Hood River – White Salmon BRIDGE REPLACEMENT PROJECT

Final Cumulative Impacts Technical Report

November 2020

Prepared for:

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LIST OF EXHIBITS

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

APE	area of potential effects
API	area of potential impact
BMP	best management practice
Btus	British thermal units
CRGNSA	Columbia River Gorge National Scenic Area
CRGNSA Act	Columbia River Gorge National Scenic Area Act
DAS	Oregon Department of Administrative Services
DEQ	Oregon Department of Environmental Quality
DSL	Oregon Department of State Lands
Ecology	Washington Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESD	Washington State Employment Security Department (ESD)
FHWA	Federal Highway Administration
GHG	greenhouse gas
HAER	Historic American Engineering Record
I-	Interstate
Management Plan	Columbia River Gorge National Scenic Area Management Plan
mmBtu	million British thermal units
MT CO2e	metric tons of carbon dioxide equivalent
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NSA	National Scenic Area
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OED	Oregon Employment Department
OFM	Washington Office of Financial Management
OHWM	ordinary high-water mark
the Port	Port of Hood River
the Project	Hood River-White Salmon Bridge Replacement Project
RFFA	reasonably foreseeable future action
RTC	Southwest Washington Regional Transportation Council
SR	State Route
SWCAA	Southwest Clean Air Agency
TS&L	type, size, and location
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
WDA	workforce development area
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation

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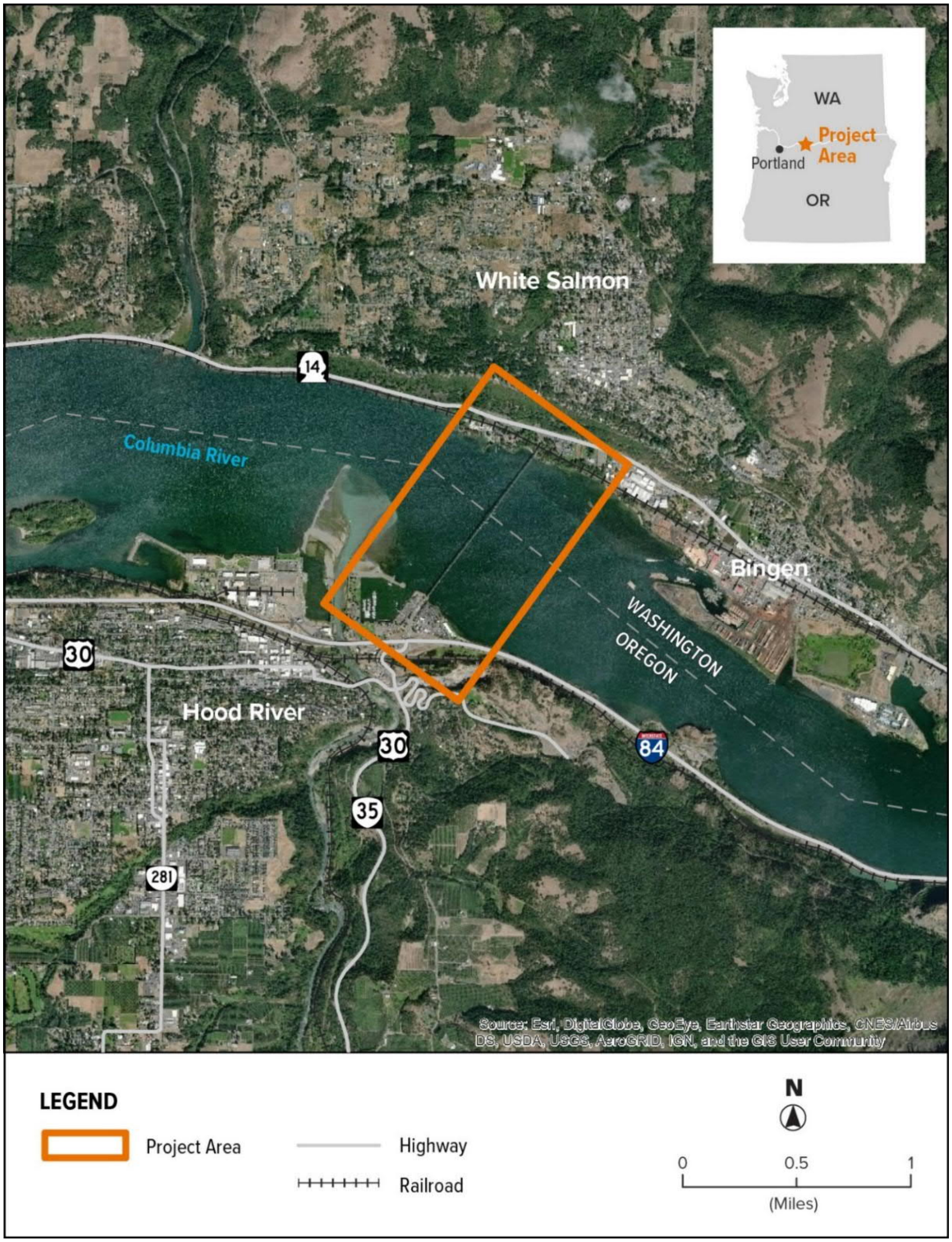
1. INTRODUCTION

The Hood River-White Salmon Bridge Replacement Project (the "Project," formerly named the SR-35 Columbia River Crossing Project) would construct a replacement bridge and then remove the existing Hood River Bridge between White Salmon, Washington, and Hood River, Oregon (Exhibit 1).The bridge is owned by the Port of Hood River (the Port), serving an average of over 4 million trips annually.

Exhibit 1. Project Area



The purpose of this Project is to improve multi-modal transportation of people and goods across the Columbia River between the communities of White Salmon and Bingen, Washington and Hood River, Oregon. The Project is intended to: a) improve traffic operations for current and future cross-river traffic and at connections to I-84 and SR 14; b) provide a cross-river connection for bicyclists and pedestrians; c) improve vehicle and freight travel safety by reducing real and perceived hazards; d) maintain and improve a transportation linkage between the White Salmon, Bingen, and Hood River communities, businesses, and services; e) fulfill the legislative directives tied to the Project funding; f) improve river navigation for vessels passing under the bridge; and g) improve the river crossing's seismic resiliency.

The overall need for the Project is to rectify current and future transportation inadequacies and deficiencies associated with the existing bridge. Specifically, these needs are to:

- Present Capacity: substandard width and operational issues are causing traffic congestion on the bridge and at both approaches
- Future Transportation Demand: the existing bridge is not designed to meet future travel demand for vehicles
- Bicycle and Pedestrian Facilities: lack of bicycle and pedestrian facilities limits multi-modal mobility
- Safety: narrow lanes and lack of shoulder create real and perceived safety hazards
- Social Demands/Economic Development: the existing bridge restricts the current and projected flow of goods, labor and consumers across the river
- Legislation: comply with federal funding obligation Transportation Equity Act for the 21st Century (TEA-21), the Washington State Legislature designation of the SR-35 corridor, and Oregon HB 2017
- River Navigation: the substandard horizontal clearance creates difficulties for safe vessel navigation
- Seismic Deficiencies: the existing bridge does not meet current seismic standards and is vulnerable to a seismic event

The Project began in 1999 with a feasibility study that ultimately resulted in the publication of the State Route (SR) 35 Columbia River Crossing Draft Environmental Impact Statement (EIS) in 2003, which identified the "EC-2 West Alignment" as the preliminary preferred alternative. In 2011, the Type, Size, and Location (TS&L) Study recommended a fixed-span concrete segmental box girder bridge as the recommended bridge type. In 2017, the Project was relaunched to complete the National Environmental Policy Act (NEPA) process. This report provides an update to the cumulative impacts that were previously analyzed in Chapter 5 of the Project's Draft EIS.

