

Appendix K: Land Use Technical Appendix

For Programmatic Environmental Impact Statement on Green Hydrogen Energy Facilities in Washington State

By

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For the

Shorelands and Environmental Assistance Program

Washington State Department of Ecology

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Acronyms and Abbreviations List

BESS	battery energy storage system
CESA	Compatible Energy Siting Assessment
CFR	Code of Federal Regulations
Commerce	Washington State Department of Commerce
DHS	Department of Homeland Security
DNR	Washington State Department of Natural Resources
DoD	Department of Defense
Ecology	Washington State Department of Ecology
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GMA	Washington State Growth Management Act
LAMIRDS	limited areas of more intensive rural development
NFIP	National Flood Insurance Program
OFM	Office of Financial Management
PEIS	Programmatic Environmental Impact Statement
RCW	Revised Code of Washington
SED	shoreline environment designation
SMP	Shoreline Master Program
SSDP	Shoreline Substantial Development Permit
UGA	urban growth area
USC	U.S. Code
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

Summary

This technical appendix describes land uses in the study area. It also describes the regulatory context and potential impacts and actions that could avoid or reduce impacts.

This technical appendix analyzes the following key features of land use for each of the green hydrogen facility types evaluated in the Programmatic Environmental Impact Statement:

- Land use planning designations
- Land use constraints
- Consistency with plans, policies, and regulations

Findings for land use impacts described in this technical appendix are summarized as follows:

- Through compliance with laws and permits, and with implementation of measures to avoid and reduce impacts, construction, operation, and decommissioning activities would result in **less than significant impacts** on land use.
- Through compliance with laws and permits, and with implementation of actions to avoid and mitigate significant impacts, green hydrogen facilities would have **no significant and unavoidable adverse impacts** on land use from construction, operation, or decommissioning.

1 Introduction

This technical appendix describes land uses within the study area and assesses probable impacts associated with types of green hydrogen facilities, and a No Action Alternative, which are described in Chapter 2 of the State Environmental Policy Act Programmatic Environmental Impact Statement (PEIS).

This section provides an overview of the aspects of land use and lists relevant regulations that contribute to the evaluation of potential impacts.

1.1 Resource description

Land use refers to how land is developed for various human uses or preserved for natural purposes. This section describes the current land use conditions in the green hydrogen facilities study area and the potential changes resulting from the facility types. It also generally evaluates the consistency of the facility types with applicable federal, state, and local regulations, plans, and policies. Mitigation measures that can be used to reduce impacts are also described.

In the study area, the following resources could have impacts that overlap with impacts to land use. Impacts on these resources are reported in their respective technical appendices:

- **Aesthetics and visual quality:** This technical appendix provides information regarding potential aesthetics and visual quality impacts on land uses.
- **Biological resources:** This technical appendix evaluates potential impacts on existing wildlife and habitat areas.
- **Environmental health and safety:** This technical appendix evaluates potential health and safety impacts on people and the environment.
- **Noise and vibration:** Evaluates potential noise and vibration impacts on residences, other sensitive receptors, and structures.
- **Recreation:** This technical appendix evaluates potential impacts on recreation areas.
- **Transportation:** This technical appendix evaluates potential impacts on transportation.
- **Tribal rights interests, and resources:** This technical appendix provides information on Tribal rights, interests, and resources.

1.2 Regulatory context

Table 1 summarizes the primary land use plans, policies, and regulations that apply to green hydrogen facility development in Washington.

Table 1. Applicable laws, plans, and policies

Regulation, statute, guideline	Description
Federal	
Coastal Zone Management Act (CZMA; 16 U.S. Code [USC] 1451 et seq.)	Applies to projects in the state's 15 coastal counties that are proposed by a federal agency, require certain federal permits or licenses, or include certain federal funding sources. The Washington State Department of Ecology (Ecology) provides consistency review in coordination with the federal action agency. The National Coastal Zone Management Program aims to balance competing land and water issues through state and territorial coastal management programs. Projects located within any of Washington's 15 coastal counties and requiring a federal authorization, certification, license, or permit require a certificate of consistency with the CZMA.
Flood Control Act and National Flood Insurance Act; Federal Emergency Management Agency (33 USC 15, 42 USC 50)	Allows property owners in participating communities to purchase flood insurance. Requires participating jurisdictions to implement floodplain management regulations that reduce future flood damage.
Energy Facility Planning Process (15 Code of Federal Regulations [CFR] 923.13)	The Coastal Zone Management Program must contain a planning process for energy facilities likely to be located in or that may significantly affect the coastal zone, including a process for anticipating the management of the impacts resulting from such facilities.
Safe, efficient use, and preservation of the navigable airspace (14 CFR 77)	The requirements to provide notice to the Federal Aviation Administration of certain proposed construction or the alteration of existing structures.
Rights of States and Political Subdivisions (16 USC 839g(a))	Guarantees the right of counties and cities to make energy facility siting decisions, including, but not limited to, determining the need for a particular facility, evaluating alternative sites, and considering alternative methods of meeting the determined need within the Federal Columbia River Power System.
State	
Washington State Growth Management Act (GMA) (Chapter 36.70A Revised Code of Washington [RCW])	Requires fast-growing cities and counties to develop a comprehensive plan to manage their population growth. Establishes a series of 15 goals that should act as the basis of all comprehensive plans. Requires all cities and counties to designate natural resource lands (forestry, agriculture, fisheries, and mining) and identify steps to preserve them. Requires all cities and counties to adopt critical areas regulations.
Major Industrial Developments (RCW 36.70A.365, 36.70A.367, and 36.70A.368; Washington Administrative Code [WAC] 365-196-465 and 365-196-470)	Counties may establish a process for approval of a major industrial development outside of the Urban Growth Area for a specific business. A "major industrial development" is defined as a "master planned location for a specific manufacturing, industrial, or commercial business" (RCW 36.70A.365). The process for approval must be established in consultation with cities.
Local Project Review (Chapter 36.70B RCW)	The Local Project Review Act was established after the passage of the GMA, as the statewide framework for local government land use planning review and development permitting. Fundamental land use planning

Regulation, statute, guideline	Description
	choices made in adopted comprehensive plans and development regulations serve as the foundation for project review.
Forest Practices Rules (Title 222 WAC), Forest Practices Act (Chapter 76.09 RCW)	Establish standards for timber harvesting, pre-commercial thinning, road construction, fertilization, forest chemical application, and other forest practices applications.
Floodplain Management (Chapter 173-158 WAC, Chapter 86.16 RCW)	Statewide floodplain management regulations. Establishes state requirements that equal the minimum federal requirements for the National Flood Insurance Program, in addition to higher standards. Applies to the planning, construction, operation, and maintenance of any structures or improvements that might affect the flooding regimen of a water body.
Project Consistency (Chapter 365-197 WAC)	A basic principle of the GMA and the Local Project Review Act is that land use decisions made in adopting a comprehensive plan and development regulations under Chapter 36.70A RCW should not be revisited during project review. When review of a project indicates that it is consistent with earlier land use decisions, that project should not be reevaluated or scrutinized with respect to whether those decisions were appropriate.
Washington State Shoreline Management Act (Chapter 90.58 RCW) and implementing guidelines (Chapter 173-26 WAC)	Requires all counties and most towns and cities with shorelines to develop and implement Shoreline Master Programs (SMPs). Establishes three policy areas: shoreline use, environmental protection, and public access. Requires SMPs to achieve “no net loss” of shoreline ecological functions.
Local	
Critical areas and floodplain codes	Implements federal and state minimum standards in addition to higher standards, if adopted, through local flood management ordinances. Requires review of proposed activities, implementation of flood-safe construction standards, and issuance of permits.
Countywide planning policies	A city or county must coordinate its comprehensive plan with any other cities or counties with which it shares a common border. To help facilitate this requirement, counties, in cooperation with cities within their boundaries, are responsible for establishing countywide planning policies that create a framework for where population growth and infrastructure investment will be directed within a given county.
Written notice to Department of Defense (DOD) for renewable energy projects (RCW 35.63.270, 35A.63.290, and 36.01.320; WAC 365-16-475)	Requires cities and counties to provide the DOD with written notice for alternative-energy permit applications.
Comprehensive plans	Local planning efforts by cities and counties that provide a vision for the community and identify steps needed to meet that vision.

Regulation, statute, guideline	Description
Zoning	Implements local comprehensive plans by establishing zoning maps and codes describing allowed uses and development standards in each zone.
Building and fire codes	Washington State statutes call for cities and counties to require a building permit when any structural change or alterations are made to an existing building or when any new construction is undertaken. Building and fire codes help to ensure that buildings and facilities constructed in the state are safe and healthy for building occupants, accessible to persons with disabilities and the elderly, and energy efficient.

The following section describes the regulatory context for local planning and permitting.

1.2.1 Washington State Growth Management Act

The Washington State Growth Management Act (GMA) (codified primarily in [Chapter 36.70A Revised Code of Washington](#)¹ [RCW]) requires fast-growing counties in the state to develop comprehensive plans to manage their population growth (Figure 1). The counties with lower population levels and/or growth that are not required to “fully plan” must still plan for critical areas and natural resource lands under the GMA (MRSC 2024b). The GMA requires much of the study area to plan fully.

A comprehensive plan designates and maps future land uses within a city or county. These future land uses are implemented through corresponding zoning designations. The zoning code specifies the types of uses allowed and design standards within each zone. If a proposed use or development does not meet the development standards for that zoning district, or the use or development is only allowed in that zoning district subject to a discretionary conditional use review and approval process, a zoning variance and/or conditional use permit would be required.

