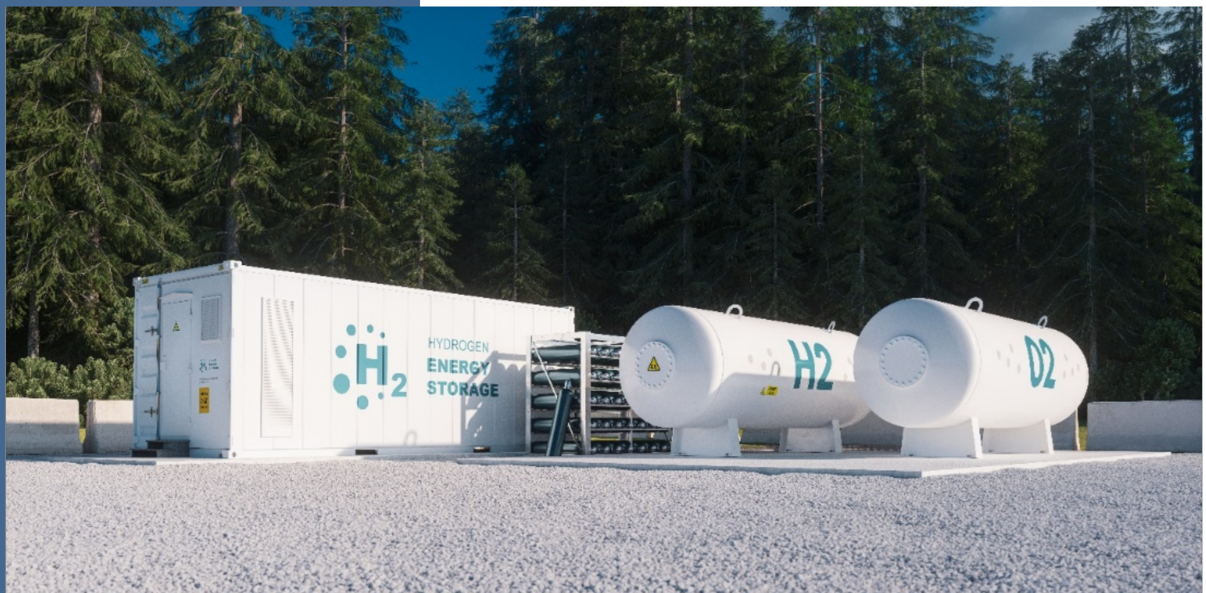

Appendix O: Transportation Technical Appendix

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

By

HDR

For the

Shorelands and Environmental Assistance Program

Washington State Department of Ecology

Olympia, Washington

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DEPARTMENT OF ECOLOGY
State of Washington

Table of Contents

List of Figures and Tables

Figures

Tables

Acronyms and Abbreviations List

BESS	battery energy storage system
BNSF	BNSF Railway
CAPCOA	California Air Pollution Control Officers Association
CFR	Code of Federal Regulations
CIP	capital improvement plan
Ecology	Washington State Department of Ecology
FAA	Federal Aviation Administration
FAST Act	Fixing America's Surface Transportation Act
FSP	Freight System Plan
I-	Interstate
NPDES	National Pollutant Discharge Elimination System
PEIS	Programmatic Environmental Impact Statement
RCW	Revised Code of Washington
SR	State Route
TIP	transportation improvement program
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
UP	Union Pacific Railroad
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation

Summary

This technical appendix describes the transportation conditions 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:

- Transportation system (roads, rail, vessels, and commercial airports)
- Traffic, public transit, and non-motorized or other transportation system conflicts
- Movement of trucks, trains, or vessels to transport equipment for construction, operation, or decommissioning of green hydrogen facilities

The technical appendix analyzes the transportation needed for construction, operation, and decommissioning activities. Transportation impacts are based on qualitative movement and circulation of people and goods, potential traffic hazards, and concerns relative to freight traffic on or near a facility. This considers the size of the workforce, worker commutes, length of construction period, expected road detours or closures, and quantities and off-site sources of construction materials and disposal locations.

The transportation, distribution, and end uses of green hydrogen are not evaluated in this study. This would be done during future project-level environmental review.

Findings for transportation 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, the construction, operation, and decommissioning of facilities would likely result in **less than significant impacts** on transportation.
- 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 transportation from construction, operation, or decommissioning.

1 Introduction

This technical appendix describes transportation conditions and trends 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 transportation and lists relevant regulations that contribute to the evaluation of potential impacts.

1.1 Resource description

Transportation elements evaluated in this technical appendix include:

- Transportation system (roads, rail, vessels, and commercial airports)
- Traffic, public transit, and non-motorized or other transportation system conflicts
- Movement of trucks, trains, or vessels to transport equipment for construction, operation, or decommissioning of green hydrogen facilities

1.2 Regulatory context

Table 1 lists laws, plans, and policies relevant to evaluating potential impacts on transportation.

Table 1. Applicable laws, plans, and policies

Regulation, statute, guideline	Description
Federal	
U.S. Code (USC) Title 23, Highways	Federal code regulating all highways and related infrastructure along with various classifications. This includes programs, enforcements, funding, safety, research, and education that governs highways.
USC Title 49, Transportation	Federal code providing regulations to all federal agencies governing transportation and related infrastructure.
49 Code of Federal Regulations (CFR) 77, Federal Aviation Administration (FAA) Obstruction to Navigation Federal Regulation	Requires FAA approval of any construction or alteration located on a public use airport or heliport regardless of height or location.
49 USC 5101 et seq., Hazardous Materials Transportation Act	Empowers the Secretary of Transportation to designate as hazardous material any "particular quantity or form" of a material that "may pose an unreasonable risk to health and safety or property." Title 49 regulations pertain to all forms of surface transportation and transportation security, including pipelines, railroads (passenger and freight), waterways, cars, etc. Hazardous material or hazardous waste handlers, shippers, carriers, or freight forwarders must comply with Title 49 regulations, which cover requirements for markings, labels, placards, shipping papers, training, emergency response, and performance-oriented packaging standards.

Regulation, statute, guideline	Description
Fixing America's Surface Transportation (FAST) Act – National Highway Freight Network	The National Highway Freight Network established through the FAST Act requires states to improve the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas.
14 CFR 77, Safe, Efficient Use, and Preservation of the Navigable Airspace	Establishes (1) requirements to provide notice to FAA of certain proposed construction or alteration of structures; (2) standards used to determine obstructions to air navigation and navigational and communication facilities; (3) the process for aeronautical studies of obstructions to air navigation or navigational facilities; and (4) the process to petition FAA for discretionary review of determinations, revisions, and extensions of determinations.
State	
Revised Code of Washington (RCW) 36.70A.070(6), Comprehensive Plan – Mandatory Elements – Transportation Element	Establishes requirements for a transportation element in county or city comprehensive plans. The transportation element needs to be consistent with the land use element and include various sub-elements including level of service standards and forecasts.
Chapter 47.50 RCW, Highway Access Management	Establishes regulations of access to the state highway system and the development of an access management program.
RCW 36.75.130, Approaches to county roads—Rules regarding construction—Penalty.	Establishes regulations and rules for construction approaches to county roads.
Chapter 47.52 RCW, Limited Access Facilities	Establishes general regulations surrounding limited access facilities.
Chapter 46.44 RCW, Size, Weight, Load	Relates to regulations on dimensions and weight for vehicles on state routes and highways.
Chapter 468-38 Washington Administrative Code, Vehicle Size and Weight—Highway Restrictions—Equipment	Provides rules necessary for the implementation of certain sections of Chapter 46.44 RCW to include the issuance of special permits that allow vehicles or combinations of vehicles on public highways. The chapter also includes rules on safety and operations as they relate to the special permits.
RCW 47.06.040, the Statewide Multimodal Transportation Plan	Requires the Washington State Department of Transportation (WSDOT) to develop a statewide multimodal transportation plan, which is in conformance with federal requirements, with required components.
WSDOT Freight System Plan	The WSDOT Freight System Plan (FSP) updated in 2022 provides information needed by statewide stakeholders to inform freight transportation policy and investment decisions between 2022 to 2025. The FSP is devised to meet the requirements of RCW 47.06.040.
WSDOT Washington State Rail Plan 2019-2040	The WSDOT Washington State Rail Plan updated in 2019 provides a planning document for the state's rail system, that includes forecasts, needs, strategies and improvements, and funding. The Washington State Rail Plan is devised to meet the requirements of RCW 47.06.040.
WSDOT 2024 Highway System Plan	Implements RCW 47.06.040 and ensures that the highway system in Washington supports and enhances the movement of people and goods; addresses federal and state policies and meets federal and state planning requirements.

Regulation, statute, guideline	Description
Local	
Regional transportation plans	Plans that provide goals, policies, and future plans related to transportation, traffic, and transit within regions.
Regional airport plans	Plans that provide goals, policies, and future plans related to regional airports.
Port plans	Plans that provide goals, policies, and future plans related to ports.
Transportation element of comprehensive plans	The transportation element in city and county comprehensive plans provide goals, policies, and future plans related to transportation and traffic.
Transportation improvement programs (TIPs)	City and county TIPs provide a list of funded planned projects along with funding details. This list should be developed in cooperation with state and public transit providers.
Transportation studies and plans	Other miscellaneous regional transportation studies or plans that are publicly available and add to the evaluation of the transportation resource of the project.
Capital improvement plans (CIPs)	City and county CIPs are multi-year plans for capital expenditures needed to restore, improve, and expand infrastructure in a jurisdiction or area. It details the work that needs to be done for each project, an expected timeframe for completion, and funding.