2. PROJECT ALTERNATIVES

Four alternatives are being evaluated to address the Project's purpose and need:

- No Action Alternative
- Preferred Alternative EC-2
- Alternative EC-1
- Alternative EC-3

Exhibit 2 shows the alignment of the existing bridge, which represents the No Action Alternative, and the three build alternatives. The build alternatives connect to SR 14 in White Salmon, Washington, and Button Bridge Road in Hood River, Oregon, just north of the Interstate 84 (I-84)/United States Highway 30 (US 30) interchange (Exit 64).

Each alternative is summarized in Exhibit 3 and described in more detail in the following sections. Exhibit 4 illustrates the navigational clearance for the existing bridge and the replacement bridge (same for each build alternative).

Exhibit 2. Location of the Preferred Alternative EC-2, Alternative EC-1, and Alternative EC-3

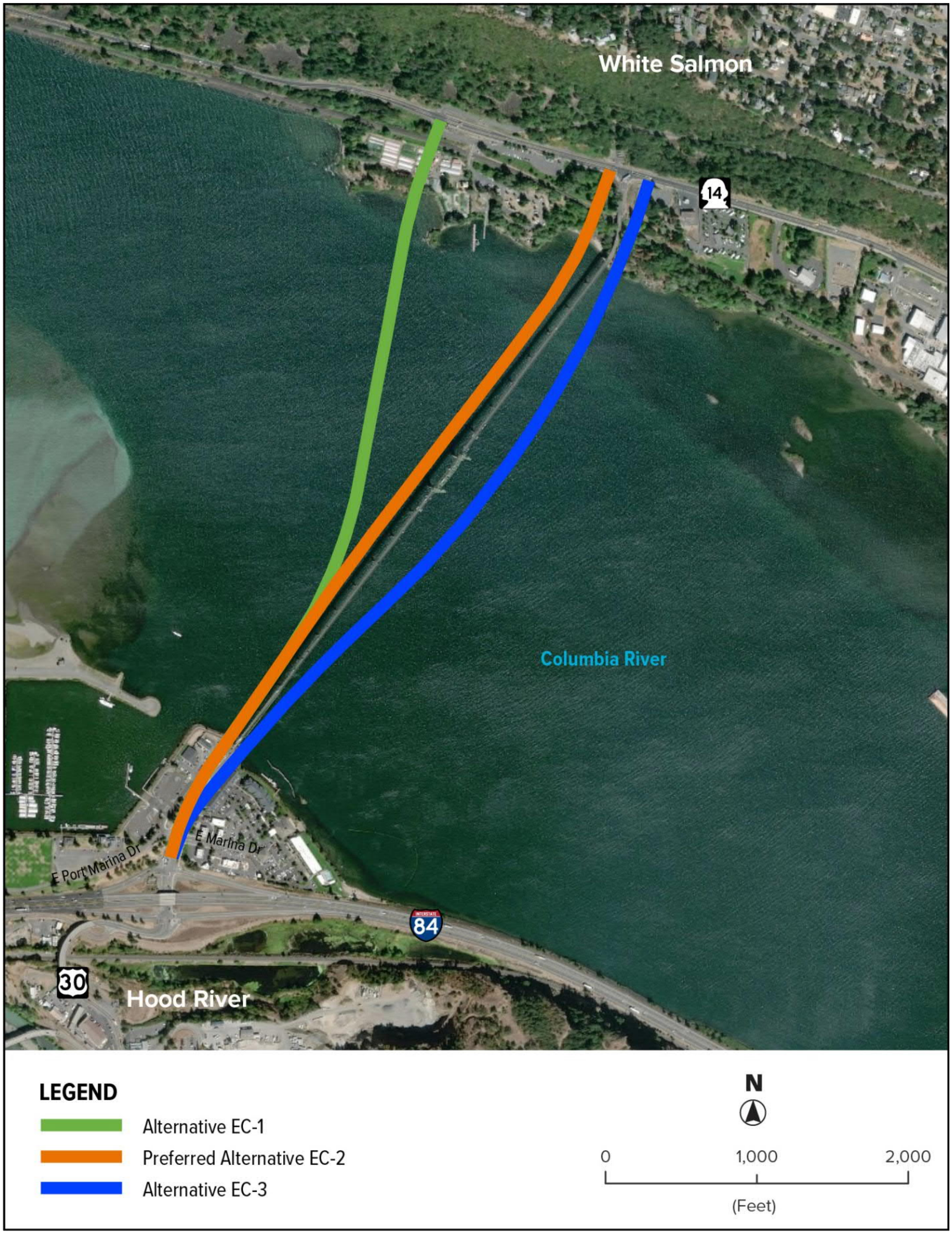
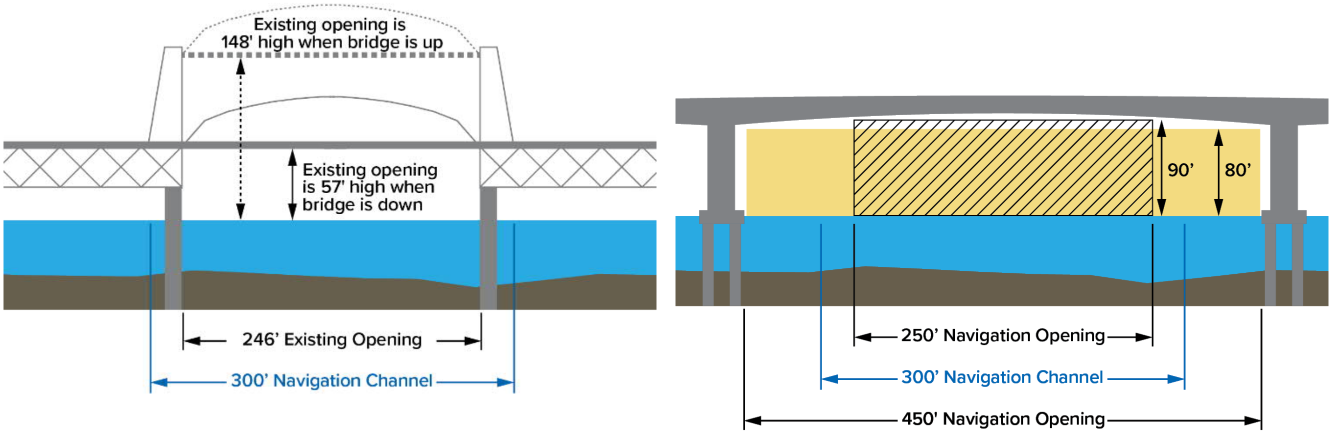


Exhibit 3. Summary Comparison of Key Elements of Alternatives

	No Action Alternative	Preferred Alternative EC-2	Alternative EC-1	Alternative EC-3
Bridge alignment	No change	Slightly west of existing	WA: West of existing OR: Slightly west of existing	Slightly east of existing
Bridge structure				
Bridge type	Steel deck truss bridge with vertical lift span	Segmental concrete box girder bridge (fixed span)		
Total number of piers (in water / on land)	28 (20 / 8)	13 (12 / 1)	13 (11 / 2)	13 (12 / 1)
Structure length	4,418 feet	4,412 feet	4,375 feet	4,553 feet
Travel lanes	9-foot 4.75-inch lanes	12-foot lanes		
Roadway shoulders	No shoulders	8-foot shoulders		
Vehicle height limit	14 feet-7 inches	None		
Shared Use Path	None	12-foot wide, only on west side with overlooks		
Bridge deck	Steel-grated	Concrete		
Vehicle Gross Weight Limit	80,000 pounds (lbs.); no trip permit allowance for overweight vehicles	> 80,000 lbs., with approved trip permit		
Design speed	Unknown	50 miles per hour (mph)		
Posted speed	25 mph	35 mph		
Toll collection	Toll booth on Oregon side	Electronic tolling/No toll booth		
Stormwater treatment	None	Detention and water quality treatment		
Navigation clearance	246 feet horizontal by 57 feet vertical when bridge is down and up to 148 feet vertical when lifted	450 feet horizontal x 80 feet vertical (maximum horizontal opening) 250 feet horizontal x 90 feet vertical (centered within maximum vertical opening)		
SR 14/Hood River Bridge intersection	Signalized intersection	Roundabout slightly west of existing intersection; SR 14 raised approximately 2 feet above existing road level	Roundabout with connection to N. Dock Grade Road west of existing intersection; SR 14 raised approximately 17 feet above existing road level	Roundabout slightly east of existing intersection; SR 14 remains at existing road level
Button Bridge Road/E. Marina Way intersection	Signalized intersection	Signalized intersection		
Anticipated construction duration	None	6 years (3 years to construct the replacement bridge and 3 years to remove the existing bridge)		

