Appendix D: Water Resources Report

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

By

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For the

Shorelands and Environmental Assistance Program

Washington State Department of Ecology

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DEPARTMENT OF ECOLOGY

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Acronyms and Abbreviations List

BESS	battery energy storage system
BMP	best management practice
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
Ecology	Washington State Department of Ecology
FEMA	Federal Emergency Management Agency
HPA	Hydraulic Project Approval
HUC	Hydrologic Unit Code
MW	megawatt
NFIP	National Flood Insurance Program
NPDES	National Pollutant Discharge Elimination System
PEIS	Programmatic Environmental Impact Statement
RCW	Revised Code of Washington
Risk MAP	Risk Mapping, Assessment, and Planning
SEPA	State Environmental Policy Act
SPCC	Spill Prevention, Control, and Countermeasures
SSA	sole-source aquifer
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USC	*United States Code*
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area

Executive Summary

This resource report describes the water resources conditions in the study area and potential impacts resulting from solar energy facilities. The analysis considers construction, operation, and decommissioning impacts on surface water and groundwater quantity and quality, water availability and water rights, streams and stream buffers, wetlands and wetland buffers, and floodplains. It also describes actions that could avoid or reduce impacts on water resources.

Findings for water resources impacts described in this resource report are summarized as follows:

- Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the construction, operation, and decommissioning of facilities would likely result in **less than significant impacts** on:
    - Surface water
    - Groundwater
    - Water availability or water rights
    - Wetlands
    - Floodplains
- Through compliance with laws and permits and with implementation of actions to avoid and mitigate significant impacts, utility-scale solar facilities would have **no significant and unavoidable adverse impacts** on water resources from construction, operation, or decommissioning.

Crosswalk with Water Resources Report for Utility-Scale Onshore Wind Energy

Two 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 water resource reports for each PEIS.

Utility-Scale Solar Energy PEIS (this document)	**Utility-Scale Onshore Wind Energy PEIS**
• Differences in which WRIAs and aquifers the study area overlaps • Different impacts related to impervious surfaces • Includes potential water use for washing solar panels	• Differences in which WRIAs and aquifers the study area overlaps • Different impacts related to impervious surfaces

1 Introduction

This resource report describes water resources within the study area and assesses potential impacts associated with types of facilities (alternatives), including a No Action Alternative. Chapter 2 of the State Environmental Policy Act (SEPA) Programmatic Environmental Impact Statement (PEIS) provides a description of the types of facilities evaluated (alternatives).

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

1.1 Resource description

In this resource report, the term "water resources" refers to surface water and groundwater, wetlands, and floodplains. Water quality, water quantity (flows and levels), and water availability and water rights are key features of water resources. The study area for water resources is described in Section 2.1.

1.2 Regulatory context

Table 1 identifies the primary federal, state, and local regulations that relate to water resources in the study area. Section 3.3 identifies the water-related permits that may be required for facility implementation.

Table 1. Applicable laws, plans, and policies

Regulation, statute, guideline	Description
Federal	
Clean Water Act (CWA) (33 *United States Code* [USC] 1251 et seq.)	The Federal Water Pollution Control Act of 1948 was the first major U.S. federal law to address water pollution. The law was amended in 1972 and became commonly known as the Clean Water Act. The CWA establishes the basic structure for regulating pollutant discharges into waters of the United States and makes it unlawful to discharge any pollutant from a point source into those waters without a permit. The following rows identify key sections of the CWA relevant to permitting facilities for which construction or operation would result in a discharge into waters of the United States.

Regulation, statute, guideline	Description
CWA Section 401 (Certification)	Provides states with the authority to ensure that federal agencies do not issue permits or licenses that violate state water quality standards or other protections of the CWA. An applicant for a federal permit must obtain a Section 401 Water Quality Certification from the state in which the activity would occur. Washington State Department of Ecology (Ecology), U.S. Environmental Protection Agency (USEPA), and some Tribes administer Section 401 Certifications in Washington.
CWA Section 402 (National Pollutant Discharge Elimination System [NPDES])	Establishes the NPDES program, requiring pollutant discharges to surface waters be authorized by a permit. NPDES permit requirements initially applied to point source discharges, but the program was expanded in 1987 to explicitly include stormwater discharges. USEPA issues NPDES permits for federally owned facilities and Tribal lands in Washington. Ecology administers the NPDES permitting program for other facilities and lands in Washington.
CWA Section 404 (Permits for Dredged or Fill Material)	Establishes a program to regulate the discharge or dredged or fill material into waters of the United States, including wetlands. The U.S. Army Corps of Engineers (USACE) issues Section 404 permit decisions.
CWA Section 303(d) (Impaired Waters and Total Maximum Daily Loads)	Establishes a process to identify and clean up polluted waters. Administered by Ecology in Washington.
Rivers and Harbors Act of 1899 (33 USC 403)	Requires USACE Section 10 authorization for the construction of any structure in or over any navigable water of the United States.
Executive Order 11990, Protection of Wetlands	Provides the overall wetlands policy applicable to all agencies managing federal lands, sponsoring federal projects, or providing federal funds to state or local projects. Requires federal agencies to follow avoidance, mitigation, and preservation procedures and to obtain public input before new construction in wetlands. Consistency with the overall wetlands policy contained in Executive Order 11990 is achieved through CWA Section 404 compliance requirements.
Federal Water Quality Criteria Applicable to Washington (40 *Code of Federal Regulations* 131.45)	Establishes human health criteria for priority toxic pollutants in surface waters in Washington.
Coastal Zone Management Act (CZMA) Federal Consistency	Provides for the management of coastal resources. CZMA Federal Consistency is a tool that state programs use to manage coastal activities and resources and to facilitate cooperation and coordination with federal agencies. Under Washington’s federally approved Coastal Zone Management Program, activities that could affect the coastal zone must comply with Washington’s Shoreline Management Act, Water Pollution Control Act, Clean Air Act, and Ocean Resources Management Act.

Regulation, statute, guideline	Description
State	
Washington State Water Pollution Control Law (Chapter 90.48 Revised Code of Washington [RCW])	Grants Ecology the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland waters, salt waters, water courses, and other surface and groundwater in the state. Tool Ecology uses to regulate certain activities in wetlands and waters that are non-jurisdictional under Section 404 of the CWA through the issuance of Administrative Orders.
Water Quality Standards for Surface Water (Chapter 173-201A Washington Administrative Code [WAC])	Establishes water quality standards for surface water, implementing Title 90 RCW (Chapter 90.48 RCW – Water Pollution Control Act).
Water Quality Standards for Groundwater (Chapter 173-200 WAC)	Establishes water quality standards for groundwaters, implementing Title 90 RCW including Chapters 90.48 (Water Pollution Control Act) and 90.54 RCW (Water Resources Act of 1971).
NPDES Permit Program (Chapter 173-220 WAC)	Establishes a state individual permit program, applicable to the discharge of pollutants and other wastes and materials to the surface waters of the state, operating under state law as a part of the NPDES created by Section 402 of the CWA. Permits issued under this chapter are designed to satisfy the requirements for discharge permits under both Section 402(b) of the CWA and Chapter 90.48 RCW.
Water Rights (Chapter 173-152 WAC)	Establishes the framework for Ecology's performance of basin assessments and processing of water rights applications, implementing Title 90 laws including Chapters 90.03 (Water Code) and 90.82 RCW (Watershed Planning).
Water Rights-Environment (Title 90 RCW)	Contains many laws covering subjects including water rights, claims registration, minimum streamflows, water pollution control, shoreline management, and aquatic resources mitigation.
Hydraulic Code Rules (Chapter 220-660 WAC)	Implements Chapter 77.55 RCW (Construction Projects in State Waters), regulating projects that use, divert, obstruct, or change the natural flow or bed of any water of the state. Requires entities who are planning such projects to obtain a Hydraulic Project Approval from Washington Department of Fish and Wildlife.
Floodplain Management (Chapter 173-158 WAC)	Implements Title 86 RCW (Chapter 86.16 RCW – Floodplain Management), establishing regulations for floodplain management to ensure local government compliance with the National Flood Insurance Program (NFIP).
Administration of Surface and Groundwater Codes (Chapter 508-12 WAC)	Establish regulations for Ecology's administration of surface water and groundwater codes, including regulation of water rights diversions, surface water and groundwater appropriation procedures, and reservoir permits.
Growth Management Act (Title 36 RCW)	Chapter 36.70A RCW contains Washington's Growth Management Act, which requires local governments to manage growth by identifying and protecting critical areas and natural resource lands, among other measures.