2 Methodology

2.1 Study area

The study area for transportation includes the PEIS geographic scope of study for green hydrogen facilities (Figure 1) and the surrounding areas relevant to transportation.

The analysis is limited to Washington State Department of Transportation (WSDOT)-identified truck freight corridors, rail freight corridors, maritime freight corridors, commercial airports, and at-grade rail crossings that intersect with the green hydrogen facilities PEIS geographic scope of study. Freight transportation modes are the focus because these are the main transportation modes on which green hydrogen facilities would depend. Maps for WSDOT-identified truck freight corridors, rail freight corridors, maritime freight corridors, commercial airports, and at-grade rail crossings that intersect with the PEIS geographic scope of study are provided in Section 3.1.

Local transportation is also considered in this analysis, particularly major interstate freeways and state routes that intersect with the PEIS geographic scope of study. This is because during construction, operation, and decommissioning, these major routes are expected to serve as first- and last-mile connections between the green hydrogen facilities and workers, equipment, or other elements necessary for the facility.

Public transit and non-motorized bike lanes in highly populated counties that intersect with facilities are reviewed briefly, given that green hydrogen facilities are expected to be developed close to urban centers. Furthermore, public transit and non-motorized modes are a key element of statewide plans and impacts from construction of the facilities may include disruption to public transit and non-motorized modes. In-depth review of public transit and non-motorized modes would be more appropriate for a project-level review, which is not the scope of this analysis.

Transportation evaluation and assumptions related to green hydrogen facilities are based primarily on the size of the workforce, worker commutes, length of construction period, expected road detours or closures, and quantities and off-site sources of construction materials and disposal locations. Transportation impacts for green hydrogen facilities in the PEIS are based on qualitative movement and circulation of people and goods, potential traffic hazards, and concerns relative to freight traffic.

Figure 1, 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.

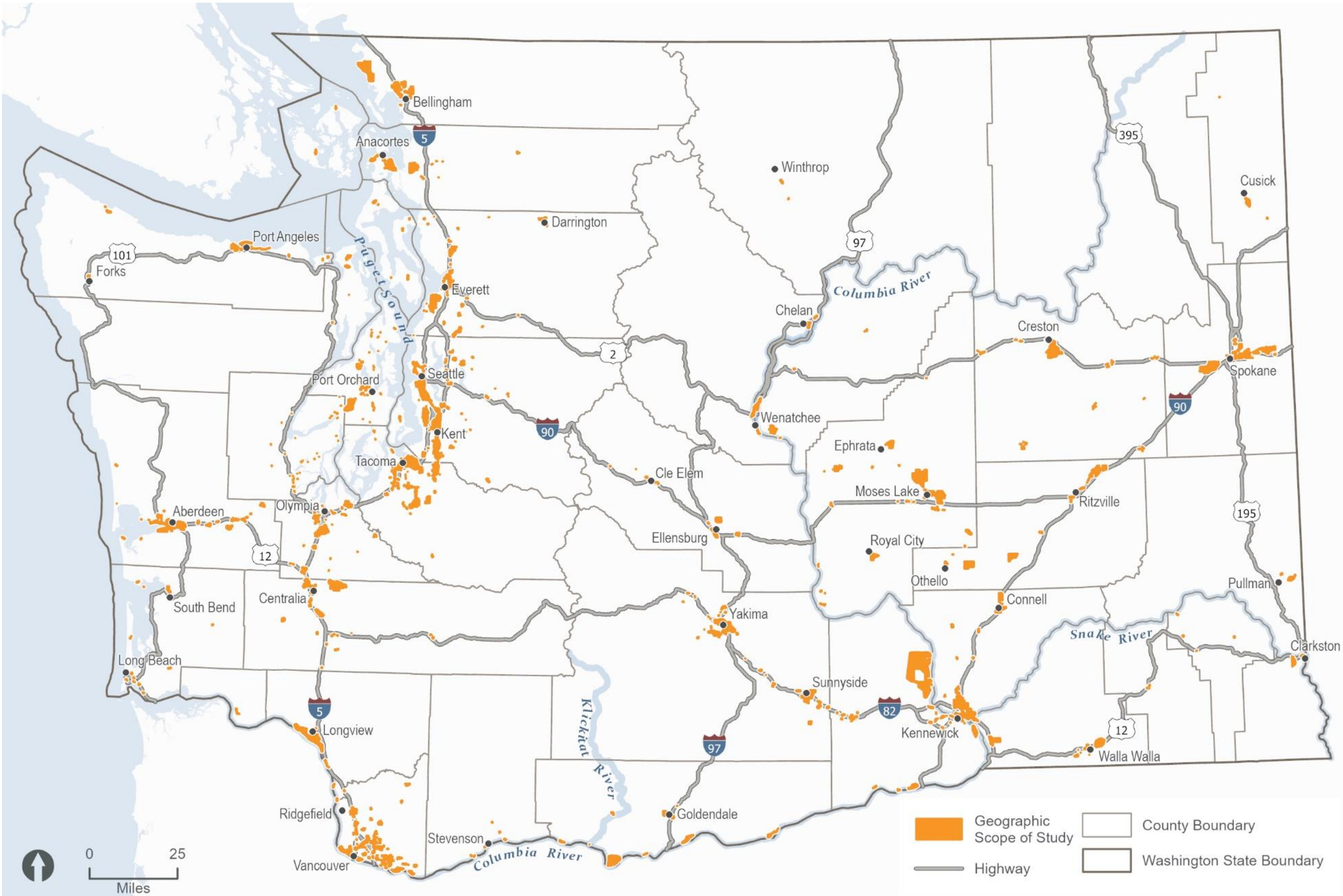

Figure 1. Green Hydrogen Energy Facilities PEIS geographic scope of study

2.2 Technical approach

Key transportation resources within the study area were evaluated using existing publicly available information published by federal, state, or local agencies where applicable. Publicly available literature and reports from WSDOT, followed by counties, cities, and agencies operating in high population areas of the state and focused on freight, were prioritized (MRSC 2024).

Information and assumptions made from these sources were used to derive qualitative measures of (1) expected ranges of traffic volumes and distances; (2) expected road, rail, and vessel traffic; and (3) expected improvements to transportation network for the study area.

Additional supplemental literature was reviewed for green hydrogen, if available. Given that this is a relatively new field in the state, literature sources related to green hydrogen were from other parts of the United States or international sources.

Geographic information systems software was used to conduct various basic analyses to identify transportation data in the study area. The analysis did not include traffic modeling or engineering, level of service analysis, vehicle-miles traveled analysis, or other new data collection or modeling. The discussion is qualitative and based on existing, non-site-specific information.

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

This impact assessment does not include project-level review or location-specific impacts. This technical appendix evaluates typical transportation resources and the typical impacts to those resources. Potential significant adverse impacts are prioritized over nonsignificant adverse impacts. Qualitative measures (see Section 2.2, above) related to expected ranges are also used to determine impacts to the study area from general construction, operation, and decommissioning of green hydrogen facilities. Impacts are then evaluated relative to applicable federal, state, and local laws and regulations, where applicable. The process for obtaining necessary approvals and permits is also briefly discussed. Transportation resources for operations and end uses will be considered during project-level reviews.

Typical anticipated impacts could include temporary or permanent road closures or reroutes; traffic increases on roadways and freight corridors; fortification of culverts and bridges for overweight or oversized shipments; or rail crossing additions, disruptions, and closures. Other unique impacts could include aviation and disruptions to navigable air space. Developers would likely consult with the Federal Aviation Administration (FAA) to construct or alter certain objects of a certain height within navigable airspace, and FAA may require lighting or marking the objects.

The significance of impacts is evaluated using two main indicators and their thresholds:

- **Traffic and conflict with local transportation network**: The facility would result in permanent, significant effects on local traffic patterns, volumes, hazards; damage to infrastructure; or risks to other users. Typical operational activities would likely result in long-term local road closures or interruptions to local traffic patterns or volumes, causing the movement of people and goods to be impacted over the long term.
- **Truck, train, or vessel count increase:** The frequency and amount of transportation required for typical facility activities during operation increases local truck, rail, or vessel use and traffic to the extent that the movement of people and goods would be impacted over the long term.

3 Technical Analysis and Approach

3.1 Overview

This section provides an analysis of potential impacts on transportation that might occur for a green hydrogen facility under the facility types analyzed in the PEIS. This section also evaluates actions that could avoid or reduce the identified impacts and potential unavoidable significant adverse impacts.

3.2 Affected environment

The affected environment represents the conditions in the study area at the time this study was prepared and provides the baseline for evaluating how a specific natural or built-environment resource could be affected by proposed facilities. Depending on the resource, and because the temporal scope of analysis includes 25 years within which potential facilities could be constructed and 50 years of potential facility operations (75 years total), the potential for the affected environment to change in that time must also be considered.

This section presents information about existing transportation in the study area and a general description of the existing conditions and trends of resources and resource uses in the planning area that may be affected by implementation of the green hydrogen facilities described in Sections 3.4 through 3.6. Common types of transportation modes in Washington state include cars and trucks as well as transit, biking, walking, rail, aviation, and marine transport (Washington State Transportation Commission 2020). Each of these types of transportation is addressed with a focus on freight, and some are analyzed more in depth than others.

3.2.1 Road infrastructure, traffic, and truck freight volumes

Washington's road network spans more than 80,000 miles, with 764 Interstate System highway miles and 1,602 miles of U.S. highways connected by state routes, county roads, city streets, and other roadways (WSDOT 2022c). Green hydrogen facilities are expected to utilize trucks as the main mode of transportation during construction and operations, for shipments of materials or equipment to the facility.