Exhibit 4. Navigation Clearance of Existing Bridge and Proposed Replacement Bridge



Existing Bridge

Proposed Replacement Bridge

2.1. No Action Alternative

The No Action Alternative would retain the existing bridge in its existing condition and configuration. Routine operations would continue and maintenance would be implemented to continue operations. Under the No Action Alternative, elements of the existing bridge include:

- Alignment: The bridge would continue to span the Columbia River between its northern terminus at the SR 14/Hood River Bridge intersection in White Salmon, Washington, and its southern terminus at the Button Bridge Road/E. Marina Way intersection in Hood River, Oregon, as shown in the aerial photograph in Exhibit 2.
- Type: The bridge would continue to be a 4,418-foot steel deck truss bridge with a vertical lift span. The bridge would continue to have 20 piers in the Columbia River.
- Ownership: The bridge will continue to be owned and operated by the Port.
- Vehicle lanes: The bridge will continue to have one narrow (9 feet, 4.75 inches) travel lane in each direction and no shoulders.
- Bicycle and pedestrian facilities: The bridge would continue to have no pedestrian or bicycle facilities, and signage would continue to prohibit pedestrians and bicycles on the bridge.
- Speed: The posted speed limit on the bridge would continue to be 25 mph.
- Vehicle restrictions: Vehicles would continue to be weight-restricted to 80,000 lbs.; vehicles with approved trip permits would still not be allowed to use the bridge. Wide loads would continue to be prohibited without special arrangements, and large vehicles would be encouraged to turn their mirrors in. The height limit for vehicles would continue to be 14 feet, 7 inches where the lift span occurs.
- Tolling: The bridge would continue to be tolled for all vehicles with a toll booth on the south end of the bridge and electronic tolls collected through the Port's Breezeby system. Plans to shift to all ETC are being considered, but there is no certainty they will be implemented.

- Navigational clearance: The horizontal clearance for marine vessels would continue to be 246 feet, narrower than the navigation channel width of 300 feet, as shown Exhibit 4. The vertical clearance would continue to be 57 feet when the lift span is down and 148 feet when it is raised; vessels would continue to be required to request bridge lifts in advance. The lift span section would continue to use gate and signals to stop traffic for bridge lifts.
- Seismic resilience: The bridge would continue to be seismically vulnerable and would not be cost effective to be seismically retrofitted.
- Stormwater: No stormwater detention or water quality treatment would be provided for the bridge. Stormwater on the bridge would continue to drain directly into the Columbia River through the steel-grated deck.
- Roadway connections: The bridge would continue to connect to SR 14 on the Washington side at the existing signalized SR 14/Hood River Bridge intersection. On the Oregon side, the southern end of the bridge would continue to transition to Button Bridge Road, connecting to the local road network at the existing signalized Button Bridge Road/E. Marina Way intersection north of I-84. The bridge would continue to cross over the BNSF Railway tracks on the Washington side and over the Waterfront Trail along the Oregon shoreline.
- Bicycle and pedestrian connections: The bridge would continue not to provide bicycle or pedestrian connections across the Columbia River. Bicyclists and pedestrians wanting to cross the river would continue to need to use an alternate means of transportation, such as the Mt. Adams Transportation Service (MATS) White Salmon/Bingen to Hood River bus (buses provide bicycle racks), or a private vehicle.

The Supplemental Draft EIS considers two scenarios for the No Action Alternative:

- End of bridge lifespan: assumes that the existing Hood River Bridge would remain in operation through 2045[1] and would be closed sometime after 2045 when maintenance costs would become unaffordable. At such a time, the bridge would be closed to vehicles and cross-river travel would have to use a detour route approximately 21 miles east on SR 14 or 23 miles east on I-84 to cross the Columbia River using The Dalles Bridge (US 197). Alternatively, vehicles could travel 25 miles west on SR 14 or 21 miles west on I-84 to cross the Columbia River via the Bridge of the Gods. When the bridge would be closed, the lift span would be kept in a raised position to support large vessel passage that previously required a bridge lift or the existing bridge would be removed.
- Catastrophic event: addresses the possibility that an extreme event that damages or otherwise renders the bridge inoperable would occur prior to 2045. Such events could include an earthquake, landslide, vessel strike, or other unbearable loads that the bridge structure cannot support.

[1] The year 2045 is the design horizon for the Project. The design horizon is the year for which the Project was designed to meet anticipated needs.

2.2. Preferred Alternative EC-2

Alternative EC-2 would construct a replacement bridge west of the existing bridge. The existing bridge would be removed following construction of the replacement bridge. Under Alternative EC-2, elements of the replacement bridge would include:

- Alignment: The main span of the bridge would be approximately 200 feet west of the existing lift span. The bridge terminus in White Salmon, Washington, would be located approximately 123 feet west of the existing SR 14/Hood River Bridge intersection, while the southern terminus would be in roughly the same location at the Button Bridge Road/E. Marina Way intersection in Hood River, Oregon, as shown in Exhibit 5 and Exhibit 6.
- Type: The bridge would be a 4,412-foot fixed-span segmental concrete box girder bridge with a concrete deck and no lift span. The bridge would have 12 piers in the Columbia River and one land-based pier on the Washington side of the river.
- Ownership: While the Port may own and operate the replacement bridge, other options for the ownership and operation of the replacement bridge that may be considered include other governmental entities, a new bi-state bridge authority, and a public-private partnership, depending on the funding sources used to construct the replacement bridge.
- Vehicle lanes: The bridge would include one 12-foot travel lane in each direction, an 8-foot shoulder on each side, as shown in Exhibit 7.
- Bicycle and pedestrian facilities: The bridge would include a 12-foot wide shared use path separated from traffic with a barrier on the west side, as shown in Exhibit 7. In the middle of the bridge the shared use path would widen an additional 10 feet in two locations to provide two 40-foot long overlooks over the Columbia River and west into the CRGNSA with benches; the overlook locations are shown in Exhibit 5 and Exhibit 6. The cross-section of the overlooks is shown in Exhibit 7.
- Speed: The design speed for the bridge would be 50 mph with a posted speed limit of 35 mph.
- Vehicle restrictions: Vehicles would no longer be limited by height, width, or weight. Vehicles exceeding 80,000 lbs. that have approved trip permits could use the bridge.
- Tolling: Tolls for vehicles would be collected electronically so there would be no toll booth on either side of the bridge. No tolls would be collected from non-motorized users (e.g., pedestrians, bicyclists) who travel on the shared use path.
- Navigational clearance: Vertical clearance for marine vessels would be a minimum of 80 feet. The horizontal bridge opening for the navigation channel would be 450 feet, greater than the existing 300-foot wide federally recognized navigation channel, as shown in Exhibit 4. Centered within this 450-foot opening, there would be a 250-foot wide opening with a vertical clearance of 90 feet. Similar to the existing bridge, the replacement bridge would cross the navigation channel at roughly a perpendicular angle as shown in Exhibit 5 and Exhibit 6.
- Seismic resilience: The bridge would be designed to be seismically sound under a 1,000-year event and operational under a Cascadia Subduction Zone earthquake.

