safety hazards. The risk of exposure to occupational hazards that were present during construction would decrease during operation in conjunction with a decrease in the scale and intensity of on-site labor compared to construction. Decommissioning could involve a higher risk of exposure to hazardous materials, electricity, or fire due to degraded or malfunctioning facility components.

### *Wildfire risk*

Construction, operations, and decommissioning of facilities combined with agricultural use would involve the use of equipment and activities that could generate ignition risks. Facilities with agricultural land use would entail active management of the vegetative landscape (e.g., grazing, crop production, pollinator habitat) in conjunction with solar energy facilities. Because there would be active management of the vegetative landscape and a beneficial cooling effect to the land, it is assumed that fire risk, and therefore demand for fire response, for the agrivoltaics sites would generally be reduced compared to facilities without agriculture. However, coordination to reduce potential ignition risks at the agrivoltaics sites would still be required and emergency responders could face delays or obstacles to accessing the facility because of fences or gates related to agricultural operations.

### *Findings*

Impacts on EHS would be similar to findings for utility-scale solar facilities above.

#### **4.10.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid and reduce impacts of agrivoltaic facilities would be the same as facilities without agricultural land use, with the following additional measures.

#### **Recommended measures for construction, operation, and decommissioning**

- 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.

#### **4.10.6 Findings for the No Action Alternative**

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar facilities on a project-by-project basis. The potential impacts would be similar to the impacts for the types of facilities described above for construction, operation, and decommissioning, depending on project size and design, and would likely range from **less than significant** to **potentially significant adverse impacts**.

#### **4.10.7 Unavoidable significant adverse impacts**

Construction, operation, and decommissioning of utility-scale solar facilities may result in **potentially significant and unavoidable adverse impacts** related to wildfires if there are new ignition sources in remote locations with limited response capabilities. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site.

## 4.11 Noise and vibration

### Key findings

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, most construction, operation, and decommissioning activities would likely result in **less than significant impacts** related to noise and vibration.

**Potentially significant adverse impacts** related to noise would occur if:

- Construction, operations, or decommissioning activities occur within 1,000 feet of a noise-sensitive receptor in quiet rural areas
- During operations, stationary equipment is closer than 350 feet from a noise-receptor or closer than 1,100 feet from a noise-sensitive receptor in quiet rural areas
- Depending on the facility substation design, during operations, substations are closer than 650 feet from a noise-sensitive receptor or closer than 2,000 feet from a noise-sensitive receptor in a quiet rural area
- Projects with a BESS of certain design and consolidated configuration are closer than 1.5 miles from a noise-sensitive receptor

**Potentially significant adverse impacts** related to vibration would occur if:

- Pile driving during construction and decommissioning activities occur closer than 350 feet from residential land uses, or in close proximity to modern or historic structures
- Blasting is conducted within 2,000 feet of historic structures

**No potentially significant and unavoidable adverse impacts** related to noise and vibration would occur.

Noise is unwanted sound that can affect people, fish, and wildlife. Vibration is motion through something solid, like the ground, which can affect living creatures or damage buildings. The information in this section summarizes the full analysis and technical details used to evaluate noise and vibration in the PEIS, which can be found in the *Noise and Vibration Technical Resource Report* (Appendix J).

### 4.11.1 Affected environment

#### 4.11.1.1 Ambient noise levels

Due to the large extent of the study area, ambient noise levels and their effect on the surrounding environment vary based on location. Generally, noise levels are higher around transportation corridors, airports, industrial facilities, and construction activities. Noise levels associated with general community activities throughout the study area can be estimated based on population density. More densely populated counties have background values between 45 and 55 A-weighted decibels (dBA); counties with sparser densities are less than 35 dBA.

Utility-scale solar energy facilities would typically be located in rural areas with low population density, where ambient sound levels would be low. Noise may be sporadically elevated in localized areas due to roadway noise or periods of human activity.

Existing sources of noise in the study area could include existing wind turbines, motor vehicle traffic, mobile farming equipment, farming activities such as plowing and irrigation, all-terrain vehicles, local roadways, periodic aircraft flyovers, as well as natural sounds such as bird calls and wind. Sound moving through the air is affected by air temperature, humidity, wind and temperature gradients, vicinity and type of ground surface, obstacles, and terrain features. Natural terrain features such as hills, and constructed features such as buildings and walls, can significantly affect noise levels.

#### **4.11.1.2 Noise-sensitive receptors**

Some land uses are considered more sensitive to noise than others due to the amount of noise exposure and the types of activities typically involved. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, and auditoriums generally are more sensitive to noise than are commercial and industrial land uses.

Other resources can also be affected by noise, including sensitive wildlife and habitats (*Biological Resources Technical Report* [Appendix G]), human health and safety (*Environmental Health and Safety Technical Resource Report* [Appendix I]), recreational uses (*Recreation Resources Technical Report* [Appendix M]), and environmental justice populations and overburdened community areas (*Environmental Justice Technical Resource Report* [Appendix C]).

#### **4.11.1.3 Vibration-sensitive land uses and structures**

Common sources of ground vibrations associated with human activities include vibration from trains; loaded haul-trucks on rough roads; and construction activities such as blasting, pile driving, and operation of heavy earth-moving equipment. Vibrations from naturally occurring phenomena such as earthquakes are addressed in the *Earth Resources Technical Report* (Appendix D).

The effects of vibration include movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, vibration can damage buildings. Vibration can also result in annoyance for residential areas. The threshold vibration levels for annoyance are below damage thresholds for structures.

Sensitive receptors for vibration include conventional (modern) structures and historic structures, including older masonry structures. People and residential areas are also sensitive receptors for vibration, particularly during nighttime hours. Information on vibration impacts on historic properties is included in the *Historic and Cultural Resources Technical Report* (Appendix N). Sensitive receptors for vibration could occur within the geographic scope of study or on adjacent lands.

### **4.11.2 How impacts were analyzed**

Construction-related noise impacts were evaluated using the General Assessment methodology of the Federal Transit Administration (FTA) Noise and Vibration Impact Assessment Manual. The Federal Highway Administration's Roadway Construction Noise Model was also used to calculate noise levels at certain distances for comparison to FTA's published construction noise criteria. The approach for construction-related vibration impact assessment used an estimate of vibration generation at varying distances from specific construction equipment known to generate vibration.

For operational impacts from utility-scale solar energy facilities, reference noise levels from sources associated with these facilities were researched from existing project-level analyses and a conservative estimate of noise generation with distance was developed for distances at which potential impacts of operational noise may occur from the extent of a solar energy facility footprint.

Noise impacts were also evaluated for likely conflicts with local ordinances, potential exposure of noise-sensitive land uses in excess of the FTA criteria, and potential to exceed the maximum permissible environmental noise levels specific to land use (Chapter 173-60 WAC). For residential uses, an environmental designation for noise abatement (EDNA) of 50 dBA would apply during nighttime hours. Note that most local jurisdictions and the noise standards in Chapter 173-60 WAC exempt sounds originating from temporary construction site activities between the hours of 7:00 a.m. and 10:00 p.m. In addition, WAC 173-60-050(2)(a) specifically exempts noise from electrical substations from its EDNA standards.

The extent of a noise impact would depend on the existing ambient noise level at any given receptor, and site-specific modeling would be needed for each future facility proposed. Existing noise levels are commonly low in rural areas where siting of energy facilities would likely occur. For facility operation, an increase of 5 dBA could result in a noise impact at noise-sensitive receptors.

Construction vibration impacts were evaluated for the potential to expose nearby land uses and structures to peak particle velocity levels that would meet or exceed FTA criteria. The extent of vibration impacts would depend on the types of activities and equipment used and distance to vibration-sensitive receptors.

### **4.11.3 Findings for utility-scale solar facilities**

#### **4.11.3.1 Impacts**

##### **Noise impacts from construction and decommissioning**

Potential construction or decommissioning noise impacts would depend on the activities, terrain, vegetation, and local weather conditions as well as distance to the nearest sensitive receptors. Most sensitive receptors are assumed not to be located close to potential utility-scale facility locations.

Construction and decommissioning of a utility-scale facility could generate noise from multiple sources, including:

- Off-road equipment used for site preparation and construction
- Blasting
- Truck trips to bring materials to work sites including sand, fly ash, and cement to a concrete batch plant
- Noise generated by rock processing at a concrete batch plant and by pile driving

#### *Off-road equipment noise for site preparation and construction*

Heavy equipment use would vary during the site preparation and construction activities. The construction phase would also include noise-generating site characterization activities, including soil coring and the construction of meteorological towers. Typically, noise levels are highest during site preparation when land clearing, grading, and road construction would occur.

A prolonged noise contribution of 45 to 50 dBA could also result in a noise impact at noise-sensitive receptors located closer than 2,500 feet, particularly during nighttime hours. The extent of a construction or decommissioning noise impact would depend on the existing ambient noise level at any given receptor.

All construction and decommissioning activities except forklift operations would be below 45 to 50 dBA when the receptor is located 2,500 feet away. Pile driving or drilling may be needed to install solar panel foundations, which could have a duration of impact of several weeks during construction.

However, most construction activities would be temporary and of short duration. Most local jurisdictions and the noise standards in Chapter 173-60 WAC exempt temporary construction site noise between the hours of 7:00 a.m. and 10:00 p.m. Outside of these times, construction activities would be required to meet noise limits.

#### *Blasting noise*

Blasting within 50 feet of a receptor would exceed FTA criteria. Blasting is not expected to be needed for construction of most facilities but may occur as part of site preparation activities, depending on subsurface conditions. Blasting would typically be a part of site preparation and, therefore, not occur simultaneously with pile driving or other construction building activities. Noise generated by blasting is similar in magnitude to that of other construction activities. Decommissioning is not expected to require blasting.

#### *Noise from trucks*

Noise from trucks moving materials to and from a construction site would potentially increase noise levels along roadways used to access the solar facility. These truck trips would typically be made throughout the day, and, except in cases where substantial volumes of material would be hauled, the increase in noise levels would not be enough to result in a noticeable increase in traffic noise.

### *Concrete batch plant noise*

Concrete batch plants may be used to provide material for construction of foundations and would occur simultaneously with pile driving or other construction activities. Estimated noise levels from a concrete batch plant during facility construction are similar in magnitude to that of other construction activities.

### *Decommissioning*

Facility decommissioning activities would result in similar noise levels as would occur during construction, except for pile driving and blasting activities, which are not expected during decommissioning.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, most construction and decommissioning activities would likely result in **less than significant impacts** related to noise.

If construction or decommissioning activities occur within 1,000 feet of noise-sensitive receptors in quiet rural areas, this would result in a **potentially significant adverse impact**.

### **Vibration impacts from construction and decommissioning**

Potential construction and decommissioning vibration impacts would depend on the equipment, methods, and distance to sensitive receptors or structures. Construction may involve blasting and the use of equipment such as impact pile drivers and vibratory rollers, which can generate substantial vibration. Vibration from pile driving during construction would exceed the applicable FTA criterion at distances closer than 350 feet, while vibration from vibratory rollers would exceed FTA criterion at distances closer than 50 feet. All other construction and decommissioning equipment could be 25 feet or closer without exceeding FTA criteria. Therefore, vibration from specific activities occurring at distances closer than 350 feet from residential land uses could be a potential impact to people.

Vibration has the potential to result in architectural damage to nearby structures. Cosmetic damage could result from pile driving closer than 30 feet to a modern building, or closer than 80 feet to a historic building. Therefore, vibration from specific construction and decommissioning activities occurring in close proximity to modern or historic structures could result in building damage. However, these are not likely to be that close to utility-scale facilities.

Blasting could cause cosmetic damage to sensitive structures because of vibration or acoustic overpressures. Some types of blasting would result in vibration impacts on historic structures located within 2,000 feet.

Facility decommissioning would result in similar vibration levels as would occur during construction, except for pile driving and blasting activities, which are not expected during decommissioning.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, most construction and decommissioning activities would likely result in **less than significant impacts** related to vibration.

Vibration from specific construction and decommissioning activities occurring at distances closer than 350 feet from residential land uses, or in close proximity to modern or historic structures, would be a **potentially significant adverse impact** with respect to human annoyance or building damage. If some types of blasting are conducted within 2,000 feet of historic structures, it would result in a **potentially significant adverse impact**.

## **Noise and vibration impacts from operation**

### *Solar energy facility noise*

The major noise sources during operations are inverters, inverter distribution transformers, and substation transformers. It is expected that all equipment would operate during the day, and only the substation transformers would operate at night. Larger facilities would likely require a larger, and potentially louder, substation transformer.

For residential uses, an EDNA of 50 dBA would apply during nighttime hours. Therefore, siting of stationary equipment closer than 350 feet from a given noise-sensitive land use would have the potential to exceed the WAC standards. In quiet rural areas, an increase of 5 dBA over ambient could result in a noise impact at noise-sensitive receptors. Remote, sparsely populated counties can have a background value of 35 dBA or lower. If stationary equipment generates a noise level of 40 dBA this would be an impact. This increase is estimated to have potential to occur within approximately 1,100 feet of stationary equipment.

### *Substation noise*

Based on a reference facility assessment, a typical substation transformer is estimated to generate a noise level of 72 dBA at a distance of 6 feet during full load with fans and pumps running. Any receptor more than 110 feet away from such a substation, or 350 feet away in quiet rural areas, would be unlikely to be affected by noise associated with the substation. Larger facilities would likely require a larger, and potentially louder, substation transformer. For larger substations, any receptor more than 650 feet away from such a substation in a noise-sensitive area or more than 2,000 feet away from such a substation in a quiet rural areas would be unlikely to be affected by noise associated with the substation. WAC 173-60-050(2)(a) specifically exempts noise from electrical substations from its EDNA standards. However, there could be circumstances in which a larger project, with a greater power-generating capacity, could result in lesser impacts than a smaller project if located on a larger project site with greater buffer distances than a smaller project.

### *Corona noise*

The localized electric field near an energized overhead electric power line conductor can be sufficiently concentrated to produce a small electric discharge, which can ionize air close by. This effect is called corona and can produce small amounts of sound. Corona noise is typically

characterized as a hissing or crackling sound, which may be accompanied by a hum. Slight irregularities or water droplets on the conductor and/or insulator surface accentuate the electric field strength near the conductor surface, making corona discharge and the associated audible noise more likely.

Computer modeling software developed by the Bonneville Power Administration indicates that, during wet weather conditions, audible noise levels of up to 46 dBA can occur within the gen-tie ROW corridor for a 230 kV line. The study assumed a ROW 80 feet wide and the gen-tie ROW for solar facilities is assumed to be wider than this. Outside the ROW, 34.5 kV lines would likely be inaudible. Noise from lower voltage lines and/or during dry conditions would be lower. This noise level would be below the 50 dBA EDNA applicable to residential uses.

#### *Vibration*

Operation activities would not be expected to generate vibration.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, most operations activities would likely result in **less than significant impacts** related to noise and vibration.

Stationary equipment for facilities located closer than 350 feet from a noise-sensitive land use or closer than 1,100 feet from a noise-sensitive land use in a quiet rural area would have a **potentially significant adverse impact**.

Facility substations located closer than 110 feet from a noise-sensitive land use or closer than 350 feet from a noise-sensitive land use in a quiet rural area, or larger substations for large facilities closer than 650 feet away from a noise-sensitive receptor or 2,000 feet from a noise-sensitive receptor in a quiet rural area, would also have a **potentially significant adverse impact**.

#### **4.11.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

#### **Recommended measures for siting and design considerations**

- 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.
- 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.

### **Required measures**

- 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 dBA per OSHA standard 1910.95(c)(1).

### **Recommended measures for construction, operation, and decommissioning**

- Implement noise reduction measures during construction.

### **Mitigation measures for potential significant impacts**

- 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 EDNA threshold exceedances or an increase of 5 dBA over ambient noise levels in quiet rural areas, use acoustical enclosures or barriers to reduce operations noise levels. Many manufacturers provide optional customized enclosures for mechanical equipment. Alternatively, acoustical barriers may be designed for a particular source or group of sources using acoustically rated materials.

***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.

- 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.

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

## 4.11.4 Findings for facilities with co-located BESS

### 4.11.4.1 Impacts

#### Impacts from construction and decommissioning

Site characterization, construction, and decommissioning of a utility-scale solar energy facility with a co-located BESS would generate similar noise and vibration levels as those analyzed for utility-scale facilities of the same size without a BESS.

#### *Findings*

Noise and vibration impacts during construction and decommissioning would be similar to findings for utility-scale solar facilities above.

#### Impacts from operation

The BESS would not be expected to generate operational vibration.

#### *Solar energy facility and corona noise*

Operation of a utility-scale solar energy facility with a co-located BESS would add BESS to the same equipment analyzed for utility-scale facilities evaluated in Section 4.11.3. Noise would be generated by battery storage liquid cooling units as well as inverters specific to the BESS. In general, these sources would likely operate 24 hours a day and would generate noise during the more noise-sensitive nighttime hours.

Reference facility-level noise assessments were used to estimate the noise generation potential during operations. Noise modeling for these indicated that the cooling units do not meaningfully contribute to the noise generated by the substation transformers where they are typically co-located, but can generate higher noise levels when concentrated in a single area.

Review of proxy projects indicates that there is a wide range of variability in predicted noise levels based on BESS design and configuration, particularly when comparing distributed and consolidated BESSs. The potential exists for some BESS operations to exceed the Chapter 173-60 WAC EDNA of 50 dBA at distances of up to 1.5 miles from consolidated BESS equipment, depending on the design layout of the BESS.

Corona noise for overhead lines for utility-scale solar energy facilities with BESS would be the same as identified for facilities without BESS.

#### *Findings*

The operational noise impact for co-located BESSs would range from a **less than significant impact** to a **potentially significant adverse impact** depending on the design and layout of the BESS and distance of sensitive receptors from the facility.

#### **4.11.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of facilities with co-located BESSs would be the same as facilities without a BESS with the following additional measures:

##### **Mitigation measures for potential significant impacts**

- 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.

#### **4.11.5 Findings for facilities combined with agricultural land use**

##### **4.11.5.1 Impacts**

###### **Impacts from construction, operations, and decommissioning**

Site characterization, construction, and decommissioning of a utility-scale solar facility that includes agricultural land uses would generate the same noise and vibration levels as those analyzed for utility-scale facilities without combined agriculture land use.

Operational activities may include maintenance of existing or addition of new infrastructure (e.g., roads, fences, gates) and operation of farming machinery. If the agricultural uses exist prior to facility construction, any noise contribution from these existing activities would reduce the increase over ambient described for the other types of facilities. New agricultural uses could generate noise from discing, harvesting, or other activities involving agricultural equipment. Overall, the same operational noise impacts identified for facilities without agriculture could occur, depending on siting proximity to noise-sensitive receptors. While mobile agricultural equipment could represent a new additional noise source, the seasonality of such operations and temporary duration of any additional noise generation would not be considered a significant noise contribution.

###### *Findings*

Noise and vibration impacts would be similar to findings for utility-scale solar facilities above.