Comprehensive plans would be updated during the PEIS time frame. Counties planning under the GMA are required to update their comprehensive plans every 10 years to remain consistent with updated legislation and meet current statutes. The next round of periodic updates is anticipated to occur between 2024 and 2027. During this time, the local jurisdictions are required to look at their existing land uses and plan for ways to address needs over a 20-year planning period, including meeting the state’s GHG emissions limits through addition of a climate element to their comprehensive plans. A climate element can take the form of a single comprehensive plan chapter or be integrated into several chapters/elements such as housing, transportation, and land use. Cities and counties with a 2025 comprehensive plan periodic update deadline will be the first cities required to have a climate element (Whatcom, Skagit, Clallam, Jefferson, Mason, Thurston, Lewis and Clark Counties).

¹ <https://app.leg.wa.gov/rcw/default.aspx?cite=36.70a>

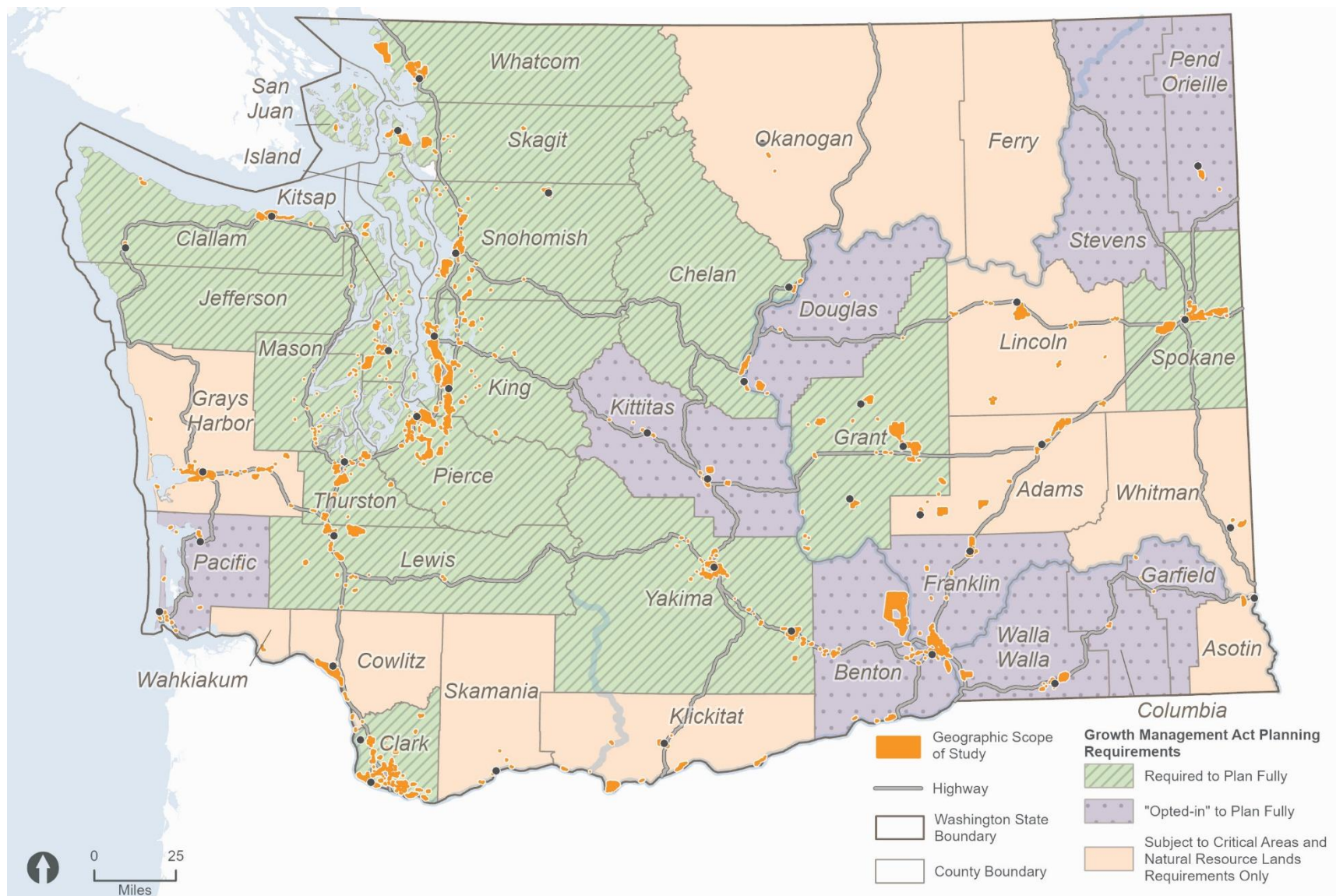


Figure 1. GMA county planning requirements

Source: Commerce 2017

1.2.1.1 Critical areas

The GMA requires all cities and counties in Washington to adopt regulations protecting critical areas in order to protect the natural environment, wildlife habitats, sources of drinking water, and human health and safety. [RCW 36.70A.030\(11\)](#)² defines five types of critical areas:

- Wetlands
- Areas with a critical recharging effect on aquifers used for potable water
- Fish and wildlife habitat conservation areas
- Frequently flooded areas
- Geologically hazardous areas

Local governments may have mapped these resources within their jurisdictions, or they may rely on state and federal agency resource mapping. Such maps provide a preliminary idea of what types of critical areas are present on a property, but this information must be supplemented by field investigations and reporting by qualified professionals.

Critical areas regulations include requirements such as the types of activities allowed within a critical area, as well as standard buffers and building setbacks. The regulations require mitigation sequencing for critical areas impacts similar to that discussed previously under the Shoreline Management Act. Proposed alterations to critical areas or their buffers for a renewable energy facility would require local agency critical areas review and, in some jurisdictions, a critical areas permit.

Local codes also usually include a separate flood hazard management section. The Washington State Department of Ecology (Ecology) is the state coordinating agency for floodplain management to ensure compliance with federal and state regulations. However, floodplain development permits are issued at the local level. Projects that would result in changed conditions affecting Federal Emergency Management Agency (FEMA) flood risk mapping may require a Conditional Letter of Map Revision or Letter of Map Revision from FEMA.

In-depth analyses of all critical areas in the study area of the Green Hydrogen PEIS; see the *Water Resources Technical Appendix*, *Biological Resources Technical Appendix*, and *Earth Resources Technical Appendix*.

1.2.2 Washington State Shoreline Management Act

Another state law implemented at the local level that dictates allowed land uses is the Washington State Shoreline Management Act ([Chapter 90.58 RCW](#)³). The Shoreline Management Act is implemented at the local through Shoreline Master Programs (SMPs). Local governments develop SMPs based on the act and state guidance, and the state ensures that

² <https://app.leg.wa.gov/rcw/default.aspx?cite=36.70a.030>

³ <https://app.leg.wa.gov/rcw/default.aspx?cite=90.58>

local SMPs consider statewide public interests. The Shoreline Management Act applies to the following areas:

- All marine waters
- Rivers or streams with flows greater than 20 cubic feet per second
- Lakes larger than 20 acres
- Upland areas within 200 feet of those waters
- Floodways and adjacent floodplain areas
- Associated wetlands

Each local government designates different shoreline environment designations (SEDs) within its regulated shoreline areas. The SEDs are similar to different types of zoning and specify the types of activities allowed (the underlying zoning designation also applies). The SMP guidelines (Washington Administrative Code [\[WAC\] 173-26-211](https://app.leg.wa.gov/wac/default.aspx?cite=173-26-211)⁴) recommend a classification system with six basic shoreline environments: High Intensity, Shoreline Residential, Urban Conservancy, Rural Conservancy, Natural, and Aquatic.

The High Intensity environment focuses on water-oriented commercial, transportation, and industrial uses, with a priority on water-dependent uses. Non-water-oriented uses are generally not allowed except as part of mixed-use development, in limited situations where they would not conflict with or limit opportunities for water-oriented uses, or on sites where there is no direct access to the shoreline.

A Shoreline Substantial Development Permit is required from the applicable jurisdiction for renewable energy facilities proposed within SMP jurisdiction. If the facility does not meet all of the standard requirements for the applicable SED or is not permitted outright, a shoreline variance or shoreline conditional use permit is required, both of which also require review and approval by Ecology. Shoreline regulations require project developers to follow a stepwise “mitigation sequencing” process, which requires applicants to first avoid impacts to shorelines, then minimize impacts, and then compensate for unavoidable impacts.

1.2.3 Floodplain development permits

Local jurisdictions that participate in the National Flood Insurance Program (NFIP) require permits for any development within the Special Flood Hazard Area. The NFIP defines development as “Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials” (44 CFR 59.1). Communities that do not participate in or have not received FEMA-developed Flood Insurance Rate Maps or Flood Insurance Studies are required to review applications for all proposed construction and development within flood-prone areas. The study area overlaps FEMA IDs within the 100-year floodplain. Floodplain development permit requirements are outlined in the local flood ordinance or other development ordinances.

⁴ <https://app.leg.wa.gov/wac/default.aspx?cite=173-26-211>

1.2.4 Civil aviation corridors

The Federal Aviation Administration (FAA) is an agency of the U.S. Department of Transportation that oversees the safety of civil aviation. A notification to FAA is required for structures meeting specific height and location criteria. Notifications allow FAA to evaluate the effect of the construction or alteration on operating procedures; determine potential hazards to air navigation; identify mitigating measures to enhance safety; and chart new objects. Additional aviation resources are described in the *Transportation Technical Appendix* and *Public Services and Utilities Technical Appendix*.