- Stormwater: Stormwater from the entire Project area (bridge and improved roadways) would be collected and piped to detention and treatment facilities on both sides of the bridge as shown in Exhibit 6. On the Washington side, separate stormwater facilities would be used for the roadways and the bridge.
- Roadway connections: The bridge would connect to SR 14 on the Washington side at a new two-lane roundabout slightly west of the existing SR 14/Hood River Bridge intersection, as shown in Exhibit 6. On the Oregon side, the southern end of the bridge would transition to Button Bridge Road, connecting to the local road network at the existing signalized Button Bridge Road/E. Marina Way intersection north of I-84. The private driveway on Button Bridge Road north of E. Marina Way may be closed under this alternative. Like the existing bridge, the replacement bridge would cross over the BNSF Railway tracks on the Washington side and over the Waterfront Trail along the Oregon shoreline.
- Bicycle and pedestrian connections: The new shared use path would connect to existing sidewalks along the south side of SR 14 in Washington and to roadway shoulders (for bicyclists) on both sides of SR 14 at the new roundabout with marked crosswalks, as shown in Exhibit 6. On the Oregon side, the shared use path would connect to existing sidewalks, bicycle lanes, and local roadways at the signalized Button Bridge Road/E. Marina Way intersection.
- Cost: Total Project construction cost is estimated to be $300 million in 2019 dollars.