Approximately 7,000 miles of Washington's road network are designated as Truck Freight Economic Corridors. Within this number, 5,135 miles are high-volume truck corridors (T-1 and T-2), defined as carrying at least 4 million tons of gross truck tonnage per year; 932 miles are alternative freight routes (alternatives to primary cross-state freight routes during disruptions); and 818 miles are first- or last-mile connector routes (truck routes that connect freight-intensive land uses to T-1 and T-2 freight corridors and alternative freight routes) (WSDOT 2022c). The majority of routes in the study area are classified as T-2, which are high-volume truck corridors; followed by T-3 routes, which are a combination of first- and last-mile connector routes and alternative freight routes (Figure 2 and Figure 3). The road network handles the largest share of freight compared to other modes of transportation (i.e., rail or barge), with trucks moving more than half of all goods in Washington. In terms of volume, trucks carry over half of the commodities moving in Washington, making up 57% by tonnage and 55% by value of goods (WSDOT 2022a). Typical goods include foodstuffs, wood products, and agricultural products.

High-volume truck corridors (T-1 and T-2) for freight in the state as identified by Annual Average Daily Traffic (WSDOT 2022c) in the study area include:

- Interstate highways or other U.S. highways: Interstate 5 (I-5), I-405, I-90, I-205, U.S. Highway (US) 395
- State highways: State Route (SR) 18, SR 167, SR 512, SR 599

The Interstate System serves interstate, regional, and intrastate traffic (FHWA 2024a). I-5 is the major north-south route through the state in western Washington, with particularly high concentrations of truck freight routes occurring between Seattle and Vancouver. I-405 is another major north-south route through the east side of King and Snohomish counties; key high concentrations of road freight occur around Bellevue. I-90 is the major east-west route and primary transportation corridor through Washington state; key road freight corridors include the segment between Snoqualmie and Ellensburg, as well as near and through Spokane. I-205 is a north-south highway connecting Vancouver, Washington, and Portland, Oregon, and intersects several major highways. US 395 is a major highway connecting Washington, Oregon, and California; within Washington, it connects the Tri-Cities region to Spokane, and key truck freight routes are identified near Kennewick.

State highway routes are maintained by WSDOT. State highways that are identified as key high truck volume freight routes and within the study area are listed above. Particularly high concentrations of truck freight routes occur near and connecting to Seattle and Tacoma along these state routes. SR 18 serves southeastern King County, running between Federal Way, Snoqualmie, and North Bend. SR 167 runs between Renton and Tacoma. SR 512 runs between Lakewood and Puyallup. SR 599 is within Tukwila and travels adjacent to the Duwamish River.

Figure 2. Truck freight economic corridors in the study area – western Washington

Figure 3. Truck freight economic corridors in the study area – eastern Washington

Major long-range improvement roadway projects that intersect with the study area identified by WSDOT include the following (there are also many other ongoing and short-term improvement projects for these Interstate highways/U.S. highways):

- The Puget Sound Gateway Program completes missing links in Washington state's highway and freight network associated with SR 509 and SR 167. Construction is from 2020 to 2026 for stage 1 and 2025 to 2031 for stage 2 (WSDOT 2024a).
- The Revive I-5 project features work on various projects from now until 2030, including dozens of preservation projects on I-5 within King and Snohomish Counties (WSDOT 2024e).
- The I-405/SR 167 corridor program includes over 150 projects designed to improve travel between Lynnwood and the Renton/Tukwila area.
- The North Spokane Corridor, which is a 10.5-mile multimodal corridor that connects I-90 at the south end (just west of the existing Thor Street/Freya Street interchange) to US 2 (at Farwell Road) and US 395 (at Wandermere) at the north end, has various construction phases from now until 2030.
- The Interstate Bridge Replacement Program, located on I-5 where it crosses the Columbia River between Vancouver, Washington, and Portland, Oregon, is currently in the environmental review process, which began in 2021. Three to 5 years are expected to be needed to complete the entire environmental review process.

3.2.2 Rail freight system and infrastructure

The rail freight system may be used for the construction, operation, and decommissioning of green hydrogen facilities. Washington's rail transportation system moves more than 95 million tons of freight per year (WSDOT 2022b). More than 3,200 miles of freight railroad tracks exist in Washington. The freight rail network across the United States is operated by Class I, II, and III railroads, which are classified by annual operating revenue. Class I railroads (long lines) have the highest operating revenue, operating in multiple states over thousands of miles of track. In Washington, Class I railroads are operated by only BNSF Railway (BNSF) and Union Pacific Railroad (UP). Non-Class I railroads are short line and regional railroads (Association of American Railroads 2020).

Rail freight serves primarily domestic commodities. Common types of commodities reported in 2017 by Class I railroads include agricultural products such as cereal grains shipped to ports for export, while a small percentage includes crude petroleum shipped to refineries across the state (WSDOT 2019a, 2022a). Non-Class I railroads primarily connect the state's farming community and businesses with the Class I rail system, serving as switching or terminal railroads or facilities (WSDOT 2022a).

Rail freight is also typically used to transport high tonnage, oversized, and high-value cargo, such as construction and operational equipment for green hydrogen facilities. Class I and II railroads operated by BNSF and UP would likely be used for green hydrogen facilities; Class III railroads may not have the capacity to transport the necessary equipment. Furthermore, BNSF and UP have the capacity to transport oversized loads and unique equipment that may need to be handled with care. Rail is used because rail transport can be up to four times more fuel efficient than truck transport; trains can transport 1 ton of cargo approximately 470 miles on 1 gallon of diesel (FRA 2020). However, trucks are still typically used to cover the first and last miles between cargo loading/unloading and delivery to the destination (WSDOT 2022c).

The majority of the industrial lands on which green hydrogen facilities are anticipated to be located are close to highly populated counties (King County, Pierce County, Snohomish County, Spokane County, and Clark County) and their urban areas, which are connected to a nearby Class I rail freight corridor (Figure 4 and Figure 5). However, a few parts of the study area in smaller jurisdictions are connected to only non-Class I railroads, which may require transfer to Class I railroads or require longer transportation by truck before transfer to rail. Such parts include areas west of the Puget Sound and areas in southeastern Washington (Figure 4 and Figure 5).

Various at-grade rail crossings are in the study area and should be considered when siting facility locations for ease of access or multimodal transfer of shipments.

There are 29 intermodal facilities in Washington, allowing for the transfer of cargo between rail and other methods of transport. Transload of cargo between rail and trucks takes place at 22 facilities statewide operated by BNSF, UP, Cascade and Columbia River Railroad, and Tacoma Municipal Belt Railway. In addition, cargo is transferred between ships and rail at seven facilities statewide (WSDOT 2022c). All intermodal facilities are in or connected to the study area.

There are no definitive future improvement plans for freight railroads, especially Class I railroads. BNSF and UP typically plan projects on a 2- to 3-year horizon and are market/business dependent. As private companies, investment plans are rarely shared (WSDOT 2019a). Among two future investments that BNSF has identified, one future investment is in the study area: the BNSF bridge over Salmon Bay at the west end of the Lake Washington Ship Canal in Seattle (WSDOT 2019a). UP has identified improved access to the Northwest Seaport Alliance at Bullfrog Junction in Tacoma as a potential project. Non-Class I railroads are expected to maintain and improve infrastructure conditions over the short and long terms, due to limited funds and deferred maintenance (WSDOT 2019a).

Current improvements in Washington by BNSF include preservation work, especially bridge and operational improvements, which are expected to continue in the near term.