1.2.5 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 military agencies to fulfill their mission requirements ([RCW 36.70A.530](https://app.leg.wa.gov/RCW/default.aspx?cite=36.70A.530)⁵). Development that is incompatible with this priority poses risks to operational efficiency and the safety of military personnel and the public. Energy developers and reviewers should consult with the Department of Defense (DoD) early during project planning to address these issues. Use the Compatible Energy Siting Assessment (CESA) mapping tool (described in Section 3.2.3.5) to identify military utilized airspace and if applicable, submit plans to the DoD. State law requires counties to provide the DOD with written notice for alternative-energy permit applications ([RCW 35.63.270](https://app.leg.wa.gov/RCW/default.aspx?cite=35.63.270),⁶ [35A.63.290](https://app.leg.wa.gov/RCW/default.aspx?cite=35A.63.290),⁷ and [36.01.320](https://app.leg.wa.gov/RCW/default.aspx?cite=36.01.320),⁸ [WAC 365-16-475](https://app.leg.wa.gov/WAC/default.aspx?cite=365-16-475),⁹ Commerce 2024b). Military airspace considerations are described in the *Transportation Technical Appendix*.

⁵ <https://app.leg.wa.gov/RCW/default.aspx?cite=36.70A.530>

⁶ <https://app.leg.wa.gov/rcw/default.aspx?cite=35.63.270>

⁷ <https://app.leg.wa.gov/rcw/default.aspx?cite=35A.63.290>

⁸ <https://app.leg.wa.gov/rcw/default.aspx?cite=36.01.320>

⁹ <https://app.leg.wa.gov/wac/default.aspx?cite=365-196-475>

2 Methodology

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

2.1 Study area

The study area for land use includes the PEIS geographic scope of study for green hydrogen facilities (Figure 2) and surrounding areas.

The study area for the evaluation of land use resources associated with construction and operation of green hydrogen facilities would be determined by identification of city and county industrially zoned areas or areas zoned to support industrial uses, such as areas with major port facilities that handle freight shipments, intermodal facilities, and airports.

Figure 2, which shows the PEIS geographic scope of study, does not include federal lands, national parks, wilderness areas, wildlife refuges, state parks, or Tribal reservation lands, but information related to these areas is provided in this section as context for the affected environment.

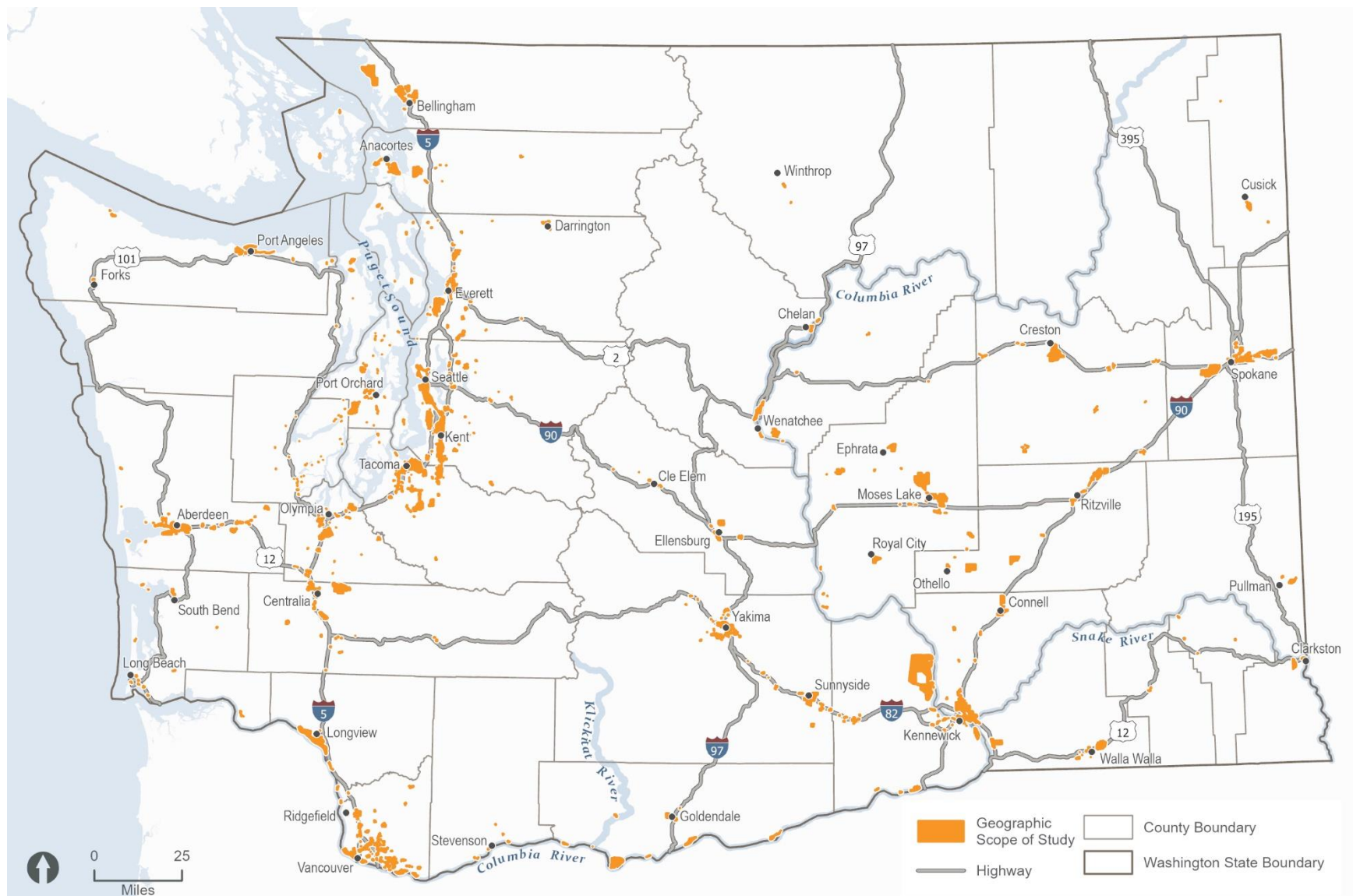


Figure 2. Green Hydrogen Energy Facilities PEIS geographic scope of study

2.2 Technical approach

The land use evaluation was based on a high-level review of regulations, plans, and policies (summarized in Table 1) as well as publicly available sources to generally characterize key land use considerations in the study area (e.g., zoning, comprehensive plan designation, shoreline jurisdiction, floodplains, and military resources). The types of facilities and activities anticipated under each facility type, as described in the PEIS Chapter 2, were reviewed and considered for how they could affect existing and future planned land uses.

This land use evaluation did not include field surveys. In addition, a detailed review of each county's plans or regulatory requirements was beyond the scope of this programmatic review.

The PEIS analyzes a timeframe of up to 25 years of potential facility construction and up to 50 years of potential facility operations (totaling up to 75 years into the future).

2.3 Impact assessment approach

For this technical appendix, potential impacts on land use are evaluated in the context of how new green hydrogen facilities would impact existing and planned land uses, including future viability. The analysis includes the potential impacts associated with site characterization, construction, operation, and decommissioning of green hydrogen facilities as related to the following:

- Changes to existing uses on public, state, Tribal, and private lands that surround or are near green hydrogen facilities
- Land use conflicts

For the purposes of this assessment, potentially significant impacts would occur if a facility resulted in the following:

- Substantial changes in the character of the existing built environment
- Permanent conversion or changes to existing low-intensity uses (primarily rural, agricultural, or resource land uses) or military uses

3 Technical Analysis and Results

3.1 Overview

This section describes the affected environment at the time this study was prepared (land uses and land ownership); anticipated permit requirements (with consideration for allowed uses and land use constraints); impacts of the different types of facilities (site characterization, construction, operation, and decommissioning); and measures that could be used to avoid or reduce impacts (siting and design considerations, permits, and best management practices).

3.2 Affected environment

This section provides an overview of population and land use types in the study area.

The local jurisdiction political subdivisions (cities and counties) of the state that overlap the PEIS geographic scope of study includes portions of 37 of the 39 counties in Washington (listed below); only Ferry and Stevens counties do not have any lands in the study area:

- Adams
- Asotin
- Benton
- Chelan
- Clallam
- Clark
- Columbia
- Cowlitz
- Douglas
- Franklin
- Garfield
- Grant
- Grays Harbor
- Island
- Jefferson
- King
- Kitsap
- Kittitas
- Klickitat
- Lewis
- Lincoln
- Mason
- Okanogan
- Pacific
- Pend Oreille
- Pierce
- San Juan
- Skagit
- Skamania
- Snohomish
- Spokane
- Thurston
- Wahkiakum
- Walla Walla
- Whatcom
- Whitman
- Yakima

3.2.1 Population

The estimated population of Washington State was approximately 7.95 million in 2023 (OFM 2023a). Population densities are generally highest on the west side of the Cascades (Figure 3).

The Washington State Office of Financial Management (OFM) tracks population changes across the state. Between 2020 and 2023, the state's population increased by 244,840 people, driven largely by people moving into the state (OFM 2023a). In 2023, population growth remained concentrated in more metropolitan areas, consistent with trends over the past few decades (see Figure 4 and Figure 5).