Exhibit 5. Preferred Alternative EC-2 Alignment

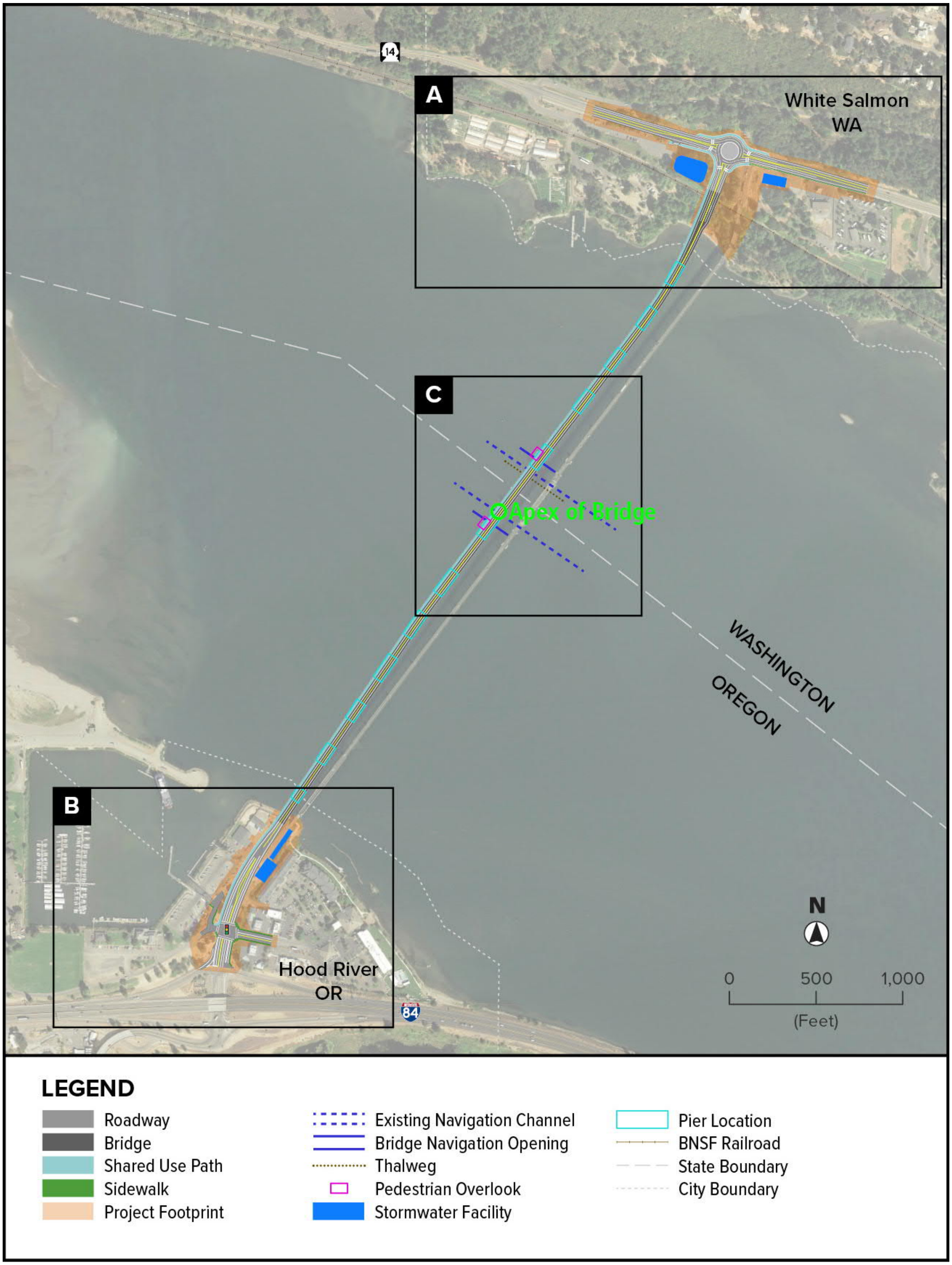


Exhibit 6. Preferred Alternative EC-2 Enlargements

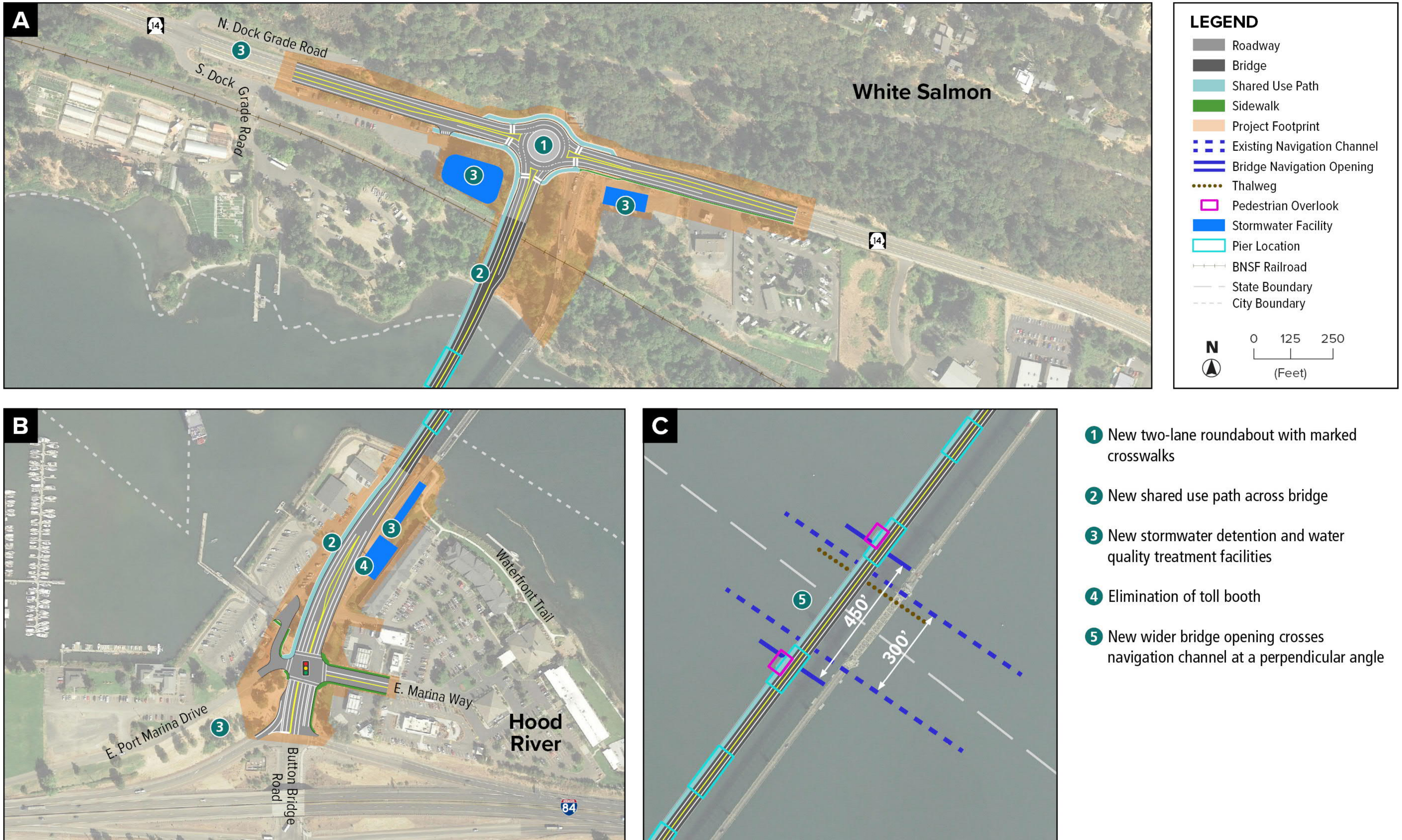


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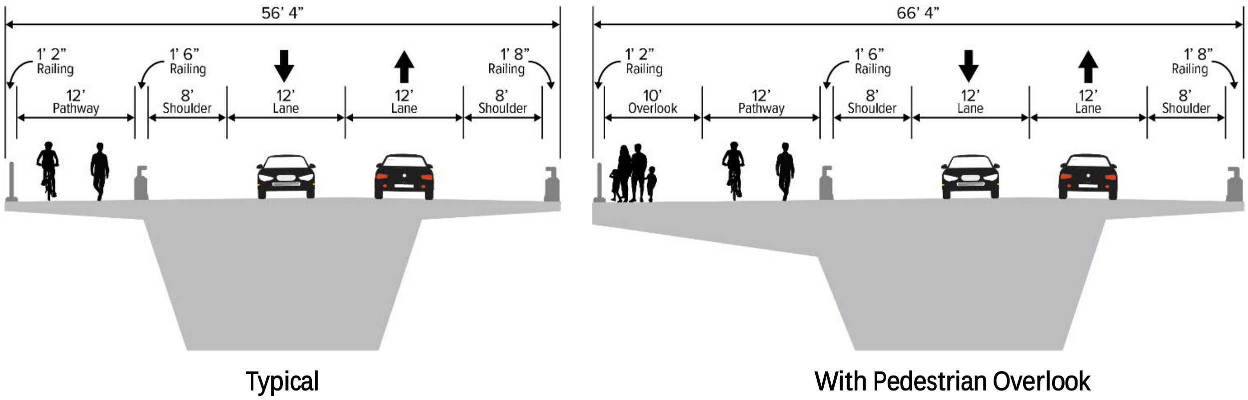
Exhibit 7. Replacement Bridge Typical Cross-Section



2.3. Alternative EC-1

Alternative EC-1 would construct a replacement bridge west of the existing bridge. Like Alternative EC-2, the existing bridge would be removed following construction of the replacement bridge. Exhibit 8 shows alignment of Alternative EC-1 and Exhibit 9 provides enlargements of the improvements that would be constructed under Alternative EC-1.

Like Preferred Alternative EC-2, the total Project construction cost for Alternative EC-3 is estimated to be $300 million in 2019 dollars. Under Alternative EC-3, elements of the replacement bridge would be the same as the elements described for Alternative EC-2 except:

- Alignment: The main span of the bridge would be approximately 700 feet west of the existing lift span. The bridge terminus in White Salmon, Washington, would be located approximately 2,309 feet west of the existing SR 14/Hood River Bridge intersection, while the southern terminus would be in roughly the same location as the existing terminus at the Button Bridge Road/E. Marina Way intersection in Hood River, Oregon.
- Type: The bridge would be a 4,553-foot fixed-span segmental concrete box girder bridge with a concrete deck and no lift span. Like Preferred Alternative EC-2, the bridge would have 12 piers in the Columbia River and one land-based pier on the Washington shore.
- Navigational clearance: The navigational opening would be the same as Alternative EC-2, but the bridge would cross the navigation channel at a more skewed angle than under Alternative EC-2.
- Roadway connections: Connections to roadways would generally be the same as Alternative EC-2, but the bridge would connect to SR 14 on the Washington side at a new two-lane roundabout at the SR 14/Hood River Bridge/N. Dock Grade Road intersection west of the existing bridge. Access to S. Dock Grade Road would be provided via the driveway east of the Mt. Adams Chamber of Commerce and Heritage Plaza Park and Ride.
- Bicycle and pedestrian connections: Connections to bicycle and pedestrian facilities would generally be the same as Alternative EC-2, but the roundabout intersection with SR 14 on the Washington side would be located further west at N. Dock Grade Road.