Figure 4. Railroads in the study area – western Washington

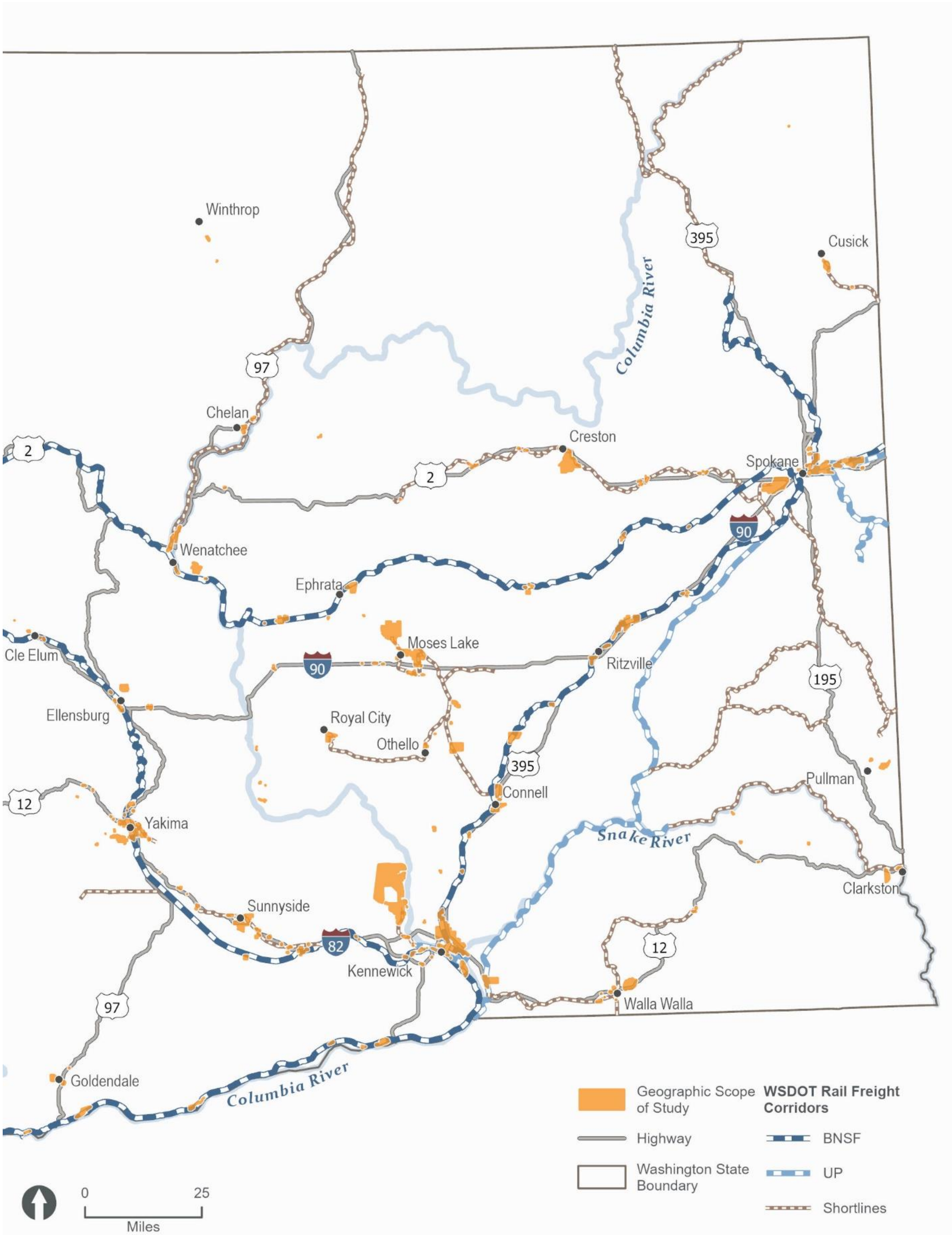

Figure 5. Railroads in the study area – eastern Washington

3.2.3 Maritime freight system and infrastructure

Navigable waterways and ports could be used to transport green hydrogen facility components (Figure 6). Navigable waterways, for the purpose of this technical appendix, are defined as waterways by which freight transportation occurs by barge. Chapter 33 Code of Federal Regulations (CFR) 329.4 defines Navigable Waters of the United States as:

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

The U.S. Army Corps of Engineers (USACE) plans, constructs, operates, and maintains navigation channels, locks, and dams to maintain authorized channel depths in harbors and inland waterways. Within Washington, USACE provides navigation along the Columbia River that follows the Oregon-Washington border and extends 106.5 miles from the mouth of the Columbia River to Vancouver, Washington, as well as along the lower 11.6 miles of the Willamette River. Columbia River navigation accommodates the current fleet of international bulk cargo and container ships as part of the Columbia and Lower Willamette Federal Navigation Channel, which in 2017 was used to transport 47.5 million tons of cargo (USACE 2024).

As of 2024, the USACE Seattle District manages 26 navigation projects (USACE 2024). These projects are within the Puget Sound area and western Washington. Navigation projects include maintaining channels and other structural features for safe navigation or removing hazards and obstructions underwater.

According to WSDOT’s Freight System Plan (WSDOT 2022a), Washington’s maritime freight transport network includes the Salish Sea, the Columbia-Snake River System, and the U.S. Pacific Coast (Figure 6).

The U.S. Department of Transportation has designated two marine highway routes that serve Washington: M-5 and M-84. Marine highway M-5 includes Pacific Ocean coastal waters and connects commercial navigation channels, ports, and harbors from San Diego to the U.S.-Canada border. Marine highway M-84 spans Oregon, Washington, and Idaho from Astoria, Oregon, to Lewiston, Idaho (MARAD 2023, 2024), and includes the Columbia, Willamette, and Snake rivers. The Columbia-Snake River System portion of marine highway M-84 transports 2.5 to 10 million tons of product per year.

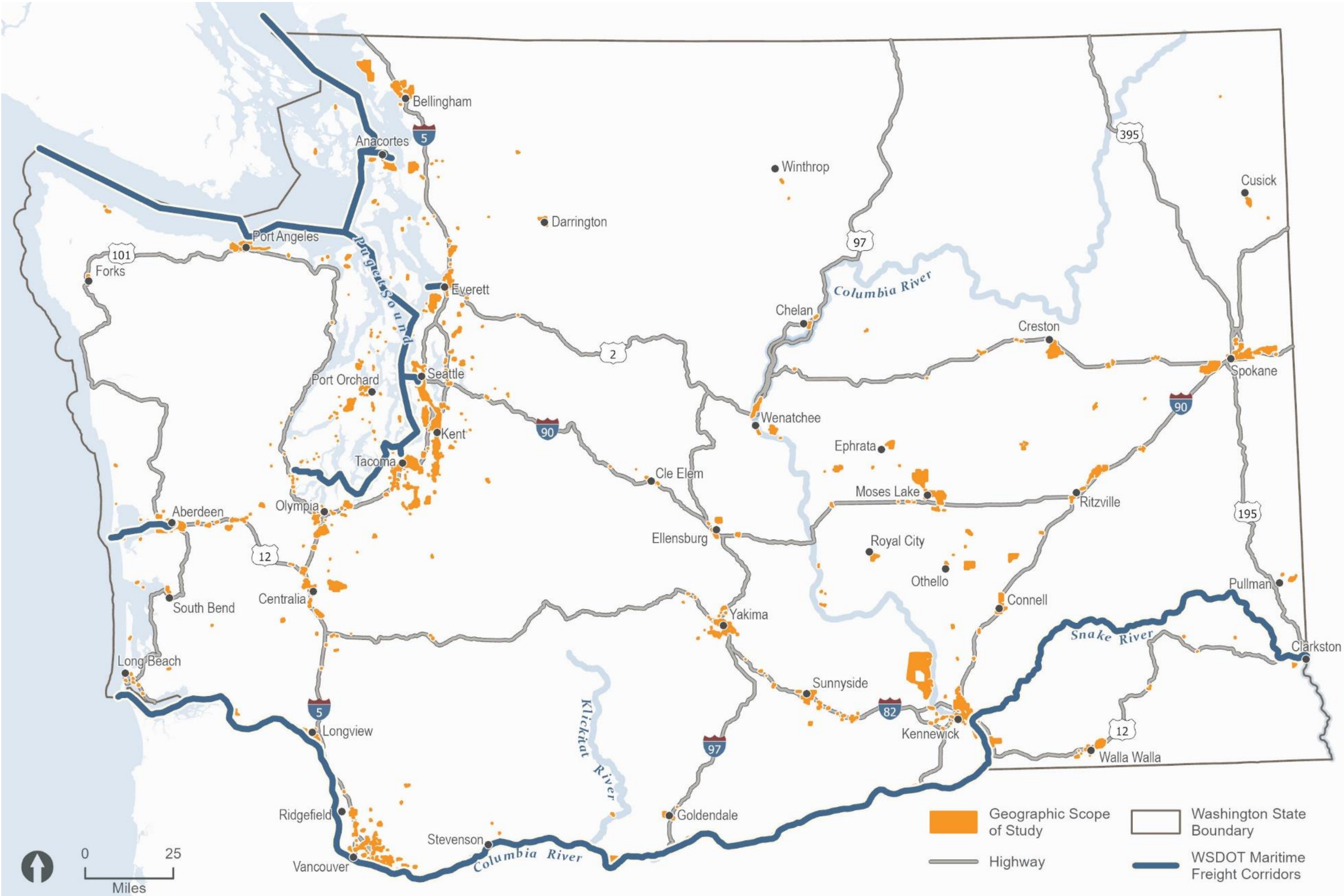

Figure 6. Maritime freight routes in the study area

The study area described in Section 2.1 excludes Tribal reservations; however, Tribal fishing areas may overlap the WSDOT maritime freight routes shown in Figure 6 above. The Washington Department of Fish and Wildlife (WDFW) works with Tribal and federal fishery managers to manage the state's fisheries (WDFW 2024). Every year, WDFW publishes a detailed list of fishing seasons and fishery agreements for treaty and non-treaty salmon fisheries in marine and freshwater areas. During project-level analysis, significant coordination would be required with WDFW and Tribes to ensure that Tribal fishing routes are not impacted.

Washington ranks fifth in the United States in terms of overall maritime volumes. There are 18 public ports, 158 marine terminals, 11 deepwater marine ports, and 57 inland ports in Washington. Roughly 27 million tons of freight is moved per year, serving primarily agricultural, energy, and manufacturing industries (WSDOT 2022c). The highest tonnage of marine freight routes in the state (more than 25 million tons per year) is in the Salish Sea area, stretching from the northwestern part of the state (Port of Port Angeles to the Port of Tacoma) (WSDOT 2022a). Commodities carried along this stretch include logs and lumber, aircraft parts, dry containers, refrigerated containers, breakbulk, roll-on/roll-off, grain, and seafood (WSDOT 2022a). Although travel times by barge take longer than rail or truck, it provides a lower-cost option that is very efficient (WSDOT 2022c). According to the Pacific Northwest Waterways Association, one tow (a towboat plus four barges) can move the same amount of freight as one freight train and 538 trucks (PNWA 2022).

Future statewide improvement projects are dependent on individual ports and funding. Most ports are planning or investing in development, re-development, and maintenance-related projects at their terminals.

3.2.4 Airports and FAA

Air cargo is not expected to be used for the construction, operation, and decommissioning of green hydrogen facilities; if used, it is expected to be in minimal volumes.