##### **4.11.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of agrivoltaic facilities would be the same as facilities without agricultural land use.

#### 4.11.6 Findings for the No Action Alternative

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar 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 range from **less than significant impacts** to **potentially significant adverse impacts**.

#### 4.11.7 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 activities would have **no potentially significant and unavoidable adverse impacts** related to noise and vibration.

### 4.12 Land use

#### Key findings

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, most construction, operation, and decommissioning activities would result in **less than significant impacts** on land use.

Construction would have **potentially significant adverse impacts** if natural resource lands of long-term commercial significance are converted.

For facilities that include agricultural uses, impacts due to conversion of resource lands would range from **less than significant** to **potentially significant adverse impacts**, depending on the extent to which agricultural and other resource uses can coexist with energy facilities.

Changes to rural character resulting from operation of a new utility-scale energy facility would have **potentially significant adverse impacts** depending on whether plans and development regulations are in place to protect rural character and how they consider utility-scale solar facilities.

Some utility-scale solar energy facilities may result in **potentially significant and unavoidable adverse impacts** on natural resource lands of long-term commercial significance or rural character. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site and local regulations and plans.

Land use refers to how land is developed for various human uses or preserved for natural purposes. The *Land Use Technical Resource Report* (Appendix K) includes the full analysis and technical details used to evaluate land use in the PEIS. This section contains a summary of how impacts were analyzed and the key findings.

#### 4.12.1 Affected environment

Major land types and land uses in the study area include agricultural, rural residential, forestry, wildlife conservation, and undeveloped recreation areas. Major categories of land ownership include private, public, federal, state-managed, and state trust.

The Natural Resources Conservation Service classifies and maps farmland to identify the location and extent of prime farmland, farmland of unique importance, and farmland of statewide importance for Washington. The Washington State University *Least-Conflict Solar Siting Study for the Columbia Plateau* identified areas of high and low value for farmland and ranchland. Washington state has more than 1.4 million acres enrolled in the Conservation Reserve Program to re-establish valuable land cover to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat.

The GMA requires all counties and cities to designate agricultural resource lands. Criteria for designating agricultural resource lands include the following (WAC 365-190-050):

- The land is not already characterized by urban growth.
- The land is used or capable of being used for agricultural production.
- The land has long-term commercial significance for agriculture.

Land use planning designations considered in the PEIS analysis include GMA comprehensive plans, subarea plans, zoning, and Shoreline Master Programs. The analysis also considered GMA critical areas and resource lands designations, prime farmland, and farmland conservation reserves. In addition, it analyzed mapped flood hazard areas and state-designated areas for agriculture, commerce, conservation, tourism, clean energy development, opportunity zones, and rural character. Military training, testing, and operation areas as well as commercial and aircraft routes are also considered.

Several, but not all, of the counties in the study area plan under the GMA. Counties planning under GMA must include a “rural element” in their comprehensive plans that addresses “lands that are not designated for urban growth, agriculture, forest, or mineral resources.” Counties not planning under GMA are not required to have this element in their comprehensive plans. A key requirement of a rural element are measures to protect rural character.

Rural character includes many considerations such as vegetation, views, housing, employment, fish and wildlife habitat, government services, and water. However, under GMA, individual counties are responsible for adopting a locally appropriate definition of local character that guides the development of the rural element and its implementing development regulations.

Under GMA, all cities and counties in Washington are required to adopt regulations for critical areas. Critical areas regulations include standards such as the types of activities allowed within each type of critical area as well as standard buffers and building setbacks. Critical areas include:

- Wetlands

- Critical aquifer recharge areas
- Fish and wildlife habitat conservation areas
- Frequently flooded areas
- Geologically hazardous areas

Also under GMA, all cities and counties in Washington must designate and protect natural resource lands of long-term commercial significance. These include agricultural, forest, and mineral lands that have long-term significance for the commercial production of food, agricultural products, timber, or for the extraction of minerals.

#### **4.12.1.1 Population**

The estimated population of Washington state was approximately 7.95 million in 2023. Population densities are generally highest on the west side of the Cascades. Between 2020 and 2023, the state's population increased by 244,840 people, driven largely by people moving into the state. In 2023, population growth remained concentrated in more metropolitan areas, consistent with trends over the past few decades. Washington's population is expected to continue growing in all counties to a total of almost 9.9 million in 2050.

#### **4.12.1.2 Land ownership**

The estimated total land area of Washington state is 45.7 million acres (including aquatic lands). In 2009, private ownership made up approximately 54% of the state's land area, with national forests covering approximately 21% (Figure 4-6). State, local, and other federal ownership made up the remainder. Federal agencies that own or manage large areas of land overlapping the study area include USFS and BLM. State land ownership within the study area includes DNR and WDFW.

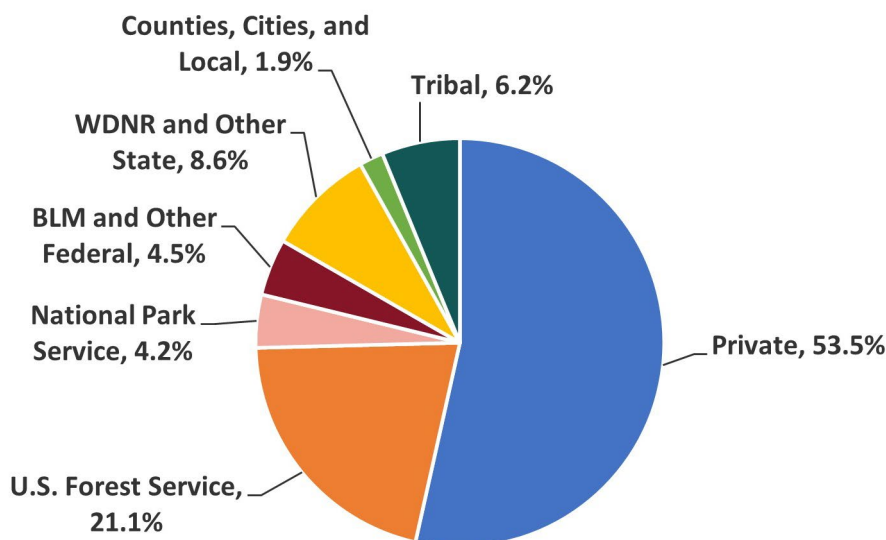


Figure 4-6. Land ownership percentages in Washington in 2009

#### **4.12.1.3 Land uses**

The study area encompasses various types of land uses, which each present unique considerations and potential for impacts associated with the development of utility-scale solar facilities. Washington's cities and unincorporated UGAs support much of the state's population and more intensive land uses, such as high-density residential, industrial, and concentrated commercial uses. Outside of cities and UGAs, which are excluded from the land use study area, common land uses include agricultural, rural residential, forestry, wildlife conservation, and undeveloped recreation areas.

##### **Agricultural land use**

Approximately 11.2 million acres in Washington are used for agriculture. Agriculture is a dominant land use in eastern Washington, encompassing millions of acres in the solar study area and including crop production, livestock grazing, and other farming activities. The study area also includes areas of prime farmland, which is land that has the best combination of characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses.

##### **Forestry**

Forestry is a significant land use in rural areas, covering approximately 22 million acres or half of the state. Timber harvest occurs on private lands as well as on public lands owned by USFS, BLM, and DNR.

##### **Mining**

Mineral resources include sand, gravel, and valuable metallic substances, as well as other minerals. There are dozens of active surface mines across Washington. DNR mapping indicates most of the active surface mine permits are for mining of sand, gravel, rock, and stone, which are important building materials.

##### **Limited areas of more intensive development**

Counties may designate "limited areas of more intensive development" in rural areas to allow for existing commercial, industrial, residential, or mixed-use areas; small-scale recreation and tourist use areas; and intensification of development on lots containing nonresidential uses. Washington has many small communities located in rural areas.

##### **Military areas**

Large areas of land, water, and air outside of military installations are used for military testing, operations, and training. The GMA prioritizes protecting lands around military installations from development that would reduce the ability of personnel to fulfill their mission requirements (RCW 36.70A.530). Development that is incompatible with this priority poses risks to operational efficiency and the safety of military personnel and the public. Energy developers should consult with the U.S. Department of Defense (DoD) early during project planning to

address these issues. Use the [Compatible Energy Siting Assessment](#) (CESA)<sup>34</sup> mapping tool to identify military utilized airspace and if applicable, submit plans to the DoD.

## 4.12.2 How impacts were analyzed

Impacts that utility-scale solar facilities would have on land use were analyzed by considering how a proposed solar energy facility could impact existing and planned land uses, the supply of land suitable for such uses, and the future viability of affected land uses. The analysis included the potential impacts associated with construction, operation, and decommissioning of new utility-scale solar facilities as related to the following:

- Conversion of land from an existing low-intensity use (rural, agricultural, or other resource uses) to a new utility-scale solar use, including the following:
  - Conversion of designated prime farmland or farmland of statewide importance to non-agricultural land uses and effects on the viability of resource uses in rural areas including agriculture, rangeland, and forestry uses
- Potential for land use conflicts with rural character
- Potential for co-location of other land uses with utility-scale solar facilities
- Potential conflicts with aviation or military operations
- Effects on existing or future land uses resulting from off-site changes in road networks, views, and increased noise, traffic, or water use
- Consistency with local, state, or federal land use plans, policies, or regulations

## 4.12.3 Findings for utility-scale solar facilities

### 4.12.3.1 Impacts

#### Impacts from construction and decommissioning

##### *Effects on existing adjacent land uses*

Construction and decommissioning of utility-scale facilities have the potential to create impacts such as increased dust, noise, traffic, and visual changes that could affect adjacent existing land uses on properties near the facility. People most likely to notice these impacts are those living or working near the construction area. Agricultural land uses could be affected by increased dust settling on crops or by noise disturbance to livestock.

Potential disturbance impacts would depend on the activities, site conditions, adjacent land uses, and distance. Impacts would be less in uninhabited areas and greater in areas close to residences or communities, along important travel routes, or near view areas that are considered important to local communities.

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<sup>34</sup> <https://cesa-wacommerce.hub.arcgis.com/pages/tool>

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on existing adjacent land uses.

Through compliance with laws and permits and with the implementation of actions that could avoid and reduce impacts, construction of most facilities would result in **less than significant impacts** on land use. Construction could have **potentially significant adverse impacts** depending on site-specific circumstances if natural resource lands of long-term commercial significance are converted.

### *Conversion of existing land use*

The siting and development of solar facilities could result in the long-term (and potentially permanent) conversion of existing or designated future land uses to utility-related uses at the solar facility sites for the life of the facilities. The impacts of converting property to a utility-scale solar facility would depend on factors including the existing use of the site, whether solar facilities are an allowed use according to current and future land use plans, and compatibility of the current and future uses with solar facilities. Changing the use of these lands to a renewable energy facility would make the land or part of it no longer available for these other uses for the life of the facility. Removing these lands, particularly those of high quality, from their resource uses would reduce the area available to continue producing agricultural, forestry, and mining products in the future or for the life of the facility. Larger facilities require larger land areas and therefore would have a greater potential to overlap with lands designated for natural resource use and protection.

Land use impacts during facility decommissioning would be similar to those for construction. If a facility is not required to be restored to pre-facility conditions and uses, it is possible that a decommissioned site could be used for something other than its use prior to development of the facility.

### *Findings*

Converting natural resource lands of long-term commercial significance to utility-scale facilities could result in impacts that range from **less than significant to potentially significant adverse impacts**, depending on site-specific circumstances.

## **Impacts from operation**

### *Land use conflicts with rural character*

Rural character encompasses many considerations such as vegetation, views, housing, employment, fish and wildlife habitat, government services, and water. A utility-scale solar facility would likely affect vegetation, views, and habitat for species (see biological resources findings in Section 4.8). Installing facilities would result in increased development intensity at facility sites and a change to the visual landscape on and adjacent to those sites that includes a greater presence of built elements. These changes could result in changes to and/or

perceptions of the rural character of the surrounding area (see aesthetics/visual quality findings in Section 4.13).

#### *Findings*

Changes to rural character resulting from operation of a new utility-scale energy facility would range from **less than significant impacts** to **potentially significant adverse impacts** depending on whether plans and development regulations are in place to protect rural character and how they consider utility-scale solar facilities.

#### *Consistency with plans, policies, and regulations*

The consistency of a proposed utility-scale solar energy facility with federal, state, and local regulations and planning documents would depend on a number of factors, such as:

- If on state or federal lands, if the facility is considered an allowed use
- If allowed by local Comprehensive Plan future land use designations, zoning, and Shoreline Management Plan (SMP) designations
- If the facility would impact areas with specific use restrictions and standards (such as SMP-regulated shorelines, critical areas, designated natural resource lands, or prime farmlands) and mitigate impacts
- If the facility can be sited and designed to avoid interfering with civil air navigation and military testing, operations, and training

Depending on the extent of critical areas on the site proposed for a facility, impacts on critical areas can often be avoided through facility design. Certain critical areas impacts must be addressed through compensatory mitigation. See the other PEIS resource sections for additional discussion of impacts on water (Section 4.7), wildlife (Section 4.8), and earth resources (Section 4.5).

#### *Findings*

A utility-scale solar facility could be proposed that is inconsistent with federal, state, and/or local plans and regulations. Plans and regulations may be changed (e.g., through a rezone or comprehensive plan amendment) to resolve inconsistencies and allow a facility to proceed with **less than significant impacts**.

#### *Military areas*

Conflicts with potential physical or visual obstructions from facility towers and activities could interfere with military activities. Early consultation with the Federal Aviation Administration (FAA) and DoD should take place to avoid these issues.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, the operation of most facilities would likely result in **less than significant impacts** related to military areas.

#### **4.12.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

#### **Recommended measures for siting and design**

- 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](#)<sup>35</sup> 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 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 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 CESA 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.

#### **Required measures**

- 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)

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<sup>35</sup> <https://www.dnr.wa.gov/cleanenergymap>

- 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 Resources Conservation Service, local farm agency, or rural development agency)
- ROW or lease (federal, state, or local agency)
- Section 4(f) review (U.S. Department of Transportation)
- U.S. Department of Defense Clearance for Radar Interference (DoD)
- Utility Accommodation Permits and Franchises (Washington State Department of Transportation [WSDOT] or local agency)

#### **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.

#### **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 solar projects.

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

### **4.12.4 Findings for facilities with co-located BESS**

#### **4.12.4.1 Impacts**

##### **Impacts from construction, operations, and decommissioning**

Construction, operations, and decommissioning impacts for utility-scale solar facilities with BESSs would be generally the same as for facilities without BESSs. The addition of battery storage could generate additional traffic for specialized equipment and construction workers. The addition of battery storage could be perceived as added industrial-type facility, resulting in a potential greater change in rural character than for facilities without BESS.

##### *Findings*

Impacts on land use would be similar to findings for utility-scale solar facilities above.

#### **4.12.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of facilities with BESSs are the same as facilities without a BESS.

## 4.12.5 Findings for facilities combined with agricultural land use

### 4.12.5.1 Impacts

#### Impacts from construction, operation, and decommissioning

Impacts during construction of a solar facility combined with agricultural use (agrivoltaic) would be generally the same as for solar facilities without agricultural land use. Land use conversion impacts could be less than other alternatives because existing rural or agricultural lands may not need to be converted if agricultural uses would be co-located with energy facilities. Incorporating ongoing agricultural uses along with utility-scale solar energy during operations may improve a facility's compatibility with local goals and policies related to preserving rural character.

Impacts from decommissioning an agrivoltaic facility would be similar to those for decommissioning a solar facility without agricultural land use. Land in agricultural use prior to facility construction would require less area to be restored following removal of solar facility equipment, and decommissioning would return the property to full agricultural use.

#### *Findings*

Impacts on land use would be similar to findings for utility-scale solar facilities above.

### 4.12.5.2 Measures to avoid, reduce, and mitigate impacts

Measures to avoid, reduce, and mitigate impacts of agrivoltaics facilities would be the same as for the facilities without agricultural land use, with the following additional measure:

#### Recommended measures for siting and design

- Design projects elements such as roads, panel height, panel spacing, and type of tracking system to accommodate crop heights, agricultural equipment and worker access, and irrigation.

## 4.12.6 Findings for the No Action Alternative

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar 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 range from **less than significant impacts** to **potentially significant adverse impacts**.

## 4.12.7 Unavoidable significant adverse impacts

There may be **potentially significant and unavoidable adverse impacts** on rural character or from conversion of resource lands of long-term commercial significance depending on local plans and development regulations. Determining if mitigation options would reduce or

eliminate impacts below significance would be dependent on the specific project and site and local regulations and plans.

## 4.13 Aesthetics/visual quality

### Key findings

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operations, and decommissioning activities would likely result in **less than significant impacts** related to light or glare.

Depending on the location and size of facility sites and visual characteristics of the construction, operation, and decommissioning, visual quality impacts would range from **less than significant impacts** to **potentially significant adverse impacts**. In general, larger facilities and facilities located in high-value scenic landscapes have a greater potential to impact visual quality.

Some utility-scale solar energy facilities may result in **potentially significant and unavoidable adverse impacts** on visual quality, depending on location and design. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site and local regulations and plans.

Visual resources refer to all objects (built and natural, moving and stationary) and features (e.g., landforms and waterbodies) that are visible on a landscape. These resources add to or detract from the aesthetic or scenic quality (or visual appeal) of the landscape. A visual impact is the creation of an intrusion or perceptible contrast that affects the scenic quality of a landscape. A visual impact can be perceived by an individual or group as either positive or negative, depending on a variety of factors or conditions (e.g., personal experience, time of day, and weather/season). The information in this section summarizes the full analysis and technical details used to evaluate aesthetics and visual quality in the PEIS, which can be found in the *Aesthetics/Visual Quality Technical Resource Report* (Appendix L).

### 4.13.1 Affected environment

Visual resources considered in this analysis include the following:

- Designated scenic vistas
- Designated scenic corridors, including roadways, trails, rivers, and streams (including federally designated Wild and Scenic Rivers)
- Designated viewsheds
- Designated ridgelines and other elevated (i.e., visually prominent) natural features
- Areas with comprehensive plans, zoning, or other land controls that define an area as scenic or as designated/protected rural character
- Publicly accessible vantage points having moderate to high visual or rural character and quality and that are well traveled and populated
- Recreational resources

- Areas sensitive to light and/or glare, including designated night sky areas, as well as areas potentially affecting aircraft

The study area includes physically diverse regions such as the Columbia River basin, the foothills of the Cascade Range, Okanogan Big Bend, the Yakima Valley, and the Palouse region.

Landscape types encompassed within the study area vary widely based on geology, topography, climate, soil type, hydrology, and land use. The study area is generally split between level terrain with long viewing distance and hilly topography. Human activity like agriculture has altered much of the landscape in the study area despite a generally sparse population density. Undeveloped areas in hilly terrain are forested up to tree-line elevation, while undeveloped flatter areas contain sparsely vegetated plains and plateaus. The central part of the state is dominated by the Columbia River and its tributaries, along with large parcels of government-owned land and Tribal reservations.