Exhibit 8. Alternative EC-1 Alignment

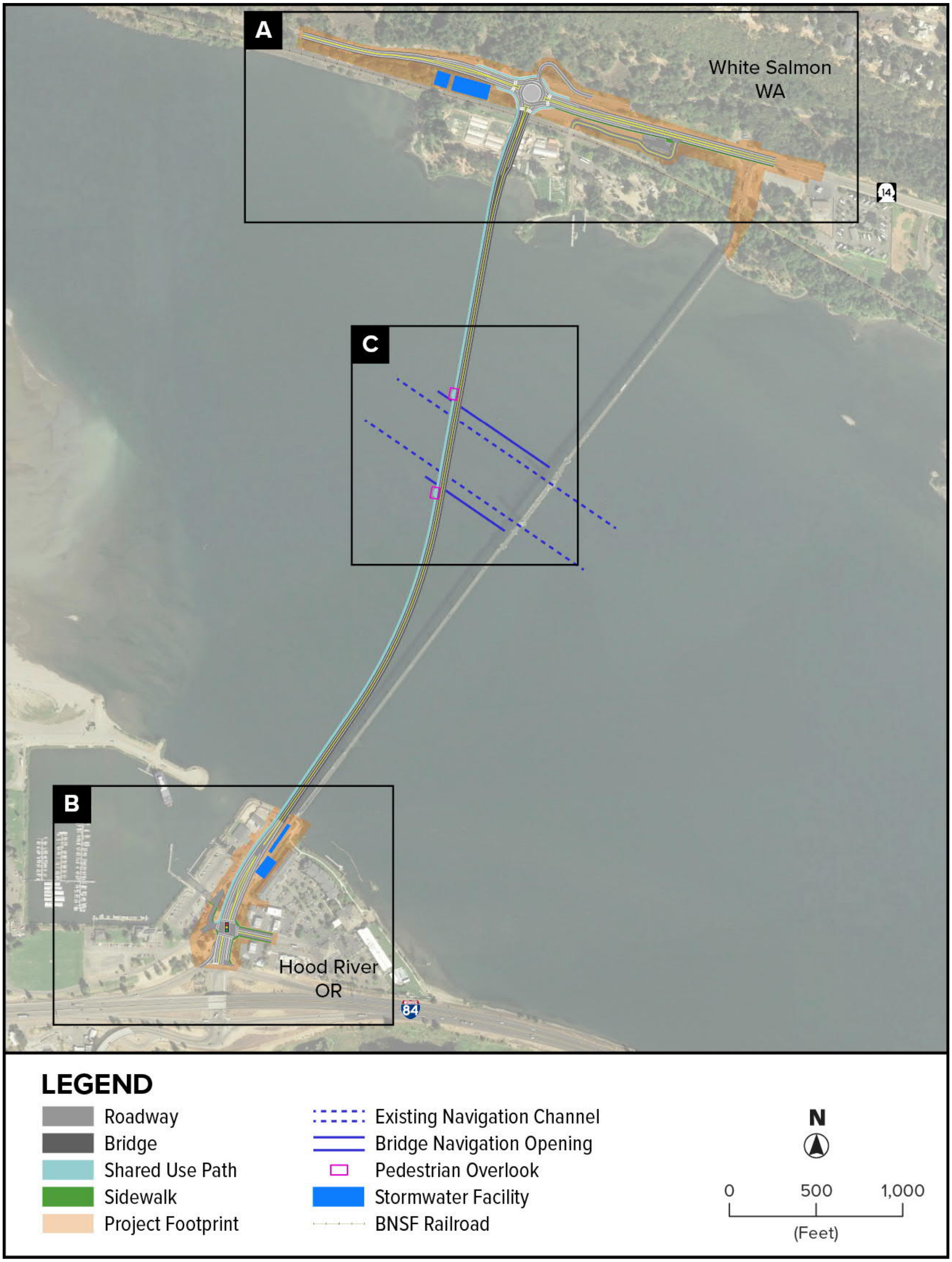
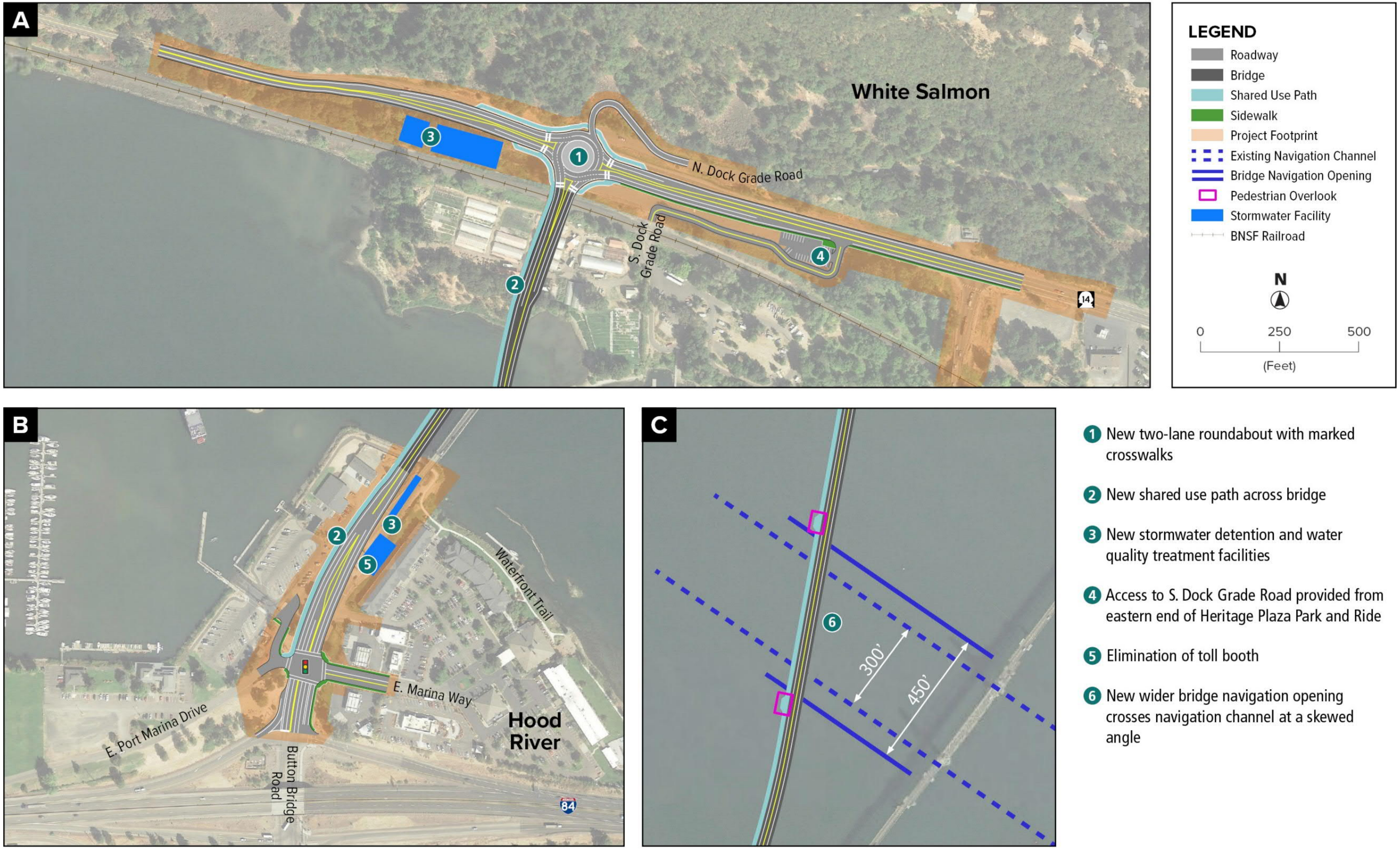


Exhibit 9. Alternative EC-1 Enlargements



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2.4. Alternative EC-3

Alternative EC-3 would construct a replacement bridge east of the existing bridge. Like Alternative EC-2, the existing bridge would be removed following construction of the replacement bridge. Exhibit 10 shows alignment of Alternative EC-3 and Exhibit 11 provides enlargements of the improvements that would be constructed under Alternative EC-3.

Like Preferred Alternative EC-2, the total Project construction cost for Alternative EC-3 is estimated to be $300 million in 2019 dollars. Under Alternative EC-3, elements of the replacement bridge would be the same as the elements described for Alternative EC-2 except:

- Alignment: The main span of the bridge would be approximately 400 feet east of the existing lift span. The bridge terminus in White Salmon, Washington, would be located approximately 140 feet east of the existing SR 14/Hood River Bridge intersection, while the southern terminus would be roughly the same as the existing terminus at the Button Bridge Road/E. Marina Way intersection in Hood River, Oregon.
- Type: The bridge would be a 4,553-foot fixed-span segmental concrete box girder bridge with a concrete deck and no lift span. Like Alternative EC-2, the bridge would have 12 piers in the Columbia River and one land-based pier on the Washington side of the river.
- Roadway connections: Connections to roadways would generally be the same as Alternative EC-2, but the bridge would connect to SR 14 on the Washington side at a new two-lane roundabout slightly east of the existing SR 14/Hood River Bridge intersection. On the Oregon side, improvements extend slightly further south to the Button Bridge Road/I-84 on and off ramps. The private driveway on Button Bridge Road north of E. Marina Way would be closed under this alternative.
- Bicycle and pedestrian connections: Connections to bicycle and pedestrian facilities would generally be the same as Alternative EC-2, but the roundabout intersection with SR 14 on the Washington side would be located approximately 264 feet further east than under Alternative EC-2.