Regulation, statute, guideline	Description
Shoreline Master Program Approval/Amendment Procedures and Master Program Guidelines (Chapter 173-26 WAC)	Implements the requirements of the Shoreline Management Act (Chapter 90.58 RCW), directing local governments to develop and administer local shoreline management programs for regulation of land uses on shorelines of the state.
CZMA Federal Consistency	Provides for the management of coastal resources. CZMA Federal Consistency is a tool that state programs use to manage coastal activities and resources and to facilitate cooperation and coordination with federal agencies. Under Washington's federally approved Coastal Zone Management Program, activities that could affect the coastal zone must comply with Washington's Shoreline Management Act, Water Pollution Control Act, Clean Air Act, and Ocean Resources Management Act.
Local	
City and county critical areas codes	As required under Washington's Growth Management Act, cities and counties have development regulations to protect critical areas including wetlands and their buffers, streams and their buffers (fish and wildlife habitat conservation areas), critical aquifer recharge areas, and frequently flooded areas.
City and county floodplain codes	Local codes regulate floodplain development as required by Federal Emergency Management Agency (FEMA) NFIP regulations.
City and county Shoreline Master Program codes	Local codes regulate development within shorelines of the state in accordance with Shoreline Master Programs and state Shoreline Management Act requirements.

2 Methodology

2.1 Study area

The study area for water resources encompasses the overall geographic scope of study for the PEIS (Figure 1), which consists almost entirely of areas in Washington located east of the Cascade Mountain crest, within the Columbia River basin. Limited areas of western Washington within the Lower Columbia River and Puget Sound basins are also part of the study area.

Figure 1. Hydrologic subregions

Data source: Ecology 2024a

2.2 Technical approach

The geographic scope of study for the PEIS covers a large portion of the state, and the types of facilities considered include broad ranges of parameters for potential future sites and facilities rather than specific locations or details. The analysis considers water resources that have the potential to be affected by the following:

- Short-term facility construction impacts on surface water quality and streamflows, groundwater quality and subsurface flows, streams and wetlands and associated regulatory buffers, floodplains, and water availability and water rights.
- Long-term impacts from facility construction, operations, maintenance, and decommissioning on surface water quality and streamflows, groundwater quality and subsurface flows, streams and wetlands and associated regulatory buffers, floodplains, and water availability and water rights.

Based on these considerations, the technical approach for this analysis included the following steps:

- Existing data and information from publicly available sources were used to generally characterize key water resource conditions in the study area (e.g., major watersheds and rivers/streams, aquifers and water uses, wetlands).
- Information and assumptions were considered to understand the types and sizes of facilities and range of activities that could be expected in utility-scale solar facility development—for construction, operation, and decommissioning. That information was used to qualitatively evaluate water resource impacts relative to baseline and predicted future conditions.
- Potential impacts were evaluated relative to applicable laws and regulations (e.g., water quality standards, water rights laws, and wetland regulations).

2.3 Impact assessment

Impacts on water resources were evaluated for site characterization, construction, operation, and decommissioning of facilities. 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).

Impact indicators for key features of water resources were assessed, and criteria for each impact indicator were used to identify potentially significant adverse impacts. Significant impacts would occur if a facility would result in the following:

- Permanent alterations to the course of surface water that are substantial or occur frequently.
- Measurable changes in surface water quality that do not comply with Washington surface water quality standards (Chapter 173-201A Washington Administrative Code [WAC]).

- Large-scale disruption of the groundwater flow regime (including groundwater recharge), such as a widespread disruption that occurs outside of the facility development footprint.
- Impacts that lead to exceedance of groundwater standards (Chapter 173-200 WAC).
- Alterations to water availability or rights for designated uses that cause impairment of existing water rights, including waterways with established minimum instream flows, or water diminishment of administratively closed waterways.
- Temporary or long-term alterations to floodplain functions and/or any loss of floodplain storage that would cause a net rise in flood elevation during the occurrence of the 100-year flood.

3 Technical Analysis and Results

3.1 Overview

This section describes key elements of the affected environment for water resources and provides an overview of how those resources are managed and regulated in Washington. Potential impacts on water resources resulting from site characterization, construction, operation, and decommissioning of facilities are described. This section also evaluates measures that could avoid, minimize, and mitigate impacts, and determines whether there would be potential unavoidable significant adverse impacts on water resources.

3.2 Affected environment

3.2.1 Surface water

3.2.1.1 Water quantity

Surface waters within the study area vary considerably in size and flow. The study area encompasses land along surface waters ranging in magnitude from the Columbia River and major river tributaries including the Yakima, Snake, White Salmon, and Klickitat rivers; to small- to large-size perennial creeks; to unnamed smaller drainageways with only seasonal flow.

The U.S. Geological Survey (USGS) has delineated drainage areas in the United States based on surface water features. Geographic areas are divided and subdivided into successively smaller hydrologic units, each with a defined numeric Hydrologic Unit Code (HUC), which describe the area of land upstream of a point on a waterbody that contributes surface runoff to that point.

There are eight hydrologic subregions (HUC-4 basins) under the national HUC system that are entirely or partially within the state of Washington. The study area for the solar PEIS analysis includes portions within seven of these subregions, as summarized in Table 2 and shown in Figure 1.

Table 2. Hydrologic subregions

Hydrologic subregion name	HUC 4 number	Contains portions of study area
Kootenai-Pend Oreille-Spokane	1701	Yes
Upper Columbia	1702	Yes
Yakima	1703	Yes
Lower Snake	1706	Yes
Middle Columbia	1707	Yes
Lower Columbia	1708	Yes
Oregon-Washington Coastal	1710	No
Puget Sound	1711	Yes

Washinton has 62 Water Resource Inventory Areas (WRIAs) established under WAC 173-500-040 to provide a framework for water resources management in the state (Ecology 2024b). WRIAs are based on natural watershed boundaries and are used by Ecology and other natural resources agencies as a basis for study, planning, and regulation of activities affecting water resources. The study area for this analysis includes lands located within 41 of Washington's 62 WRIAs, as shown in Figure 2.

Table 3. Water Resource Inventory Areas

WRIA number	WRIA name	Overlaps portions of study area
1	Nooksack	No
2	San Juan	No
3	Lower Skagit – Samish	No
4	Upper Skagit	Yes
5	Stillaguamish	No
6	Island	No
7	Snohomish	No
8	Cedar – Sammamish	Yes
9	Duwamish – Green	Yes
10	Puyallup – White	Yes
11	Nisqually	Yes
12	Chambers – Clover	No
13	Deschutes	No
14	Kennedy – Goldsborough	No
15	Kitsap	No
16	Skokomish – Dosewallips	No
17	Quilcene – Snow	No
18	Elwha – Dungeness	No
19	Lyre – Hoko	No
20	Soleduc	No
21	Queets – Quinault	No
22	Lower Chehalis	No
23	Upper Chehalis	No
24	Willapa	No
25	Grays – Elochoman	No
26	Cowlitz	Yes
27	Lewis	Yes
28	Salmon – Washougal	Yes
29	Wind – White Salmon	Yes
30	Klickitat	Yes
31	Rock – Glade	Yes

WRIA number	WRIA name	Overlaps portions of study area
32	Walla Walla	Yes
33	Lower Snake	Yes
34	Palouse	Yes
35	Middle Snake	Yes
36	Esquatzel Coulee	Yes
37	Lower Yakima	Yes
38	Naches	Yes
39	Upper Yakima	Yes
40	Alkali – Squilchuck	Yes
41	Lower Crab	Yes
42	Grand Coulee	Yes
43	Upper Crab-Wilson	Yes
44	Moses Coulee	Yes
45	Wenatchee	Yes
46	Entiat	Yes
47	Chelan	Yes
48	Methow	Yes
49	Okanogan	Yes
50	Foster	Yes
51	Nespelem	No
52	Sanpoil	Yes
53	Lower Lake Roosevelt	Yes
54	Lower Spokane	Yes
55	Little Spokane	Yes
56	Hangman	Yes
57	Middle Spokane	Yes
58	Middle Lake Roosevelt	Yes
59	Colville	Yes
60	Kettle	Yes
61	Upper Lake Roosevelt	Yes
62	Pend Oreille	Yes