In many of the undeveloped portions of the study area, the land is generally flat and there are few obstructing structures. This, combined with generally high air quality and low humidity, means that it is possible to see for long distances. Minimal light pollution allows for dark night skies.

The western portion of the study area is higher in elevation. Visual characteristics may be impacted by recreation and resource extraction activities such as logging and mining. More hilly and mountainous terrain as well as the presence of vegetation and other ecological features contribute to a greater visual diversity and quality in this part of the study area. Areas of highest visual quality may attract tourists and other recreationists.

Extensive scenic resources occur within or near the study area, many on government- or Tribal-owned lands. Tourism in these areas is a major contributor to the regional economy. Of particular importance is the viewshed from major roadways that pass through the area. There are numerous national and state-designated scenic byways that traverse or are near portions of the study area. Parts of the Klickitat River and White Salmon River that are designated as National Wild and Scenic Rivers also traverse portions of the study area.

Sensitive viewer groups are varied throughout the study area. These groups range from people in residential areas in less developed and agricultural areas, to motorists and recreationalists/tourists. The viewing experience for each group would vary, depending on the length of time and distance the viewer would be exposed to a solar facility and the physical conditions of the view.

#### **4.13.2 How impacts were analyzed**

The assessment of impacts in the study area was qualitative, and considered the following:

- Existing visual or rural character, land uses that may be sensitive to strong visual contrast (including light and glare), and sensitive viewer groups
- Potential impacts of facilities on existing visual or rural character and sensitive viewer groups or land uses

- Effects of lighting and glare on sensitive receptors

The magnitude of the aesthetics and visual quality impacts associated with a solar energy facility would depend on site- and project-specific factors, including the following:

- Distance of the facility from publicly accessible vantage points, and their placement within the context of foreground, middleground, and background views<sup>36</sup>
- Size of the facility
- Size and height of the solar panel array trackers
- Surface treatment (such as color) of solar panels, buildings, and other structures
- The presence and arrangement of lights in the solar array field and on other structures
- The presence of workers and vehicles for construction, maintenance, or decommissionings activities
- Viewer characteristics, such as the number and type of viewers and their attitudes toward renewable energy and solar power
- The visual characteristics of natural and built elements in the existing landscape
- The visual quality and sensitivity of the landscape, including the presence of sensitive visual, Tribal, and cultural resources, including historic properties
- The existing level of development and activities in the solar energy facility area and nearby areas, and the landscape's capacity to withstand human alteration without loss of landscape character
- Weather and lighting conditions

### 4.13.3 Findings for utility-scale solar facilities

#### 4.13.3.1 Impacts

##### Impacts from construction and decommissioning

##### *Change or reduction in visual quality*

Construction and decommissioning of a utility-scale solar energy facility would involve a range of activities that could have potential visual impacts. Construction and decommissioning activities are site and facility dependent; however, construction of a solar energy facility would normally involve the following major actions with potential visual impacts: clearing and grading for construction laydown areas, access roads, and pad foundations; constructing supporting elements like internal service roads, fences, gates, and buildings; and constructing facility components such as solar arrays, inverters, transformers, and electrical transmission lines. Construction vehicles, equipment, and worker presence and activity may also generate dust and emissions that can result in visual impacts. Additional construction activities may be necessary at very remote locations or for very large solar facilities, such as the construction of temporary offices or sanitary facilities.

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<sup>36</sup> The foreground, middleground, and background refer to areas in space. The foreground refers to the nearest area. The background refers to the area of space in the distance. The middleground occupies the space in between.

Construction visual impacts would vary in frequency and duration throughout the course of construction. There may be periods of intense activity followed by periods with less activity. Visual impacts would, to some degree, vary in accordance with construction activity levels. Construction schedules are also project-specific, with some taking longer and therefore extending the duration of construction-related visual impacts.

Construction of a solar panel array, support facilities, and an interconnector and gen-tie line would be required for utility-scale solar energy facilities. The relative scale of typical solar array components and other buildings and potential elements of solar facilities are illustrated in Figure 2-2 in Chapter 2. In general, larger facilities would require construction of more PV arrays and ancillary structures and facilities over a much larger and broader land area, which would lead to more impacts.

Depending on the facility location, there could be some situations where work areas would be blocked from view by intervening topography or screened by vegetation. There could also be cases where a development site would be in an area where there are limited views of the facility from sensitive viewers or viewer groups. However, some facility development sites would be in proximity to roadways, towns and cities, recreational areas, and other vantage points that would have views of these facilities. In general, larger facilities would require much larger and broader land areas, which could lead to more impacts.

Visual impacts associated with vegetation clearing include the potential loss of vegetative screening, which would result in the opening of views, potentially substantial visual changes for viewers close to the solar field, and potentially substantial changes for viewers with distant views of the solar field.

Decommissioning activities would produce visual impacts similar to construction activities. Restoration activities would typically include recontouring, grading, scarifying, seeding and planting, and stabilizing disturbed surfaces. Newly disturbed soils would create a visual contrast that would persist for several seasons before vegetation would begin to mature and restore the pre-facility visual landscape. Complete restoration of vegetation to pre-facility conditions may take much longer. Invasive species may colonize newly and recently reclaimed areas and could produce visual contrasts. Vegetation restoration at some decommissioned facilities may be more challenging due to factors such as soil degradation, the extent of invasive species colonization, a change in seed dispersal patterns, or degradation of adjacent habitats. The length of time it takes for native vegetation to re-establish varies greatly depending on location, weather patterns, soil fertility, surrounding land use, and the type of vegetation planted or recruited. Decommissioning impacts would last until restoration of the site is complete.

### *Findings*

Depending on the location and size of facility sites and visual characteristics of the construction and decommissioning activities, impacts from construction and decommissioning activities would range from **less than significant impacts to potentially significant adverse impacts** on visual quality. In general, larger facilities and facilities located in high-value scenic landscapes have a greater potential to impact visual quality.

### *New sources of light or glare*

Site characterization, construction, and decommissioning of a utility-scale solar energy facility would be expected to occur during daylight hours. Some nighttime activities may be performed such as electrical connection, inspection, and testing activities. Any lighting used during construction or decommissioning activities would be occasional, temporary, and shielded downward. Also, these facilities would require big areas of undeveloped or minimally developed land (up to approximately 12,000 acres), which would put much of the construction and decommissioning activities away from receptors sensitive to light. Therefore, the potential for nighttime lighting during construction or decommissioning to impact nighttime views would be minimal.

Construction and decommissioning would involve increased vehicle traffic and the presence, transport, and use of construction equipment and materials. These activities would temporarily increase glare in and around a facility site if activities were associated with an increased presence of reflective materials, potentially including construction equipment, shiny materials, and vehicle windows. However, an increase in glare that could result from the presence of construction equipment or materials would be minimal and temporary. Only portions of the facility site would be actively under construction or decommissioning at a particular time. Such new temporary sources of glare would not remain in any one fixed location for the entire duration of construction but would be present at different locations depending on the phase of construction activities throughout the site.

Although decommissioning activities would require the use of vehicles and equipment similar to those required for construction, any sources of glare would be minimal and temporary as equipment would be moved between active work locations on the facility site, and the activities would occur over a shorter period of time. Because the facility site would be restored to pre-facility conditions following the operational life of the facility, there would be no remaining permanent sources of light or glare.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** related to light or glare.

## **Impacts from operation**

### *Change or reduction in visual quality*

Operations and maintenance of solar energy facilities and associated electricity interconnector and gen-tie lines, roads, and ROWs would result in long-term visual impacts. Site operation impacts would generally occur throughout the life of the facility. Impacts may occur from cleared areas, built structures, roadways, and operational activities.

Cleared areas would include maintenance roads, facility access roads, and other support facilities. Visual contrasts associated with these cleared areas would include the potential loss of vegetative screening, which would result in the opening of views and potentially significant visual changes for viewers close to the cleared area. For both maintenance and access roads, the cleared area would be relatively narrow. The cleared area for interconnector and gen-tie lines are typically wider and longer than roads. For these reasons, contrasts from roads would normally be far less severe than for interconnector and gen-tie lines.

Built structures associated with utility-scale facilities would introduce complex shapes and lines and artificial-looking textures and colors into the landscape that would likely contrast noticeably with natural-appearing landscapes (see Figure 2-2 in Chapter 2). Because PV arrays are generally low to the ground, most buildings, some tanks, and possibly other facility components would protrude above the PV arrays and would be visible from outside the facility even when viewed from relatively flat areas. When viewed from elevated positions, more of the facility would be visible and the regular geometry of the panel arrays would be more apparent.

The visual pattern created by many thousands of identical solar panels and mounting structures in evenly spaced rows creates a distinctly non-natural and sometimes striking and unusual view of a facility that contrasts strongly with natural-appearing backgrounds.

Operational activities associated with the PV arrays and support facilities include routine maintenance (such as washing of PV panel surfaces), road and building maintenance, and repairs. These activities would be visible off site and might generate visible dust plumes in some circumstances.

Site entrances and main access roads leading to substations, parking areas, or operations and maintenance buildings are more likely to be paved two-lane roads, but interior roads are typically one-lane dirt or gravel roads. Roads may introduce strong visual contrasts to the existing landscape and landscape features, depending on width, length, surface treatment, and route relative to surface contours. Improper road maintenance could lead to the growth of invasive species or erosion, both of which could introduce undesirable contrasts in line, color, and texture, primarily for foreground and near-middleground views.

The relatively low population density of most of the study area suggests that while solar energy facilities may be visible for long distances (potentially greater than 20 miles away), many facility locations would generally be viewed by few people. Impacts on residents are generally greater than those on more transient viewers, such as drivers, workers, or recreationalists, in part

because residents are likely to view solar energy facilities more frequently and for longer durations.

A solar energy facility located in a high-value scenic landscape typically would be more conspicuous and therefore perceived as having greater visual impact than if that same facility were present in a setting of low scenic value where similar facilities were already visible. Some landscapes have special meaning to some viewers because of unique scenic, Tribal, cultural, or ecological values and are therefore perceived as being more sensitive to visual disturbances. Depending on visibility factors, solar energy facilities located near sensitive landscapes, such as national parks, historic sites, landscapes sacred to Tribes, scenic highways and trails, recreational attractions, and other valued cultural features, may be of particular concern.

#### *Findings*

Depending on the facility size range and the nature of the facility structures, operation activities could result in a range from **less than significant impacts** to **potentially significant adverse impacts** on visual quality. In general, larger facilities and facilities located in high-value scenic landscapes would have a greater potential for impacts.

#### *New sources of light or glare*

Solar energy facilities would include exterior lighting around buildings, parking areas, and other work areas. Security and other lighting could contribute to light pollution. Maintenance activities conducted at night, such as panel washing, might require vehicle-mounted lights, which also could contribute to light pollution. Light pollution impacts associated with utility-scale solar energy facilities include skyglow, light trespass, glare, light clutter, and over-illumination.

FAA-compliant aircraft warning lights could be required for meteorological or interconnector towers, gen-tie towers, or other structures 200 feet (61 meters) tall or higher and might be required in some circumstances for lower height structures. FAA guidelines for marking and lighting facilities could require aircraft warning lights that flash during the day and at night. The presence of aircraft warning lights would greatly increase visibility of the facilities and associated interconnector and gen-tie lines at night, because the synchronized flashing red warning lights or strobes could be visible for long distances. For larger facilities, operation of aircraft warning lights would occur over a broader area depending on the siting and design for tall structures.

Utility-scale solar energy facilities would include fields of solar panel tracking systems with up to 3,600,000 PV panels. The reflection of sunlight off solar panel surfaces would be the primary source of potential glare from a facility. Solar panels are designed to be as light-absorptive as possible in order to maximize the efficiency of energy production, and they typically are covered with a tempered glass layer that is treated with an anti-reflective coating to further reduce their reflectiveness. PV panel tracking systems would position the arrays so that the sun's rays are perpendicular to the face of the panel, reflective light back toward the sun and

above the line of sight of most viewers. These design features reduce the potential for glare impacts from the arrays.

In addition to the panels, facilities would include other components that may have reflective surfaces, such as panel support structures, support building windows, fencing, and interconnector and gen-tie towers and lines, which may also cause glint or glare. Surface coatings can be applied to facilities to reduce glare, and these reflections would be minimal when considered with the PV panels and would not contribute substantially to glare.

Because of their intermittent operation, aircraft warning lights would likely not contribute to sky glow from artificial lighting. Security and other lighting on support structures (e.g., the control building) could contribute to skyglow. These impacts could be reduced by shielding or other measures and would be expected to be minimal because typically only a few structures would have lighting capable of producing skyglow.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** related to light or glare.

#### **4.13.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

#### **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.
- 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.
  - 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.
  - Setting back solar panel arrays from linear public features (e.g., roads, railways, trails) to avoid a visual tunneling effect and using vegetation to screen views.
  - Using solar array trackers 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 ROW 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 ROWs 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.
- Design facilities to prevent glint/glare and comply with FAA glare avoidance requirements.

### **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 ROW or leasing processes.

### **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.
- Use non-reflective materials or non-specular finishes and coatings on facilities to prevent glare.
- Provide a phone number for the public to report complaints related to glare from solar panels. If a complaint is received regarding glare from panels, investigate to determine whether the complaint is legitimate and whether the facility is the source of the glare. If it is determined that the facility is the source of glare and it is causing human health or safety hazards (e.g., road or air travel concerns), implement measures to reduce the glare.

### **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.

## 4.13.4 Findings for facilities with co-located BESS

### 4.13.4.1 Impacts

#### Impacts from construction, operations, and decommissioning

##### *Change or reduction in visual quality and light or glare*

The construction, operation, and decommissioning activities occurring for facilities with co-located BESSs would be similar to other support facilities and structures described for facilities without BESSs. BESSs are typically installed in a graveled area where vegetation clearing and gravel surfacing or a concrete pad would be required.

The addition of BESSs would not change or reduce the visual nature of solar energy development because the racks, containers, buildings, control systems, and other elements associated with a BESS would look similar to other elements associated with a solar facility.

BESS construction and decommissioning may require night work lighting; however, these activities would be occasional, temporary, and shielded downward. The potential for nighttime lighting during construction or decommissioning to impact nighttime views would be minimal. Lighting associated with a BESS would be the same type as for utility-scale facilities and the addition of BESSs would not change the sources of light and glare of a solar energy facility. Because the facility site would be restored to pre-facility conditions following the operational life of the facility, there would be no remaining permanent sources of light or glare.

#### *Findings*

Impacts to aesthetics and visual quality would be similar to findings for utility-scale solar facilities above.

### 4.13.4.2 Measures to avoid, reduce, and mitigate impacts

Measures to avoid, reduce, and mitigate impacts of facilities with co-located BESSs would be the same as facilities without a BESS.

## 4.13.5 Findings for facilities combined with agricultural land use

### 4.13.5.1 Impacts

#### Impacts from construction, operations, and decommissioning

##### *Change or reduction in visual quality and light or glare*

The construction and decommissioning activities for facilities combined with agricultural land use would be the same as for the other types of facilities evaluated in the PEIS. Agrivoltaics could include construction of facilities on active agricultural land (or a new agricultural land use could be added), which would be similar to the construction of solar energy facilities on broad expanses of undeveloped or fallow land.

Long-term changes or reduction in visual quality from facilities with agricultural use would be the same as for facilities without agricultural land use. The co-location on agricultural land would not change or reduce the visual nature of a solar energy development.

#### *New sources of light or glare*

Facility construction and decommissioning activities for facilities with agricultural use would be the same as those occurring for facilities without agricultural land use. Agricultural activities are not anticipated to involve nighttime lighting, except for emergency or other episodic use.

The types of light and glare impacts, as well as measures to avoid, reduce, and mitigate light and glare, during operation would be the same as for facilities without agricultural land use. It is assumed that current agricultural activities would continue to occur and would not result in additional sources of light and/or glare that are not present under existing conditions.

Because a facility site would be restored to pre-development conditions or continue as agricultural fields following the operational life of the facility, there would be no remaining permanent sources of light or glare.

#### *Findings*

Impacts to aesthetics and visual quality would be similar to findings for utility-scale solar facilities above.

#### **4.13.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of agrivoltaic facilities, including the restoration of agricultural land, would be the same as facilities without agricultural land use.

#### **4.13.6 Findings for the No Action Alternative**

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar development 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 range from **less than significant** to **potentially significant adverse impacts**. Impacts associated with light and glare would result in a **less than significant impact**.

#### **4.13.7 Unavoidable significant adverse impacts**

Some utility-scale solar energy facilities may result in **potentially significant and unavoidable adverse impacts** on visual quality, depending on location and design. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site and local regulations and plans.

## 4.14 Recreation

### Key findings

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

**Potentially significant adverse impacts** would occur if:

- The facility results in the loss of recreation resources or crowding of alternative recreational opportunities
- Increased use of neighboring recreational opportunities were to result in overcrowding and overuse of those resources
- The facility results in segmentation of recreational facilities, such as severing trail connections, and recreationists no longer have access to the full activity

**No potentially significant and unavoidable adverse impacts** related to recreation would occur.

Recreation provides people with the opportunity to engage with and enjoy both the natural and built environments. Washington has vast opportunities for outdoor recreation, from mountains to deserts, including both land- and water-based activities. Recreation opportunities include activities in parks, rivers, on state and federally managed lands, and on privately owned lands. Outdoor recreation is an important aspect of life and provides economic and health benefits to communities in the study area.

The *Recreation Resources Technical Report* (Appendix M) includes the full analysis and technical details used to evaluate recreation in the PEIS. This section contains a summary of how impacts were analyzed and the key findings. Visual impacts can be found in the *Aesthetics/Visual Quality Technical Resource Report* (Appendix L).

### 4.14.1 Affected environment

The study area encompasses a wide range of landscapes, including mountains, deserts, lakes, and rivers. Designated recreation areas in or adjacent to the PEIS study area include local parks, national forest land managed by USFS, wilderness areas, national monuments, state and local parks, and lands managed by DNR, WDFW, BLM, Bureau of Reclamation, and USFWS.

Recreational activities vary with terrain, season, and land use. During the summer, recreational activities include hiking, biking, camping, and water activities such as swimming, rafting, and kayaking. These activities are popular in designated recreation areas and on public lands, especially in the Cascade Range. Winter activities include skiing, snowboarding, and snowshoeing, and are concentrated in mountainous regions. Agritourism activities like u-pick

produce, farm tours, and seasonal events also occur across the study area. Other common recreational activities in the study area include the following:

- **Hunting and fishing** are significant recreational activities with varying seasons that occur throughout the state. Hunting and fishing seasons vary throughout the year by the species of animal. Tribal hunting and fishing take place throughout the state at various times during the year. More details are provided in the *Tribal Rights, Interests, and Resources Technical Report* (Appendix B).
- **Informal recreation** on public or private lands includes dispersed camping, wildlife and wildflower viewing, backcountry driving, off-trail hiking and biking, and shooting.
- **Water-based recreation** is prevalent in rivers, reservoirs, and lakes. Wild and scenic rivers within the study area include the White Salmon River and Klickitat River, both located in the southern portion of the state.