Exhibit 10. Alternative EC-3 Alignment

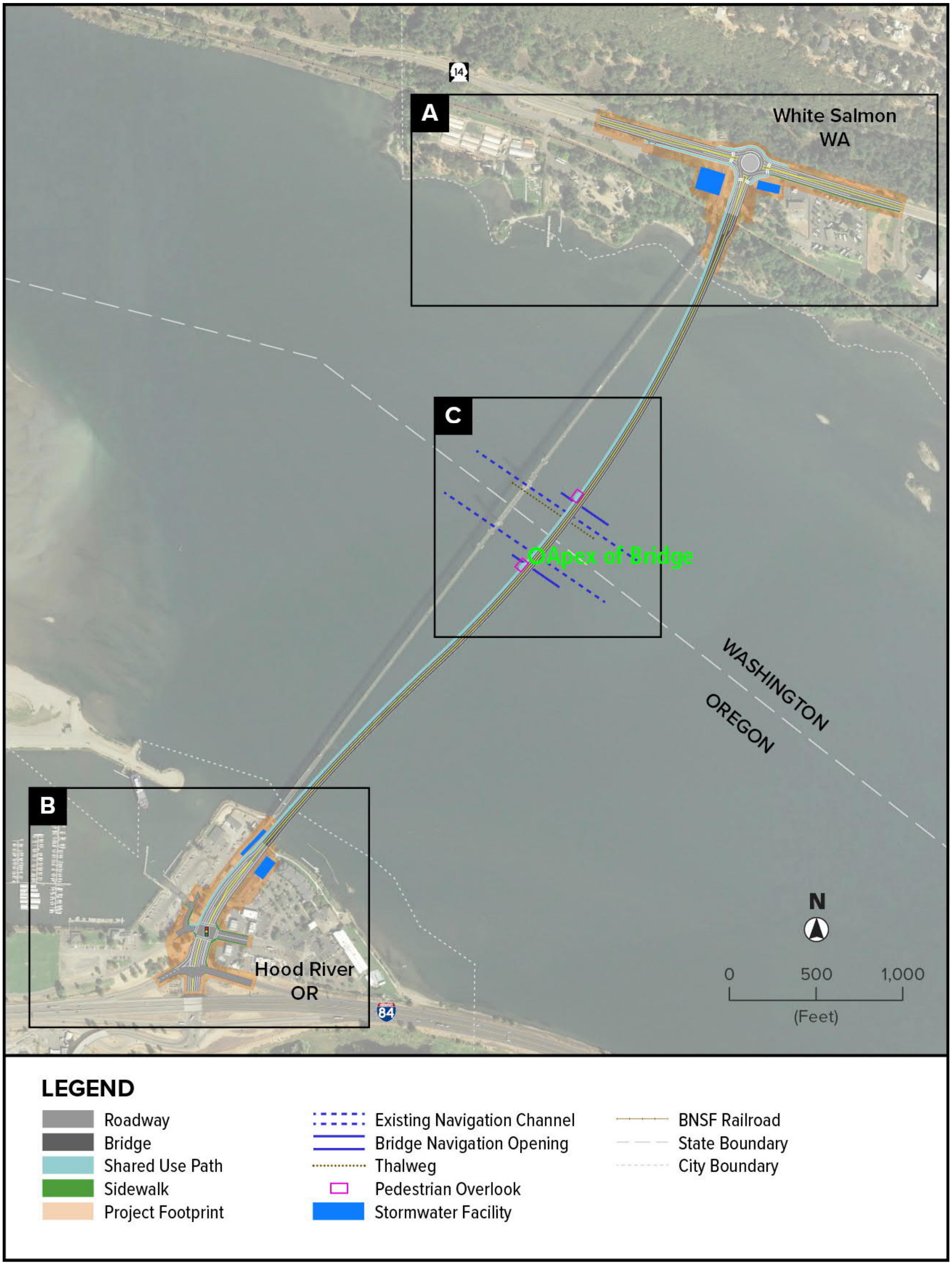
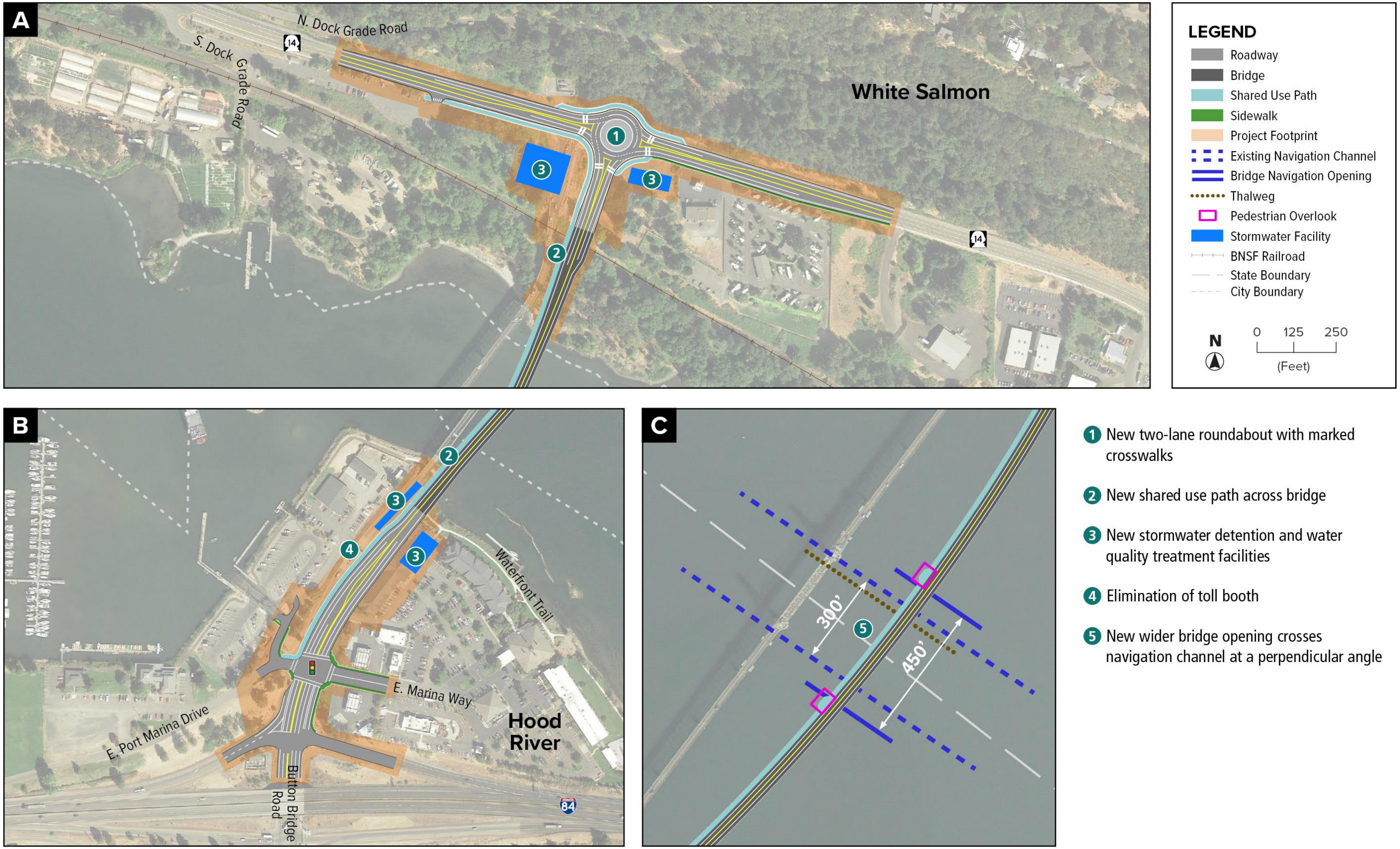


Exhibit 11. Alternative EC-3 Enlargements



1. New two-lane roundabout with marked crosswalks
2. New shared use path across bridge
3. New stormwater detention and water quality treatment facilities
4. Elimination of toll booth
5. New wider bridge opening crosses navigation channel at a perpendicular angle

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2.5. Construction of the Build Alternatives

Construction of the build alternatives would be similar in duration and approach.

- Timeline and sequencing: The NEPA process is anticipated to be complete in 2021; subsequent phases of the Project would be dependent on funding availability. Construction would take approximately 6 years and would require work during approximately six in-water work windows (IWWWs). Approximately three IWWWs would be necessary to construct the replacement bridge, and approximately three additional IWWWs would be necessary to complete the removal of the existing bridge.
- In-water work window: Certain construction and removal activities conducted below the OHWM of the Columbia River would be restricted to an IWWW established for the Project. The IWWW would be established in permits for the Project through inter-agency coordination including Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), NOAA Fisheries, and USFWS. Preliminary discussions with these agencies indicate that the authorized IWWW would likely be October 1-March 15 of each year. In-water work activities that would be restricted to this IWWW would include vibratory and impact pile installation, installation of drilled shaft casings, installation of cofferdams, and unconfined wiresaw removal of the existing pier foundations. Vibratory pile removal would not be restricted to the IWWW.
- Mobilization and site preparation: The contractor would likely mobilize equipment to the construction site via barges and trucks. Erosion control measures (e.g., silt fences, etc.) and debris containment devices (i.e., floating debris booms) would be installed and clearing and grubbing limits would be established prior to vegetation removal. Barges would require anchoring, tethering, and spudding.
- Construction staging: At least two staging areas would be necessary for staging and storage of materials and equipment; the location of these areas would be determined later in the design process, including obtaining all relevant environmental permits and land use approvals. It is estimated that a minimum of 2 acres would be necessary for staging and storage of materials and equipment. Materials arriving by barge may be offloaded to upland staging areas or may be temporarily stored on barges. All staging areas and equipment fueling areas would be located above the OHWM and outside of environmentally sensitive areas. Staging and temporary access areas will occur in upland locations, on areas that are either already disturbed or that will be restored post-Project.
- Temporary work structures: The Project would likely require the installation of several temporary in-water structures during construction and removal of the existing bridge. These structures would include temporary work bridges, cofferdams, drilled shaft casings, and temporary piles. These temporary features would be designed by the contractor after a contract is awarded, but prior to construction.