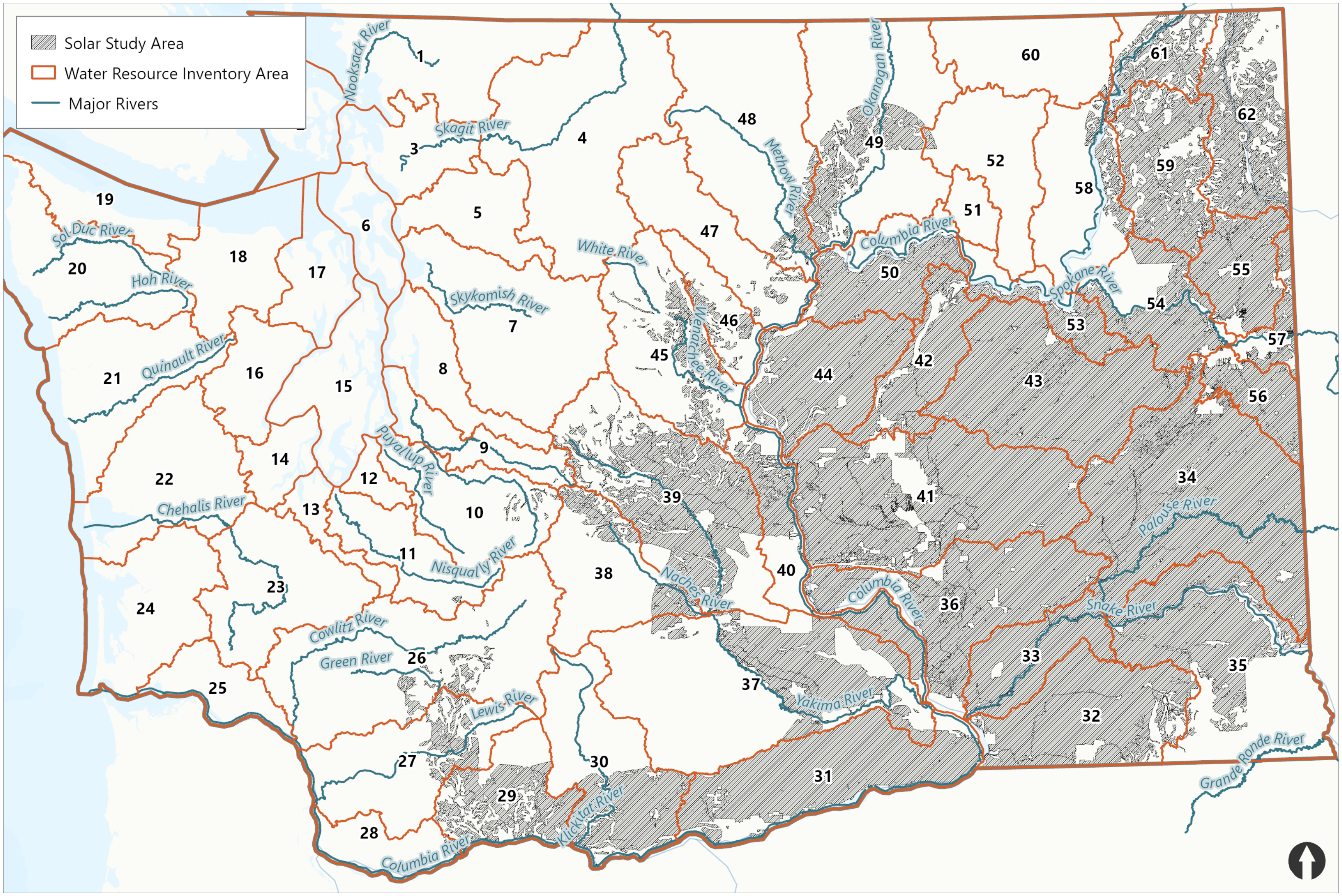

Figure 2. Water Resource Inventory Areas

Data source: Ecology 2024a

3.2.1.2 Water quality

Water quality is a key element of surface water regulation and management in Washington, and the state is required by the federal Clean Water Act (CWA) to perform a water quality assessment every 2 years to track the water quality status of the state's rivers, streams, lakes, and marine waterbodies (Ecology 2018). The assessments are conducted by Ecology and submitted to the U.S. Environmental Protection Agency (USEPA) for review and approval. Waterbodies that are identified as impaired by pollutants are categorized as Category 5 waters and placed on the state's CWA Section 303(d) list, indicating that they require a water improvement project. Ecology develops water cleanup plans, or Total Maximum Daily Loads, for impaired waters to reduce pollution with the goal of bringing the water into compliance with water quality standards. Many waters that are on the CWA Section 303(d) list are found in the study area. Washington's Water Quality Assessment and CWA Section 303(d) list are available to review on Ecology's website (https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d).

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 the following:

- Elevated temperatures from land clearing and development (reduced shading), point source discharges, and dams
- Low dissolved oxygen from elevated water temperatures and excessive organic material decay
- High total suspended solids and turbidity from land disturbance and erosion
- Bacteria from livestock and failing septic systems
- Elevated nutrients and pesticides from agricultural activities
- Toxics from industrial activities
- Pollutants, including metals and petroleum hydrocarbons, in stormwater runoff from roads and other impervious surfaces

3.2.2 Groundwater

Groundwater is the water found underground in the spaces of saturated soil and rock. A saturated soil or rock layer with spaces that allow water to move through it is called an aquifer. Aquifers may be confined or unconfined. A confined aquifer is bound by impermeable layers (e.g., rock or clay) above and below it and is usually under pressure. Unconfined aquifers have no upper confining layer; the top of the aquifer is the water table that is in equilibrium with atmospheric pressure and rises and falls in response to recharge or discharge.

Groundwater recharge occurs when water from the surface (e.g., rain or snowmelt, or surface waterbodies) seeps downward to groundwater. Groundwater flow is influenced by topography and generally moves toward surface water drainages and marine waterbodies.

There are seven principal aquifers in Washington as identified in the USGS Groundwater Atlas of the United States (USGS 2000). The study area for this analysis includes land overlying portions of most of these aquifers, as shown in Figure 3.

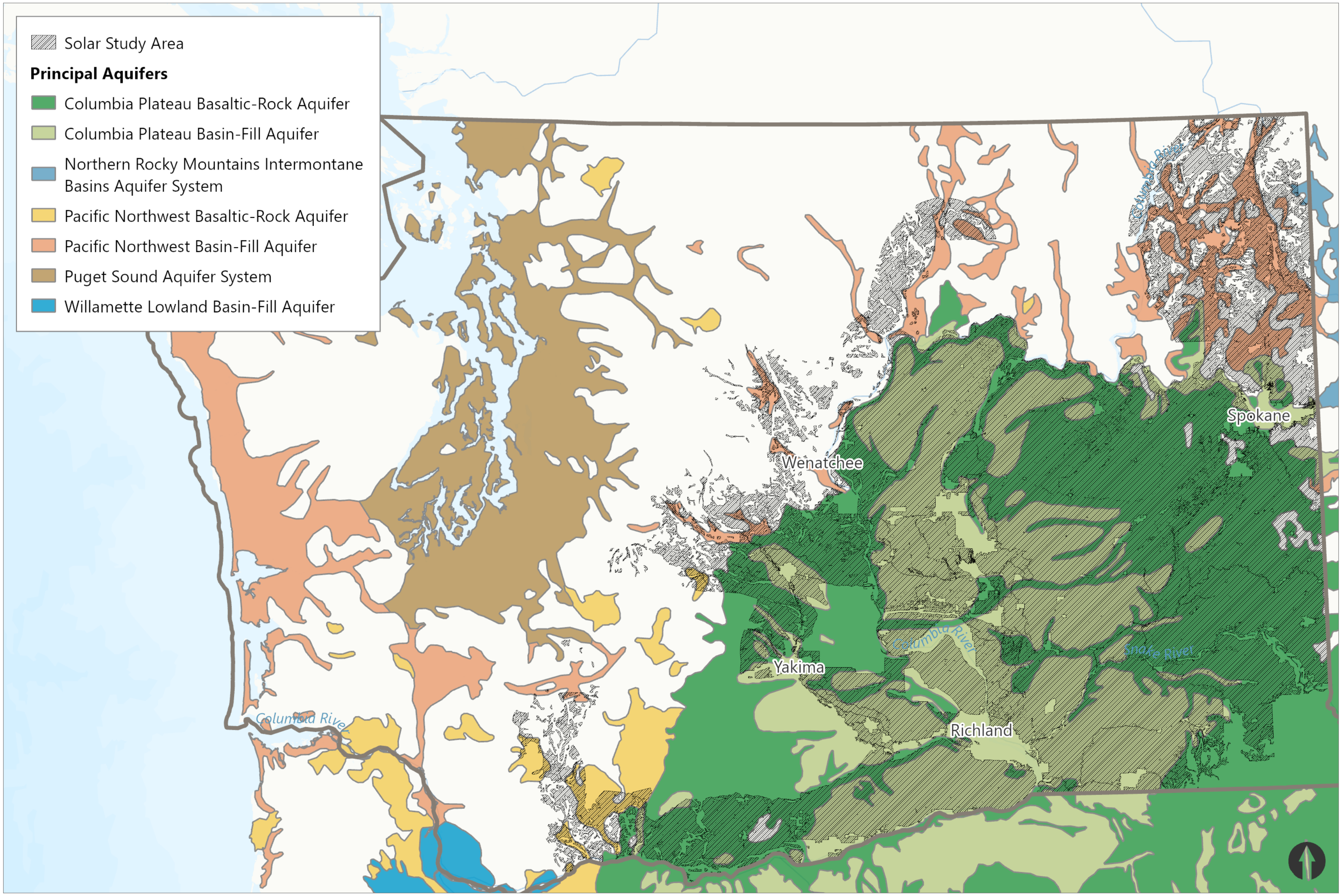

Figure 3. Principal aquifers in Washington

Data source: USGS 2021

Most of the study area in eastern Washington is on lands with Columbia Plateau basaltic-rock and Columbia Plateau basin-fill aquifers. Smaller portions of the study area include areas with the Pacific Northwest basin-fill aquifer, Pacific Northwest basaltic-rock aquifer, and Puget Sound aquifer system. Portions of the study area are on lands identified by USGS as "other rocks that are minimally permeable" (USGS 2000).