#### 4.14.2 How impacts were analyzed

The assessment of impacts was qualitative, and considered the following:

- Loss of recreational opportunities with no opportunities for relocation
- Potential segmentation of existing recreational resources
- Potential for loss of existing recreational opportunities or areas that could result in overuse and overcrowding of other recreational activities in the surrounding area

This analysis uses information and findings from visual impacts (see Section 4.13, Aesthetics/Visual Quality), noise impacts (see Section 4.11, Noise and Vibration), and air quality (see Section 4.6, Air Quality and Greenhouse Gases).

#### 4.14.3 Findings for utility-scale solar facilities

##### 4.14.3.1 Impacts

###### Impacts from construction and decommissioning

Potential site characterization, construction, and decommissioning impacts on recreational areas located on or adjacent to solar energy facility sites could include increased noise, dust (and reduced visibility), and traffic, and temporary changes in access. There could be a temporary increase in use at alternative recreation sites during construction. The decommissioning and removal of a facility could result in the restoration of recreational opportunities that were previously lost from construction of solar facilities.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, most construction and decommissioning activities would likely result in **less than significant impacts** on recreation.

If construction or decommissioning of the facility results in the loss of recreation resources or crowding of alternative recreational opportunities, there would be **potentially significant adverse impacts**.

### **Impacts from operation**

Some facilities may allow continued or new recreation on some of their facility site, whereas others may restrict recreational access for safety and security reasons. Elimination of recreational opportunities may also result in higher uses of neighboring recreation opportunities or segmentation of existing recreational areas (such as trails).

Recreationists near a facility during operations could experience changes that diminish their recreational experience, including noise and view impacts created by a solar facility. For more discussion of these impacts, refer to the *Aesthetics/Visual Quality Technical Resource Report* (Appendix L) and the *Noise and Vibration Technical Resource Report* (Appendix J).

An increased facility size could increase the risk for significant adverse impacts from lost recreation opportunities and increase potential for impacts on nearby recreational opportunities. This could include a variety of recreational areas and opportunities. For example, fencing could exclude access to an area for mountain biking, hunting, or hiking.

Operations of solar energy facilities could impact plants, wildlife, and wildlife habitat, which could, in turn, impact hunting and wildlife viewing. For more information related to the impacts on wildlife and habitats, see the *Biological Resources Technical Report* (Appendix G).

### *Findings*

If operation of the facility results in the loss of recreation resources or crowding of alternative recreational opportunities, it would be a **potentially significant adverse impact**. If increased use of neighboring recreational opportunities throughout the operations phase were to result in overcrowding and overuse of those resources, such conditions would be **potentially significant adverse impacts**. Segmentation of recreational facilities, such as severing trail connections, could also result in **potentially significant adverse impacts** if recreationists no longer have access to the full activity.

#### **4.14.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

### Recommended measures for siting and design

- 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.

### Required measures

There are no specific permit requirements that pertain to recreation.

### Recommended measures for construction, operation, and decommissioning

- 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.

### 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.

## 4.14.4 Findings for facilities with co-located BESS

### 4.14.4.1 Impacts

#### Impacts from construction, operation, and decommissioning

The construction and decommissioning activities for facilities with a co-located BESS would be the same as those for facilities without a BESS. For this analysis, it is assumed the BESS would be located within the solar energy facility site footprint and would require a small additional area of development, but would not contribute other recreational impacts than described for facilities without a BESS.

*Findings*

Impacts to recreation would be similar to findings for utility-scale solar facilities above.

#### **4.14.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate the impacts of facilities with co-located BESSs are the same as facilities without a BESS, with the following additional measure:

**Recommend measures** for siting and design

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

### **4.14.5 Findings for facilities combined with agricultural land use**

#### **4.14.5.1 Impacts**

##### **Impacts from construction, operation, and decommissioning**

Recreational opportunities are generally less prevalent in agricultural landscapes because these areas have a primary purpose of raising livestock or crops, they are often located on private property, and they typically do not provide features like trails to support recreation. However, privately owned lands can still be used for recreation by the property owner or the public, including for hunting as part of WDFW's Private Land Program. Agricultural activities located on lands that are multi-use could also support recreational activities.

Impacts from construction, operation, and decommissioning of solar energy facilities co-located with agricultural land uses would largely be the same as those discussed for facilities without agricultural land use.

*Findings*

Impacts to recreation resources would be similar to findings for utility-scale solar facilities above.

#### **4.14.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of agrivoltaic facilities would be the same as facilities without agricultural land use, with the following additional measure:

**Recommended measures** for construction, operation, and decommissioning

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

### **4.14.6 Findings for the No Action Alternative**

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar 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, operation, and decommissioning, depending on project size

and design, and would likely result in **less than significant impacts to potentially significant adverse impacts**.

#### 4.14.7 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 activities would have **no potentially significant and unavoidable adverse impacts** on recreation resources.

### 4.15 Historic and cultural resources

#### Key findings

Each historic or cultural resource's significance is unique to that resource; therefore, the impact analysis will also be unique and would need to be conducted during future project-level review for facilities. The significance of Tribal cultural resources can only be understood from within the cultural context of an affected Tribe. Accordingly, impact assessment and determinations of significance or non-significance would be done with engagement and in consultation with potentially affected Tribes and DAHP at the project level.

The land in Washington state has been utilized since before glaciers retreated at the end of the Pleistocene era. During the succeeding millennia, people have used a wide variety of strategies and approaches to interact with the landscape and its resources. As the environment has changed, so have those approaches. This has resulted in a history of human use and occupation that is reflected in historic and cultural resources. The *Historic and Cultural Resources Technical Report* (Appendix N) includes the analysis and technical details used to evaluate historic and cultural resources in this PEIS. This section contains a summary of the affected environment, how impacts were analyzed, and the key findings.

#### 4.15.1 Affected environment

The study area includes a diverse range of geological formations, animals, and plants. Each of these regions has a unique geological history that has formed the current landscape, and which plays an important role in archaeological site formation. The presence of an archaeological site means there was past human activity and physical objects or remains have been preserved there. Archaeological resources are typically identified through archaeological survey work.

Throughout the study area there are lands and shorelines where Tribes have lived for thousands of years and continue to live and use. Archaeological sites, historic properties, and Tribal place names are also present. They include areas connected to Tribal cultural and spiritual practices and are represented within oral tradition stories and historic documents. Historic architectural resources include buildings, sites, structures, objects, or districts that have reached a particular age threshold to be considered for eligible for listing in a historic register. Many of these resources are present in the study area.

A TCP is a property or a place that is inventoried or determined to be eligible for inclusion on the National Register of Historic Places or the Washington Heritage Register because of its association with cultural practices and beliefs. These are rooted in history and are important to maintaining the continuing cultural identity of the community's traditional beliefs and practices. DAHP maintains a database of TCPs, but very few are publicly disclosed. TCPs can be any location, landform, or object that has distinct association and importance to a group. The scale can be as large as an entire river or mountain or be confined to a single boulder. Many TCPs are present in the study area.

### **4.15.2 How impacts were analyzed**

The PEIS evaluated how facilities could affect the following key features of cultural resources:

- Archaeological resources, both recorded and unrecorded
- Historic architectural buildings and structures listed or eligible for listing in a historic register
- Human remains and cemeteries
- Sacred sites
- Documented and undocumented TCPs

DAHP maintains a digital database of recorded historic, archaeological, and traditional cultural properties. It also hosts an archaeological predictive model that assesses the risk for finding an archaeological resource. The model is an effective early warning tool for understanding the baseline level of probability for encountering certain types of archaeological resources and assessing a general level of effort that may be needed for future studies but does not account for cultural and sacred places. Only a small portion of the state has been mapped in detail for historic and cultural resources. A future proposed facility would need to conduct site-specific cultural surveys to evaluate potential impacts in accordance with DAHP and federal requirements and guidance.

The significance of cultural resources specific to Tribes can only be understood from within the cultural context of an affected Tribe. Accordingly, the impact assessment and determinations of significance or non-significance of Tribal cultural resources would be done with engagement and in consultation with Tribes. This would be done through the SEPA process or the federal Section 106 process.

### **4.15.3 Findings for all solar facility types evaluated in the PEIS**

#### **4.15.3.1 Impacts**

##### **Impacts from construction and decommissioning**

Most site characterization activities would involve little or no ground disturbance. However, some ground-disturbing activities, such as drilling deep soil cores and building access roads, could result in impacts on or inadvertent discoveries of cultural resources. In mountainous terrain, additional site grading and clearing may be required if existing access routes are unavailable or unsuitable for the planned investigation equipment.

Construction and decommissioning activities that could impact historic and cultural resources include ground disturbance, degradation of visual quality, noise, and interruption of the landscape and habitat. Tribal spiritual practices could be interrupted by construction impacts on land areas and cultural or sacred sites, including degradation of visual quality, noise, and interruption of access.

Construction could result in damage or destruction of cultural resources from the clearing, grading, and excavation of the site and from building facilities and associated infrastructure. Construction will likely include subsurface infrastructure (e.g., foundations, pilings, utility trenches). Ground disturbance during construction is likely to impact unrecorded archaeological resources because there are many such sites throughout the study area and because most of the study area has not been archaeologically surveyed.

Degradation and destruction of cultural properties could result from changes to the landscape and water flow patterns. The removal of soils, erosion of soils, and runoff into adjacent areas could also affect resources. Oil or other contaminant spills could affect resources.

Increased human access and subsequent disturbance such as looting, vandalism, and trampling of cultural resources could result from creating corridors or facilities in otherwise intact and inaccessible areas. Visual changes, changes in light, dust, and human presence could affect cultural resources for which visual integrity is a component of sites' significance, such as Tribal sacred sites, historic structures, trails, and historic landscapes.

Construction noise would depend on the activities, terrain, vegetation, and local weather conditions but may involve blasting and the use of equipment such as impact pile drivers and vibratory rollers. These can generate substantial noise and vibration. Cultural resources that are susceptible to noise impacts include TCPs or sacred sites because the cultural uses or practices that occur at these locations could be interrupted or diminished. Construction vibration could adversely affect cultural resources by damaging rock features or archaeological sites.

Decommissioning would involve similar types of activities as for construction. Site restoration activities may include recontouring, grading, seeding, planting, and perhaps stabilizing disturbed surfaces. The types of impacts would be similar to those associated with facility construction.

### **Impacts from operation**

Operational activities that could affect historic and cultural resources include changes in access to natural and cultural resources and increased human activity with associated noise, light, dust, and human presence. Ongoing operations and maintenance are anticipated to include little new ground disturbance because the use of maintenance vehicles and equipment would generally be limited to access roads and areas already developed during construction.

Archaeological sites could still be affected by the increase in activity during operation of a facility. This includes increased vehicle traffic, vegetation management, or other activities, as

well as the presence of people who might disturb surface artifacts. Ongoing ground disturbance could reveal previously unrecorded archaeological sites that are associated with TCPs.

Visual degradation of settings associated with cultural resources could result from the presence of utility-scale solar energy facilities and associated land disturbances. Visual changes could include the presence of rectangular solar arrays and structures. These could also include lighting, fencing, roads, vehicles, and workers conducting maintenance activities. These could affect cultural resources for which visual integrity is a component of sites' significance, such as Tribal sacred sites and landscapes, historic structures, trails, and historic landscapes.

Facility fencing and ongoing operations could impact access and travel paths traditionally utilized by Tribes for significant historic and cultural resources. This is most likely to impact TCPs, sacred sites, cemeteries, or precontact period archaeological sites where setting, feeling, and association are key aspects of the site.

#### **4.15.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

Mitigation would be done with engagement and in consultation with potentially affected Tribes and DAHP at the project level. Mitigation may be developed through consultation with affected Tribes as part of the SEPA process. Mitigation may also be developed under federal Section 106 of the National Historic Preservation Act. This is a separate, federal process.

#### **Recommended measures for siting and design**

- Design and site projects to avoid impacts on cultural and historic resources. Begin with use of 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 TCPs, 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.

### **Required measures**

- 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.

### **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.

### **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.

## 4.16 Transportation

### Key Findings

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

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

The term “transportation” refers to the system of roads, transit routes, railroads, waterways, and airport facilities that move people and goods. In this PEIS, transportation includes roadways and travel patterns, railroads, air travel, and navigable waterways.

The *Transportation Resources Technical Report* (Appendix O) includes the full analysis and technical details used to evaluate transportation in the PEIS. This section contains a summary of how impacts were analyzed and the key findings.

### 4.16.1 Affected environment

#### 4.16.1.1 Roadways and travel patterns

Washington’s road network spans over 80,000 miles, including 764 miles of interstate highways and 1,602 miles of U.S. highways. Major highways in the study area include I-90 and I-82, along with numerous state highways. These corridors serve as principal freight arterials, moving regional and international cargo, and providing commute and recreation routes. I-90 serves as the primary east-west corridor through Washington state. I-82 connects Ellensburg to Oregon.

Eighty percent of communities in Washington rely solely on trucks for their goods. Major agricultural production areas, including Yakima, Whitman, and Grant counties, depend heavily on the road network for transporting agricultural products.

#### 4.16.1.2 Railways

Washington’s rail transportation system moves over 95 million tons of freight annually. The study area includes over 3,200 miles of freight railroad tracks. Rail freight is preferred for transporting high tonnage, oversize, and high-value cargo, such as solar panels, due to its fuel efficiency and capacity for heavy loads. The study area contains seven intermodal facilities for transferring cargo between rail and other transportation methods.

#### **4.16.1.3 Air travel**

Air transport is primarily used for smaller solar energy components, such as solar panels. Commercial airports outside of the study area could be used to receive solar facility components that are then transported to facilities within the study area. Major air cargo hubs in Washington that could support shipping of solar energy components include Seattle-Tacoma International Airport, King County International Airport-Boeing Field, and Spokane International Airport. Seattle-Tacoma International Airport serves as a primary gateway for international air freight, particularly from Asia. The study area also includes 98 general aviation airports, with additional airports nearby. These airports vary in size and uses but are primarily small airports serving local uses, including private aviation and agricultural operations.

#### **4.16.1.4 Navigable waterways**

Navigable waterways and ports are used to transport solar facility components. The Columbia River and the Snake River are key waterways located within the study area. Ports within or near the study area, such as Vancouver and Longview, receive solar energy components and transfer them to other modes of transport. Washington has 18 public ports and numerous marine terminals. Eight ports are located within the study area.

Using marine waterways can reduce road and rail congestion and system wear. The Columbia-Snake River System, part of the marine highway M-84, is a crucial route for transporting agricultural, energy, and manufacturing products. The study area's ports facilitate efficient and cost-effective freight transport, essential for regional and international trade.

### **4.16.2 How impacts were analyzed**

The assessment of impacts in the study area was qualitative, and considered the following:

- Traffic volumes and distances for construction and operation of facilities
- Potential water (barge), rail, and air traffic
- Potential new or redeveloped access roads or parking/staging areas for facility construction, operation, and maintenance activities

For the purposes of this assessment, a potentially significant impact would occur if a facility 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

## 4.16.3 Findings for utility-scale solar facilities

### 4.16.3.1 Impacts

#### Impacts from construction and decommissioning

Depending on location, solar energy facilities could impact local roads. Construction and decommissioning would require transporting equipment, materials, and workers to a facility site, potentially utilizing road, rail, air, or water (barge) transport. This would cause a temporary increase in demand for transportation services and a temporary increase in traffic on roads during construction (6 and 18 months) and decommissioning.

#### *Worker commute*

Workers would likely commute using existing roads. The workforce would likely be between 100 to 800 workers, depending on the facility size, and timing and schedule for construction. The number of workers on site daily would vary. The location of the facility and commuting routes would determine whether construction or decommissioning would cause traffic congestion. Major roads typically accommodate more traffic than local roads, so a site closer to major roads may generate less congestion. The number of daily worker trips would range from 180 to 500 trips and would vary depending on the phase of construction.

#### *Material and component transport*

Shipments to and from the solar energy facilities would mostly be by truck, although rail transport to the closest intermodal facility for materials or water (barge) transport could be used. The demand for transport would increase in proportion to the size of the facility. Construction would require 50 to 90 truck trips per day during the peak construction period, not including worker vehicle trips. The number of daily truck trips would vary depending on construction activities and the length of the construction period. The number of daily truck trips would also vary throughout the construction and decommissioning periods depending on the stage in the process.

Solar panels often require oversize shipping services and can be transported by truck, rail, air, and water. The choice of solar panel transportation method would depend on the size and quantity of solar panels, the manufacturer's location, and the site location. If oversize or overweight truck shipments are required, local traffic would be temporarily affected.

For rail transport, utility-scale solar energy facilities would be unlikely to impact railroad operations because the solar equipment would represent a small part of the total amount of freight transported on a regular basis by railroads in the study area. However, roadway congestion, delays, or safety issues could arise if there are rail crossings near roads with high volumes of construction traffic. 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 additional demand associated with utility-scale facilities.

When compared to the existing volume of supplies, equipment, and materials that are shipped via truck, rail, air, and barge into, out of, and throughout the study area, the temporary

increase in traffic volumes associated with construction or decommissioning would represent a small amount of the total traffic volumes in the area. Local transportation management plans and municipal regulations would address temporary traffic volume increases, detours, signage, and construction timing. No long-term road closures or interruptions to traffic patterns or volumes are expected during construction or decommissioning.

#### *Road development*

The construction or decommissioning of a facility could require new roads or development of existing roads. Road developments could include adding driveways or turning lanes or widening roads to accommodate larger truck turns. Road building or development would require construction labor, supplies, and equipment. It would also result in temporary traffic disruptions. However, these activities are temporary and there are policies and regulations in place to reduce impacts on the public (such as Traffic Management Plans). No substantial damage to roadways or related infrastructure (e.g., culverts or bridges) or transit, rail, air, or water transportation would occur.

#### *Findings*

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

### **Impacts from operation**

#### *Traffic impacts*

Operations would result in a small increase in vehicle trips caused by employees traveling to the site. Periodic equipment repair or replacement would require the use of road, rail, water, or air shipping. 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. If on-site water is not available on-site during operations, water would need to be transported to the facility.

No long-term road closures or interruptions to traffic patterns or volumes are expected during operations. Air or marine transport would only be needed for periodic replacement of large components. No substantial damage to roadways or related infrastructure (e.g., culverts or bridges) or transit, rail, air, or water transportation would occur.

#### *Aviation impacts*

Authorization from FAA is required for any structure over 200 feet tall. Electrical interference from solar array control systems with aircraft operations is unlikely but should be evaluated for any new installation.