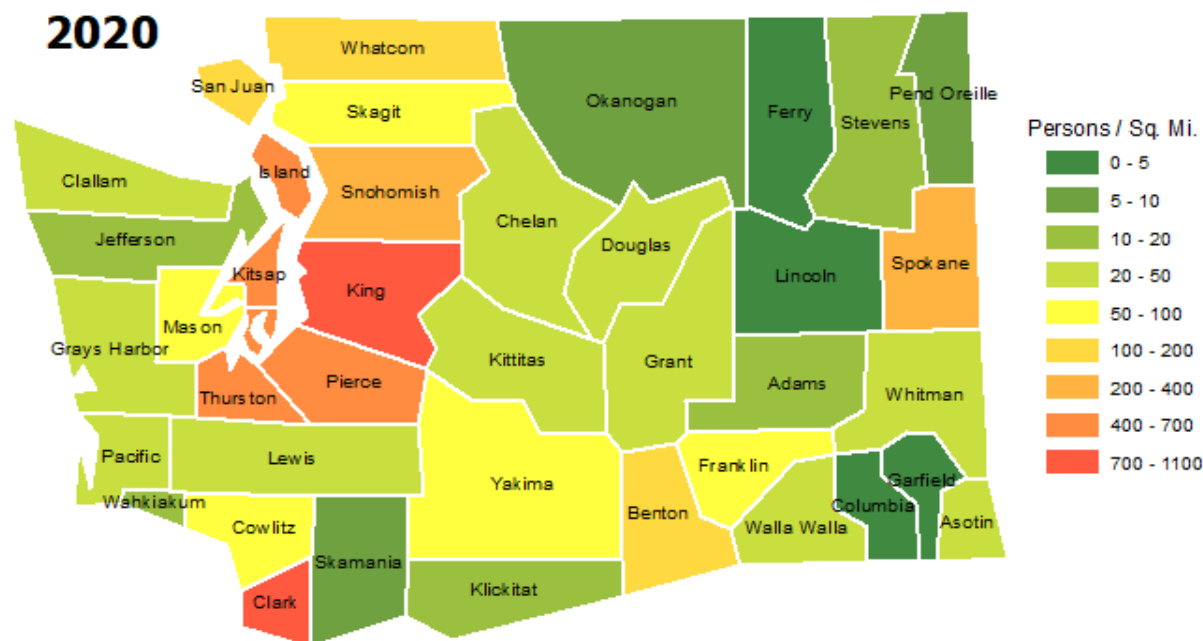


Figure 3. Population density by county in 2020

Source: OFM 2020

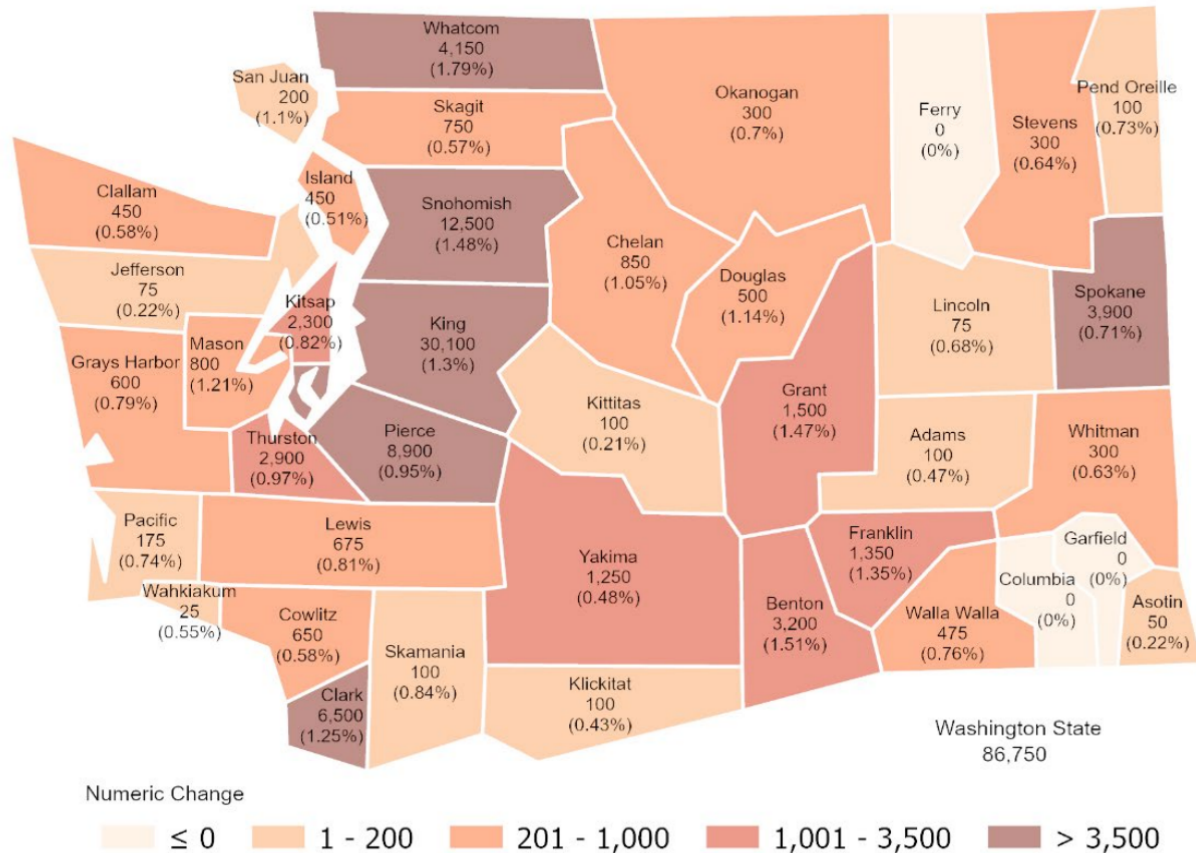


Figure 4. Population change by county in 2023

Source: OFM 2023a

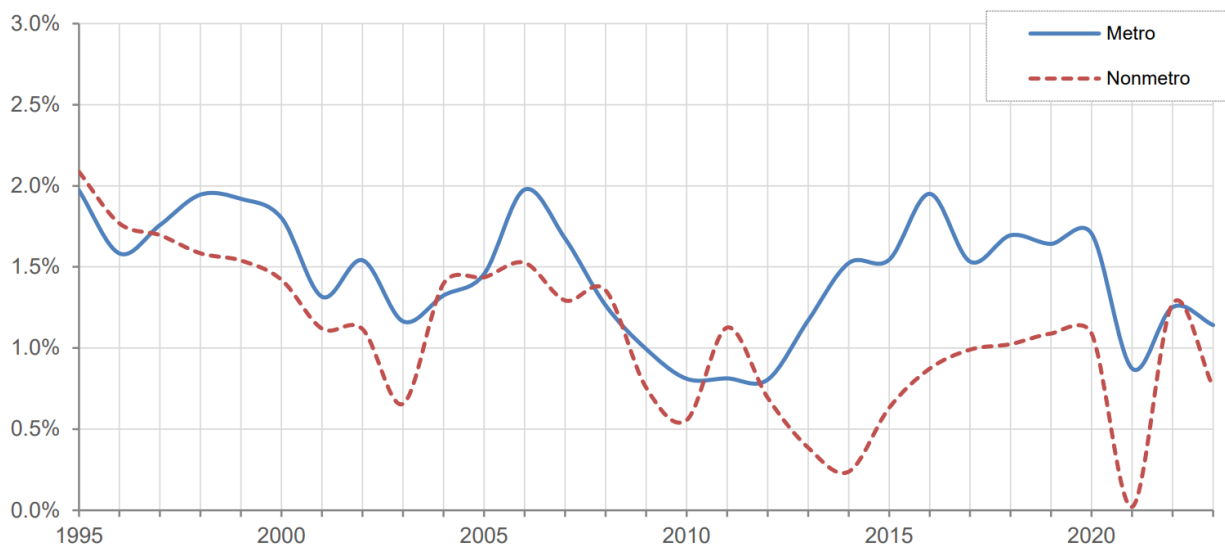


Figure 5. Population changes in metropolitan and non-metropolitan areas, 1995 to 2020

Source: OFM 2023a

The OFM expects Washington’s population to continue growing to almost 9.9 million in 2050 (a 28% increase compared to 2020 estimates), for an annual average growth rate of 0.8% (OFM 2023b). All counties in the state are predicted to grow in population by 2050 (OFM 2022).

3.2.2 Land ownership

The study area has a mix of private, public, and Tribal land ownership. The only Tribal land is the industrial zoned Puyallup Reservation property around the Port of Tacoma. Public ownership is largely associated with the port facilities and airports. Industrial sites are privately owned.

3.2.3 Land uses

Washington’s cities and unincorporated urban growth areas (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, land uses tend more toward agricultural, rural residential, forestry, wildlife conservation, and undeveloped recreation areas. This land use pattern reflects historic settlement of the state, resource extraction uses and associated transportation routes, and, since its enactment in 1990, the GMA.

The GMA seeks to focus growth in areas that have adequate public services, protect natural resource lands and critical areas, and generally discourage urban sprawl. Under the GMA, cities and counties in Washington are either “fully planning” or “partially planning.” Fully planning jurisdictions must meet all GMA requirements. Partially planning jurisdictions must meet only some GMA requirements. The study area contains both fully and partially planning jurisdictions.

3.2.3.1 Industrial land uses

Under the GMA, fully planning counties and cities are required to provide sufficient capacity of industrial lands suitable for development within their jurisdictions. Land uses that support industrial activity contribute to the region’s economy.

Industrial land uses include various land-intensive activities, often involving patterns of noise, light, and hours of operation. Industrial uses can include refineries, manufacturing, transportation (e.g., airports, rail, ports), warehousing, freight terminals, and laboratories (Puget Sound Regional Council 2024). During the process of identifying industrial lands, counties and cities consult with local economic development organizations to identify sites that are particularly well suited for industry. Suitable site characteristics often include ease of accessibility to rail or highways; large parcels; locations along major electrical transmission lines or pipelines; and locations near or adjacent to ports and commercial navigation routes. Other considerations include the availability of infrastructure and surrounding land use compatibility.

The PEIS geographic scope of study (Figure 2) is approximately 248,216 acres, with the majority made up of industrial lands. These lands include city and county industrially zoned areas or areas zoned to support industrial uses, such as areas with major port facilities that handle

freight shipments, intermodal facilities, and airports. Various types of land uses may occur adjacent to industrial lands on which green hydrogen facilities are anticipated to be located.

Limited areas of more intense rural development and major industrial developments

Under the GMA, rural areas are lands outside of designated urban areas and not in long-term resource use. Some industrial sites are in more rural environments since counties may designate “limited areas of more intensive rural development” (LAMIRDs) 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 (MRSC 2024a). Washington has many small communities with industrial uses located in rural areas.