The USEPA administers a sole-source aquifer (SSA) program through its authorities under the federal Safe Drinking Water Act of 1974 (Section 1424[e]). SSAs 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 should the aquifer become contaminated. Projects within SSAs that received federal funding must undergo USEPA review to ensure the projects will not contaminate the SSA.

USEPA has designated 13 SSAs in Washington (USEPA 2024), three of which overlap with the study area for this analysis (Figure 4):

- Spokane Valley-Rathdrum Prairie Aquifer Source Area, which is located in Spokane County in the eastern portion of the study area.
- Lewiston Basin Aquifer Area, which is located in Asotin and Garfield counties and overlaps with the southeastern portion of the study area.
- Cedar Valley Aquifer Source Area, which is located in King County and overlaps with a small portion of the western part of the study area.

Cities and counties in Washington protect groundwater resources by establishing critical aquifer recharge areas, as required by the state's Growth Management Act. Development activities within critical aquifer recharge areas are regulated by city and county critical areas codes. These codes establish standards and review processes intended to protect a community's drinking water by preventing pollution and maintaining supply.

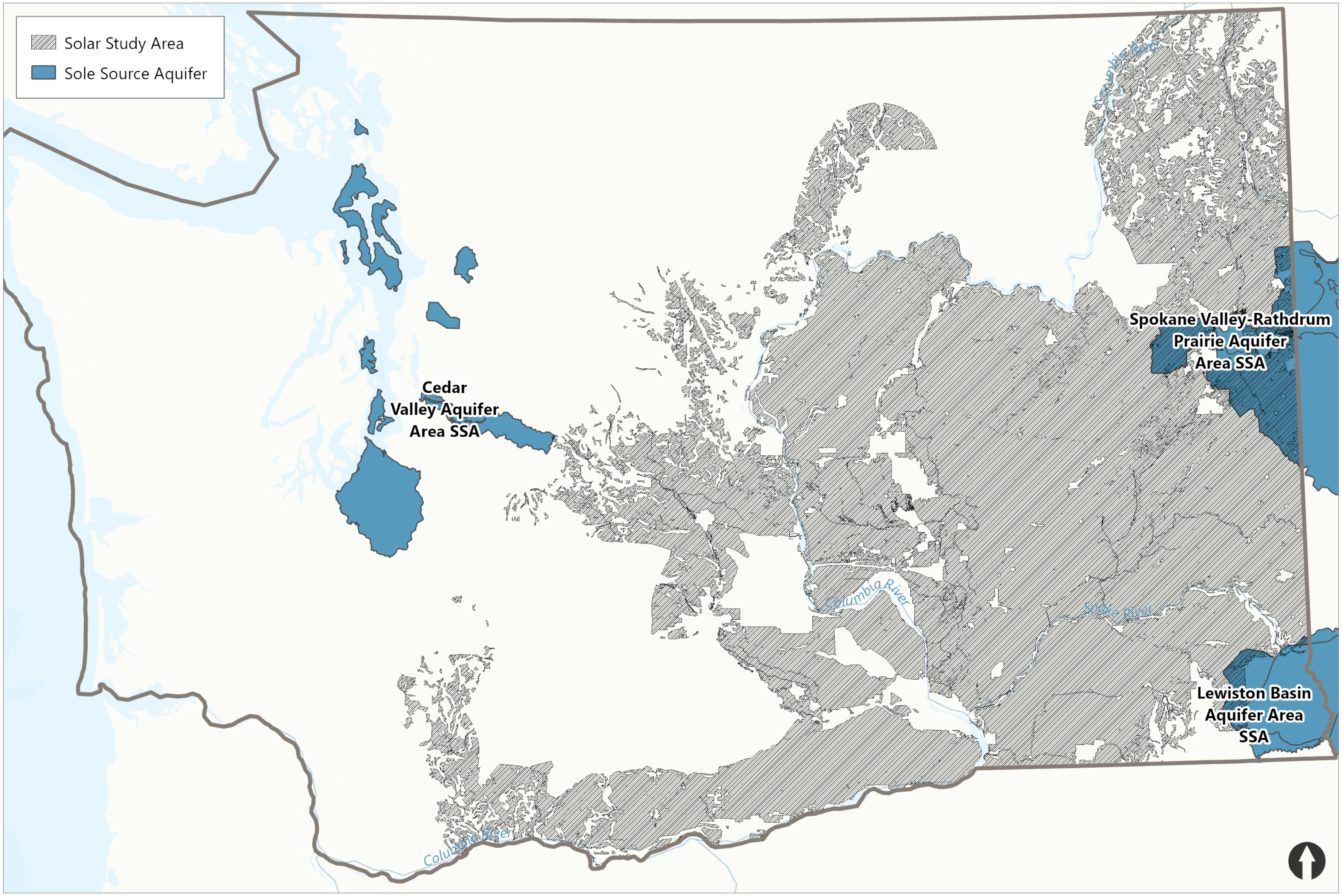

Figure 4. Sole-source aquifers that intersect the solar study area

Data source: USEPA 2024

3.2.3 Water availability and water rights

Across the study area, water availability varies by location and is dependent on many factors such as local hydrology and climate conditions (precipitation, air temperature, snowpack), land uses, and existing water rights including minimum instream flows. Ecology has responsibilities for managing waters of the state, including issuing rights to use water while protecting instream resources for public benefit. Water rights in Washington are issued based on a prior appropriation system, whereby a senior water rights holder who established a right first cannot be impaired by a junior water rights holder who was granted rights later.

USGS compiles and publishes data on water withdrawals by state, tracking use trends over time. For the most recent publication reporting 2015 data (USGS 2018), total water withdrawals in Washington were estimated to be approximately 4,255 million gallons per day across eight use categories, ranked as follows:

- Irrigation 59%
- Public Supply 20%
- Industrial 10%
- Aquaculture 6%
- Domestic 3%
- Thermoelectric 1%
- Livestock 1%
- Mining < 1%

While irrigation and public supply comprise nearly 80% of the state's water use overall, water use differs substantially between western and eastern Washington. The dominant water use in the western part of the state, where most of the state's population resides, is public supply. In the drier and more sparsely populated eastern portions of the state, where much of the state's agricultural production is based, crop irrigation is by far the dominant water use category. The areas of highest water use in the state are in central Washington, for crop irrigation (USGS 2018).

In addition to water rights for withdrawals, water availability is influenced by requirements to maintain minimum instream flows. Washington State law requires that streamflows be managed in a way that protects instream resources and values including fish and wildlife, Tribal resources, water quality, recreation, aesthetics, and navigation. Ecology has established by rule minimum instream flows and stream closures for many surface waters—covering nearly half of the state's watersheds and including the Columbia River—to accomplish this. Ecology considers instream flow requirements and closed waterbodies in its review of new water rights applications, and if approved, junior water right holders typically see their rights curtailed during periods when minimum instream flows are not met (e.g., during dry summer low-flow periods). In many areas of the state, new water rights are not available without full mitigation (in kind, in place, and in time).

3.2.4 Wetlands

Wetlands 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 are characterized as areas where the underlying water table is at or near the soil surface (saturated) or where the ground is covered by shallow water (inundated) for an extended duration during the growing season. Such conditions result in the development of anaerobic (low-oxygen) conditions in the upper part of the soil column and the formation of hydric soils. Wetlands also support hydrophytic or "water-loving" vegetation, which can include herbs, shrubs, vines, and trees that are specifically adapted to growing in saturated or flooded soil conditions.

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. They are often supported by perennial water sources such as springs, permanently flowing streams, or permanent waterbodies. However, wetlands can also occur in association with intermittent or ephemeral waters including seasonally flowing drainageways and vernal pools. Estuarine wetlands, found in brackish water in estuaries where freshwater meets saltwater, do not occur in the solar study area.

Wetlands occur throughout the study area where utility-scale solar facilities are considered. However, unlike many streams, rivers, lakes, and marine waters whose locations and boundaries are often evident and relatively well mapped, there is no detailed single source that identifies and maps the presence, extent, and condition of all wetlands. Remote mapping of wetlands using aerial photography and satellite imagery is often challenging because the most visible aspects of wetlands, vegetation cover and hydrology, are highly variable and often change both seasonally and over longer periods in response to variations in climate and other factors such as land use. The presence of hydric soils is something that must be determined by direct observation in the field and is not something that can be detected remotely.

As such, proponents of utility-scale solar energy facilities would be required to conduct quantitative analyses and site surveys (e.g., wetland determination or delineations, wetland rating and functions and values assessments, critical area assessments) to determine the amount, type, and category of wetlands on and around potential facility sites, and the width and condition of associated wetland buffers. Information on the potential occurrence of wetlands in the landscape is available from the following sources:

- U.S. Fish and Wildlife Service's National Wetlands Inventory (USFWS 2024)
- Ecology's 2016 Modeled Wetland Inventory (Ecology 2016)[1]
- USGS National Hydrography Dataset (USGS 2024)
- Available local wetland inventories
- Aerial photography and Light Detection and Ranging imagery

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[1] The Ecology (2016) Modeled Wetland Inventory only covers the western portion of the state.