There may be concerns related to the construction of structures in green hydrogen facilities with heights that may interfere with airspace, which could trigger FAA Obstruction to Navigation Federal Regulation, 49 CFR 77. The regulation states that the FAA must be notified if any of the following construction types are proposed:

- Any construction or alteration exceeding 200 feet above ground level
- Any construction or alteration:
    - Within 20,000 feet of a public use or military airport that exceeds a 100:1 surface from any point on the runway of each airport with at least one runway more than 3,200 feet;
    - Within 10,000 feet of a public use or military airport that exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 feet; or
    - Within 5,000 feet of a public use heliport that exceeds a 25:1 surface.
- Any highway, railroad, or other traverseway whose prescribed adjusted height would exceed the above-noted standards

- When requested by the FAA
- Any construction or alteration located on a public use airport or heliport regardless of height or location

Green hydrogen facility structures are not anticipated to have heights exceeding 100 feet above ground level. The height of distribution lines is also estimated to not exceed 100 feet.

As indicated, public use and military airports are of concern when it comes to the FAA regulation above. The 2023–2027 National Plan of Integrated Airport Systems lists 548 airports in Washington, including 415 airports for private use that are closed to the public and 133 airports for public use (FAA 2022). Figure 7 and Figure 8 show the public, non-military airports. Out of 132 airports shown, 45 public, non-military airports are in the study area (WSDOT 2020).

Military bases in Washington (see Table 2) do not have airports that are also for public use. The military bases in Table 2 that have air stations to serve military operations and training are followed by an asterisk (*) (US Military OneSource 2024).

Table 2. Military bases in Washington

Location (zip code)	Name of military base
Seattle (98124)	U.S. Army Recruiting Command, Seattle Battalion
Everett (98207)	Naval Station Everett
Oak Harbor (98278)	Naval Air Station Whidbey Island*
Bremerton (98314)	Naval Base Kitsap
Camp Murray (98430)	194th Wing, Washington Air National Guard*
Pierce County (98433)	Joint Base Lewis-McChord*
Pierce County (98433)	U.S. Army Cadet Command 8th Brigade
Spokane County (99011)	141st Air Refueling Wing*
Spokane County (99011)	Fairchild Air Force Base*

Note: Bases followed by an asterisk (*) have air stations to serve military operations and training.

Air cargo in Washington is primarily handled at Seattle-Tacoma International Airport, King County International Airport-Boeing Field, and Spokane International Airport. Non-hub and small commercial passenger airports within the state account for only 4% of the total air cargo volumes moved in 2016 (PSRC 2019):

- Seattle-Tacoma International Airport, as an international air cargo hub, is a primary gateway for air freight from Asia and is currently studying options for expanding its cargo facilities.
- Spokane International Airport is the primary cargo airport for eastern Washington and benefits from less traffic congestion, more available land, and larger cargo facilities compared to Seattle-Tacoma International Airport (Spokane International Airport 2014).
- Grant County Airport in Moses Lake, located within the study area, has wide runways, large aviation facilities, and more available land compared to many other public airports in Washington (Port of Moses Lake 2024).

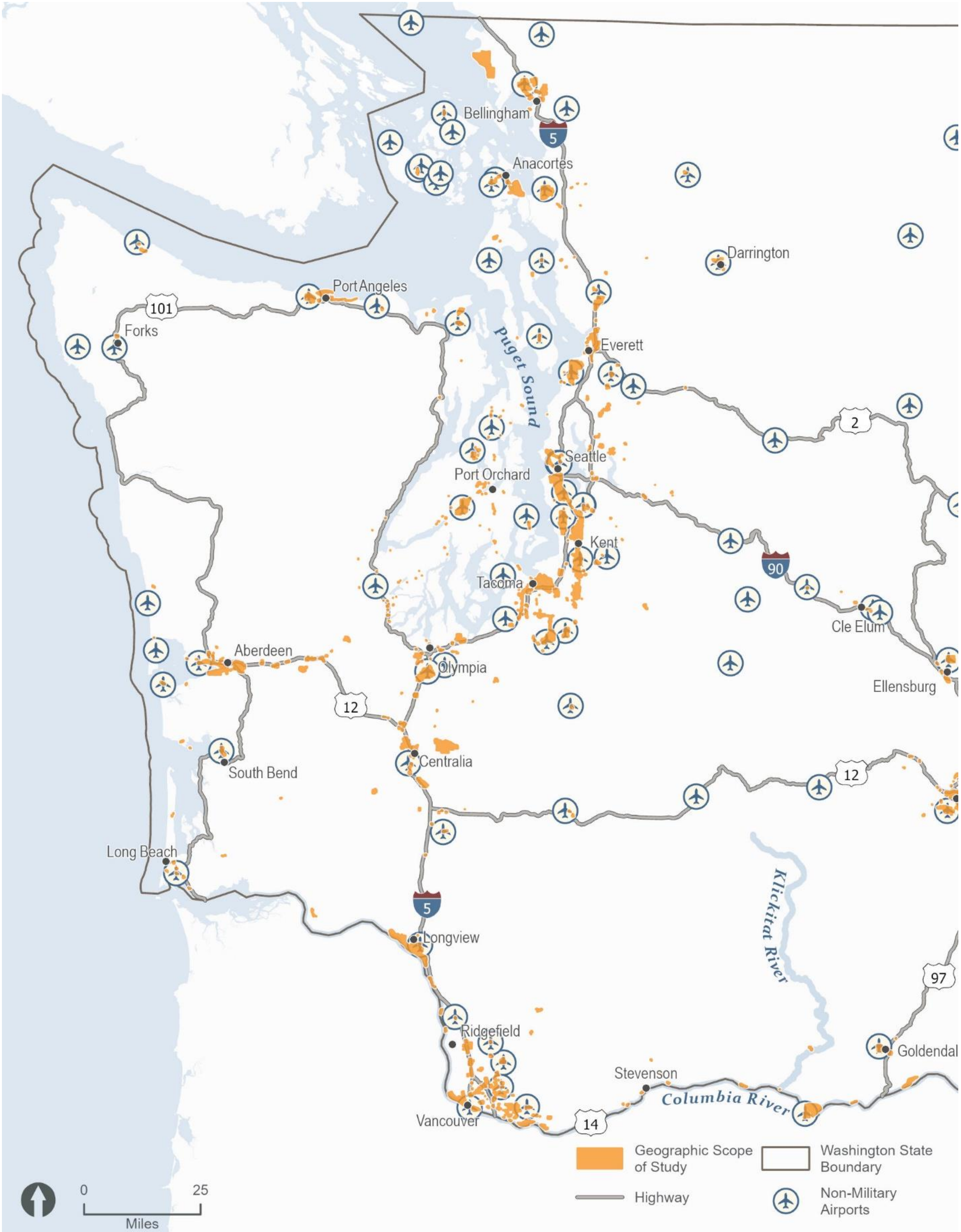

Figure 7. Public, non-military airports in the study area – western Washington

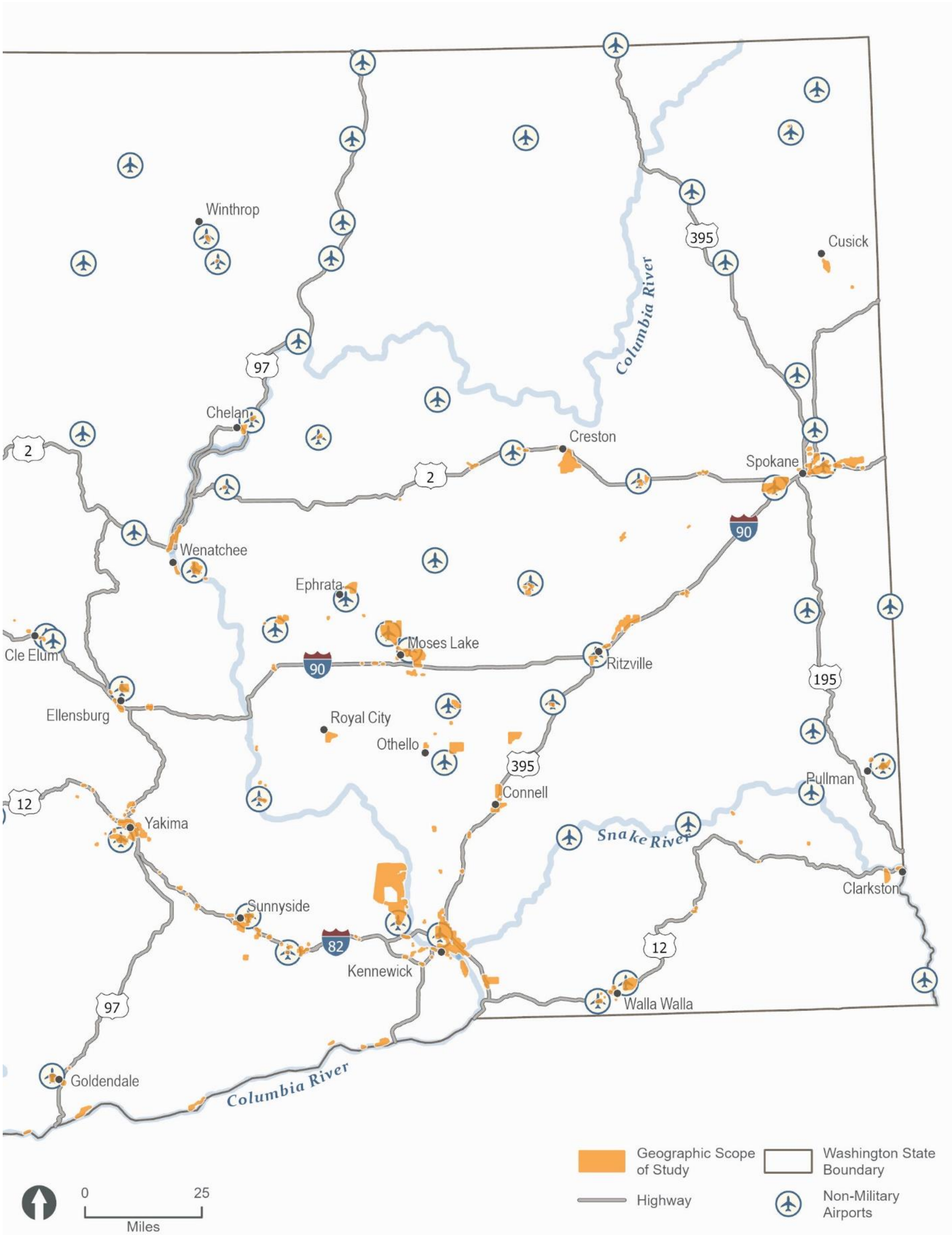

Figure 8. Public, non-military airports in the study area – eastern Washington

Air cargo facilities in Washington identified by WSDOT that overlap the study area are shown in Figure 9 and Figure 10 and listed below:

- Anacortes Regional Airport
- Auburn Municipal Airport
- Bellingham International Airport
- Friday Harbor Airport
- King County International Airport (Boeing Field International Airport)
- Orcas Island Airport
- Pangborn Memorial Airport
- Pullman-Moscow Regional Airport
- Seattle-Tacoma International Airport
- Spokane International Airport
- Tri-Cities Airport
- Walla Walla Regional Airport
- Yakima Air Terminal McAllister Field

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 transportation:

- **Access Connection Permit and General Permit (WSDOT):** Required for vehicular access, and connection points of ingress to and egress from, the state highway system within unincorporated managed access areas that are under the jurisdiction of WSDOT. General permits are for constructing access approaches, and an access connection permit is for use of the access point.
- **Clean Water Action Section 402 National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit (Ecology):** Required for construction that disturbs more than 1 acre of land and has potential to discharge stormwater to state surface waters or construction disturbance of any size that has the potential to be a significant contributor of pollutants or may be expected to cause a violation of any water quality standard (including groundwater standards). May be required for road construction.
- **Construction and Development Permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency):** Various project construction activities and placement of new or modification of existing facilities would be subject to local permits to ensure compliance with land use, grading and drainage, stormwater management, building standards, fire codes, etc.
- **Determination of No Hazard to Air Navigation, Form 7460-1 Notice of Proposed Construction or Alteration (FAA):** Required if the facility could affect navigable airspace. This approval ensures that the facility does not pose a hazard to air navigation, which is critical for tall structures. Required if FAA has requested one or if the proposed structure has the potential to do the following:

    - Exceed 200 feet above ground level
    - Be located near an airport and exceed the slope ratio
    - Involve construction of a traverse way (e.g., highway, railroad, waterway) and, once adjusted upward with the appropriate vertical distance, would exceed a certain standard
    - Emit frequencies
    - Be in an instrument approach area
    - Be near a navigation facility and impact the assurance of navigation signal reception
    - Be on an airport or heliport
- Developers can use **FAA's Notice Criteria Tool** (FAA 2024) to determine whether the proposed facility requires an FAA Form 7460-1. FAA may also request a Form 7460-1 filing. Advisory Circular 70/7460-1M, Obstruction Marking and Lighting, describes standards for marking and lighting structures such as buildings and supporting structures of overhead wires (FAA 2020).
- **Environmental Permits (e.g., Critical Areas, Shorelines) (local agency):** Must be obtained for construction and development activities within designated critical areas and shorelines regulated by local jurisdictions. Projects would be reviewed under local critical areas ordinances and Shoreline Master Programs.
- **Land Use Permits (e.g., Comprehensive Plan Amendments, Conditional Use Permit/Special Use Permit, or Zoning Amendments) (local agency):** Required if changes to a comprehensive plan or zoning designation and/or if a conditional use permit, special use permit, or variance is required for the project.
- **Overweight/Oversize Permits (WSDOT):** Special motor vehicle permit regulations and conditions are required for oversize/overweight loads, including when curfew hours, escort requirements, or nighttime movements are necessary.
- **Road Haul Agreement (local agency):** Agreement with local road agency regarding project construction transportation haul routes and addresses impacts to locally managed roads.
- **Right-of-Way or lease (federal, state, local agency):** Placement of facility infrastructure such as roads, generating facilities, and transmission lines on lands under federal, state, or local agency management jurisdiction requires approval from the applicable land manager.
- **U.S. Department of Transportation Act of 1966, Section 4(f) Review (U.S. Department of Transportation):** Review required to ensure the protection of publicly owned parks, recreation areas, wildlife refuges, and historic sites.

Figure 9. WSDOT air cargo facilities overlapping the study area – western Washington

Figure 10. WSDOT air cargo facilities overlapping the study area – eastern Washington

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, based on existing facilities in other areas, ranges from 1 acre to 10 acres, depending on the production method, type of storage facilities, and layout of external pipes and tanks, a parking area, and security fencing. The estimated height of structures is up to 100 feet.

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 Traffic and conflict with local transportation network

The proximity of the site to major roads, the phasing of construction activities, the size of the project, and the size of the construction workforce would determine the magnitude and extent of temporary disruptions to the local transportation network due to construction worker commuters. Approximately 10–100 construction workers would be needed to build a green hydrogen facility depending on the size of facility. Most facilities would be close to urban areas; therefore, long-term relocation or out-of-state travel may not be necessary since urbanized areas typically have large construction labor forces. Local hotels and other short-term lodgings could be used for workers to temporarily stay local to the site if needed, which can minimize traffic. Construction workers commuting from areas around the state would likely drive to a site using highways. Workers who commute could travel from large cities in the study area.

Most of the study area is located close to major roads, which accommodate more traffic than local roads. Given the limited number of construction workers and the proximity to major roads, it is likely that there would be minimal congestion added to existing traffic and the transportation network from construction workers.

Construction equipment

Heavy equipment and materials needed for site access (road improvement), site preparation, and construction of on-site buildings and support facilities are typical of other industrial construction projects and would not pose unique transportation considerations. Equipment used during construction may include graders, rubber-tired bulldozers, tractors, loaders, backhoes, excavators, cranes, forklifts, generators, welders, cement and mortar mixers, pavers, rollers, pile-drivers, air compressors, and trucks. Trucks would be the primary mode used to transport construction inputs, as they supported about 89% of freight weight and about 87% of value for the construction industry in 2017 (WSDOT 2022b). Shipments of materials, such as gravel, concrete, and water, would not be likely to affect local primary and secondary road networks. There may be transportation of oversized loads and equipment, which could result in temporary impacts on traffic patterns (e.g., delays) or hazards experienced by other road users such as drivers, bicyclists, and pedestrians. However, use of transportation modes for shipping construction components, supplies, and materials would only be temporary; hence, any impacts would also be temporary.

Transportation modes and related infrastructure

Facility construction may also include fortifying local bridges, reconstructing turning radii, adding acceleration or deceleration lanes on highways, or removing obstructions to move shipments. This would be determined on a site-specific basis. Construction of required road or rail improvements or new roads or rail lines at a particular site can be highly disruptive to communities, especially given the proximity of the industrial lands to highly populated urban areas and busy roads. If a facility is near rail lines, it could also lead to temporary at-grade rail crossing closures or rail line disruptions during construction that could interfere with the local transportation network. Although most conditions modified for construction (e.g., a temporary access road, widened turning radii, or a new acceleration lane) would be returned to existing conditions after construction, some may remain. The remaining modified conditions would represent a permanent impact to the transportation system but are not likely to result in significant adverse impacts to users such as long-term road closures or interruptions to traffic patterns and volumes, due to policies, permitting requirements, local design guidelines, local transportation management plans and municipal code regulations in place.

Given the proximity of the industrial lands to urban areas, there could also be conflicts between heavy truck haul routes and public transportation and nonmotorized routes during construction. The majority of the large urban public transportation agencies in western Washington are in the study area, such as King County Metro, Sound Transit, Pierce Transit, Everett Transit, and Community Transit, along with those in eastern Washington, such as Ben Franklin Transit and Spokane Transit Authority (WSDOT 2019b). There are also various bike lanes and sidewalks in local roads in urban areas. Careful site planning and consideration are required to prioritize safety and minimize conflicts. The common usage of heavy trucks during construction could lead to safety conflicts with other transportation modes (e.g., pedestrians), which could lead to collisions. Inadequate haul route planning or if the facility site is located near busy intersections could increase the likelihood of collisions. Between 2019 and 2023, over 30,000 heavy truck-involved crashes occurred in Washington, leading to over 300 fatalities (WSDOT 2024b). Heavy truck collisions are common, especially along the I-5 corridor, and are clustered along densely populated areas such as King, Pierce, and Spokane counties, which are in the study area.

The FAA has requirements to provide notice to FAA of (1) certain proposed construction or alteration of structures; (2) standards used to determine obstructions to air navigation and navigational and communication facilities; (3) a process for aeronautical studies of obstructions to air navigation or navigational facilities; and (4) the process to petition FAA for discretionary review of determinations, revisions, and extensions of determinations.

Jurisdictions having authority, such as WSDOT or the local county or city, would regulate construction activities and issue permits at their discretion for road construction or improvement, such as right-of-way permits, construction permits, and permits related to stormwater or utilities, if applicable. Local jurisdictions would also regulate signage and hours of construction. Activities related to construction are temporary in nature, and there are policies and regulations in place to reduce impacts to the public. However, construction of large facilities or construction in highly populated urban areas may be disruptive, even if construction is only 1–3 years.