The potential for sun glare off PV panels is unlikely to impact pilot vision. PV panels are typically treated with an anti-reflective coating. Along busy air routes, such as airport approach routes, the solar array patterns could be adjusted to minimize interference. With the implementation of mitigation to avoid or reduce impacts (see the *Aesthetics/Visual Quality Technical Resource*

*Report* [Appendix L]), and adjustments to solar array patterns to minimize interference with pilot vision, no permanent changes to aviation are expected to occur from solar energy facility operations.

#### *Findings*

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

#### **4.16.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

##### **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 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.

##### **Required measures**

- 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)
- ROW 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 ROWs.
- 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.

#### **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.

#### **Mitigation measures for potential significant impacts**

- No potential significant impacts identified.

### **4.16.4 Findings for facilities with co-located BESS**

#### **4.16.4.1 Impacts**

##### **Impacts from construction, operations, and decommissioning**

Impacts would be similar to facilities without BESSs, except that more truck trips would be required to transport the BESSs during construction and decommissioning. Some of those additional trips would be oversize or overweight loads, which could have localized temporary impacts. In addition, BESSs are typically constructed on gravel areas, so additional gravel may need to be transported to the site.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction, operations, and decommissioning activities with a co-located BESS would likely result in **less than significant impacts** on transportation.

#### **4.16.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid and reduce impacts of facilities with co-located BESSs would be the same as facilities without a BESS.

### **4.16.5 Findings for facilities combined with agricultural land use**

#### **4.16.5.1 Impacts**

##### **Impacts from construction, operation, and decommissioning**

Impacts during construction, operation, and decommissioning would be similar to facilities without co-located agricultural use, except that more materials or components and associated truck trips could be required due to changes in the layout or panel heights in order to accommodate agricultural use under the panels. There would also be additional traffic associated with the agricultural use during operations. Traffic would be similar to that of existing agricultural areas and activities in the study area.

#### *Findings*

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

#### **4.16.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of agrivoltaic facilities would be the same as facilities without agricultural land use.

### **4.16.6 Findings for the No Action Alternative**

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for utility-scale solar 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**.

### **4.16.7 Unavoidable significant adverse impacts**

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

## 4.17 Public services and utilities

### Key findings

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, most construction, operation, and decommissioning activities would likely result in **less than significant impacts** on public services and utilities.

A facility would result in **potentially significant adverse impacts** to fire response if activities required a large fire response in remote locations with limited response capabilities, or if there are other unique aspects of a facility site.

This may result in a **potentially significant and unavoidable adverse impact**. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site.

Public services and utilities include basic services and facilities that support development and protect public health and safety.

The public services evaluated include the following:

- Fire and emergency response
- Law enforcement
- Hospitals
- Emergency management
- Public schools

The utilities evaluated include:

- Electrical power
- Water supply
- Wastewater
- Solid waste services
- Natural gas
- Communications

The *Public Services and Utilities Technical Resource Report* (Appendix P) includes the full analysis and technical details used to evaluate public services and utilities in the PEIS. This section contains a summary of how impacts were analyzed and the key findings. Information on EHS can be found in the *Environmental Health and Safety Technical Resource Report* (Appendix I).

## 4.17.1 Affected environment

### 4.17.1.1 Public services

The study area is served by a variety of public service providers. Depending on the local conditions, public services may be provided by federal, Tribal, state, county, or local governments as well as volunteer fire departments and other volunteer groups. Public services addressed in this section include fire protection, law enforcement, emergency or other medical services, and schools.

#### Emergency response

Emergency response services include the following:

- **Law enforcement** services are provided by various county, municipal, and state entities including local county sheriff's offices and the Washington State Patrol. Portions of the study area are outside of local law enforcement jurisdictions. For example, DNR and federal agencies provide enforcement on their lands.
- **Fire prevention and response** are managed by local county fire departments, supported by volunteer units and other response teams.
- **Wildfire response** is provided by local fire departments as well as DNR, USFS, and BLM. DNR supports local responders and during high-risk conditions has helicopter and aircraft teams staged to respond to remote locations.
- **Emergency Medical Services** include paramedics to respond to medical emergencies.
- **Hospitals and medical facilities** provide public health preparedness and response services, with medevac services supported by public and private entities.

#### Public schools

A variety of public education school districts serve portions of the study area. These districts range in size from small, rural school districts to larger districts with numerous schools.

### 4.17.1.2 Utilities

The study area includes utility service areas and areas without services. Utilities described in this section include communications, gas and electrical, water, wastewater, and solid waste management. Depending on the area, utilities may be provided by county, city, Tribal, or private suppliers. In general, utility infrastructure often correlates to the size of the population it serves.

#### Communications

Communications services, including internet, broadband, and cell service, are generally available in populated areas, while rural parts may have limited or no service. Emergency alerts are communicated through radio, cell phones, and email.

#### Gas and electric

Four natural gas companies operate in Washington state. Electrical utilities are provided through public utility districts and three main corporations. Solar energy facilities are unlikely to

require gas service connections but must identify existing subsurface utilities before construction.

### **Water and wastewater**

Water supply in the study area comes from groundwater wells, surface water, and other sources. Solar facilities typically do not use wastewater systems, relying instead on septic or portable sanitary systems.

### **Solid waste landfills and recycling**

Solid waste is managed by cities, counties, and private entities, with nearly 1,000 facilities in Washington, including 14 municipal solid waste landfills. Municipal and commercial solid waste is the largest contributor to solid waste. The next largest is construction and demolition debris, industrial waste, and cured concrete. A substantial portion of the materials that make up solar energy facilities are recyclable, such as steel, aluminum, glass, copper, and plastic. Under state law, beginning January 31, 2031, manufacturers of solar energy modules that operate or sell solar panels in Washington state will be required to take back and recycle them.

Lithium-ion, zinc-hybrid, and flow batteries have lifespans that are shorter than a typical solar energy facility. Facilities with co-located BESSs would have to dispose of batteries after they reach their lifespan. Lithium-ion batteries are considered a hazardous waste that cannot be hauled away with a standard solid waste pickup. Coordination with local solid waste providers would be needed to determine if they can recycle zinc-hybrid batteries and, if not, what guidelines need to be followed for disposal. Flow batteries can be recycled. The disposal of hazardous materials from batteries is described in Section 4.10, Environmental Health and Safety.

## **4.17.2 How impacts were analyzed**

The assessment of impacts was qualitative, and considered the following:

- Increased demand for public services that would exceed existing capacities of public service providers or such that unplanned new or physically altered governmental facilities would be needed to serve the facility
- Relocation or construction of new or modified utilities or service systems
- Potential to obstruct or otherwise impact aerial emergency response capabilities

## **4.17.3 Findings for utility-scale solar facilities**

### **4.17.3.1 Impacts**

#### **Impacts from construction and decommissioning**

Impacts associated with the site characterization, construction, and decommissioning of solar energy facilities could consist of those related to exceeding emergency response capacity, conflicts with other existing utilities, and potential prolonged service interruptions that may occur over portions of the construction period.

### *Emergency response*

Construction and decommissioning of utility-scale solar energy facilities would employ a temporary workforce. This could result in an increased demand for public services including law enforcement, fire departments, and other emergency service response within and near the study area.

Materials and equipment on site may increase the potential for theft, vandalism, trespass, fire, safety issues, and/or accidents requiring law enforcement or other emergency response services. Facilities are expected to have site security including a combination of fencing, lighting, security patrols, security cameras, and other electronic security monitoring systems. It is anticipated that proactive planning, including a construction site security plan, would reduce potential law enforcement response demands.

Activities during construction of solar energy facilities would introduce ignition risks. In rural areas, the fire response demand posed in the event of a construction-related fire at a solar facility could limit fire response resources needed elsewhere in the area. Wildfire risks are discussed in Section 4.10, Environmental Health and Safety.

Worker safety training and adherence to safety procedures during construction would reduce potential emergency medical response demands. Solar energy facilities are frequently sited in locations that are far from hospitals or other emergency facilities. Winter conditions could make medical response more difficult if weather conditions prevent a medevac landing or access roads are closed. Consultation or early coordination with emergency response providers to ensure access and other proactive safety planning would reduce such risks. Additional discussion regarding emergency response is included in the *Environmental Health and Safety Technical Resource Report* (Appendix I).

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures avoid and reduce impacts, most construction and decommissioning activities would likely result in **less than significant impacts** on law enforcement, emergency medical response, and most fire response.

A facility would result in **potentially significant adverse impacts** to fire response if activities required a large fire response in remote locations with limited response capabilities or if there are other unique aspects of a facility site.

### *Public schools*

#### *Findings*

The impact on local schools would be minor, because few out-of-area workers are likely to permanently relocate their families to the community where the solar energy facility is being developed. Impacts on school enrollment would be **less than significant**.

### *Gas, electrical, and communications systems*

Although new gas lines are not likely to be installed as part of a solar energy facility, existing gas and electrical lines would need to be located, marked, and avoided prior to ground-disturbing construction. During construction, there would also be the potential for temporary service interruptions as electrical systems are connected to the solar energy facility. The contractor and developer would have to coordinate, apply for permits, and meet the design specifications of the local power provider for connections. Service providers require that line outages be scheduled during off-peak times, which would be coordinated to limit service disruptions. Notifications to residents and businesses for planned service interruptions would also likely be required.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on gas, electrical, and communication systems.

### *Water and wastewater*

Information on impacts on water resources is included in Section 4.7, Water Resources. A developer would need to have sufficient water rights for a project to be feasible, so the PEIS assumes adequate water is available. Water demand would consist of the supply needed for activities such as concrete mixing, dust control, fire control, or for initial revegetation efforts. Sanitation and wastewater could be managed through contracted portable systems or septic systems. Water for non-potable uses may be accessed from reclaimed/recycled water supplies where available. Potable water would be needed for drinking water and could be supplied by a commercial supplier, on-site well, or a public or community water system.

Conflicts with existing subsurface water lines, wells, and wastewater lines could be addressed through utility mark and locate activities, which would be required prior to construction ground disturbances.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on water and wastewater utilities.

### *Solid waste and recycling*

During construction, the primary solid waste generated would consist of solid construction debris and a limited amount of waste associated with the construction workforce. Some of this waste, such as scrap metal or cardboard, could be recycled; the remainder would be transported to a licensed transfer station or landfill. Based on the quantities generated by similar-sized solar energy facilities, the nearly 1,000 solid waste providers in the state and 14 landfills could likely accommodate construction waste.

The quantities and content of solid waste would vary depending on the facility size, and the actions associated with decommissioning would depend on materials used and specific site restoration actions needed. Decommissioning would typically involve removal of all aboveground components of the solar facilities and would be likely to generate more solid waste than during the construction or operation phases. The regulatory requirements of the PV Module Stewardship and Takeback Program would reduce the quantity of PV waste content that would reach area landfills during decommissioning. Hazardous waste would be disposed of under federal and state requirements.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on solid waste and recycling.

### **Impacts from operation**

#### *Emergency response*

As with construction, solar energy facility operations could increase the demand for law enforcement services due to potential theft, accidents, vandalism, or trespassing. However, various security measures would typically be in place as part of normal operations to protect the facilities. Such measures would reduce demand for law enforcement services.

Impacts related to fire protection and response services involve consideration of two main types of fire risks during facility operation: 1) fire risks caused by solar energy facility operational activities; and 2) fires started outside of facilities that are affected (i.e., spread, movement, or ability to be suppressed) by the presence of a solar energy facility.

Like other electrical installations, PV solar systems can be subject to electrical faults. Incorrectly specified, sized, or faulty wiring or equipment can cause a fire at a solar energy facility site. However, fires from PV solar panels are uncommon. All solar and electrical equipment would be required to conform to state and international building and fire code standards, including protective measures to reduce the potential of fires from lightning. These design measures would reduce ignition risks. Facilities would require testing and inspection for grid and system safety prior to commissioning, which would reduce operational fire risks.

Activities involving regular maintenance of a solar energy facility may include periodic electrical repair, welding, and equipment use and fueling. Such activities introduce risk for sparks or other ignition sources to an operational facility. However, these risks can be reduced through appropriate implementation of an Operational Site Safety Management Plan. This analysis assumes that solar energy facilities would be regularly maintained and monitored to reduce these risks. Accidents and fires could still occur; however, there is a low risk of operations activities igniting a wildfire.

Siting solar energy facilities in rural areas could have fencing and facility access restrictions that could delay emergency response if not proactively coordinated. Local and/or volunteer fire

departments and responders may not be adequately trained and equipped to respond to wildfires that may occur on utility-scale solar energy facility sites. Specific facility access procedures, training, and coordination for response providers and volunteer units can help address concerns with local fire response capacity. The siting and height of structures such as substations, meteorological towers, and overhead gen-tie lines can also present risks to aerial firefighting. These should be addressed through early consultation with DNR or federal agencies to evaluate the siting and design for solar energy facilities.

Emergency medical services could be needed for employees. For example, routine maintenance activities could involve a fire, electrical shock, or a medical emergency. The challenges of an emergency medical response could be exacerbated by winter conditions, distance of the facility site from medical services, and access to the site. However, the operational staffing for solar energy facilities would likely be small. Additionally, facility operators would be expected to use appropriately trained technicians to operate and maintain the equipment. These considerations should result in a minimal increase in emergency medical service needs.

#### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, most operations of a facility would likely result in **less than significant impacts** on law enforcement, emergency medical response, and most fire response.

A facility would result in **potentially significant adverse impacts** to fire response if activities required a large fire response in remote locations with limited response capabilities or if there are other unique aspects of a facility site.

#### *Public schools*

#### *Findings*

Facilities may require a small number of full-time permanent staff for facility operations and maintenance. Facilities would not increase the population such that new or modified public schools would be needed and impacts on local school enrollment during the operations phase would be **less than significant**.

#### *Gas, electrical, and communications systems*

Once operational, solar facilities would not be anticipated to increase demand for gas or electricity services. Solar energy facilities and their associated substations may include communication systems or tall meteorological structures, the presence of which could impact existing communication systems or low-wave radio signals. An evaluation of specific potential communications conflicts would occur as part of the Federal Communications Commission (FCC) review or during the conditional use permit/land use approval process. Solar facilities would not be anticipated to increase demand for gas or electricity services during operations.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operations would likely result in **less than significant impacts** on gas, electrical, and communications systems.

### *Water and wastewater*

Water demand may include requirements for dust control, panel cleaning, potable water, vegetation, fire control, or sinks or toilets. If water is used for solar panel washing, a utility-scale facility could use approximately 16,000 to 114,000 gallons per year, per MW. At the high end of water usage (including water for solar panel washing) for a 1,200 MW facility, this would total 136.8 million gallons of water per year. Water demand would vary based on panel size, soiling rates, and cleaning frequency. Facilities could also use dry cleaning methods, which would result in much lower overall facility water use. This water could come from a municipal supply, if water is available and approved by the utility. It could also be trucked in or from an on-site well, in which case a water right would be needed. If consistent with public health requirements and available supply, reclaimed water may supply some of such water demands. Additional discussion of water supply is provided in Section 4.7, Water Resources. A developer would need to have sufficient water rights for a project to be feasible, so the PEIS assumes adequate water is available.

Potable water also may be needed for on-site drinking water, which could be supplied by a well or trucked to the site. The small number of operational staffing would limit impacts associated with waste and wastewater. If solar energy facilities include on-site septic systems during operation, such systems would conform to state requirements for the protection of water resources and public health. Septic systems or portable units, if utilized, would typically be maintained by a licensed service provider.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, construction and decommissioning activities would likely result in **less than significant impacts** on water and wastewater utilities.

### *Solid waste and recycling*

A small amount of solid waste would be generated as part of normal operations and maintenance activities. Periodic replacement of PV solar panels would occur over the 30-year operational lifespan of solar facilities. These PV materials would be replaced in a manner consistent with state PV Module Stewardship and Takeback Program requirements. Other types of waste may include broken or rusted metal, defective or malfunctioning equipment, electrical materials, empty containers, miscellaneous solid waste, and typical refuse from operations and maintenance staff. Approximately 1 to 2 cubic yards of waste per week would be expected, which would be collected by a commercial waste management service.

### *Findings*

Through compliance with laws and permits, and with the implementation of measures to avoid and reduce impacts, operation activities would likely result in **less than significant impacts** on solid waste and recycling.

#### **4.17.3.2 Measures to avoid, reduce, and mitigate impacts**

The section below identifies measures to avoid, reduce, and mitigate impacts. General measures that apply to all projects are described in Section 4.2. Chapter 7 provides a list of required permits and approvals. Appendix A includes a compiled list of measures for all resources with additional details.

#### **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, USFS, and/or DNR during siting and design and throughout the life cycle of the project to identify and address fire response needs.

#### **Required measures**

- Construction and Development Permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency)
- Electrical Permits (Washington State Department of Labor and Industries)
- FCC 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)
- ROW or lease (federal, state, or local agency)
- Water Right Authorization (Ecology)
- In coordination with relevant authorities, develop plans and procedures to reduce risks specific to the project and regional conditions.
- Implement measures to reduce utility service interruptions and conflicts.

#### **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.

#### **Mitigation measures for potential significant impacts**

- 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.

## 4.17.4 Findings for facilities with co-located BESS

### 4.17.4.1 Impacts

#### Impacts from construction, operation, and decommissioning

The site characterization, construction, operation, and decommissioning of a facility co-located with a BESS is anticipated to include the same impacts on public services and utilities as those described for facilities without BESSs.

Co-location of BESSs introduces an additional fire risk management and emergency response consideration. The types of BESSs evaluated in this PEIS rarely start fires if properly installed and maintained. Flow batteries and zinc-bromide batteries are generally not flammable. BESSs come equipped with remote alarms for operations personnel and emergency response teams. Other protective measures include ventilation, overcurrent protection, battery controls to operate the batteries within designated parameters, temperature and humidity controls, smoke detection, and maintenance in accordance with manufacturers' guidelines. Some battery types may contain hazardous materials that pose potential risks for environmental release if not handled correctly, and lithium-ion or lithium metal batteries, in particular, could introduce hazards for first responders. BESS facilities could create extreme hazards for firefighters and emergency responders with the possibility of explosions, flammable gases, toxic fumes, water-reactive materials, electrical shock, corrosives, and chemical burns. Utility-scale energy storage requires specialized and reliable equipment to perform firefighting operations safely and effectively to the Washington Fire Code, NFPA, OSHA, and Underwriters Laboratories codes and standards, as discussed in the environmental health and safety section, as well as the applicable county fire protection district codes and standards.

Specialized advanced planning and procedures for enhanced fire response training would be required to ensure that the solar energy facilities and co-located BESSs do not initiate or exacerbate wildfires during construction, operation, or decommissioning or otherwise generate hazards that could interfere with or exceed emergency response capabilities. The recommended approach from the American Clean Power Association is not to use water for firefighting but allow the battery to burn in a controlled manner. This would result in air emissions which could be hazardous to emergency responders and would require protective gear.