Counties may establish a process for approval of a major industrial development outside of the UGA for a specific business. A “major industrial development” is defined as a “master planned location for a specific manufacturing, industrial, or commercial business” ([RCW 36.70A.365](https://leg.wa.gov/rcw/default.aspx?cite=36.70A.365)¹⁰). Some examples of major industrial developments in the study area include the Industrial Park at Transalta in Lewis County and the Cherry Point Rural Industrial Land Bank in Whatcom County.

Green hydrogen development

Based on the Washington State Department of Commerce (Commerce) legislative report that provided analysis about likely supply and demand expectations for green electrolytic hydrogen and renewable hydrogen in Washington state through 2050 (Commerce 2024), the state of Washington is expected to have a high demand for green electrolytic hydrogen and renewable fuels. To meet this demand, hydrogen and renewable fuels production must be developed in coordination with expanded renewable electricity capacity.

This development scenario would be reflected in the updated comprehensive plans. Growth patterns and energy needs would develop, consistent with the comprehensive plans. The geographic scope of study for the PEIS is in lands suitable for green hydrogen facilities. It is reasonable to assume that green hydrogen energy facilities would be developed on vacant industrial parcels or parcels that could be undeveloped. Future patterns of development, including green hydrogen energy facilities, would be required to comply with the comprehensive plan and zoning requirements, as updated.

3.2.3.2 Ports

Washington’s public ports system includes 75 distinct port districts across 33 of the 39 counties in the state (WCIT 2021). Washington’s public port districts include seaports, river ports, and airports. Ports facilitate trade, the movement of passengers, tourism, supply chains, industrial activities, and public spaces such as parks and other recreational spaces (Washington Ports 2017). Many public port districts invest in industrial and commercial lands to foster economic development in their communities.

¹⁰ <https://app.leg.wa.gov/rcw/default.aspx?cite=36.70a.365>

Port districts play an integral role in remediating parcels and preparing land for industrial and commercial development. Ports can then create industrial and commercial business parks to cluster together like-firms that require similar resources. Infrastructure investments such as water and sewer lines, utility hookups, and water treatment plants are common and further increase the attractiveness of sites for prospective companies.

The following port districts own facilities in the study area:

- Port of Anacortes
- Port of Bellingham
- Port of Benton
- Port of Clarkston
- Port of Everett
- Port of Grays Harbor
- Port of Kalama
- Port of Kennewick
- Port of Longview
- Port of Olympia
- Port of Pasco
- Port of Port Angeles
- Port of Seattle
- Port of Tacoma
- Port of Vancouver

Intermodal facilities support the movement of goods through two or more different modes of transport like truck, rail, sea, and air. Major freight intermodal facilities in Washington include cargo airports, rail intermodal terminals, and major ports handling freight shipment. The following ports and intermodal facilities are in the study area:

- BNSF Seattle International Gateway
- BNSF South Seattle Intermodal Facility
- BNSF Spokane Intermodal Facility
- Port of Quincy Intermodal Terminal
- Union Pacific Argo Intermodal Facility
- Union Pacific Tacoma South Intermodal Terminal

3.2.3.3 Airports

Washington has 138 public-use airports. Airports are integral parts of the state's transportation system. Airports range in size from the busiest airports in metropolitan areas, to community airports serving businesses and other private aircraft, to small landing strips in outlying locations (WSDOT 2011).

All towns, cities, and counties in Washington must discourage development of incompatible land uses adjacent to public-use airports through adoption of comprehensive plan policies and

development regulations ([RCW 36.70.547](https://app.leg.wa.gov/rcw/default.aspx?cite=36.70.547)¹¹). The Washington State Department of Transportation prepared the *Airports and Compatibility Land Use Guidebook* (WSDOT 2011) to assist local jurisdictions in determining compatible land uses around airports. The guidebook notes that most industrial lands are compatible with airport operations, particularly if such uses do not contain airspace obstructions. Accordingly, many jurisdictions allow industrial lands within their airport overlay zones.

The following airports are within the study area:

- Anacortes Airport (Anacortes)
- Auburn Municipal Airport (Auburn)
- Bellingham International Airport (Bellingham)
- Boeing Field/King County International Airport (Seattle/Tukwila)
- Felts Field (Spokane)
- Friday Harbor Airport (Friday Harbor)
- Grant County International Airport (Moses Lake)
- Orcas Island Airport (Orcas Island)
- Pangborn Memorial Airport (East Wenatchee)
- Pullman/Moscow Regional Airport (Pullman)
- Seattle-Tacoma International Airport (Sea-Tac)
- Snohomish County Paine Field Airport (Everett)
- Spokane International Airport (Spokane)
- Tri-Cities Airport (Kennewick, Pasco, Richland)
- Walla Walla Regional Airport (Walla Walla)
- William R. Fairchild International Airport (Port Angeles)
- Yakima Air Terminal, McAllister Field (Yakima)

The FAA is an agency of the U.S. Department of Transportation that oversees the safety of civil aviation. A notification to FAA is required for structures meeting specific height and location criteria. Notifications allow FAA to evaluate the effects of the construction or alteration on operating procedures; determine potential hazards to air navigation; identify mitigating measures to enhance safety; and chart new objects. Green hydrogen project developers could be required to consult with FAA to construct or alter certain objects of a certain height within navigable airspace or install lighting or marking the objects.

3.2.3.4 Refineries

A refinery is an industrial facility used to produce fuels from crude oil, unfinished oils, natural gas liquids, or other hydrocarbons. The fuels may be transported from the refinery by pipeline, marine vessel, rail, or truck. There are five refineries located in Washington State in four cities:

- **Anacortes:** HF Sinclair and Marathon
- **Blaine:** BP Cherry Point
- **Ferndale:** Phillips 66
- **Tacoma:** US Oil

¹¹ <https://app.leg.wa.gov/rcw/default.aspx?cite=36.70.547>

3.2.3.5 **Military use areas**

Washington's largest federal military installations operate under the DoD at locations distributed across the state, with the highest concentration of installations and personnel around Puget Sound.

While Puget Sound hosts the highest concentration of military installations in the state, with multiple services represented, the U.S. Army, Air Force, and non-DOD defense facilities form a significant part of communities in central and eastern Washington. Washington also hosts the Washington Military Department's base in Pierce County and a U.S. Coast Guard base in Seattle, which falls under the authority of the Department of Homeland Security (DHS). Each of the services relies on major bases as well as many support facilities or sites located throughout the state, although the following represent some of the state's primary installations:

- Fairchild Air Force Base
- Joint Base Lewis-McChord and Yakima Training Center
- Naval Air Station Whidbey Island and Naval Outlying Field–Coupeville
- Naval Base Kitsap–Bangor, Keyport and Puget Sound Naval Shipyard and Intermediate Maintenance Facility
- Naval Station Everett
- U.S. Coast Guard–District 13, under DHS
- Washington Military Department headquarters at Camp Murray

Washington State Compatible Energy Siting Assessment

In 2022, the Washington State Department of Commerce published a report about Washington's clean-energy trends, civilian-military coordination needs, and best practices to foster early and ongoing consultation in energy siting. It describes military bases in the state as well as military needs for land, airspace, and offshore areas for logistics, training, and testing. The study also included development of a prototype, online mapping tool for renewable energy projects and military needs, which is available at: <https://cesa-wacommerce.hub.arcgis.com/>

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 and project reviewers must consult with the DoD early during project planning to address these issues. Use the CESA map tool to identify military utilized airspace and if applicable, they must submit plans to the DoD (Commerce 2024b). Figure 6 through Figure 8 show DoD military

facilities and airspace identified in the CESA Map Tool.¹² State law requires counties to provide the DoD with written notice for alternative-energy permit applications (RCW 35.63.270, 35A.63.290, and 36.01.320; WAC 365-16-475; Commerce 2024a).

¹² Notice on CESA Map Tool: This CESA Map Tool is under development and should not be used for planning or decision-making purposes. This tool may not contain the most current information for features displayed, including military training, testing, and operating areas where military operations are suggested. This is only a sample tool and is not authorized for official use.