- USGS topographic maps
- Natural Resources Conservation Service Web Soil Survey (USDA-NRCS 2024)

Although these sources can offer general information on the likelihood of a site to support wetlands, they do not provide a definitive indication of the presence or absence of wetlands. The definitive presence of wetlands and a demarcation of their boundaries can only be determined through a wetland delineation performed in accordance with 1987 *Corps of Engineers Wetland Delineation Manual* (1987 Manual; Environmental Laboratory 1987) and the appropriate regional supplement.[2]

Wetlands provide a number of important ecosystem functions, including habitat for terrestrial, aquatic, and amphibious species; water quality improvement; flood flow reduction/protection; shoreline stabilization; groundwater recharge; and streamflow maintenance (Ecology 2023). Many of these functions, such as flood flow reduction and shoreline stabilization, are particularly valuable to humans. This resource report focuses on hydrological wetland functions and values, including those related to water quality, flood protection, shoreline stabilization, and groundwater recharge. Wetland functions and values associated with the provision of habitat for aquatic and terrestrial species are addressed in the *Biological Resources Report* (Anchor QEA 2024).

Because of their ecological importance and value to humans, wetlands are regulated under various federal, state, and local laws including Sections 401 and 404 of the CWA, the Washington State Water Pollution Control Act, and county and municipal critical areas ordinances. Although the definitions of the jurisdictional limits of wetlands are similar under these various laws, there are differences in whether or not a wetland is subject to federal or state regulation. In particular, federal regulations typically only apply to those wetlands that are directly connected to certain surface waters that are considered to be waters of the United States. Those wetlands determined to be non-jurisdictional by the federal government are often regulated under state and local laws.

As part of state and local regulation of wetlands in Washington, wetlands are rated and categorized using the Washington State Wetland Rating System, which was developed by Ecology. The rating system includes specific regional methods for the western (Hruby and Yahnke 2023) and eastern (Hruby 2014) portions of the state. These methods are designed to consider regional differences in climate, landforms, hydrology, and wetland types that are characteristic of those areas. Ecology's wetland rating system is used to differentiate wetlands based on their sensitivity to disturbance, significance in the watershed, rarity, ability to be replaced, and the beneficial functions they provide to society. The rating system evaluates wetlands on their ability to provide water quality improvement, hydrologic, and wildlife habitat

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[2] Two regional supplements to the 1987 Manual are applicable to Washington: (1) *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (USACE 2010); and (2) *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008).

functions based on the wetland's physical characteristics (site potential), surrounding environment (landscape potential), and the importance of those functions to humans (value) in the vicinity. The categories derived using the rating system include the following:

- **Category I wetlands** represent a unique or rare wetland type, are more sensitive to disturbance, are relatively undisturbed, or contain ecological attributes that provide a high level of functions. These types and functions are very difficult to replace.
- **Category II wetlands** provide high levels of some functions. These types and functions are very difficult to replace.
- **Category III wetlands** have moderate levels of functions. They have been disturbed in some ways and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.
- **Category IV wetlands** have the lowest levels of functions and are often heavily disturbed.

Wetland categories are also used by local entities to assign protective buffers to wetlands under their critical areas regulations.

Because Category I and II wetlands typically represent relatively unique or rare wetland types that are difficult to replace and that provide high levels of function, any impacts on those wetland types would be difficult to mitigate for and would be determined on a case-by-case basis. As shown in Table 3, Ecology has identified typical Category I and II wetlands for both the eastern and western portions of the state. Based on the geographic area of study for solar facilities, some western Washington wetland types (e.g., estuarine, interdunal, and coastal lagoons) are unlikely to occur where facilities considered in this PEIS may be sited.

Table 4. Typical Category I and II wetlands in eastern and western Washington

Regional wetland category descriptions
Eastern Washington Category I wetlands
Alkali Wetlands: Wetlands characterized by the presence of shallow saline water with a high pH. Such wetlands provide primary habitat for several species of migratory shorebirds and are also heavily used by migratory waterfowl. They also support unique plants and animals not found anywhere else in eastern Washington, including important pollinators (e.g., alkali bees) that are vital to agriculture in the western United States.
Wetlands of High Conservation Value: Wetlands previously called Natural Heritage Wetlands that have been identified by the Washington Natural Heritage Program as important ecosystems for maintaining plant diversity in the state.
Bogs and Calcareous Fens: *Bogs:* Wetlands with peat soils and a low pH (typically < 5) that support plants and animals specifically adapted to such conditions. Bogs do not tolerate changes or disturbance well, with even minor changes in water quality or nutrient inputs potentially resulting in major adverse effects on the plant and animal communities. They are also extremely slow to develop. *Calcareous Fens:* Wetland with peat soils that exhibit neutral or alkaline conditions (pH > 5.5) that are maintained by groundwater rich in calcium and magnesium bicarbonates (or sometimes calcium and magnesium sulfates) and that support rare plants and animals. Considered to be one of the rarest wetland types in the United States and one of the rarest peat wetland types in Washington. Found only in north-central to northeastern part of the state.

Regional wetland category descriptions
Mature and Old-growth Forested Wetlands with Slow-growing Trees: Wetlands containing mature or old-growth forested wetlands that are over 0.25 acre and dominated by slow-growing tree species such as redcedar (*Thuja plicata*), Alaska yellow cedar (*Chamaecyparis nootkatensis*), pines (mostly western white pine, *Pinus monticola*), western hemlock (*Tsuga heterophylla*), Oregon white oak (*Quercus garryana*), and Engelmann spruce (*Picea engelmannii*).
Forests with Aspen Stands: Forested wetlands that include quaking aspen (*Populus tremuloides*) stands. Aspen stands are a WDFW Priority Habitats and Species habitat.
Wetlands that Perform Many Functions Very Well: Wetlands scoring 22 points or more (out of 27) from the rating of functions.
Eastern Washington Category II wetlands
Forested Wetlands in the Floodplains of Rivers: Forested wetlands in the floodplain that are critical to the proper functioning and dynamic processes of rivers, including influencing channel form and providing habitat for many aquatic species.
Mature and Old-growth Forested Wetlands with Fast-growing Trees: Mature and old-growth forested wetlands with over 0.25 acre of forest dominated by fast-growing native trees such as red alder (*Alnus rubra*), cottonwood (*Populus* spp.), willow (*Salix* spp.), quaking aspen, and birch (*Betula* spp.)
Vernal Pools: Vernal pool ecosystems are formed when small depressions in the scabrock or in shallow soils fill with snowmelt or spring rains. They retain water until the late spring when they dry out as a result of reduced precipitation and increased evapotranspiration. Vernal pools hold water long enough throughout the year to allow some strictly aquatic organisms to flourish, but not long enough for the development of typical wetland characteristics.
Wetlands that Perform Functions Well: Wetlands scoring between 19 and 21 points (out of 27) on the questions related to functions. Includes wetlands judged to perform most functions relatively well or one group of functions very well and the other two moderately well.
Western Washington Category I wetlands
Large Undisturbed Estuarine Wetlands: Relatively undisturbed estuarine wetlands that are larger than 1 acre.
Wetlands of High Conservation Value: Wetlands previously called Natural Heritage Wetlands that have been identified by the Washington Natural Heritage Program as important ecosystems for maintaining plant diversity in the state.
Bogs: Wetlands with peat soils and a low pH (typically < 5) that support plants and animals specifically adapted to such conditions. Bogs do not tolerate changes or disturbance well, with even minor changes in water quality or nutrient inputs potentially resulting in major adverse effects on the plant and animal communities. They are also extremely slow to develop.
Wetlands with Mature/Old-growth Forests: Mature and old-growth forested wetlands over 1 acre in size.
Wetlands in Coastal Lagoons: Relatively undisturbed wetlands in coastal lagoons (shallow bodies of water that are partly or completely separated from the sea by a barrier beach) that are larger than 0.1 acre.
Interdunal Wetlands Larger than 1 Acre that Score High (8 or 9 points) for Habitat Functions: Interdunal wetlands are a type of wetland that form in the deflation plains and swales that are geomorphic features in areas of coastal dunes. These dune forms are the result of the interaction among sand, wind, water, and plants. For the purpose of rating, any wetlands that are located west of the upland boundary mapped in 1889 (western boundary of upland ownership) are considered to be interdunal.
Wetlands that Perform Functions at High Levels: Wetlands scoring 23 points or more (out of 27) on the questions related to functions are Category I wetlands.

Regional wetland category descriptions
Western Washington Category II wetlands
Smaller Estuarine Wetlands: Any estuarine wetland smaller than 1 acre, or those that are disturbed and larger than 1 acre.
Wetlands that Perform Functions Well: Wetlands scoring between 20 and 22 points (out of 27) on the questions related to functions. Includes wetlands judged to perform most functions relatively well or one group of functions very well and the other two moderately well.
Interdunal Wetlands Larger than 1 Acre or those in a Mosaic: Interdunal wetlands larger than 1 acre and that score 7 or lower for habitat, or those found in a mosaic of wetlands and dunes larger than 1 acre.