Lithium-ion, zinc-hybrid, and flow batteries have lifespans that are shorter than a typical solar energy facility and would need to be disposed of or recycled. When a battery reaches its end of life, the operator or decommissioner should follow Ecology's guidance for managing universal waste, which includes the management of batteries. Hazardous waste disposal is discussed in Section 4.10, Environmental Health and Safety.

#### *Findings*

Impacts to public services and utilities would be similar to findings for utility-scale solar facilities above, with additional fire response and solid waste management considerations for BESSs.

#### **4.17.4.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of facilities with co-located BESSs would be the same as facilities without a BESS, with the following additional measures.

##### **Required measures**

- When a battery reaches its end of life, follow Ecology's guidance for managing universal waste.
- Incorporate BESS considerations into the project's Fire Prevention and Response Plan.

#### **4.17.5 Findings for facilities combined with agricultural land use**

##### **4.17.5.1 Impacts**

##### **Impacts from construction, operation, and decommissioning**

Impacts on public services and utilities are anticipated to be similar to facilities without agricultural land use. However, because facilities would include active management of the vegetative landscape (e.g., grazing, irrigated crop production, pollinator habitat) and provide a beneficial cooling effect to the land, fire risk for the agricultural uses would generally be less compared to the other facilities analyzed. Emergency fire response demand may correspondingly decrease due to this type of land management. Agricultural land uses involve specific access considerations relevant to public services due to the shared land uses. Facilities could include fencing to accommodate grazing or other agricultural activities, which could pose challenges for first responders.

#### *Findings*

Impacts to public services and utilities would be similar to findings for utility-scale solar facilities above.

#### **4.17.5.2 Measures to avoid, reduce, and mitigate impacts**

Measures to avoid, reduce, and mitigate impacts of agrivoltaic facilities would be the same as facilities without agricultural land use.

#### **4.17.6 Findings for the No Action Alternative**

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for solar 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 range from **less than significant** to **potentially significant adverse impacts**.

#### **4.17.7 Unavoidable significant adverse impacts**

Construction, operation, and decommissioning of utility-scale solar facilities may result in a **potentially significant and unavoidable adverse impact** if activities required a large fire response in remote locations with limited response capabilities, or if there are other unique aspects of a facility site that affect fire response. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project.

## 5 Cumulative Impacts

### 5.1 Cumulative impacts analysis

Cumulative impacts are effects that would result from the impacts of utility-scale solar energy facilities added to the impacts from other past, present, and RFFAs. Cumulative impacts can result from incremental, but collectively significant, actions that occur over time. The cumulative impacts analysis was prepared in accordance with SEPA (WAC 197-11-060) and RCW 43.21C.535. The purpose is to make sure that decision-makers consider the full range of consequences under anticipated future conditions. Future project-specific environmental reviews would need to consider the cumulative impact of the project with other local and regional actions.

The cumulative impact analysis considered the following:

- Effects of multiple actions in the geographic study area (see Figure 3-1)
- Effects on the same resource
- Long-term effects

The following steps were used:

- Identify the resources that could be adversely affected by the future utility-scale solar energy facilities evaluated in the PEIS.
- Assess the current condition and historical context for each resource including trends affecting the resource.
- Consider RFFAs in the same timeframe and affecting the geographic study area for each resource.
- Analyze cumulative impacts using the best available data.

#### Key findings

Due to the large geographic study area and broad trends of RFFAs identified in Table 5-1 that are considered in this planning document, all resources in this section would have impacts that range from **less than significant** to **potentially significant**. Developers of future projects would need to conduct cumulative analyses relative to their proposal.

For some resources, the study area for cumulative impacts may extend beyond the geographic scope of study in Figure 3-1 to evaluate the incremental impacts on the resource within a larger community or landscape, such as migration corridors. The *Cumulative Impacts Technical Report* (Appendix Q) contains more detailed information and specific analyses.

## 5.2 Past, present, and reasonably foreseeable future actions

Current conditions are a result of past and present actions. The current conditions in the study area were used as the baseline existing environmental conditions for the resource analyses in the PEIS and are described as part of the affected environment for those resources. Therefore, past actions were not considered again for most resources. Tribes have noted that resources in the study area are part of a much larger integrated cultural network and that impacts can extend far beyond the study area in space and time. To analyze the full range of consequences of potential cumulative impacts on Tribal rights, interests, as well as resources and cultural resources, some additional past and present actions are considered in this analysis (see Sections 5.3.1 and 5.3.13).

RFFAs, including the solar energy facilities evaluated in this PEIS, are activities that could affect the geographic study area over the 50-year study period (July 2025 through June 2075). These include trends that could affect humans and the environment within the study area during the study period. This trend analysis is appropriate for this planning document.

Table 5-1 outlines the types of future actions identified as reasonably foreseeable in the study area and timeframe. These were used to identify trends that were used for the cumulative analysis.

Table 5-1. Summary of reasonably foreseeable future actions affecting the study area

RFFA	Associated activities	Trends identified
Energy Projects including Clean Energy Developments and Changes to Existing Energy Systems	<ul style="list-style-type: none"> <li>Development of new energy-generating facilities, including the solar energy facilities evaluated in this PEIS; transmission systems; and distribution networks</li> <li>Modification of existing energy generation, transmission, and distribution infrastructure including those for electricity, natural gas, and petroleum products (e.g., gasoline and oil)</li> <li>Decommissioning, decontamination, and demolition of former coal-fired power plants and associated facilities</li> </ul>	<ul style="list-style-type: none"> <li>State committed to reducing GHG emission by 95% below 1990 levels by 2050</li> <li>Increased development of clean energy sources to meet state goals</li> </ul>
Urban, Commercial, and Industrial Activities and Development	<ul style="list-style-type: none"> <li>Local residential developments</li> <li>Urban redevelopment projects</li> <li>Utility infrastructure (e.g., water/sewer, electrical distribution, and communications) rehabilitation and expansion</li> <li>Industrial development</li> <li>Industrial facility decommissioning</li> </ul>	<ul style="list-style-type: none"> <li>28% increase in population by 2050</li> <li>1.04% to 1.27% increase in workforce growth for nonfarm occupations over next 10 years</li> <li>Increased development to support population and workforce growth</li> </ul>

RFFA	Associated activities	Trends identified
Rural and Agricultural Activities and Development	<ul style="list-style-type: none"> <li>• Changes in the types of crops farmed</li> <li>• Conversion of non-designated agricultural land</li> <li>• Irrigation system maintenance and upgrades</li> <li>• Livestock grazing development and expansion</li> </ul>	<ul style="list-style-type: none"> <li>• Overall decline in agricultural land use from 1997 to 2022 (1.9 million acres of farm converted to other uses)</li> <li>• Future conversion of higher valued agricultural land less likely due to Goal 8 of Growth Management Act</li> <li>• Increased changes in farming practices and improvements to rural and agricultural-based infrastructure</li> <li>• Changes in agricultural activities to adapt to climate change</li> </ul>
Federal, State, Tribal, and Local Wildlife and Habitat Projects	<ul style="list-style-type: none"> <li>• Growth management programs</li> <li>• Stream and riparian habitat projects</li> <li>• Watershed planning and implementation</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing long-term strategies and activities that improve habitat and ecosystem functions, habitat connectivity, and species-specific conservation projects</li> <li>• Statewide 30-year program in place to restore and improve resiliency of shrubsteppe habitat</li> </ul>
Transportation Infrastructure Development and Modification	<ul style="list-style-type: none"> <li>• Highway and road expansion and maintenance</li> <li>• Rail transportation expansion and maintenance</li> <li>• Port and navigation channel expansion and maintenance</li> <li>• Airport and aviation support infrastructure expansion and maintenance</li> <li>• Multimodal transportation projects</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing activities that maintain, expand, and improve state road and rail transportation systems and increase air and watercraft cargo shipping</li> <li>• Increased development and enhancement of multimodal (e.g., road, rail, waterway, bicycle, pedestrian) connections and choices</li> </ul>
Timber and Forestry Management	<ul style="list-style-type: none"> <li>• Expansion/reduction in forest management areas</li> <li>• Updates to the state's Forest Practices Rules</li> <li>• Timber harvests</li> <li>• Fire/fuel management projects</li> <li>• Fire suppression/firefighting activities</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing programs and activities to reduce fire risk in timber and forestry areas considering the effects of climate change</li> </ul>
Contaminated Site Cleanup and Remediation	<ul style="list-style-type: none"> <li>• Initial and remedial site investigations</li> <li>• Site cleanup activities</li> <li>• Monitoring and maintenance activities</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing cleanup and remediation activities at known contaminated sites</li> </ul>

RFFA	Associated activities	Trends identified
Mining Operations	<ul style="list-style-type: none"> <li>• Expansion of existing mining and processing facilities</li> <li>• Development of new mines and processing facilities</li> <li>• Changes in mining processes and procedures</li> <li>• Performance of reclamation activities</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing development expansion, operation, and reclamation of existing and newly permitted mining sites</li> </ul>
Recreation Activities on Public Lands	<ul style="list-style-type: none"> <li>• Management plans to continue and/or increase access to and use of hiking, biking, and equestrian trail systems; winter recreation areas; camping and RV sites; and areas for hunting, fishing, and off-road motor vehicle use</li> </ul>	<ul style="list-style-type: none"> <li>• Increased recreational use of public lands</li> <li>• Increased development and maintenance of public access points, trail systems, and other recreational use areas</li> </ul>
Military Use	<ul style="list-style-type: none"> <li>• Development or modification at military facilities</li> <li>• Runway resurfacing, construction, rehabilitation, and maintenance projects, and expansion of exclusion areas</li> <li>• Changes to surface and air training, operations, and testing</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing assessments of civilian-military compatibility needs to ensure military use and safety of military personnel</li> </ul>
Water Supply Development and Withdrawals for Municipal, Agricultural, Industrial, and Conservation Uses	<ul style="list-style-type: none"> <li>• Development and use of reservoirs, well fields, water distribution systems, water treatment plants, and pump stations for municipal, agricultural, and industrial uses</li> <li>• Implementation of projects designed to improve water conservation and encourage water storage and flood risk reduction</li> <li>• Implementation of projects that support streamflow for aquatic species</li> <li>• Changes in water rights policy and water availability</li> <li>• Dam removals</li> </ul>	<ul style="list-style-type: none"> <li>• Increased risk of drought and subsequent water shortages considering the effects of climate change</li> <li>• Ongoing activities related to the development, modification, and use of water supply systems to address future water supply issues</li> </ul>

### 5.3 Cumulative impacts by resource

This section provides a summary of potential cumulative effects from the types of facilities considered in the PEIS and other RFFAs on resources. In general, the larger the facility the greater the potential for cumulative impacts because of the larger footprint, the increased need for construction materials, and the increased scale of the supporting infrastructure. It is assumed that energy projects included in RFFA 1 are likely to be located relatively near each other to take advantage of the same energy source conditions and infrastructure.

### 5.3.1 Tribal rights, interests, and resources

Tribes are recognized as unique sovereign people that exercise self-government rights that are guaranteed under treaties and federal laws. Tribal rights, interests, and resources refer to the collective rights and access to traditional areas and times for gathering resources associated with an Indian Tribe's sovereignty since time immemorial. They include inherent rights or formal treaty rights associated with usual and accustomed territories.

Tribal resources include areas important to traditional cultural practices and the natural and cultural resources associated with those practices including plants, wildlife, or fish used for commercial, subsistence, and ceremonial purposes. Tribal resources may also include archaeological or historic sites or TCPs associated with Tribal use and sites considered sacred by Tribes. Tribal resources, archaeological sites, historical and cultural sites, TCPs, and natural resources can often be interconnected and overlapping as Tribal resources. Additional details can be found in the *Tribal Rights, Interests, and Resources Resource Technical Report* (Appendix B).

Tribal rights, interests, and resources have been repeatedly affected by past and present actions. Construction of past and present projects has included a range of ground disturbance and alterations to the landscape, some of which persist and contribute to the cumulative impacts that may result from solar energy facilities. The assessment of cumulative impacts on Tribal rights, interests, and resources includes these considerations.

All RFFAs identified in Table 5-1 have the potential to contribute to cumulative impacts on Tribal rights, interests, and resources. These could be from ground disturbance; restrictions to access; noise impacts; degradation of visual quality; or by affecting landscape, habitats, and species. The development of new energy, industrial, commercial, and agricultural facilities and transportation, mining, or forestry activities could impact Tribal resources. This could be from erosion, water quality impacts and water consumption, biological resource impacts, and disruption of access to resources. Federal, state, Tribal, and local wildlife and lands management and habitat projects would be expected to maintain, restore, or create habitats, including wetlands. Contaminated site cleanup and remediation projects would also be expected to improve habitats in the long term, but there would be short-term risks from leaks or spills during cleanup and remediation. Increased human access from recreational activities could potentially disrupt, alter, or degrade habitats and species. Water supply development and withdrawals for municipal, agricultural, industrial, and conservation uses could result in improvements to water resources but could also potentially disrupt, alter, or degrade habitats and species.

Construction and decommissioning activities of utility-scale solar facilities could result in cumulative impacts when combined with the impacts of these activities. Cumulative impacts on plants, animals, and ecological communities used by Tribal members could occur if multiple facilities and other activities are in the same area. These could result in changes to vegetation, fragmentation of habitats, degradation of fisheries, or restricted movement of animals and impacts to migration paths due to increased fencing, roads, and other structures. Tribal spiritual

practices could be interrupted by construction impacts, and access to land areas and cultural or sacred sites could be limited. Sensitive viewers or sensitive receptors of noise impacts could include members of Tribes, and some landscapes can have special meaning because of Tribal connections or values. Multiple solar facilities and other activities developed in close proximity to each other could intensify disruption to sacred religious and ceremonial practices. As such, projects that are being constructed at the same time and near each other could intensify impacts from degradation of visual quality, noise, and interruption of culturally significant landscapes and habitats.

Potential cumulative impacts on Tribal rights, interests, and resources during operation of solar facilities include disturbance of previously unrecorded archaeological sites and visual degradation of settings associated with Tribal resources. Impacts could also include limitation of access and travel paths traditionally utilized for hunting, fishing, and other ritual and cultural activities. Impacts from limiting access and travel and from visual degradation are likely to be more significant cumulatively than on an individual project basis.

### **5.3.2 Environmental justice and overburdened communities**

RCW 43.21C.535 requires this PEIS to consider environmental justice and overburdened communities. This PEIS considers whether potential environmental impacts disproportionately affect people of color populations and low-income populations. Of the 202 census tracts that overlap the study area, 49 (or 24%) contain a people of color population and 134 (or 66%) contain a low-income population. This PEIS also identifies where overburdened communities are located in the study area. An overburdened community is defined as a geographic area where highly impacted communities and vulnerable populations face multiple combined environmental harms and health impacts. Of the census tracts that overlap the study area, 46% were identified as overburdened community areas. Additional details regarding environmental justice and overburdened communities can be found in the *Environmental Justice Technical Resource Report* (Appendix C).

All RFFAs identified in Table 5-1 have the potential to contribute to cumulative impacts on people of color populations and low-income populations. This is mostly because if projects are sited in or near these communities, residents could be disproportionately affected by project activities. These include increased traffic, noise, air emissions, hazards, visual impacts, and land use changes. The development of new energy, industrial, commercial, and agricultural facilities and transportation and forestry activities would have a greater risk of visual changes and conversion of land uses that affect the rural character of surrounding areas. These impacts could occur disproportionately in areas containing low-income populations and people of color populations. Mining is also likely to result in EHS risks and adverse environmental impacts from the use of hazardous materials that could disproportionately impact low-income populations and people of color populations.

Construction, operation, and decommissioning of the types of solar energy facilities evaluated in this PEIS are most likely to have cumulatively considerable impacts on people of color populations or low-income populations from visual changes, conversion of land uses, and

impacts on fire response. The siting and operation of these facilities could result in the conversion of existing land uses. The specific impacts from these would depend on the existing use of the site where the facility would be located. Solar arrays and activities could have visual impacts from long distances, depending on topography and other factors. These changes could result in changes to perceptions of the rural character of the surrounding area. Facility activities could result in an impact on fire response if activities required a large fire response in remote locations with limited response capabilities or if there are other unique aspects of a facility site. If a facility is located near people of color populations or low-income populations, this would potentially result in **disproportionate impacts** on these populations.

Solar facilities and other activities near each other could also result in cumulative impacts on other resource areas, which could result in further cumulative impacts on people of color populations or low-income populations. Potentially significant impacts on resource areas that may disproportionately affect people of color or low-income populations, if cumulatively considered with similar effects from other RFFAs, include the following:

- Land use
- Aesthetics and visual quality
- Biological resources
- Historic and cultural resources
- Tribal rights, interests, and resources
- Public services and utilities
- EHS
- Noise and vibration
- Recreation

### 5.3.3 Earth

Earth resources include geology, like soils and topography, and geologic and seismic hazards. Details can be found in the *Earth Resources Technical Report* (Appendix D).

All RFFAs identified in Table 5-1 have the potential to result in impacts on earth resources. The cumulative impacts would depend on the location and number of activities and how near they are to each other. Ground-disturbing activities would impact soils. These may include grading for roads and development, clearing a site, and installing infrastructure. They could also include stockpiling and removing soils, changing the flow of water, and construction of access roads and facilities. These impacts may increase the potential for soil compaction, surface erosion and runoff, sedimentation of nearby waterways, soil contamination, slope instability, landslide risks, and changes in local drainage patterns. Grading and fill activities of multiple developments in the same area could result in an increased risk of large-scale landslides.

Cumulative impacts to earth resources from solar facilities and other RFFAs would be expected to increase but would vary depending on the size, type, and number of activities within a given area.

### 5.3.4 Air quality and greenhouse gases

All of the study area meets all ambient air quality standards. There are some areas of concern for particulate matter and ozone within the study area. Washington has requirements for reducing GHG emissions to achieve net-zero emissions by 2050. Additional details regarding air quality and GHGs can be found in the *Air Quality and Greenhouse Gases Technical Resource Report* (Appendix E).

Most RFFAs in Table 5-1 could contribute to cumulative impacts on air quality and GHGs. These RFFAs would use equipment and burn fossil fuels that would result in air pollutant and GHG emissions. These activities could create dust emissions from land-clearing activities and vehicle travel on paved and unpaved roadways.

State GHG emissions are expected to decrease over time to meet regulatory requirements like CETA, the Climate Commitment Act (CCA), and the Clean Fuels Standard. Clean energy sources would add to the state energy system, coal-fired power plants would be retired, and the use of electric cars would increase. However, population growth would lead to increases in urban, commercial, transportation, and industrial developments. These would emit GHGs but would need to meet regulatory requirements. More frequent and intense wildfires due to climate change could become an increasing source of particulate matter emissions and GHGs.

Cumulative impacts to air resources from solar facilities and other RFFAs may increase or decrease, depending on the size, type, and number of activities within a given area.

### 5.3.5 Water resources

Water resources include surface water and groundwater quantity and quality, water availability and water rights, streams and stream buffers, wetlands and wetland buffers, and floodplains. Further details on water resources can be found in the *Water Resources Technical Report* (Appendix F).