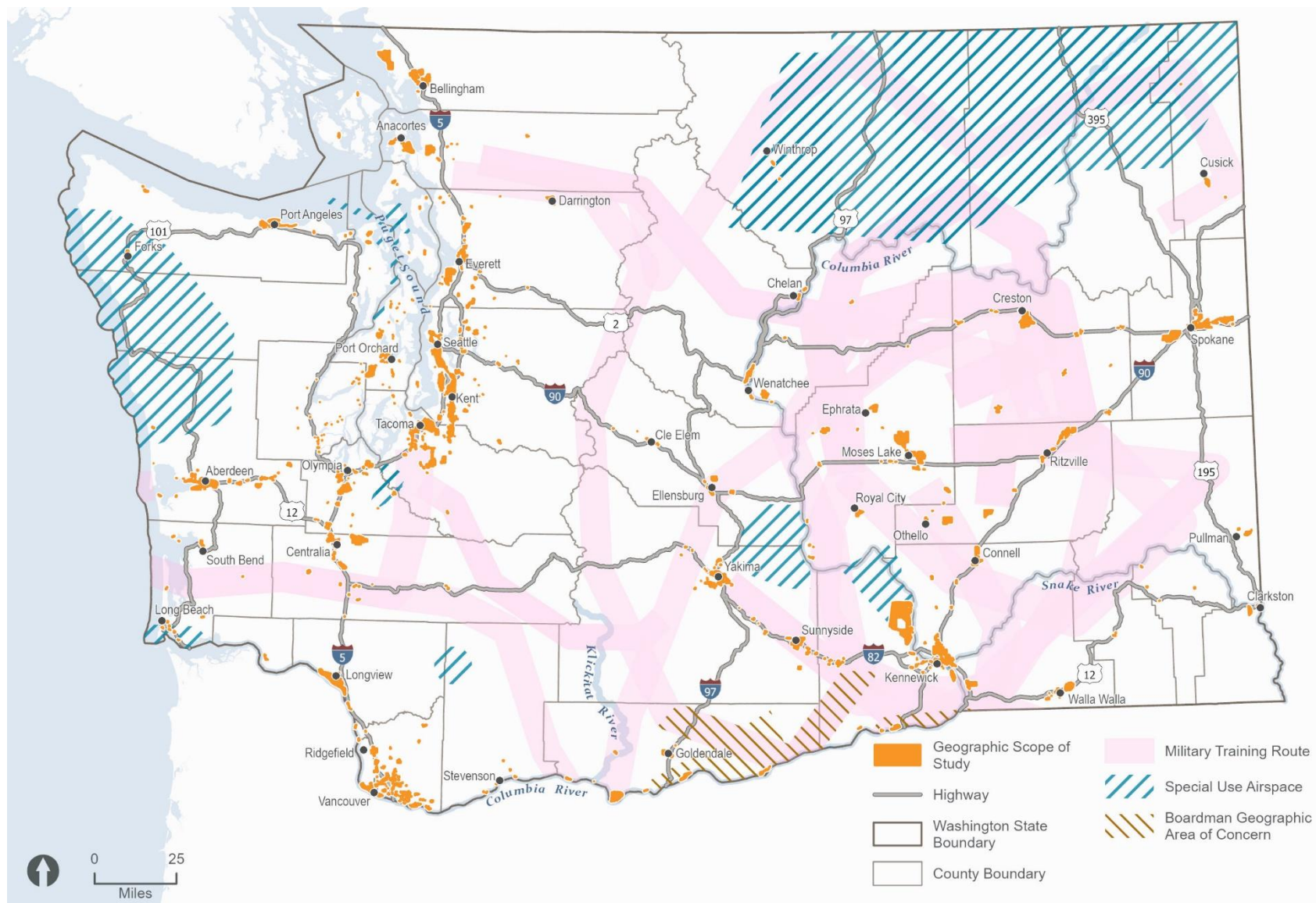


Figure 6. Military utilized air space

Source: Commerce 2024b

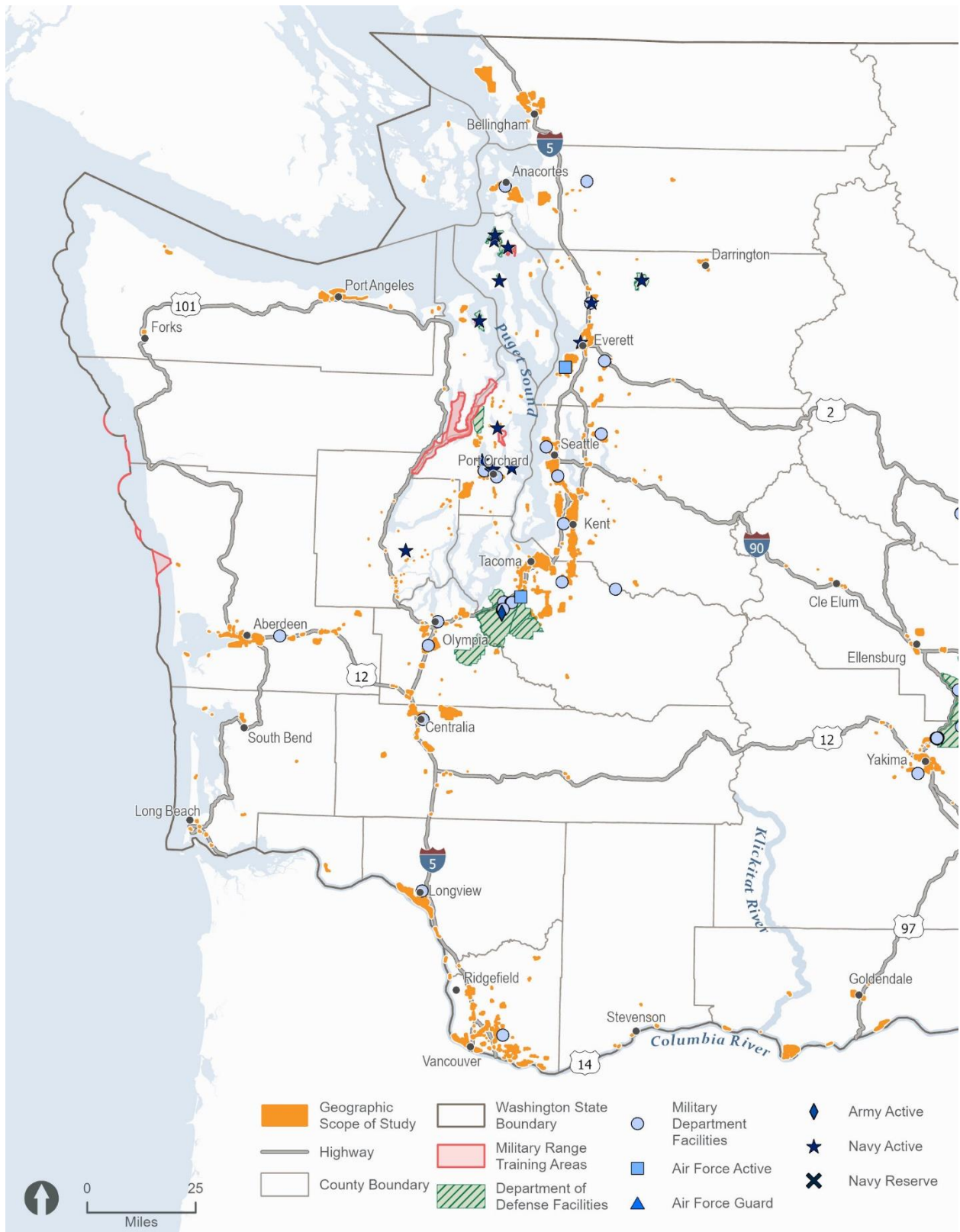


Figure 7. Western Washington military facilities and training areas

Source: Commerce 2024b

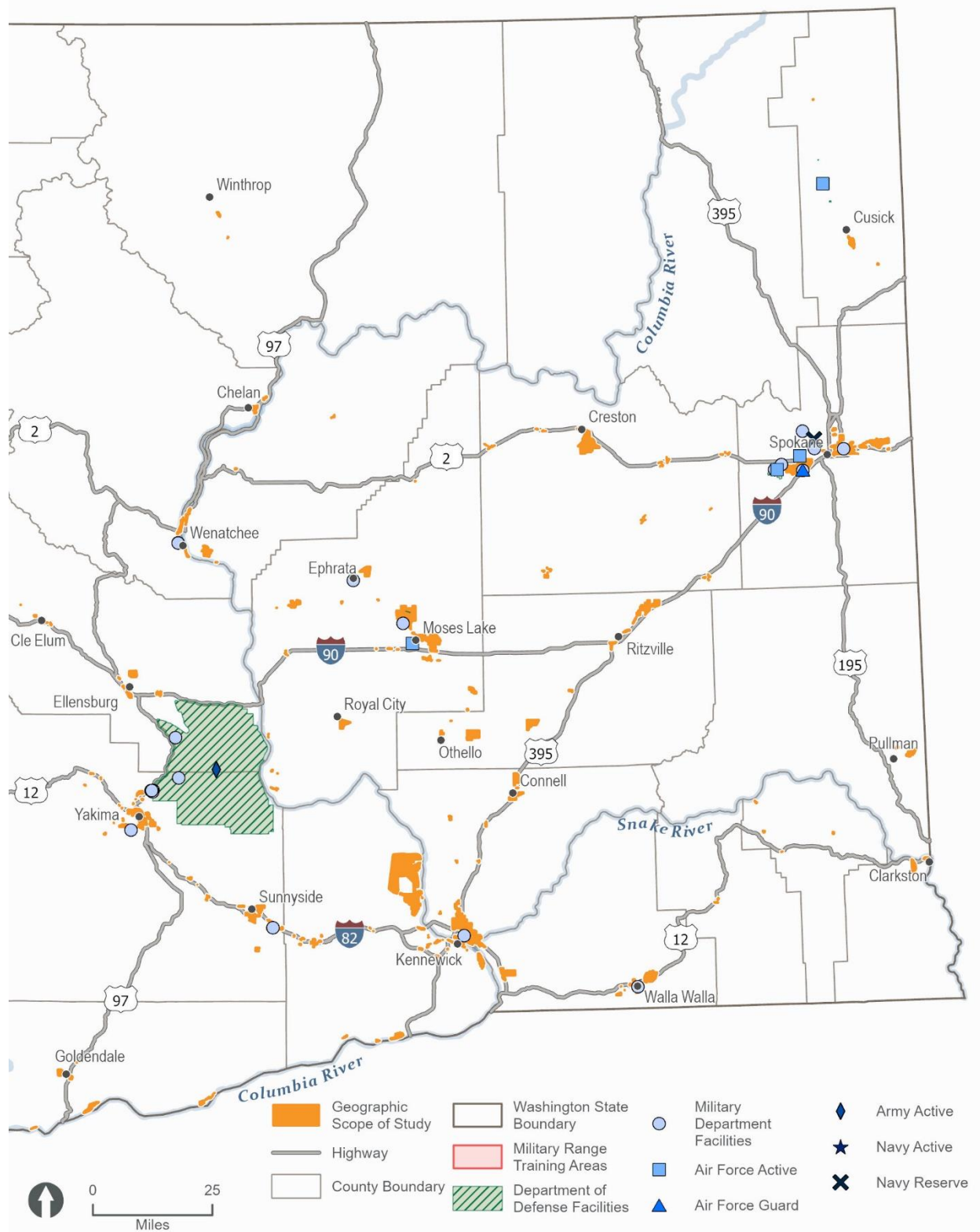


Figure 8. Eastern Washington military facilities and training areas

Source: Commerce 2024b

3.2.4 Other land use designations

There are various other land use designations that may affect land use compatibility.