Source: Hruby 2014; Hruby and Yahnke 2023

Category III and IV wetlands are the most common types of wetlands in the state. As a result, most wetlands that would be encountered on potential development sites for utility-scale solar energy facilities are likely to be those types. Category III and IV wetlands typically provide moderate to low levels of functions and support relatively common plant and animal species. While such wetlands are still important (and regulated), they have likely experienced some level of disturbance and are easier to replace through compensatory mitigation. Permits that may be required for impacts on such areas are described in Section 3.3.

3.2.5 Floodplains

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps identify flood hazard areas regulated under the National Flood Insurance Program (NFIP). Special flood hazard areas are defined as areas that would be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year (i.e., the “100-year” flood) and generally form the basis for state and local floodplain management regulations. Local governments (cities and counties) are responsible for managing development in floodplains under the NFIP, and construction and development activities that involve grading or structural improvements in the floodplain typically require a floodplain development permit from the local jurisdiction.

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 (Risk MAP) program tools available on the FEMA website (https://www.fema.gov/flood-maps/tools-resources/risk-map).

3.3 Potentially required permits

The following permits related to water resources would potentially be required for construction, operation, or decommissioning activities for typical solar energy facilities:

- **CWA Section 404 Permit (U.S. Army Corps of Engineers [USACE]):** Required for activities that involve the discharge of dredged or fill materials in waters of the United States, including streams and wetlands.

- **CWA Section 401 Water Quality Certification (Ecology/USEPA/Tribes):** Required for activities affecting a water of the United States and needing a federal permit or license (e.g., USACE Section 404 permit). Verifies whether projects can meet water quality standards.
- **Chapter 90.48 Revised Code of Washington (RCW) authorization:** Impacts on non-federally regulated waters and wetlands may require authorization from Ecology pursuant to Chapter 90.48 RCW (Water Pollution Control).
- **Hydraulic Project Approval (HPA) (Washington Department of Fish and Wildlife [WDFW]):** Required for projects in or near state waters that use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state. Intended to ensure that construction is done in a way that protects fish and aquatic habitats.
- **CWA Section 402 National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit (Ecology):** Required for construction that disturbs more than 1 acre of land and has potential to discharge stormwater to state surface waters or construction disturbance of any size that has the potential to be a significant contributor of pollutants or may be expected to cause a violation of any water quality standard (including groundwater standards).
- **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).
- **Water Right (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 (e.g., typically domestic and industrial uses less than 5,000 gallons per day each, although some areas are more restrictive).
- **Critical Areas Permit (Local Agency):** Must be obtained for construction and development activities within designated critical areas regulated by local jurisdictions, including vegetated buffers adjacent to streams and wetlands, critical aquifer recharge areas, and frequently flooded areas.
- **Local Agency Shoreline Permit (Local Agency):** Needed for development within shoreline zones adjacent to surface waters and regulated by local jurisdictions under the Shoreline Master Programs and code.
- **Local Agency Floodplain Development Permit (Local Agency):** Needed for development activities including grading within special flood hazard areas mapped by FEMA.

3.4 Small to medium utility-scale solar energy facilities of 20 MW to 600 MW (Alternative 1)

3.4.1 Impacts from construction

3.4.1.1 Surface water

3.4.1.1.1 Water quantity

Site characterization and construction activities could impact surface water flows for facilities that involve elements within or adjacent to streams, such as for a facility access road crossing of a stream. Streamflows could be temporarily re-routed from their natural channels by diversions needed to construct such crossings. Permanent alterations to streams could occur if culvert installations are needed at access road crossings, which if not adequately designed and sized, could restrict streamflow conveyance. 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 for facility construction would impact flow rates and volumes of surface runoff reaching nearby streams. Vegetation clearing and soil compaction in site investigation and construction areas would reduce the land's potential to absorb and infiltrate precipitation, potentially leading to increases in stormwater peak flows.

Construction of operations and maintenance buildings and service roads associated with solar energy facilities would add impervious surface area, with building structures up to 5,000 square feet in size assumed for small to medium facilities. 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 streams.

In addition to increased stormwater runoff from impervious surface additions, construction of facility elements would alter drainage patterns in other ways. Facility changes in site topography from grading for site improvements, installation of access roads interrupting natural surface runoff patterns, and installation of utility trenches acting as a conduit for surface flow all affect how surface runoff moves across a site to nearby streams. Additionally, the solar arrays themselves, which are assumed to cover up to 6,000 acres of ground for facilities considered in this alternative, could impact local drainage patterns by redirecting where precipitation falls on the land (i.e., reducing precipitation that reaches the ground directly below each panel) and how it infiltrates or flows to surface waters.

3.4.1.1.2 Water quality

Site characterization and construction activities could adversely affect surface water quality in several ways. In-water construction for elements such as new stream crossings for roads would temporarily elevate stream turbidity levels from sediment disturbance and temporary water management (e.g., bypassing and then re-introducing flows). Soil disturbance from establishing initial site access for geotechnical surveys or to install meteorological towers or from construction activity anywhere on a site would temporarily increase erosion potential and sediment transport to receiving waters in runoff or by wind, contributing sediment 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.

The presence of construction equipment and materials would increase the potential for associated pollutants to enter surface waters during in-water construction or through stormwater runoff from areas of upland construction. Typical construction equipment could include bulldozers, loaders, graders, mobile cranes, pumps, pile drivers, and trucks. Potential pollutants from operating such equipment would include fuel (gasoline and diesel fuel), oil, grease, coolant, and hydraulic fluid. If a photovoltaic panel breaks during transport or installation, chemicals could be released by leaching rainwater that falls on broken modules. This water could be transported in runoff and could eventually be transported to groundwater.

Fuel may be stored on the facility in an aboveground storage tank for equipment and vehicle use. 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. Environmental health and safety impacts are discussed in the *Environmental Health and Safety Resource Report* (ESA 2024).

Construction would include on-site concrete pouring and could also include concrete production at on-site batch plants. Concrete production and pouring create the potential for introducing high-pH discharges to surface waters if not properly managed, which could elevate stream pH levels.

Proponents would be required to complete activities in compliance with applicable permits such as an NPDES permit. Implementation of permit requirements would reduce impacts to surface water quality.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the construction of small to medium facilities would likely result in **less than significant impacts** on surface water.

3.4.1.2 Groundwater

Site characterization and construction for solar energy facilities—including groundwater or geotechnical drilling and testing to gather information or construction of foundations for buildings and electrical substations—would include subsurface excavation and fill and concrete pouring and 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 excavation.

The construction of new impervious surfaces in the form of facility buildings (up to 5,000 square feet for each facility) 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. This would result from impervious surfaces preventing infiltration of rainfall and snowmelt in the impervious surface footprints and directing runoff to locations adjacent to those footprints. The installation of new solar panels would have a similar effect but to a lesser extent, with solar panels reducing precipitation reaching the ground directly below the panels but maintaining infiltration capabilities of the underlying ground.

Some facilities may include on-site water well installation and groundwater extraction to support construction and would require a water right (see Section 3.4.1.3). Wells using groundwater may result in localized water table drawdown.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the construction of small to medium facilities would likely result in **less than significant impacts** on groundwater.

3.4.1.3 Water availability and water rights

Construction of solar energy facilities would create a water use need for supplying drinking water to construction workers, which are estimated to number between approximately 100 and 400 workers. Additionally, facilities would require a water supply during construction for fugitive dust control, equipment cleaning, and concrete production. Water for some facilities may be available from existing municipal sources or may be transported by truck to the site. Other facility sites may require obtaining water from new surface water diversions or groundwater withdrawals.

Diversions of surface water for construction would require obtaining a water right prior to diversion. Groundwater pumping would also require a water right if withdrawals exceeded 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 vary by location in the study area. Water rights may not be granted in watersheds that are already over-appropriated and subject to instream flow requirements that are often not met.

If facilities need a water supply from ground or surface water on-site, they would be required to obtain a water right for construction water needs. If water is not available, a water right will not be issued.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the construction of small to medium facilities would likely result in **less than significant impacts** on water availability or water rights.

3.4.1.4 Wetlands

Impacts to areas and functions of wetlands could occur during both the site characterization and construction phases of small to medium sized utility-scale solar energy facilities. Wetlands 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 in the vicinity of wetlands could introduce invasive plant species, change surface drainage patterns, and/or introduce sediments or pollutants into adjacent wetlands via runoff.

Wetlands may be present on a potential facility site and the types of wetlands would be identified as part of the site characterization phase. The type, size, and amount of wetland would determine the degree of potential impact. If wetland impacts are likely, project developers comply with a mitigation sequencing process in order to achieve the state goal of no net loss of wetland acreage and function. For projects involving unavoidable impacts to wetlands, compensatory mitigation will generally be required 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.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the construction of small to medium facilities would likely result in **less than significant impacts** on wetlands.