All RFFAs identified in Table 5-1 have the potential to result in impacts on water resources. Cumulative impacts would occur when activities are within or adjacent to streams, wetlands, and floodplains. Ground disturbance, vegetation clearing, soil compaction, and increased impervious surface area would impact surface runoff. Sedimentation and spills of hazardous materials would adversely impact water quality in wetlands and other shared waters. Multiple developments within floodplains would result in cumulative impacts on floodplain functions. New development would increase the need for water use and obtaining water rights. Some activities, such as wildlife and habitat projects, could decrease impacts on water.

Cumulative impacts to water resources from solar facilities and other RFFAs may increase or decrease, depending on the size, type, and number of activities within a given area.

### 5.3.6 Biological resources

Biological resources considered in this cumulative analysis include terrestrial, aquatic, and wetland wildlife species, plant species, and habitats. These resources are described in detail in the *Biological Resources Technical Report* (Appendix G).

All RFFAs identified in Table 5-1 have the potential to contribute to cumulative impacts on biological resources. Construction activities like land clearing, excavation, fill, and grading could affect species and habitat. Building and using roads, transmission lines, and facilities would also affect them.

Terrestrial, aquatic, and wetland habitats, including special-status habitats, would be affected by development activities. Impacts include habitat fragmentation, degradation, and loss, which could also affect landscape-scale habitat connectivity and wildlife migration corridors. Impacts may also include creating edge habitat.

Cumulative impacts would primarily be related to the disturbance, injury, and mortality of species. Wildlife would be affected by the movement of vehicles and equipment. Habitat changes across the landscape would adversely affect these species by limiting suitable habitats for cover, foraging, nesting, breeding, rearing, and migration activities. It would also result in the increased potential for invasive species to displace native species. Mobile species, like birds or larger animals, may be able to move into unaffected habitats. Special-status species may be particularly vulnerable to decreases in habitat connectivity due to their already declining populations and sensitivity to changes in their preferred habitats.

Wildlife may be affected by the movement of vehicles and equipment for solar energy facilities and nearby RFFAs.

Cumulative impacts on landscape-scale habitat and migration and wildlife corridors would occur if multiple RFFAs are developed in the same area, resulting in habitat degradation, fragmentation, and loss affecting landscape-scale habitat connectivity and wildlife migration corridors and the creation of edge habitat. This would restrict the movement of animals and migration paths due to increased fencing, roads, and other structures.

Migration routes and wildlife corridors provide important habitats for migrating species like birds and large animals. Cumulative impacts on landscape-scale habitat and migration and wildlife corridors would occur if multiple activities occur in the same area. Some animals and birds could be affected by activities that restrict their movements. This could be from construction, operation, or increased fencing, roads, and other structures. Many ungulates, or large hooved animals, migrate on a seasonal basis. The viability of these animals could be affected if summer and winter migration patterns are disrupted. USGS reports provide detailed mapping of migration routes (see Figure 5-1 for an example of this mapping).

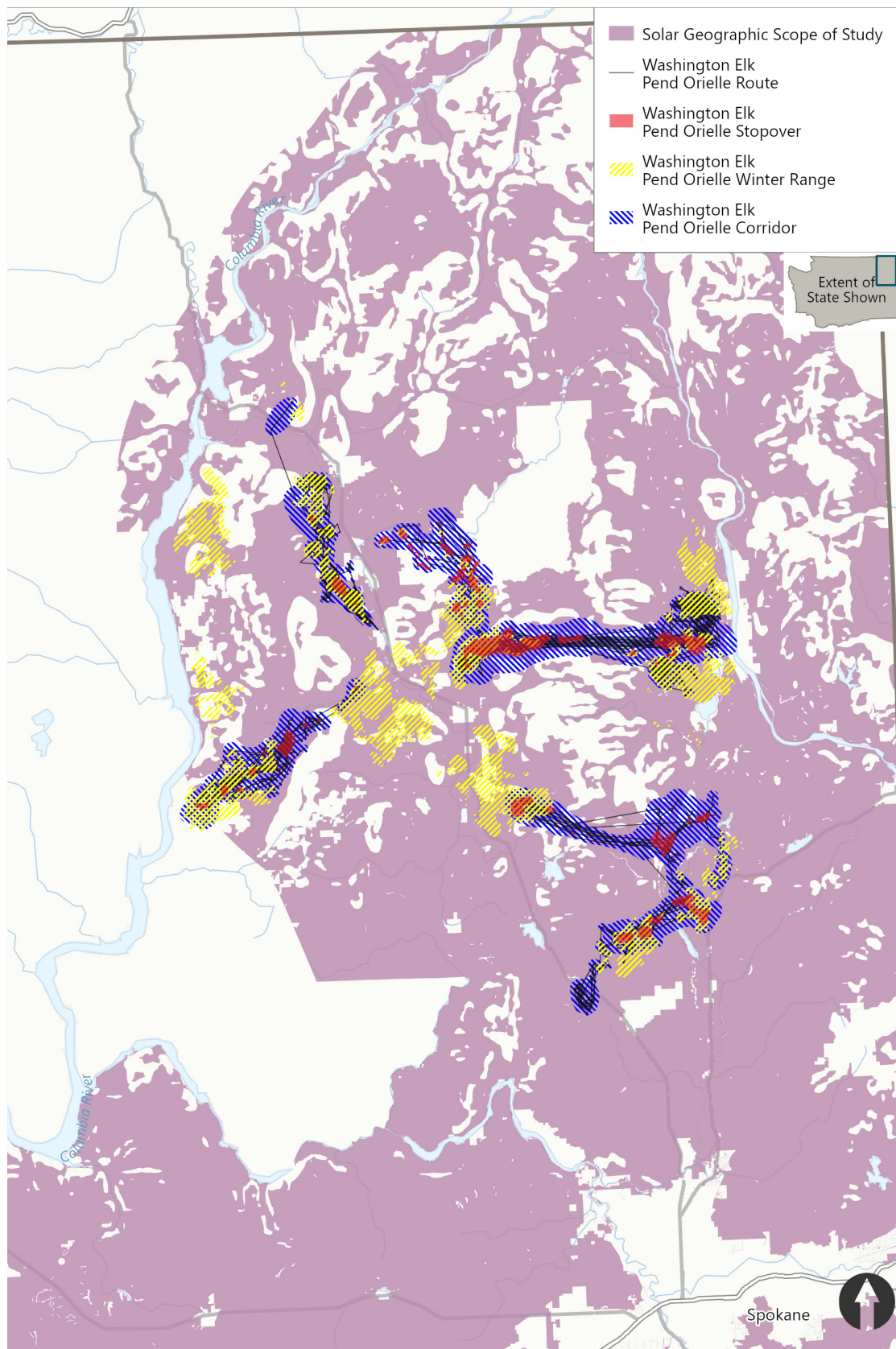


Figure 5-1. Example ungulate migration map for Pend Oreille elk winter range

If multiple solar facilities are developed in the same area, birds may be at risk of collision or altered behavior because they may confuse solar panels with water bodies. This may attract migrating birds and cause them to collide with the panels, or they may try to use the panels as places to rest or feed.

Cumulative impacts to biological resources from solar facilities and other RFFAs would be expected to increase but would vary depending on the size, type, and number of activities within a given area and the magnitude and extent of disturbance to terrestrial, aquatic, and wetland habitats and species.

### **5.3.7 Energy and natural resources**

The study area contains substantial energy sources, including wind, sunlight, electricity, and fuels. Mines and quarries throughout the area produce sand, gravel, and crushed stone. These resources are described in detail in the *Energy and Natural Resources Technical Report* (Appendix H).

Most RFFAs have the potential to contribute to cumulative impacts on energy. Clean energy projects would add electricity resources while other energy projects could use electricity. New development would use resources to grow. Changes in land designations would make a site suitable or unsuitable for development. Improved transportation infrastructure would be expected to lead to improved energy distribution. Conservation efforts could reduce the need for energy-intensive water treatment systems. Activities could increase the need for electricity and fuels for new development. There may be an increased need for aggregate to construct infrastructure, urban developments, transportation projects, and water supply projects.

Cumulative impacts to energy from solar facilities and other RFFAs may increase or decrease, depending on the size, type, and number of activities within a given area. Cumulative impacts to natural resources from solar facilities and other RFFAs would likely increase depending on the size, type, and number of activities within a given area.

### **5.3.8 Environmental health and safety**

EHS includes hazardous materials exposure, wildfire hazards, and worker health and safety. For more information, refer to the *Environmental Health and Safety Technical Resource Report* (Appendix I).

All RFFAs identified in Table 5-1 have the potential to result in impacts on EHS. Many activities are permitted to store, use, or dispose of hazardous materials. The study area contains cleanup sites on the National Priorities List under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as Superfund sites. These sites have hazardous material contamination present in the soil, surface water, or groundwater. Decommissioning for solar energy facilities and other energy facilities and cleanup and mining sites could involve a higher risk of releasing hazardous materials. This could be from degradation of facility components or from increased movement of hazardous materials.

Washington has experienced many extreme fire events in recent years due to climate change. Due to the relatively dry conditions, wildfires in eastern Washington occur more often than in other parts of the state and this trend is expected to continue in the future. Based on research conducted by the University of Washington, all counties in Washington show a significant increase in the projected number of high fire days between the years 2040 and 2069. Development or land use changes could lead to increased ignition risks or create areas with elevated fire risk. Some activities, such as land management and habitat projects, could potentially reduce wildfire risk by improving the health of ecosystems and communities.

Cumulative impacts to wildfire risk and hazardous materials from solar facilities and other RFFAs would likely increase depending on the size, type, and number of activities within a given area.

### **5.3.9 Noise and vibration**

Impacts from noise and vibration are based on distance to potential sensitive human receptors. In general, noise levels are high around major transportation corridors, airports, and industrial facilities and low in rural or non-industrial areas. For more information, refer to the *Noise and Vibration Technical Resource Report* (Appendix J).

Most RFFAs identified in Table 5-1 have the potential to result in noise and vibration impacts. Noise levels for activities are highest during construction when land clearing, grading, and road construction would occur. These could include heavy equipment operation, pile driving, and blasting. These would typically be temporary and of short duration.

Noise impacts during operations of activities would depend on the type, terrain, vegetation, and local weather conditions as well as distance to the nearest sensitive receptors. Sources of noise and vibration from operations of solar facilities would contribute to cumulative impacts. Urban, rural, agricultural, commercial, mining, and transportation development and use are expected to add to noise and vibration.

Cumulative impacts from noise and vibration from solar facilities and other RFFAs would likely increase depending on the size, type, and number of activities within a given area.

### **5.3.10 Land use**

Most of the study area is agricultural, rural residential, forestry, wildlife conservation, and undeveloped recreation areas. GMA counties must develop Comprehensive Plans to manage their land use. Non-GMA counties must still plan for critical areas and natural resource lands. For more information, refer to the *Land Use Technical Resource Report* (Appendix K).

Most RFFAs identified in Table 5-1 have the potential to result in land use impacts. Cumulative impacts on land use would occur as a result of the construction and operation of energy, urban, industrial, and transportation activities. The nature and extent of cumulative effects on land use in the study area would depend on whether the RFFAs and the solar energy facilities resulted in changes or conversions to the same types of land uses and designations. For example, the

general trend towards conversion of land uses to urban developments combined with solar energy facilities in rural areas would lead to a cumulative loss in other land uses such as agricultural or undeveloped lands. It is anticipated that other energy projects are likely to be located relatively near each other and near solar energy facilities evaluated in this PEIS to take advantage of the same energy source conditions and infrastructure. This may lead to a cumulative impact from changes to rural character and conversion on the same land use types. Activities could result in increased dust, noise, traffic, and visual changes that could affect other properties.

The operation of solar energy facilities would also result in changes to the visual landscape from the presence of solar arrays, with the facility potentially visible from long distances. Other development activities would also result in change to the visual landscape. These changes would result in changes to and/or perceptions of the rural character of the surrounding area.

The nature and extent of cumulative effects on land use in the study area would depend on whether the RFFAs resulted in changes or conversions to the same types of land uses and designations.

### **5.3.11 Aesthetics/visual quality**

The study area for aesthetic and visual resources includes the overall solar energy geographic study area, as well as surrounding viewsheds. Visual resources include all objects and features that are visible on a landscape and that add or detract from its aesthetic or scenic quality. Additional details can be found in the *Aesthetics/Visual Quality Technical Resource Report* (Appendix L).

Most RFFAs identified in Table 5-1 have the potential to result in impacts on aesthetics and visual quality. Development and operation would involve a range of activities with potential visual impacts. These include the removal of vegetation; dust generation; new roads; and modifying or building residential, industrial, commercial facilities. Multiple utility-scale solar energy facilities in the same area would introduce visual contrasts because of the horizontal rows of PV panels. This visual impact would likely be seen from long distances.

Typically, vegetation-clearing activities for facilities, forestry management, and roads would create visual impacts primarily by changing the color and texture of the cleared areas. Other RFFAs, such as other energy facilities, land use changes, and the development of water reservoirs or major transportation infrastructure projects, would also introduce visual contrasts and glare from artificial light sources.

Cumulative impacts to visual resources from solar facilities and other RFFAs would likely increase depending on the size, type, and number of activities within a given area.

### **5.3.12 Recreation**

Recreation resources include parks, recreational opportunities, public lands, and public amenities such as trails. Designated recreation areas include local parks, federal lands, and

state lands. Hunting and fishing seasons vary throughout the year by the species of animal. For more detailed information, see the *Recreation Resources Technical Report* (Appendix M). Tribal hunting and fishing also occur throughout the state at various times during the year. For more detailed information, see the *Tribal Rights, Interests, and Resources Technical Report* (Appendix B).

Some RFFAs identified in Table 5-1 have the potential to result in impacts on recreational resources. Construction of utility-scale solar energy facilities, other energy facilities, new commercial and industrial development, mining operations, transportation projects, and water supply projects would increase temporary noise, dust and visibility, and traffic, and result in temporary changes in access to recreation resources. Larger transportation networks would also involve more vehicle traffic, resulting in more sources of noise and vibration and air pollution near recreation areas. Construction and operations could restrict access to existing recreational sites on a site or affect access to nearby areas. Increased fencing could also result in loss of recreational opportunities. As described in Section 5.3.6, activities are expected to have cumulative impacts on habitat and species, reducing opportunities for hunting and wildlife viewing. Some activities, such as wildlife and habitat projects, could improve recreational opportunities.

Cumulative impacts to recreation resources from solar facilities and other RFFAs would likely increase depending on the size, type, and number of activities within a given area.

### **5.3.13 Historic and cultural resources**

Archaeological sites, historic properties, and Tribal place names exist throughout the study area. They include areas connected to spiritual practices and named places and are represented within oral tradition stories and historic documents. Historic and cultural resources include recorded and unrecorded archaeological resources, historic architectural resources listed or eligible for listing in a historic register, human remains and cemeteries, sacred sites, and documented and undocumented TCPs. Historic and cultural resources have been repeatedly affected by past and present impacts. Additional details regarding historic and cultural resources can be found in the *Historic and Cultural Resources Technical Report* (Appendix N).

All RFFAs identified in Table 5-1 have the potential to result in impacts on historic and cultural resources. Construction of past and present projects has included a range of ground disturbance and alterations to the landscape, some of which persist and contribute to the cumulative impacts that may result from solar energy facilities. The assessment of cumulative impacts on historic and cultural resources includes these considerations.

Construction and decommissioning of all utility-scale solar energy facilities considered in this PEIS along with other activities could result in cumulative impacts on, or inadvertent discoveries of, historic and cultural resources. Construction and decommissioning activities that could impact historic and cultural resources include ground disturbance, degradation of visual quality, noise, and interruption of the landscape. Ground disturbance is likely to impact unrecorded archaeological resources due to the prevalence of such sites throughout the study area and the

fact that the majority of the study area has not been archaeologically surveyed. Other cumulative impacts that may result from solar energy facilities along with other activities could include degradation and interruption of culturally significant landscapes and habitats. Increased human access exposes archaeological sites and historic structures and features to greater probability of impact from a variety of stressors.

Potential cumulative impacts on historic and cultural resources during operation include disturbance of previously unrecorded archaeological sites. They also include visual degradation of settings associated with historic and cultural resources and limitation of access and travel paths traditionally utilized for cultural resources. These impacts are likely to be more significant cumulatively than on an individual project basis.

Together, past and present projects, the future activities identified here, and potential solar facilities represent changes to culturally important landscapes. Archaeological sites and TCPs are non-renewable resources; impacts on these resources could contribute to cumulative impacts from past, present, and future projects.

### **5.3.14 Transportation**

Transportation includes roadways, railroads, airports, ports, transportation systems, traffic, parking, and movement of people and goods. For more information, refer to the *Transportation Resources Technical Report* (Appendix O).

Most RFFAs identified in Table 5-1 have the potential to result in impacts on transportation. Transporting resources and workers during construction, operation, and decommissioning contribute to cumulative impacts on transportation and traffic. Activities may include road modifications or new road construction. Transportation activities would directly affect transportation resources and would be likely to result in improvements to traffic or movement. Increases in traffic from transportation infrastructure projects and urban, rural, industrial, agricultural, and commercial facilities would result in impacts.

Cumulative impacts to transportation resources from solar facilities and other RFFAs would likely increase depending on the size, type, and number of activities within a given area.

### **5.3.15 Public services and utilities**

Public services in the study area include public schools, fire departments, emergency medical services, and law enforcement. Public services may be provided by federal, Tribal, state, county, or local governments as well as volunteer fire departments and other volunteer groups. Utilities include telecommunications, gas and electrical, water, wastewater, and solid waste management. Depending on the area, utilities may be provided by county, city, Tribal, or private suppliers. These resources and activities are described in detail in the *Public Services and Utilities Technical Resource Report* (Appendix P).

Some RFFAs identified in Table 5-1 have the potential to contribute to cumulative impacts on public services and utilities. New urban, commercial, and industrial activities and development

would be expected to increase the demand and availability of public services and utilities, as would activities associated with changes in rural and agricultural activities. Increased demand from activities could exceed existing capacities of public service providers and result in the need for new or modified utilities or service systems.

Firefighting and emergency response needs would increase from changes in land management and the development and operation of energy facilities, water supply projects, and rural and urban developments. These activities would introduce ignition sources that would increase the risk of fire. Urban, commercial, industrial, rural, and agricultural development may also increase demand for potable water and wastewater treatment. If waste associated with urban, rural, commercial, agricultural, and industrial activities is not managed appropriately, it would exceed capacities for utility providers such as landfills and transfer stations.

Cumulative impacts to public services and utilities from solar facilities and other RFFAs would likely increase depending on the size, type, and number of activities within a given area.

## 6 Consultation and Coordination

This chapter describes how information was shared during the development of the PEIS. Ecology used several methods to reach out to Tribes, local and state agencies, solar energy developers, environmental organizations, and other interested parties. These groups were provided opportunities to share information, comments, and perspectives and to engage in the development of the PEIS.