Corridors with more oversized or overweight truck movements include the I-5 corridor between Seattle and Portland, the I-90 corridor between Seattle and Ellensburg, and I-90 between Ritzville and the state's border with Idaho (WSDOT 2022c). These corridors are in the study area, especially I-5. If oversized loads are required for the construction of green hydrogen facilities, further damage to already damaged roadways may occur. However, most of the anticipated construction equipment (e.g., heavy earthmoving equipment, cranes) would remain at a facility site for the duration of construction activities. Such construction equipment is routinely moved on U.S. roads, and there would be a limited number of one-time shipments.

Facility developers would be required to transport equipment and supplies in compliance with transportation regulations and permits, which are designed to minimize substantial damage or change to transit, rail, and water transportation, and roadways or related infrastructure (e.g., culverts or bridges). Therefore, substantial damage to transportation modes and related infrastructure requiring major repairs or replacement to return to safe usage and pre-impact conditions would not be expected.

A green hydrogen facility could be decommissioned following the end of its useful life, which can range from 20 to 50 years. This could include dismantling and removing aboveground components. A project site would be restored to its pre-project conditions and uses unless the project owner, permitting authority, and regulatory agencies agree on alternate actions. Service roads may be removed or remain, depending on agreements with the new or existing landowners.

Impacts associated with decommissioning would be temporary and similar to impacts of construction because the same routes and number of construction workers would likely be used. The number of truck or rail trips may be similar to those needed for construction and would depend on the amount and type of equipment brought in and taken out.

Developers would be required to transport equipment and supplies in compliance with transportation regulations and permits, which are designed to minimize substantial damage or change to transit, rail, air (including military flight training), water transportation, and roadways or related infrastructure (e.g., culverts or bridges). Therefore, substantial damage to transportation modes and related infrastructure requiring major repairs or replacement to return to safe usage and pre-impact conditions is not expected.

3.4.1.2 Truck, train, or vessel count increase

It is not anticipated that a high number of roadway truck trips would be needed during construction for materials and equipment. The number of trips would vary based on size of the facility, but generally major or long-term impacts to truck traffic counts during construction are not anticipated, as construction is temporary and anticipated to be between 1 and 3 years. Estimated range of truck trips are generated from the air quality model used in the *Air Quality and Greenhouse Gases Technical Appendix*. The anticipated daily one-way truck trips needed for industrial facility construction based on construction inputs for workers, vendors, hauling trips could range from a maximum of 5,706 trips (24 trips per day, based on 20 work days per month or 240 per year) for a facility on a 1-acre site to 140,931 trips (587 trips per day, based on 20 work days per month or 240 per year) for a facility on a 10-acre site (CAPCOA 2022).

It is also not anticipated that trains or vessels would be heavily used for transportation of typical construction equipment; hence, it is unlikely that there would be impacts due to increased train or vessel count.

It is not anticipated that a high amount of freight trips would be needed during decommissioning, similar to construction. Hence, truck, train, or vessel counts would not increase from the counts provided for construction.

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

3.4.2 Impacts from operation

3.4.2.1 Traffic and conflict with local transportation network

There would be occasional deliveries of materials during operation, which could include fuel for backup generators or maintenance vehicles. Hazardous materials are routinely shipped for other applications and pose no unusual hazards. On-site operations would include repair and maintenance, which could include the implementation of dust suppression and cleaning operations. If on-site water is not available for dust suppression and cleaning, water would need to be shipped to the facility location. Deliveries would require unloading zones and truck parking, and the lack of truck parking facilities has been a concern across the state. Undesignated truck parking has increased in areas not designed for truck weights and volumes, leading to disturbances in local areas and roadway infrastructure (WSDOT 2022d). Green hydrogen facility design would adhere to requirements for parking as well as ingress and egress access. No long-term road closures or interruptions to traffic patterns or volumes are expected for small facilities; however, large facilities or facilities in urban areas may add to local traffic pattern interruptions due to increased frequency of deliveries or maintenance.

During operations, there may be an increase in trucks used for maintenance activities, which could degrade pavement conditions. From 2018 to 2022, existing pavements that are in fair or better condition across the state decreased (WSDOT 2024c). The remaining service life of pavements has also generally decreased (WSDOT 2024c). If green hydrogen facilities require routine use of heavy trucks, it could contribute to the further degradation of local or highway pavements. Additionally, among the estimated total of 7,300 bridges on state, city, and county road systems in Washington, there are over 200 bridges rated to be in poor condition that are in study area counties (WSDOT 2024d). These bridges were built in the 1930s to 1990s and are aging and may not handle heavy trucks well (WSDOT 2024d). If delivery routes to green hydrogen facilities for operational equipment require the frequent use of bridges, this could lead to safety hazards, requiring major replacement or repairs.

As mentioned in Section 3.2.2, a few parts of the study area in small jurisdictions are connected to only non-Class I railroads, which could require transfers or multimodal transportation. Non-Class I railroads have deferred maintenance issues and unscheduled repairs due to lack of funding. If green hydrogen production facilities are built and dependent on railroad infrastructure, this could further add demand to already deteriorating infrastructure.

Transportation activities during operation would be unlikely to result in substantial damage or change to roads, rail, or marine freight corridors, and major repairs or replacement are not generally anticipated. However, large green hydrogen facilities may require more routine oversized or overweight shipments. Furthermore, if a facility is in an area where infrastructure is already damaged or not equipped to take oversized or overweight shipments, impacts could occur.

3.4.2.2 Truck, train, or vessel count increase

There may be an increase in vehicle trips due to maintenance employees periodically traveling to and from the facility site during operations; the increase would be dependent on the size of the facility. There may also be an increase in heavy truck counts for shipments. Heavy truck counts are expected to increase minimally for small facilities, as equipment, supplies, or materials are not expected to be shipped to or from facilities on a regular basis. However, large facilities may require increased heavy truck counts, which could interfere with local traffic patterns and volumes.

For large facilities, the increased frequency of shipments could lead to an increase in train counts. Increased train counts would mean longer at-grade rail crossing times, which could cause local traffic congestion, leading to slower travel times. For small facilities, rail transport of construction materials for green hydrogen facilities would be typical and not expected to greatly increase the volume of freight rail.

Similarly, for large facilities, an increase in water vessel (e.g., barge) transport counts could be anticipated. The increase in maritime movements could lead to traffic delays and congestion, as areas with bridges over waterway shipping channels could experience traffic congestion when bridges are raised and lowered to let shipping traffic pass (WSDOT 2022d).

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

3.4.3 Measures to avoid, reduce, and mitigate impacts

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

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

3.4.3.1 General measures

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

  Rationale: Laws, regulations, and permits provide standards and requirements for the protection of resources 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 WDFW, county extension services, weed boards, or land management agencies on soil and revegetation measures, including approved seed mixes. Such plans address:
  - Documentation of pre-construction conditions and as-built construction drawings
  - Measures to salvage topsoil and revegetate disturbed areas with native and pollinator-supporting plants
  - Management of hazardous and solid wastes
  - Timelines for restoration and decommissioning actions
  - Monitoring of restoration actions
  - Adaptive management measures

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

- **Cumulative impact assessment:** Assess cumulative impacts on resources based on reasonably foreseeable past, present, and future projects. Identify 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

- Consider traffic routes and peak hour traffic volumes when designing access roads.
- Design any new access roads to the appropriate standard, no higher than necessary for the intended function.

- Assess potential transportation impacts in coordination with appropriate state and local agencies, and consult land use plans, transportation plans, and other local plans.
- Coordinate with agencies, Tribes, and interested parties if facility design proposes a change in interstate access or a new interstate access. Consider proposed access changes in the context of statewide and local transportation and land use planning because they can affect local and regional traffic circulation.
- Design the facility to comply with applicable FAA regulations, including lighting requirements, to avoid or minimize potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.
- Coordinate with FAA and the Department of Defense early to identify and reduce impacts on military and civilian airport and airspace use.
- Coordinate with local planning authorities regarding general traffic, public transit routes and stops, school bus routes and stops, and emergency providers and hospitals.
- Consider the impacts of facility siting and design on non-motorized and public transit facilities and routes.

3.4.3.3 Required measures

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

- Access Connection Permit and General Permit (WSDOT)
- Clean Water Act Section 402 NPDES Construction Stormwater Permit (Ecology)
- Construction and Development Permits (e.g., road access, grading, building, mechanical, lights, signage) (local agency)
- Determination of No Hazard to Air Navigation, Form 7460-1 Notice of Proposed Construction or Alteration (FAA)
- Environmental Permits (e.g., Critical Areas, Shorelines) (local agency)
- Land Use Permits (e.g., Comprehensive Plan Amendments, Conditional Use Permit/Special Use Permit, or Zoning Amendments) (local agency)
- Overweight/Oversize Permits (WSDOT)
- Road Haul Agreement (local agency)
- Right-of-Way or lease (federal, state, or local agency)
- U.S. Department of Transportation Act of 1966, Section 4(f) Review (U.S. Department of Transportation)
- Implement a Transportation Management Plan in coordination with WSDOT and/or the local jurisdiction for traffic management during construction and for access approaches from rights-of-way. Examples of items to address include the following:
    - Evaluation of alternative transportation modes, including rail or waterway freight
    - Routes and haul schedules
    - The transport of cranes and other large pieces of equipment and acceleration, deceleration, and turn lanes on routes with site entrances
    - Advance notice to adjacent landowners and residents of construction to reduce access disruptions

- How lane closures would occur and how evacuation procedures would be followed in the event of an emergency
    - Minimizing hazards and congestion on local traffic flow
    - Proximity to rail crossings and coordination with railway operators
- If a Haul Route Agreement is needed, coordinate with the local jurisdiction to identify a qualified third-party engineer who would document road conditions prior to construction and again after construction is complete. Ensure post-construction road restoration to conditions as good or better than preconstruction.
- Ensure that fill brought to a facility site would be suitable for its intended use and delivered in accordance with the Transportation Management Plan.