3.4.1.5 Floodplains

Site characterization and construction activities could impact floodplains for solar energy facilities that involve elements within or adjacent to a stream, 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 streams could occur with culvert installations at access road crossings, which could restrict natural stream and floodplain functions for flood storage, sediment transport, and large wood transport and could also restrict aquatic species movements. WAC 220-660-190 requires culverts for fish-bearing streams be designed to pass 100-year flood flow and debris. County and city codes have requirements for floodplain development permits for construction in floodplains regulated under the NFIP.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the construction of small to medium facilities would likely result in **less than significant impacts** on floodplains.

3.4.2 Impacts from operation

3.4.2.1 Surface water

Operation and maintenance of solar energy facilities would involve the on-site storage and use of potential pollutants including oil for electrical transformers (up to 600 gallons per transformer) and fuel and oil for generators to provide backup power. Fuel is expected to be stored in aboveground storage tanks with containment. If more than 1,320 gallons are stored on site, a facility must have a plan to prevent, control, and respond to spills. 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. Environmental health and safety impacts are discussed in the *Environmental Health and Safety Resource Report*.

The addition of impervious surfaces for buildings and access roads, combined with on-site oil and fuel storage and the periodic presence of maintenance vehicles and equipment on the site, 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.

Maintenance of solar panels could involve periodic washing of the panels with water, to remove particulates that accumulate on the surface of the panels. If water were to be applied excessively, runoff from panel washing could cause localized erosion and increase the potential for sediment transport to nearby streams. It is assumed that no surfactants would be used in panel washing.

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 surface water.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the operation of small to medium facilities would likely result in **less than significant impacts** on surface water.

3.4.2.2 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.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, operation of small to medium facilities would likely result in **less than significant impacts** on groundwater.

3.4.2.3 Water availability and water rights

Water supply would be needed to operate and maintain solar energy facilities for use in buildings and potentially to allow periodic washing of solar panels. If water is used for solar panel washing, a small to medium facility could use up to 3.3 million gallons per year, though this would vary based on panel size, soiling rates, and cleaning frequency. This use rate is equal to an average of approximately 9,000 gallons per day, which would exceed the 5,000 gallons per day industrial use threshold to qualify for a groundwater permit exemption in many locations in Washington. Such a withdrawal rate from an on-site well would require a water right. As an alternative to washing solar panels with water, waterless cleaning methods, including use of soft brushes, may be feasible for removing particulates from panel surfaces.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the operation of small to medium facilities would likely result in **less than significant impacts** on water availability or water rights.

3.4.2.4 Wetlands

General operating procedures are unlikely to affect wetlands because they typically involve relatively passive activities that do not readily alter the landscape once the infrastructure is installed. Potential water quality impacts on wetlands could occur during periodic washing of solar panels or rain events, which could create runoff that carries sediment. Spills of pesticides, fuel, vehicle fluids, or other hazardous materials used or stored at the facility could impact nearby wetlands 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. 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.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the operation of small to medium facilities would likely result in **less than significant impacts** on wetlands.

3.4.2.5 Floodplains

Potential operation and maintenance impacts on floodplains would be similar to those described previously 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 water velocity attenuation. Overall, 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.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the operation of small to medium facilities would likely result in **less than significant impacts** on floodplains.

3.4.3 Impacts from decommissioning

3.4.3.1 Surface water

The potential for temporary water quality impacts on surface waters from facility and road decommissioning would be similar to some of the impacts associated with construction. 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. Temporary ground disturbance from structure and access road removal, and from site grading to restore original grades after structure and road removal, would temporarily increase the erosion potential of the site and increase the potential for exposed soils to reach nearby streams through runoff or by wind. Revegetation of temporary disturbance areas would limit the length of time soils are exposed. Structure removal at decommissioning would restore pre-facility drainage patterns.

The presence of construction equipment would increase the potential for associated pollutants to enter surface waters during decommissioning activities. Potential pollutants from operating such equipment 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. Environmental health and safety impacts are discussed in Section 4.8 of the *Environmental Health and Safety Resource Report*. 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 to surface water. Water must meet discharge requirements but could elevate stream pH levels if not properly managed.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the decommissioning of small to medium facilities would likely result in **less than significant impacts** on surface water.

3.4.3.2 Groundwater

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.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the decommissioning of small to medium facilities would likely result in **less than significant impacts** on groundwater.

3.4.3.3 Water availability and water rights

Decommissioning activities would create a temporary demand for water supply that is similar in magnitude to the demand described for construction. Water would be needed for on-site workers and likely for fugitive dust control while ground disturbance for decommissioning is underway. Water supply could also be needed to irrigate site restoration plantings for some period after structures are removed and grading is complete, until successful plant establishment.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the decommissioning of small to medium facilities would likely result in **less than significant impacts** on water availability or water rights.

3.4.3.4 Wetlands

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 in those areas. Decommissioning activities could result in or increase soil compaction that could affect soil infiltration and alter drainage patterns.

Such impacts would be minimized by the implementation of erosion control measures and BMPs and via prompt revegetation and decompaction of disturbed soils. As with construction and operations, decommissioning work would increase the potential for spills and leaks of fuel and other vehicle fluids from construction equipment to enter wetlands. Removal of facility infrastructure and access roads could also alter drainage patterns on the site, potentially affecting wetlands that occur in the vicinity.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the decommissioning of small to medium facilities would likely result in **less than significant impacts** on wetlands.

3.4.3.5 Floodplains

Potential decommissioning-related impacts on floodplains would be similar to those described previously for surface waters. Temporary work activity and ground disturbance in the floodplain could result in temporary impacts on floodplain functions. Floodplain functions could be restored to pre-facility conditions following structure and road removal and restoration grading and planting.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, the decommissioning of small to medium facilities would likely result in **less than significant impacts** on floodplains.

3.4.4 Actions to avoid and reduce impacts

This section identifies the types of actions that should be considered to ensure water resources avoid and reduce impacts. Site-specific measures to avoid and minimize impacts on water resources would need to be developed at the facility level.

3.4.4.1 Siting and design considerations

The following list identifies actions that could be taken by a facility proponent to avoid, minimize, and/or mitigate impacts on water resources when considering site locations and developing site designs for solar energy facilities.

- Conduct a hydrologic study of the site to understand the local surface water and groundwater hydrology. Identify site surface runoff and drainage patterns and groundwater levels and flow direction.
- Perform a wetland delineation on the site to identify and map any potential wetlands that may be present. 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 facility construction and operation, map their locations, and identify any off-site connections to surface waters.
- Avoid siting structures and roads within streams, wetlands, associated buffers, mapped floodplains and other frequently flooded areas, and critical aquifer recharge areas.
- Avoid siting structures in areas of known soil or groundwater contamination, or in direct proximity to impaired receiving waters.
- Where gen-tie or utility line crossings of streams cannot be avoided, prevent impacts on surface waters by spanning the stream (aboveground lines) or using horizontal directional drilling to cross beneath the stream (underground lines).
- Where stream and wetland impacts cannot be avoided, minimize impacts on water quality by working below the ordinary high water mark or within the wetland boundary during the dry season when no rain is predicted, and/or within the WDFW-recommended in-water work window for minimizing impacts on aquatic species.
- Minimize impacts of stream and wetland crossings by following applicable design guidelines (e.g., WDFW *Water Crossing Design Guidelines* [Barnard et al. 2013]) and adhering to regulations, including WAC 220-660-190 (Water Crossing Structures).
- Avoid alteration of existing drainage patterns to the extent practicable, especially in sensitive areas such as erodible soils or steep slopes.
- Avoid siting facility infrastructure in floodplains. If floodplains cannot be avoided, design the structures located within them so as not to restrict or redirect flows from their natural flow path.

3.4.4.2 Permits, plans, and best management practices

Small to medium solar energy facilities may require various federal, state, and local agency reviews and permits to ensure adequate protection of water resources. Obtaining water resources permits and successfully implementing permit conditions typically requires developing plans that document BMPs to avoid and minimize impacts. The following list identifies permits, plans, and BMPs that may be required.