### 6.1 PEIS scoping process

Scoping for the PEIS began on September 27, 2023. The Determination of Significance and Scoping Notice for the PEIS initiated Ecology's environmental review process. The public scoping comment period was held from September 27 to October 27, 2023. Two online public scoping meetings were held for the public to provide verbal comments on October 5 and October 10, 2023. Spanish interpreters were available at meetings, and materials were translated into Spanish. A separate Tribal scoping meeting was held on October 17, 2023. Tribes were provided an additional 30 days to submit comments. Ecology accepted written scoping comments online and by mail, and verbally during online public scoping meetings.

A variety of scoping materials were available on Ecology's PEIS website for public review throughout the scoping period. The website provided information on scoping, including how to comment and a link to an online comment form. The *Scoping Summary Report* (Appendix R) provides a summary of the scoping process and the scoping comments received.

#### Scoping outreach summary

- **Legal notices** published on the SEPA Register on September 27, 2023, and published in *The Seattle Times*, *The Spokesman-Review*, *Columbia Basin Herald*, *TriCity Herald*, and *Tú Decides*
- **Notifications** sent to Tribal Chairs, Natural and Cultural Resources Directors, and Executive Directors of Tribal Organizations
- **Public, agency, and media notifications** through social media post on Twitter, email and listserv distributions, and news releases
- **PEIS website** developed and provided information and links
- **Information** published on Ecology's Public Input and Events Listing website

### 6.2 Draft PEIS public comment period process

The Draft PEIS was published on September 25, 2024. Comments were accepted during a 33-day public comment period (September 25 through October 28, 2024). This was a joint comment period with joint public hearings for the Draft Utility-Scale Solar Energy PEIS and Draft Utility-Scale Onshore Wind Energy PEIS. Comments submitted for one document were accepted and considered for both.

The Draft PEIS and its appendices were available for public review during the public comment period on the SEPA Register and Ecology's PEIS website, with information on how to provide comments. Outreach was provided in English and Spanish. The Draft PEIS was also available at the Ecology Headquarters in Lacey, Washington, and Ecology's Central Region Office in Union Gap, Washington. CD or additional printed copies were also available upon request. TTY or relay services, as well as Americans with Disabilities Act accommodations, were also available.

Three public hearings were held during the Draft PEIS comment period. Two were in person, and one was held virtually. Comments were accepted through various methods, including electronic submittals using a comment form on the PEIS website, oral and written comments provided at the public hearings, and comments submitted by mail.

Ecology conducted public notice and outreach activities to notify Tribes, agencies, members of the public, and interested parties of the public comment period and to announce upcoming public hearing dates. Ecology offered Spanish language translation services at the public meetings and additional languages if requested. A variety of outreach and notification methods were used to communicate information about the public comment period including the SEPA Register, legal notices, email listserv notices, a blog post, website updates, social media posts, Tribal notifications, and agency notifications.

## **6.3 Additional outreach and coordination with interested parties**

A series of meetings were held with interested parties during development of the Draft PEIS. These meetings were designed to engage environmental organizations, the solar industry, utilities, federal and local governments, and ports. Invited parties included those that have been active in discussions about solar energy development in the state, expressed an interest in contributing information for the PEIS process, or are located in areas where future facilities considered in this PEIS may be proposed.

Meetings were designed to share Ecology's clean energy legislative directive, updates on the purpose of the PEIS and how it can be used, as well as the PEIS timeline. Meetings were also used to gather general input and specific information and feedback from participants.

In February and March 2025, Ecology conducted three Clean Energy PEIS Implementation Workshops and one Tribal forum to gather feedback and insight on different types of guidance and tools for using PEISs for utility-scale solar, utility-scale onshore wind, and green electrolytic and renewable hydrogen. These workshops engaged multiple groups, including non-governmental organizations, industry, local government, and Tribes.

## **6.4 Tribal engagement and consultation**

Ecology provided notification of the scoping period to Tribal leaders and Natural and Cultural Resources Directors of all federally recognized Tribes with lands and territories in Washington

state, and Executive Directors of Tribal organizations. Government-to-government consultation was offered to federally recognized Tribes in Washington as an option at any time during the PEIS process. After scoping, Ecology repeated this invitation for consultation at Tribal forums in spring 2024 where the scoping report was discussed.

Ecology provided opportunities where Tribes could choose to share information, comments, and perspectives on clean energy planning as well as facility environmental review and permitting processes. A Tribal scoping meeting was held on October 17, 2023.

Tribal forums were held during development of the Draft PEIS on March 12 and April 30, 2024, with representatives of interested Tribes and Tribal associations attending. At Tribal forums during development of the Draft PEIS, Ecology presented the geographic scope of study. The study area excludes Tribal reservation and trust lands, and Ecology asked if Tribes wanted to include their lands in the scope of study. Ecology offered Tribes an opportunity to review draft sections of the *Tribal Rights, Interests, and Resources Technical Report* (Appendix B) and *Historic and Cultural Resources Technical Report* (Appendix N). The Columbia River Inter-Tribal Fish Commission and Suquamish Tribe provided comments, which Ecology considered in developing the Draft PEIS.

For the Draft PEIS, Ecology held a Tribal forum on November 7, 2024, and there was an extended Tribal comment period. A Tribal forum on PEIS implementation was held on March 27, 2025.

## 6.5 Agency coordination

Ecology worked with state agencies that have expertise in the areas evaluated in the PEIS. These included EFSEC, WFDW, DNR, WSDOT, and DAHP. Ecology met with EFSEC, DAHP, WDFW, and DNR staff throughout the process to discuss sources of information, impact assessment approaches, potential impacts, and measures to avoid, reduce, and mitigate impacts. State agency staff reviewed draft versions of the technical resource reports and chapters of the PEIS. Ecology also provided regular updates to the Interagency Clean Energy Siting Coordinating Council.

## 7 Permits and Approvals

### 7.1 Federal

- **Bald and Golden Eagle Protection Act (USFWS):** Prohibits the take of bald and golden eagles without prior authorization from USFWS. An Eagle Disturbance Take Permit may be needed for construction activities near nesting sites. A Power Line Incidental Take Permit may be recommended for collision and electrocution take associated with operation of a facility's power lines.
- **Clean Water Act Section 404 Permit (U.S. Army Corps of Engineers):** Required for activities that involve the discharge of dredged or fill materials in waters of the United States, including streams and wetlands.
- **Coastal Zone Management Act Consistency (Ecology):** Required if the project is located in Washington's 15 coastal counties and could have reasonably foreseeable impacts on state coastal resources and uses. A notice of consistency with the state Coastal Zone Management Program is a condition of federal activities, federal license, and actions, including federal activities and the issuance of federal licenses and permits.
- **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.
- **ESA Section 7 Consultation (USFWS/NOAA):** Federal actions require interagency consultation with USFWS regarding terrestrial species under Section 7 of the ESA. Interagency consultation is performed to ensure that a proposed project would not jeopardize the existence of any listed species.
- **ESA Section 10 Review (USFWS/NOAA):** If take is determined likely to occur for ESA-listed species, Section 10 review would be required for the issuance of an incidental take permit and a habitat conservation plan may be required.
- **FCC filing:** FAA advisory documents govern antenna tower lighting and marking requirements, which are mandatory under the FCC rules. The FCC may require filing with FAA for proposed structures.
- **Land Evaluation and Site Assessment (Natural Resources Conservation Service, local farm agency, or rural development agency):** Evaluation method for cropland soils. Required for projects subject to the Farmland Protection Policy Act.
- **Magnuson-Stevens Fishery Conservation and Management Act (NOAA Fisheries):** This consultation is required to protect essential fish habitats affected by the facility, particularly those near significant waterbodies.
- **Migratory Bird Treaty Act (USFWS):** Prohibits the take of protected migratory birds without prior authorization from USFWS. There are currently few permitting options to authorize take at a facility. It is recommended that facilities consult with USFWS early in the development process to ensure take is avoided or minimized to the extent practicable.

- **National Environmental Policy Act (federal agency):** Environmental review is required for all federal actions including federal projects or any project requiring a federal permit, federal funding, or located on federal land.
- **National Historic Preservation Act (federal agency and Advisory Council on Historic Preservation):** A Section 106 consultation is required for actions that may affect historic properties and is typically completed along with other federal permitting or approval processes. However, Section 106 of the National Historic Preservation Act has its own separate process. The process includes consultation with interested and affected Tribes, the Advisory Council on Historic Preservation, and the State Historic Preservation Office.
- **ROW 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 would require approval from the applicable land manager.
- **U.S. Department of Defense Clearance for Radar Interference (DoD):** This clearance is required for facilities that may interfere with military radar operations, particularly for tall structures near military installations.
- **U.S. Department of Transportation Act of 1966, 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.

## 7.2 Washington State

- **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.
- **Air Quality Permits (Ecology, EFSEC, local agency):** These permits are required to control and manage emissions from construction and operation activities. New or modified industrial stationary sources of pollution must receive an air quality permit (Notice of Construction Approval) prior to operation. Chapter 173-400 WAC establishes the requirements for review and issuance of Notice of Construction Approvals for new or modified sources of air emissions. A fugitive dust plan may be required to demonstrate compliance with WAC 173-400-040(3) and 173-400-040(8)(a).
- **Aquatic Use Authorization (DNR):** This authorization is required for any facility activities involving the use of state-owned aquatic lands.
- **Archaeological Site Alteration and Excavation Permit (DAHP):** Required if any precontact archaeological site or NRHP-eligible historic-era archaeological site related to Tribal activities are impacted by a project.
- **Clean Water Act Section 401 Water Quality Certification (USEPA, Ecology, or Tribes):** This certification is required for any facility needing a federal permit or license that may result in discharges to waters of the United States, ensuring compliance with state water quality standards.

- **Clean Water Act Section 402 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). Requires that SWPPPs be prepared and implemented to ensure compliance with state and federal water quality standards.
- **Clean Water Act Section 402 NPDES Industrial Stormwater Permit (Ecology):** Required to operate sites with certain industrial activities that could discharge stormwater pollutants to surface waters of the state or certain facilities that have the potential to be significant contributors of pollutants or may be expected to cause a violation of any water quality standard (including groundwater standards). Requires a SWPPP.
- **Clean Water Act Section 402 NPDES Individual Permit (Ecology):** Ecology prepares individual NPDES water quality permits for one entity when discharge characteristics are variable and do not fit a general permit category.
- **Chapter 90.48 RCW waters of the state authorization (Ecology):** Impacts on non-federally regulated waters, including wetlands, may require authorization from Ecology to work in waters of the state pursuant to Chapter 90.48 RCW (Water Pollution Control). Compensatory mitigation is required for any impacts.
- **Electrical Permits (Washington State Department of Labor and Industries):** These permits ensure all electrical installations meet state safety standards.
- **Forest Practices Act application/notification (DNR 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.
- **Hydraulic Project Approval (WDFW):** Required for projects in, near, or over state waters that use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state. Ensures that construction is done in a way that protects fish and aquatic habitats.
- **Notice of Intent to Construct or Decommission a Well (Ecology):** Required for all drilling activities including deepening, alteration, reconstruction, or decommissioning of a well.
- **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.
- **Sand and Gravel General Permit (Ecology):** Required for extraction of sand and gravel aggregate materials that have a discharge of process wastewater, stormwater, or mine dewatering water.
- **SEPA (state or local agency):** This environmental review helps state and local agencies identify environmental impacts that may result from projects and decisions.
- **Shoreline Management Act (Ecology):** The Shoreline Management Act requires all counties and most towns and cities with shorelines to develop and implement Shoreline Master Programs. Local governments issue shoreline substantial development,

conditional use, and variance permits, as well as shoreline exemptions pursuant to the policies and use regulations in their Shoreline Master Programs.

- **State Waste Discharge Permit (Ecology):** Required for discharge to either groundwater or publicly owned treatment works.
- **Surface Mining Reclamation Permit (DNR):** Required for extraction of materials such as sand, gravel, or rock from state- or privately owned lands. Required for each surface mine that results in more than 3 acres of disturbed ground, or has a high-wall or disturbance area that meets certain criteria.
- **Water Right Authorization (Ecology):** Needed to use any amount of surface water (stream, river, lake, spring) for any purpose. Also needed to withdraw groundwater from a well for any uses not covered by a groundwater permit exemption pursuant to RCW 90.44.050 (e.g., typically limits domestic and industrial uses to no more than 5,000 gallons per day each, although some areas are more restrictive). A new water right or change in water right would be reviewed by Ecology.
- **Utility Accommodation Permits and Franchises (WSDOT or local agency):** Required for utility installations crossing state highway ROWs or local government road ROWs.

## 7.3 Local

- **Blasting Permits (local fire department or building authority):** Required for blasting activities. Blasting with explosives requires a Washington State explosives license to abate potential hazards, including noise and vibration.
- **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.
- **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.
- **Floodplain Development Permit (local agency):** Needed for development activities including grading within special flood hazard areas mapped by FEMA.
- **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.
- **Local utility connection permits/approvals (local utility):** Needed to connect to utility infrastructure through utility provider.
- **Road Haul Agreement (local agency):** Agreement with local road agency regarding project transportation haul routes and addresses impacts to locally managed roads.

## 8 List of Preparers and Contributors

Name	Subject matter
<b>Agencies</b>	
Washington State Department of Ecology	Tribal rights, interests, and resources, environmental justice and overburdened communities, earth, air quality and GHGs, water resources, biological resources, energy and natural resources, EHS, noise and vibration, land use, aesthetics/visual quality, recreation, historic and cultural resources, transportation, public services and utilities, cumulative impacts
State of Washington Energy Facility Site Evaluation Council	SEPA process, energy facility considerations
Washington Department of Fish and Wildlife	Earth, water resources, biological resources, recreation
Washington State Department of Natural Resources	Earth, water resources, biological resources, EHS, land use, recreation, transportation
Washington State Department of Transportation	Transportation
Washington State Department of Archaeology and Historic Preservation	Historic and cultural resources
Department of Defense	Military areas
<b>Consultant team</b>	
Anchor QEA	Tribal rights, interests, and resources, environmental justice and overburdened communities, earth, water resources (wetlands), biological resources, land use, cumulative impacts
Environmental Science Associates	Air quality and GHGs, water resources, EHS, noise and vibration, aesthetics/visual quality, recreation, historic and cultural resources, transportation, public services and utilities
Hammerschlag	Energy and natural resources, climate change assumptions
Dynamic Language	Document accessibility and language translation
Ross Strategic	Interested party and public engagement
Triangle Associates	Tribal engagement

## 9 Distribution List

### Governments, agencies, and regional councils

- Association of Washington Cities
- Bonneville Power Administration
- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Reclamation
- Clean Air Agencies
- Clean Energy Siting Coordination Council
- State of Washington Energy Facility Site Evaluation Council
- Environmental Justice Council
- Federal Aviation Administration
- Federal Emergency Management Agency
- Federal Energy Regulatory Commission
- General Services Administration
- Governor and executive and policy staff
- Governor's Office of Indian Affairs
- Governor's Office for Regulatory Innovation and Assistance
- National Marine Fisheries Service
- National Park Service
- Northwest Power and Conservation Council
- Puget Sound Partnership
- Puget Sound Regional Council
- U.S. Army Corps of Engineers
- U.S. Department of Defense
- U.S. Department of Energy
- U.S. Department of the Interior
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- Washington city and county planning agencies and SEPA lead agencies
- Washington State Department of Fish and Wildlife
- Washington State Department of Natural Resources
- Washington Emergency Management Division
- Washington State Association of Counties
- Washington State Conservation Commission
- Washington State Department of Agriculture
- Washington State Department of Archaeology and Historic Preservation
- Washington State Department of Commerce
- Washington State Department of Health
- Washington State Department of Social and Health Services
- Washington State Department of Transportation
- Washington State Legislators and Legislative Committees
- Washington State Parks and Recreation Commission
- Washington State Utilities and Transportation Commission

## Tribes and Tribal representation

- Affiliated Tribes of Northwest Indians
- Columbia River Inter-Tribal Fish Commission
- Confederated Tribes and Bands of the Yakama Nation
- Confederated Tribes of the Chehalis Reservation
- Confederated Tribes of the Colville Reservation
- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes of Warm Springs
- Cowlitz Indian Tribe
- Hoh Indian Tribe
- Jamestown S’Klallam Tribe
- Kalispel Tribe of Indians
- Lower Elwha Klallam Tribe
- Lummi Nation
- Makah Tribe
- Muckleshoot Indian Tribe
- Nez Perce Tribe
- Nisqually Indian Tribe
- Nooksack Indian Tribe
- Port Gamble S’Klallam Tribe
- Puyallup Tribe
- Quileute Tribe
- Quinault Indian Nation
- Samish Indian Nation
- Sauk-Suiattle Indian Tribe
- Shoalwater Bay Indian Tribe
- Skokomish Indian Tribe
- Snoqualmie Indian Tribe
- Spokane Tribe of Indians
- Squaxin Island Tribe
- Stillaguamish Tribe of Indians
- Suquamish Tribe
- Swinomish Indian Tribal Community
- Tulalip Tribes
- Upper Skagit Indian Tribe

## Utilities and industry

- Solar energy developers
- Association of Washington Business
- NW Energy Coalition
- Public Power Council
- Renewable Northwest
- Utilities
- Washington Public Utility District Association
- Washington Rural Electric Cooperative Association
- Washington Public Ports Association

## Environmental, labor, and other organizations

- Agricultural and farmland organizations
- Environmental justice organizations
- Environmental organizations
- Washington State Building and Construction Trades Council
- Washington State Labor Council

## Other distribution

- Ecology’s SEPA Register
- Ecology’s clean energy and SEPA email distribution lists
- Published legal notices and public and media notifications
- Ecology’s PEIS website

## **Appendix A. Measures to Avoid, Reduce, and Mitigate Impacts**

## **Appendix B. Tribal Rights, Interests, and Resources Technical Report**

## **Appendix C. Environmental Justice Technical Resource Report**

## **Appendix D. Earth Resources Technical Report**

## **Appendix E. Air Quality and Greenhouse Gases Technical Resource Report**

## **Appendix F. Water Resources Technical Report**

## **Appendix G. Biological Resources Technical Report**

## **Appendix H. Energy and Natural Resources Technical Report**

## **Appendix I. Environmental Health and Safety Technical Resource Report**

## **Appendix J. Noise and Vibration Technical Resource Report**

## **Appendix K. Land Use Technical Resource Report**

## **Appendix L. Aesthetics/Visual Quality Technical Resource Report**

## **Appendix M. Recreation Resources Technical Report**

## **Appendix N. Historic and Cultural Resources Technical Report**

## **Appendix O. Transportation Resources Technical Report**

## **Appendix P. Public Services and Utilities Technical Resource Report**

## **Appendix Q. Cumulative Impacts Technical Report**

## **Appendix R. Scoping Summary Report**

## **Appendix S: Response to Comments**