3.2.4.1 *Rural character*

The term “rural character” has different definitions.

Several, but not all, of the counties in the study area plan under the GMA. The GMA identifies rural character as patterns of land use and development that:

- Allow open space, the natural landscape, and vegetation to predominate over the built environment
- Foster traditional rural lifestyles, rural-based economies, and opportunities to both live and work in rural areas
- Provide visual landscapes that are traditionally found in rural areas and communities
- Are compatible with the use of land by wildlife and for fish and wildlife habitat
- Reduce the inappropriate conversion of undeveloped land into sprawling, low-density development
- Generally, do not require the extension of urban governmental services
- Are consistent with protection of natural surface water flows and ground water and surface water recharge and discharge areas ([WAC 365-196-425\(2\)\(b\)](#))¹³

Rural character therefore encompasses many considerations: vegetation, views, housing, employment, fish and wildlife habitat, government services, and water. The GMA acknowledges that “rural areas are diverse in visual character and in density, across the state and across a particular county” (WAC 365-196-425(2)(c)). Under GMA, individual counties are responsible for adopting a locally appropriate definition of local character that guides the development of the rural element in the comprehensive plan and its implementing development regulations.

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.” A key requirement of a rural element is measures to protect rural character. Counties not planning under GMA are not required to have this element in their comprehensive plans.

The majority of industrial land on which green hydrogen facilities are anticipated to be located is not anticipated to overlap areas with rural character, given that the green hydrogen scope of study as outlined in Section 2.1 has parameters set to be closer to jurisdictions with established industrial areas. However, there is some potential for green hydrogen facilities to affect rural character in areas surrounding industrial land.

¹³ <https://app.leg.wa.gov/wac/default.aspx?cite=365-196-425>

3.2.4.2 *Natural resource lands*

The GMA requires all cities and counties to adopt development regulations to assure conservation of agricultural and other natural resource lands, based on [RCW 36.70A.060](https://app.leg.wa.gov/rcw/default.aspx?cite=36.70a.060).¹⁴ The majority of the PEIS geographic scope of study is industrial land use (Section 2.1). This would exclude agriculturally zoned and other natural resource lands; hence, further analysis is not provided.

3.2.4.3 *Opportunity zones*

Opportunity zones are created by Commerce based on the federal Tax Cuts and Jobs Act of 2017, which is designed to provide tax incentives to investors who fund businesses in underserved communities (Washington Policy Center 2018). The highest number of census tracts within the state that are designated as opportunity zones are in King, Pierce, Snohomish, and Spokane Counties, which overlap the study area (Washington Policy Center 2018). Opportunity zones could influence the siting of green hydrogen facilities during project-level analysis and are not discussed further in this document.

3.3 Potentially required permits and approvals

Construction, operation, and decommissioning activities for typical green hydrogen facilities would potentially require the following permits related to land use resources:

- **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 SMPs. If the project is located within Shoreline Management Act shoreline jurisdiction, a Shoreline Substantial Development Permit (SSDP), conditional use permit, variance permit, or written SSDP exemption would be required. Local SMPs typically place dimensional standards such as height limits on new structures within the shoreline zone ([WAC 173-27-140](https://app.leg.wa.gov/waC/default.aspx?cite=173-27-140))¹⁵.
- **Floodplain Development Permit (local or state agency):** Needed for development activities including grading within special flood hazard areas mapped by FEMA. The nature and extent of development may require a hydrologic and hydraulic study or other analyses to determine if the facility would change flood zones, flood elevations, impact downstream properties, etc. Facilities that would result in changed conditions affecting FEMA flood risk mapping may require a Conditional Letter of Map Revision/Letter of Map Revision from FEMA.

¹⁴ <https://app.leg.wa.gov/rcw/default.aspx?cite=36.70a.060>

¹⁵ <https://app.leg.wa.gov/waC/default.aspx?cite=173-27-140>

- **Forest practices permit (Washington State Department of Natural Resources [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.
- **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.
- **National Environmental Policy Act (federal agency):** Environmental review required for all federal actions including federal projects or any project requiring a federal permit, federal funding, or located on federal land.
- **Right-of-Way or lease (federal, state, or local agency):** Placement of facility infrastructure such as roads, generating facilities, and transmission lines on lands under federal, state, or local agency management jurisdiction requires approval from the applicable land manager.
- **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.
- **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.
- **Utility Accommodation Permits and Franchises (WSDOT or local agency):** Required for utility installations crossing state highway rights-of-way or local government road rights-of-way.

3.4 Green hydrogen production facility

This section describes potential impacts of green hydrogen production facilities. For the purposes of the PEIS, the estimated footprint of a green hydrogen production facility ranges from 1 acre to 10 acres, and the estimated height of structures up to 100 feet, depending on the production method, type of storage facilities, and layout of external pipes and tanks, a parking area, and security fencing. A green hydrogen production facility would typically include a connection to the electricity grid to power all, or a portion of, the facility's equipment needs and buildings. Facilities typically connect to the main transmission line through distribution lines that can be up to 100 feet high and between 1 and 8 miles in length, which would be determined by the project developer based on the distance between a selected site and existing electricity grid infrastructure. This technical appendix includes evaluation of impacts associated with distribution line connections to main transmission lines.

Off-site access roads may be needed to connect a facility to the existing state routes. Most of study area is less than 10 miles from a state route (63% within 1 mile and 99% within 10 miles). If needed, the project developer would determine the length of off-site access road, based on

the distance between a selected site, existing road infrastructure, and coordination with state and local departments of transportation.

3.4.1 Impacts from construction and decommissioning

3.4.1.1 *Changes to existing uses*

Site characterization and construction of a green hydrogen production facility would be similar to site characterization and construction of other industrial facilities. The PEIS study area includes siting of green hydrogen production facilities on lands zoned for industrial facilities or lands that already have industrial-related land uses; changes to existing land uses are not anticipated. Construction adjacent to land that is not zoned or suitable for industrial facilities could affect the existing character of the built environment but would not change existing use. Distribution lines would follow existing utility or road rights-of-way and would either replace or be co-located with existing transmission and distribution lines wherever possible. Future development, including green hydrogen energy facilities, would be required to comply with the comprehensive plan and zoning requirements, as updated. Site characterization and construction would be subject to applicable policies and regulations of agencies with jurisdiction or discretionary authority. Prior to any site characterization or construction activities, construction-related impacts would be required to be addressed through the applicable permit processes.

Industrial zones may also be adjacent to Tribal lands. Site characterization and construction on or near Tribal land would need to be coordinated with Tribes to identify any potential impacts and mitigation. See the *Tribal Rights, Interests, and Resources Technical Appendix*.

The potential for construction of a green hydrogen production facility to result in significant changes in existing uses would depend on the existing built environment, intensity of construction and local regulations. Given that construction-related impacts would be required to be addressed through the applicable permit processes, impacts to existing land uses would be **less than significant**.

During decommissioning, the land would be restored to pre-green hydrogen production facility development conditions and uses, or the facility owner, permitting authority, and regulatory agencies could agree on alternate actions.

Land use impacts during facility decommissioning would be similar to those discussed for construction (i.e., 1–3 years for noise, dust, visual disturbance, and traffic as equipment is removed and the site is restored). A decommissioning plan may be prepared during site characterization as part of the facility proposal. Some cities and counties require financial security as part of a decommissioning plan.

Similar to construction, the potential for decommissioning to result in changes to land use would depend on the facility type, size, location, and existing built environment. **Less than significant impacts** from decommissioning would occur.

3.4.1.2 Land use conflicts

Temporary environmental impacts could occur during site characterization and construction (1–3 years depending on the site size). During construction, the presence of construction equipment, construction workers, and construction vehicles would increase. Construction activity could cause temporary increases in dust, noise, and traffic, as well as visual changes that could affect other properties in the vicinity. The duration of these impacts would depend on the time needed to construct a facility after environmental review and permitting is completed.

People most likely to notice these impacts are those living in nearby areas or those whose work requires them to be near the construction area for long periods. Nearby non-industrial land uses could be affected by increased dust, noise, traffic, and visual changes. Anyone regularly using roads nearby may experience temporary traffic delays or detours. Clearing of trees or shrubs on an undeveloped industrial site would result in a more substantive visual impact on compared to construction on a previously developed industrial site.

Green hydrogen production facilities could be constructed in more undeveloped areas, including industrial sites within LAMIRDs, or adjacent to waterfronts, parks, commercial areas, or residential areas. These lands could experience more intense impacts from construction, as construction would introduce a change in the character of the existing built environment.

Potential site characterization and construction-related disturbance impacts would depend on the proposed type and size of facility, distribution line needs, and associated activities, terrain, vegetation, and proximity to residences and communities. Site characterization and construction would be subject to applicable policies and regulations of agencies with jurisdiction. Therefore, impacts on land use from construction of a green hydrogen production facility would result in **less than significant impacts**, as construction-related impacts would be required to be addressed through the applicable permitting processes.

The Washington State CESA (Commerce 2022) notes that the process of producing green hydrogen does not inherently create negative impacts on military operations and readiness. Early consultation with the DoD would allow green hydrogen facilities to be sited and designed to avoid any potential land use conflicts with military operations, resulting in **less than significant impacts**.

Similar to construction, the potential for decommissioning to result in land use conflicts would depend on the facility type, size, location, and existing built environment. **Less than significant impacts** from decommissioning would occur.