- Diverting and using surface water requires a water right. In general, pumping groundwater from a well requires a water right unless it falls under the statutory groundwater permit exemption (RCW 90.44.050), which limits domestic and industrial uses to no more than 5,000 gallons per day each. Some WRIAs have more restrictive administrative groundwater permit exemptions, which should be verified for the facility location early in the planning process.
- A new water right would be issued by Ecology. Water availability for new water rights varies dramatically across the state. Many areas have administrative rules that close or limit water sources for new consumptive water rights. In those areas, all requests for new water rights will need to be fully mitigated. As an alternative, local water purveyors may have existing water right capacity to serve new solar energy facilities.
- An HPA would need to be obtained from WDFW for facilities in or near state waters that use, divert, obstruct, or change the natural flow or bed of such waters.
- Coverage under the Ecology NPDES Construction Stormwater General Permit would be needed for all facilities disturbing more than 1 acre of ground with potential to discharge to surface waters of the state, and NPDES Industrial Stormwater General Permit coverage may be needed during operation for sites with on-site oil and fuel storage and maintenance activities. Ecology requires that Stormwater Pollution Prevention Plans (SWPPPs) be prepared and implemented to ensure compliance with state and federal water quality standards. The SWPPPs need to include BMPs from the most recent version of Ecology's Stormwater Management Manual for Eastern Washington or Stormwater Management Manual for Western Washington, depending on site location.
- If the facility has an aggregate storage capacity of oil greater than 1,320 gallons or where a discharge could reach a navigable waterbody, either directly or indirectly, a Spill Prevention, Control, and Countermeasure (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. The SPCC Plan would be prepared in consultation with Ecology and pursuant to the requirements of *Code of Federal Regulations* Part 112, Sections 311 and 402 of the CWA, Section 402 (a)(1) of the Federal Water Pollution Control Act, and RCW 90.48.080.
- Facilities that involve a discharge of dredged or fill material to a water of the United States, including streams and wetlands, would need CWA Section 404 permit coverage from USACE. The application for Section 404 permit coverage would need to document BMPs the proponent will include to avoid and minimize impacts on water resources.
- For facilities that require a USACE Section 404 permit or another federal permit or license:
    - Section 401 Water Quality Certification is required. A pre-filing meeting request will be required 30 days prior to submitting a request for a Section 401 Water Quality Certification from Ecology. Additionally, when submitting a request for a Section 401 Certification Ecology may require submittal of a Water Quality Monitoring and Protection Plan and other supporting documentation.

    - Coastal Zone Management Act Federal Consistency is required if the facility is within one of the 15 coastal counties.
- Impacts on non-federally regulated waters and wetlands would require authorization from Ecology pursuant to Chapter 90.48 RCW (Water Pollution Control).
- Impacts to wetlands would require a wetland mitigation plan be developed in accordance with the state and federal interagency guidance in *Wetland Mitigation in Washington State* (Ecology et al. 2021).
- Impacts on stream and wetland buffers, floodplains and frequently flooded areas, and critical aquifer recharge areas would require local agency approvals pursuant to city and county floodplain and critical areas ordinances. Development within shoreline zones would require local agency permits pursuant to Shoreline Master Program requirements. Local agency requirements for water resources protection would need to be demonstrated and met for all of those approvals.
- Use highly visible fencing/flagging around streams, wetlands, and buffers to prevent unnecessary disturbance in sensitive areas and minimize the potential for downstream water quality impacts.
- Manage stormwater runoff from buildings, parking areas, panel washing activities, and access roads and properly maintain on-site sanitary wastewater systems to minimize water quality impacts on surface waters and wetlands from sediments and other potential contaminants.
- Implement BMPs for the use, transport, and storage of chemical and potentially hazardous materials at the facility.
- Install silt fencing throughout the site as a perimeter control, including on the contour downgradient of excavations, around buildings, and around the substations.

3.4.4.3 Additional mitigation measures

Additional measures that may help facilities avoid, minimize, or mitigate impacts on water resources are listed as follows:

- Use special construction techniques in areas of steep slopes, erodible soil, wetlands, impaired waterbodies, and stream channel crossings. Avoid creating potentially unstable slopes during excavation and blasting operations.
- Avoid creating hydrologic conduits between two aquifers during foundation excavation.
- Monitor any work performed near aquifer recharge areas to reduce the potential for contamination of the aquifer.
- Implement water conservation techniques to the extent practicable. Consider using soil stabilizers to reduce water needs for dust suppression.
- Restore pre-construction contours, decompact soil, and replant native hydrophytic vegetation in surface waters and wetlands temporarily disturbed by site characterization and construction activities.

3.4.5 Unavoidable significant adverse impacts

Through compliance with laws and permits and with implementation of actions to avoid and mitigate impacts described in Section 3.4.4, small to medium utility-scale solar facilities would have **no significant and unavoidable adverse impacts** on water resources from construction, operation, or decommissioning.

3.5 Large utility-scale facilities of 601 MW to 1,200 MW (Alternative 2)

3.5.1 Impacts from construction, operation, and decommissioning

The potential impacts on water resources described in Section 3.4 for small to medium size facilities also apply to large facilities for construction, operations, and decommissioning. The differences in facility size and scale could potentially be up to twice the size (up to 12,000 acres vs. 6,000 acres), with a higher number of electrical inverter/transformer stations (up to 90 vs. 30) and larger collector substations (10 acres vs. 5 acres). Buildings for operations and maintenance are assumed to be of similar range of sizes and areas. The larger size of the overall facility footprints would result in a proportionally greater area of ground disturbance for construction and potentially a longer duration of construction activity. Actual risks to water resources would depend on site-specific factors, but in general, the larger sites and facilities are expected to present an increased risk of erosion, sediment, and pollution-related impacts on water resources and an increased level of effort needed to manage those risks and avoid and minimize impacts. If water is used for solar panel washing, a large facility would require more water than the 3.3 million gallons per year estimated for smaller facilities, though this would vary based on panel size, soiling rates, and cleaning frequency. Facilities could also use dry cleaning methods.

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

3.5.2 Actions to avoid and reduce impacts

The same regulatory triggers and permitting needs identified in Section 3.4 would apply to large facilities. The available means of reducing impacts through avoidance and minimization measures; permits, plans, and BMPs; and additional mitigation measures are the same as those identified in Section 3.4.4.

3.5.3 Unavoidable significant adverse impacts

Through compliance with laws and permits and with implementation of actions to avoid and reduce impacts described in Section 3.4.4, large utility-scale solar energy facilities solar would have **no significant and unavoidable adverse impacts** on water resources from construction, operation, or decommissioning.

3.6 Solar facility and co-located battery energy storage system (Alternative 3)

3.6.1 Impacts from construction, operation, and decommissioning

The potential impacts on water resources described for facilities without a co-located battery energy storage systems (BESS) also apply to construction, operations, and decommissioning of facilities with a co-located BESS.

Co-locating BESSs with solar energy facility development would require some additional construction-related ground disturbance and an increased building footprint relative to facilities with no BESS. Battery storage containers are typically 40 feet by 8 feet by 8.5 feet and installed on concrete foundations designed for secondary containment. A warehouse-type enclosure of a similar scale and size may also be used.

A BESS at a solar energy facility would add another stormwater consideration to a facility and potentially another regulated element to be included in an Industrial SWPPP. Firefighters are not expected to use water for combating a fire at a BESS. Emergency response actions are to allow the fire to burn to prevent water contaminated with pollutants to affect surface water and groundwater quality.

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

3.6.2 Actions to avoid and reduce impacts

The actions for reducing impacts through avoidance and minimization measures; permits, plans, and BMPs; and additional mitigation measures are the same as those identified in Section 3.4.4, with the added recommendation that:

- BESS facilities and associated infrastructure should be located away from surface waters and wetlands.

3.6.3 Unavoidable significant adverse impacts

Through compliance with laws and permits and with implementation of actions to avoid and reduce impacts described in Section 3.4.4, solar energy facilities with a co-located BESS would have **no significant and unavoidable adverse impacts** on water resources from construction, operation, or decommissioning.

3.7 Solar facility combined with agricultural land use (Alternative 4)

3.7.1 Impacts from construction, operation, and decommissioning

The potential impacts on water resources described for facilities in Section 3.4 and 3.5 generally apply to facilities combined with agricultural use for construction, operations, and decommissioning.

There are some ways the impacts for facilities with co-located agricultural use would differ from facilities without agricultural land use:

- Because agricultural use would be combined with solar facilities, there would be a combined demand for water that is higher than for a solar energy facility growing crops than the same facility with no agricultural use. For sites with existing agricultural use, the increase in water demand would only result from the addition of a solar facility, as described for facilities in Sections 3.4 and 3.5. For sites where the type of agricultural use is changed or where agriculture is added, there could be increased demand for water. The demand for water could be higher for a site with irrigated crop production and lower for a site for livestock grazing. This could place a higher need for considering water availability and water rights issues.
- Substances commonly associated with farm operations such as pesticides, fertilizers, and livestock waste could lead to increased pollutants in stormwater runoff.

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

3.7.2 Actions to avoid and reduce impacts

The same regulatory triggers and permitting needs identified in Section 3.4 would apply to facilities' agricultural land use. The available means of reducing impacts through avoidance and minimization measures; permits, plans, and BMPs; and additional mitigation measures are the same as those identified in Section 3.4.4.

3.7.3 Unavoidable significant adverse impacts

Through compliance with laws and permits and with implementation of actions to avoid and reduce impacts described in Section 3.4.4, solar energy facilities combined with agricultural land use would have **no significant and unavoidable adverse impacts** on water resources from construction, operation, or decommissioning.

3.8 No Action Alternative

Under the No Action Alternative, the city, county, and state agencies would continue to conduct environmental review and permitting for utility-scale solar energy development under existing state and local laws on a facility-by-facility basis.

Facilities developed under the No Action Alternative would be subject to the same regulatory standards and water resources permit conditions as those for other facility types evaluated in this PEIS.

Through compliance with laws and permits and with implementation of actions to avoid and mitigate significant impacts, utility-scale solar facilities would have **no significant and unavoidable adverse impacts** on water resources from construction, operation, or decommissioning.

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