3.4.3.4 Recommended measures for construction, operation, and decommissioning

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

3.4.3.5 Mitigation measures for potential significant impacts

- No potential significant impacts identified.

3.5 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 BESSs would be the same as those for green hydrogen production facilities. This type of facility would include the transportation and installation of BESSs, which would be similar to the construction of other support facilities and structures included in a green hydrogen production facility.

During construction and decommissioning, additional workers would need to commute to the site to work on internal elements of the BESS containers. Construction worker travel times would likely be similar, but facilities may require more workers or a longer construction period.

Impacts to traffic and the local transportation network would depend on the size of the facility. The potential for damage to transportation infrastructure would be limited**.** A one-time oversized or overweight transportation shipment for construction of BESS storage containers and equipment would be required. During operations, occasional deliveries of equipment are anticipated, similar to those for green hydrogen production facilities.

Through compliance with laws and permits and with implementation of measures to avoid and reduce impacts, construction, operations and decommissioning activities would likely result **in less than significant impacts** on traffic and conflicts with local transportation network.

3.5.1.1 Truck, rail, or vessel count increase

Truck, rail, or vessel counts may increase slightly, but overall, similar to green hydrogen production facilities, the movement of people and goods would not be impacted over the long term. BESSs require very limited staffing; more personnel than those needed for the green hydrogen production facility are not anticipated.

Through compliance with laws and permits and with implementation of measures to avoid and reduce impacts, construction, operations and decommissioning activities would likely result **in less than significant impacts** on truck, rail, or vessel count increase.

3.5.2 Measures to avoid, reduce, and mitigate impacts

Measures to avoid, reduce, and mitigate impacts for green hydrogen facilities with a co-located BESS would be the same as those described in Section 3.4.3.

3.6 Green hydrogen storage facility (gas or liquid form)

This section describes potential impacts of green hydrogen production facilities with hydrogen storage. 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 to be stored 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

3.6.1.1 Traffic and conflict with local transportation network

During construction, there would be delivery of gas or liquid tanks for green hydrogen storage. Given the temporary or one-time use of oversized/overweight truck movements, damage to transportation infrastructure would be unlikely.

Impacts to transportation infrastructure could occur during construction or decommissioning if storage tanks are located at transportation terminals or at an end-use location such as an industrial or fueling facility, as regular operational activities in those areas could be disrupted. Storage tanks located at transportation terminals or at an end-use location such as an industrial or fueling facility could also require more acquisition of land that could lead to interference with existing transportation infrastructure and access points. This could potentially damage existing transportation infrastructure if there is a lack of adequate accommodations or proper planning.

During operations, there may be oversized or overweight deliveries by truck, rail, or water (ship or barge), when storage facility equipment requires replacement. This could interfere with local traffic and transportation networks, as it could be a temporary hazard to road users.

Through compliance with laws and permits and with implementation of measures to avoid and reduce impacts, construction, operations and decommissioning activities would likely result **in less than significant impacts** on traffic and conflicts with local transportation network.

3.6.1.2 Truck, train, or vessel count increase

Green hydrogen storage facilities could have impacts on local traffic counts depending on the number of storage tanks. It is not anticipated that a high number of freight trips would be needed during decommissioning, similar to construction, but this is dependent on the number of storage tanks on site.

Through compliance with laws and permits and with implementation of measures to avoid and reduce impacts, construction, operations and decommissioning activities would likely result **in less than significant impacts** on truck, rail, or vessel count increase.

3.6.2 Measures to avoid, reduce, and mitigate impacts

Measures to avoid, reduce, and mitigate impacts for green hydrogen storage facilities would be the same as those described for production facilities in Section 3.4.3.

3.7 No Action Alternative

Under the No Action Alternative, agencies would continue to conduct environmental review and permitting for green hydrogen facility development 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

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 transportation from construction, operation, or decommissioning.

4 References

Association of American Railroads, 2020. Overview of America's Freight Railroads. Accessed July 2024. Available at: https://www.aar.org/wp-content/uploads/2018/08/Overview-of-Americas-Freight-RRs.pdf.

BLM (Bureau of Land Management), 2024. Draft Utility-Scale Solar Energy Programmatic EIS. Appendix B, Section B-10, page 76.

CAPCOA (California Air Pollution Control Officers Association), 2022. California Emissions Estimator Model (CalEEMod), Version 2022.1.1.22. Available at: https://www.caleemod.com/

FAA (Federal Aviation Administration), 2020. Obstruction Marking and Lighting, Advisory Circular AC 70/7460-IM, U.S. Department of Transportation, Federal Aviation Administration, Washington, D.C., Nov. 16. Available at: https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.current/documentnumber/70_7460-1

FAA, 2022. National Plan of Integrated Airport Systems (NPIAS) - Current. Available at: https://www.faa.gov/airports/planning_capacity/npias/current

FAA, 2024. Notice Criteria Tool. Available at: https://oeaaa.faa.gov/oeaaa/external/gisTools/gisAction.jsp?action=showNoNoticeReq

MRSC (Municipal Research and Services Center of Washington), 2024. Washington County Profiles. Accessed July 2024. Available at: https://mrsc.org/research-tools/washington-county-profiles

PNWA (Pacific Northwest Waterways Association), 2022. Columbia Snake River System Facts. Available at: https://www.pnwa.net/wp-content/uploads/2022/08/CSRS.pdf.

Port of Moses Lake, 2024. Airport Operations: Grant County International Airport. Available at: https://www.portofmoseslake.com/operations

PSRC (Puget Sound Regional Council), 2019. Regional Aviation Baseline Study – Working Paper 1: Airport and Aviation Activity. Available at: https://www.psrc.org/sites/default/files/2022-03/psrc_regional_aviation_baseline_study_-_working_paper_1.pdf

Spokane International Airport, 2014. Spokane International Airport (GEG) Master Plan. Available at: https://business.spokaneairports.net/airport-master-plan/

USACE (U.S. Army Corps of Engineers), 2024. Navigation Section. Accessed July 2024. Available at: https://www.nws.usace.army.mil/Missions/Civil-Works/Navigation/

US Military OneSource, 2024. Washington Installations. Available at: https://installations.militaryonesource.mil/state/WA/state-installations

Washington State Transportation Commission, 2020. Washington Transportation Plan – 2040 and Beyond. Accessed July 2024. Available at: https://wstc.wa.gov/wp-content/uploads/2020/03/WTP-2040-and-Beyond.pdf

WDFW (Washington State Department of Fish and Wildlife), 2024. Season summaries and agreed fisheries. Available at: https://wdfw.wa.gov/fishing/management/north-falcon/summaries#loaf

WSDOT (Washington State Department of Transportation), 2019a. Washington State Rail Plan 2019-2040. Accessed July 2024. Available at: https://wsdot.wa.gov/sites/default/files/2021-10/2019-2040-State-Rail-Plan.pdf

WSDOT, 2019b. Washington State Public Transit Authorities Map. Accessed July 2024. Available at: https://wsdot.wa.gov/sites/default/files/2021-10/PT-Map-PublicTransitAuthorities-Nov2019.pdf

WSDOT, 2020. WSDOT - Aviation Non-Military Airports. Accessed August 2024. Available at: https://gisdata-wsdot.opendata.arcgis.com/datasets/WSDOT::wsdot-aviation-non-military-airports/explore

WSDOT, 2022a. Freight System Plan. Accessed July 2024. Available at: https://wsdot.wa.gov/sites/default/files/2022-12/WA-State-Freight-System-Plan-2022_0.pdf

WSDOT, 2022b. Freight System Plan Appendix C: Washington Supply Chains. Accessed July 2024. Available at: https://wsdot.wa.gov/sites/default/files/2022-11/Appendix-C-FSP-Supply-Chains_0.pdf

WSDOT, 2022c. Freight System Plan Appendix D: Washington's Freight Transportation System. Accessed July 2024. Available at: https://wsdot.wa.gov/sites/default/files/2022-11/AppendixD-FSP-Freight-Systems_0.pdf

WSDOT 2022d. Freight System Plan Appendix F: Washington's Freight Transportation System Needs, Issues, and Potential Improvements. Accessed July 2024. Available at: https://wsdot.wa.gov/sites/default/files/2022-11/Appendix-F-FSP-Freight-Needs-Issues-and-Potential-Improvements_0.pdf

WSDOT 2024a. Major Projects. Accessed July 2024. Available at: https://wsdot.wa.gov/construction-planning/major-projects

WSDOT 2024b. WSDOT Crash Data Portal. Accessed July 2024. Available at: https://remoteapps.wsdot.wa.gov/highwaysafety/collision/data/portal/public/

WSDOT 2024c. Pavement – Conditions & Performance. Available at: https://wsdot.wa.gov/about/data/gray-notebook/gnbhome/preservation/pavement/conditionperformance.htm

WSDOT 2024d. Bridge & Structure Preservation. Available at: https://wsdot.wa.gov/construction-planning/preserving-our-roads-bridges/bridge-structure-preservation

WSDOT 2024e. Revive I-5: Preserving a vital freeway. Available at: https://wsdot.wa.gov/construction-planning/search-projects/revive-i-5-preserving-vital-freeway