3.4.2 Impacts from operation

3.4.2.1 Changes to existing uses

Operation of green hydrogen production facilities would not result in changes in long-term (and potentially permanent) use of existing or designated future land uses. Green hydrogen facilities

are anticipated to be located on lands zoned and used for industrial development. Future development, including green hydrogen energy facilities, would be required to comply with the comprehensive plan and zoning requirements, as updated. Where green hydrogen production facilities are located on industrially zoned lands surrounded by industrially zoned parcels, changes to existing land use would result in **less than significant impacts**.

Conversion of property from an existing use that is not industrial to a green hydrogen production facility would only occur under unique circumstances (e.g., the existing use is nonconforming). Occurrences where non-industrial land uses exist adjacent to industrial lands or industrial land uses that are in more rural areas could induce change to the use of those sites to be more compatible with industrial facilities. This scenario would be addressed on a case-by-case basis with the applicable jurisdiction where impacts on adjacent properties would be addressed through the zoning and permitting process. Therefore, **less than significant impacts** on adjacent land uses would occur.

3.4.2.2 Land use conflicts

Green hydrogen production facilities operating on industrial lands are not expected to cause land use conflicts, as the facilities would be consistent with the designated land uses. The consistency of a proposed green hydrogen production facility with federal, state, and local regulations and planning documents would depend on a number of factors, including but not limited to the following:

- Whether the facility is within an area whose local comprehensive plan future land use designations, zoning, and SMP designations (if applicable) allow for this use
- Whether the facility would impact areas with specific use restrictions and standards (such as SMP-regulated shorelines, critical areas, and floodplains) and, if so, whether the project developer could provide adequate mitigation to offset such impacts
- Whether the facility could be sited and designed to avoid interfering with civil air navigation and military operations, access, and training

[WAC 365-196-800](https://app.leg.wa.gov/wac/default.aspx?cite=365-196-800)¹⁶ provides for development regulations to be established as a specific control on development and/or land uses by a city or county to implement the comprehensive plan adopted pursuant to the GMA.

Specific to industrial lands, [WAC 365-196-310](https://app.leg.wa.gov/Wac/default.aspx?cite=365-196-310)¹⁷ provides that cities and counties should avoid conversion of areas set aside for industrial uses to other incompatible uses to ensure the availability of suitable sites for industrial development. To the extent that a green hydrogen production facility proposal is not consistent with the local jurisdiction comprehensive plan and development regulations (including shoreline and critical areas), there are several potential avenues for achieving proposal consistency, including modification of the proposal by the project developer to comply with local jurisdiction regulations, periodic amendment of the comprehensive plan and development regulations initiated by the local jurisdiction, or project-

¹⁶ <https://app.leg.wa.gov/wac/default.aspx?cite=365-196-800>

¹⁷ <https://app.leg.wa.gov/Wac/default.aspx?cite=365-196-310>

specific or site-specific comprehensive plan and development regulation amendments initiated by the developer.

Depending on the extent of critical areas, impacts on critical areas can often be avoided through design. In some cases, unavoidable critical areas impacts can be addressed through compensatory mitigation. See the *Water Resources Technical Appendix*, *Biological Resources Technical Appendix*, and *Earth Resources Technical Appendix*, for additional discussion of impacts to water, wildlife habitat, and earth resources.

Jurisdictions could modify comprehensive plan land use designations, zoning, and SMP designations in response to, or anticipation of, population growth or natural hazards. Requests to rezone properties by the public or jurisdictions to allow a prohibited use or deviation from development regulations could influence consistency.

Conflicts may occur if a green hydrogen production facility is proposed on a site adjacent to non-industrial, low-intensity uses (i.e., rural, agricultural, or resource land uses) or industrial land uses that are in more rural areas. Neighboring parcels may be acquired as approved by the local jurisdiction or zoning changes to accommodate future needs of a facility during operations and economic growth priorities and needs of the region. This could cause permanent conversion or changes to existing low-intensity uses. The intent of zoning is to preclude these types of conflicts, and land use conflicts would be unlikely to occur. As a result, land use conflicts would result in **less than significant impacts**.

3.4.3 Measures to avoid, reduce, and mitigate impacts

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

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

3.4.3.1 General measures

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

Rationale: Laws, regulations, and permits provide standards and requirements for the protection of resources and 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
 - State-designated harbors
 - Air quality nonattainment 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:
 - 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-locate to share pads, fences, access roads, lighting, etc.

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

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

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

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

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

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

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

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

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

3.4.3.2 Recommended measures for siting and design

- Coordinate with federal, state, and local agencies; Tribes; property owners; and other interested parties as early as possible in the planning process to identify potential land use conflicts and issues, as well as state and local rules that govern project development.
- Contact the FAA early in the process to determine if there might be potential impacts on aviation and if mitigation might be required to protect military or civilian aviation use. Submit plans to the FAA for proposed construction of any facility that is 200 feet or taller or that is located in proximity to airports for evaluation of potential safety hazards.
- Contact the DoD early in the process 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.

3.4.3.3 Required measures

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

- Construction and Development Permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency)
- Environmental Permits (e.g., Critical Areas, Shorelines) (local agency)
- Floodplain Development Permit (local agency)
- Forest practices permit (DNR or local agency)
- Land Use Permits (e.g., Comprehensive Plan Amendments, Conditional Use Permit/Special Use Permit, or Zoning Amendments) (local agency)
- Right-of-Way 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 (WSDOT or local agency)

3.4.3.4 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, 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.

3.4.3.5 Mitigation measures for potential significant impacts

- No potential significant impacts identified.

3.5 Green hydrogen production facility with co-located battery energy storage system (BESS)

This section describes potential impacts of green hydrogen production facilities with up to two co-located BESS containers. The BESSs would be used to balance loads or to provide up to 15% of power in case of an outage or power quality deviation. One BESS would provide 2.85 megawatts of electricity for 4 hours (a capacity of 11.4 megawatt hours or 11,400 kilowatt hours). Each container would be approximately 60 by 12 feet wide and 10 feet tall.

3.5.1 Impacts from construction, operation, and decommissioning

Site characterization and construction activities for green hydrogen production facilities with co-located BESSs would be the same as those for green hydrogen production facilities. This type of facility would include the installation of BESSs, which would be similar to the construction of other support facilities and structures included in a green hydrogen production facility. The footprint of a facility could change with the addition of a BESSs, but the potential impacts would remain as varied as for a green hydrogen production facility due to differences in facility siting, size, and type. A green hydrogen production facility with co-located BESSs would have similar land use constraints and permitting requirements as a green hydrogen production facility.

Co-locating BESSs with a green hydrogen production facility would require additional construction-related ground disturbance and an increased building footprint relative to facilities with no BESSs. A 2023 study identified the following general types of impacts potentially associated with BESSs that may need to be considered during local zoning and permit decisions (PNNL 2023):

- Safety (risk of fire or explosion)
- Noise generated by battery equipment
- Odor and emissions during a fire
- Visual impacts and screening
- Environmental (leakage, potential impacts of water contamination during firefighting)

These impacts are addressed in other PEIS technical appendices.

Impacts from decommissioning green hydrogen production facilities with BESSs would be similar to impacts from decommissioning green hydrogen production facilities. Specialized workers and equipment may be needed to decommission the battery storage units.

Therefore, site characterization, construction, operation, and decommissioning activities and associated impacts with co-located BESSs would be the same as for green hydrogen production facilities and result in **less than significant impacts**.

3.5.2 Measures to avoid, reduce, and mitigate impacts

Available measures to reduce reducing land use impacts for a green hydrogen production facility with co-located BESSs are the same as those identified for a green hydrogen production facility (Section 3.4.3).

3.6 Green hydrogen storage facility (gas or liquid form)

This section describes potential impacts of green hydrogen storage facilities. A green hydrogen storage facility could store hydrogen in gas or liquid form. Gaseous hydrogen would be stored in stationary, aboveground, cylindrical storage systems, each of which employs different construction materials to achieve maximum working pressure ratings. Liquid hydrogen would be stored in double-walled, vacuum-insulated cryogenic storage tanks. The footprint of storage facilities would depend on the amount of hydrogen needed to store but would be less than 1 acre. This includes the storage tanks, separation space between tanks (if more than one), on-site access roads, and ancillary equipment.

A green hydrogen storage facility may be co-located with a green hydrogen production facility, or it may be located at a standalone facility, transport terminal, or end-use location such as an industrial facility or fueling facility.

3.6.1 Impacts from construction, operation, and decommissioning

Site characterization and construction activities for a green hydrogen storage facility would be the similar to those for a green hydrogen production facility. Construction of hydrogen storage would include the installation of hydrogen storage facilities (liquid or gas), which would be similar to the construction of other industrial facilities and structures. The footprint of a storage facility would vary depending on the type of storage and where it is sited. Potential impacts would remain varied due to differences in siting, size, and type. Whether co-located, standalone, at transport terminals, or at an end-use location, storage facilities would have similar land use constraints and permitting requirements as a green hydrogen production facility.

Impacts from decommissioning a green hydrogen storage facility would be like impacts from decommissioning green hydrogen production facilities in that they would depend on the facility type, size, location and existing built environment.

Therefore, site characterization, construction, operation, and decommissioning activities and impacts associated with green hydrogen storage facilities would be the same as those for a production facility and result in **less than significant impacts**.

3.6.2 Measures to avoid, reduce, and mitigate impacts

The same measures to avoid, reduce, and mitigate impacts described previously (Section 3.4.3) also apply to this facility type.

3.7 No Action Alternative

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for green hydrogen facilities under existing 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 facility size and design, and would be **less than significant**.

3.8 Unavoidable significant adverse impacts

The siting and operation of green hydrogen facilities are not expected to result in the conversion of existing uses or designated future land uses to industrial-related uses if developed on industrial land.

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

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