  Three temporary work bridges would likely be installed to support construction activities. One temporary work bridge would be installed at each end of the replacement bridge alignment. A third temporary work bridge would be constructed on the Washington side of the river to support the removal of the existing bridge. These temporary structures would likely be supported by 24-inch steel pipe piles.

Additional temporary piles would be necessary throughout construction and removal of the existing bridge for a variety of purposes, including supporting falsework and formwork, pile templates, reaction piles, and for barge mooring. These temporary piles would also likely be 24-inch steel pipe piles.

Barges would be used as platforms to conduct work activities and to haul materials and equipment to and from the work site. Three barges would typically be needed at each pier during drilled shaft construction, and at least one barge would remain at each pier after shaft construction to support column and superstructure construction.

Temporary cofferdams would likely be installed to create isolated in-water work areas for certain activities. A temporary cofferdam would likely be installed to create an isolated in-water work area for construction of a spread footing foundation on the Washington shoreline. Sheet pile cofferdams may also be installed at one or more piers on the existing bridge to create an isolated work area for removal of the existing bridge foundations.

Drilled shaft shoring casings would also be installed as temporary work structures to create isolated work areas for drilled shaft construction. An outer steel casing, with a diameter approximately 12-inches larger than that of the finished drilled shaft, would be installed to act as an isolation structure. The outer cases will be 84 inches in diameter for the 72-inch shafts, and 108 inches in diameter for the 96-inch shafts.

- Work area isolation and fish salvage: To minimize impacts to fish, fish salvage measures would be employed to remove fish from temporarily isolated in-water work areas during and after the installation of drilled shaft shoring casings and cofferdams. Fish salvage would follow the best management practices (BMPs) established in the biological opinion for FHWA and ODOT's Federal Aid Highway Program programmatic consultation and would be supervised by a fish biologist. A fish biologist with the experience and competence to ensure the safe capture, handling, and release of all fish will supervise all fish capture and release. To minimize take, efforts will be made to capture ESA-listed fish known or likely to be present in an in-water isolated work area using methods that are effective, minimize fish handling, and minimize the potential for injury. Attempts to seine and/or net fish, or the use of minnow traps shall precede the use of electrofishing equipment. Isolation structures will be installed such that they will not be overtopped by high water. A reasonable effort would be made to re-locate threatened or endangered fish using methods that minimize the risk of injury.
- Bridge foundation installation: The foundations for the replacement bridge would consist of three different foundation types: 1) pile-supported foundations; 2) drilled-shaft-supported foundations; and 3) spread footings. In general, pile-supported foundations would be used at locations where the depths to bedrock are relatively deep (greater than 50 feet below ground surface) while drilled shaft-supported foundations would be more economical in locations where depths to bedrock are nearer to the surface (less than 50 feet below ground surface). Spread footings would be used where bedrock is located at or near the surface and deep foundations are not required.

  Pile-supported foundations would be supported by 48-inch diameter steel pipe piles. The typical in-water foundation would require 25 piles, where-as smaller terrestrial pile-supported foundations would require fewer piles. Piles would be installed with a vibratory hammer to the extent practicable, as a means of minimizing impacts associated with underwater noise. An impact hammer would be used to drive the piles to the final tip elevation, and/or to proof the piles to verify load-bearing capacity.

Drilled shaft-supported foundations would be supported by either 72-inch-diameter drilled shafts or 96-inch-diameter drilled shafts. The larger-diameter drilled shafts would be used on the bents that flank the navigation channel. Installation of drilled shafts would be conducted by first oscillating an outer steel casing to a specified design depth. As the casing is being advanced to the design depth, soil would be removed from inside the casing using an auger and clamshell. Excavated soils would be temporarily placed onto a barge with appropriate containment and ultimately placed at an approved upland site. Once the interior of the casing has been excavated to the design depth, an interior steel casing of the finished diameter of the shaft would be installed. This casing would be installed either with an oscillator or vibratory hammer. Once the interior casing has been installed to final depth, a steel reinforcement cage would be installed within the casing, and the shaft would be filled with concrete.

Construction of spread footing foundations below the OHWM of the river would be conducted within a temporarily dewatered work area within a cofferdam. Once the cofferdam is installed and the work area established, formwork would be installed for the spread footing, steel reinforcing would be installed within the forms, and the concrete for the footing would be poured. The cofferdam would remain in place until the concrete is fully cured to allow the concrete to cure in a dewatered environment. Once the concrete for the footing is fully cured, the formwork would be removed followed by the temporary cofferdam.

- Bridge superstructure construction: Once the foundation piles and drilled shafts are installed, a concrete pile cap would be installed atop the shafts at the waterline, and the concrete pier and superstructure would be installed atop the pile cap. Pile caps may be either precast or cast-in-place.

  The superstructure would consist of both precast and cast-in-place concrete segments. Additional finish work would also be conducted, including surfacing, paving, and installation of other finish features, such as striping and signage.

  Work on the superstructure would be conducted either from the bridge deck, from the deck of temporary work bridges, or from barges. It is anticipated that the superstructure would be constructed using a balanced cantilever method that uses paired sets of form travelers to build outwards from each pier. It is assumed that a contractor may operate up to four pairs of form travelers at a given time to expedite the construction of the superstructure.

  Many of the bridge superstructure components would be composed of precast concrete. Precast elements would likely include bridge columns, beams, girders, and deck panels. Precast bridge elements would be constructed in upland controlled environments and would be transported to the Project site by either barge or truck.

- Dismantling and removal of the existing bridge: The existing bridge would remain open until the replacement bridge is constructed and operational, at which point it would be dismantled and removed. This work would be conducted via barges and/or temporary work platforms and may require in-water isolation.

  Removal of the superstructure would most likely be conducted by barge-mounted cranes. Removal of the superstructure would likely begin with removal of the counterweights, followed by the lift towers and the individual truss sections. The lift towers and truss sections would be cut into manageable pieces and loaded onto barges or trucks by a crane. Each section would then be either transported to an upland site for further dismantling or disposed of directly at an appropriately permitted upland facility.

Removal of the existing foundations would be conducted by one of the following two methods:

- o Wiresaw removal to mudline, without a cofferdam. A diamond wire/wire saw would be used to cut the foundation into manageable pieces that would be transported to a barge and disposed of in a permitted off site upland location. The foundations would be removed to the mudline and the substrate would be naturally restored with surrounding sediments.
- o Wiresaw or conventional pier removal techniques within a cofferdam. Conventional removal techniques consist of using a hydraulic ram to break the piers into rubble, and torches or other cutting methods to cut reinforcement. Materials would then be transported to a barge and disposed of in a permitted off site upland location. The foundations would be removed to the mudline and the substrate would be naturally restored with surrounding sediments.

It is assumed that the cofferdam removal option would be used at both piers that flank the navigation channel, but may also be used in other pier locations. At the two navigation channel piers, once cofferdams are installed and fish salvage has occurred, approximately 7,800 cubic yards of existing riprap would be removed. Riprap would be removed via a barge mounted clamshell, and loaded onto barges, and disposed of at an off-site permitted upland location. Once riprap has been removed, the existing piers would either be removed using one of the methods described above.

- Post-Project site restoration: Construction of the Project would result in temporary impacts to native and non-native vegetation on both the Oregon and Washington sides of the river. Areas temporarily disturbed during construction would be restored upon completion of the Project consistent with state and local regulations.

  On the Oregon side of the river, most temporary disturbance would occur within areas that are either impervious or already developed. Temporary disturbance would occur within areas that consist of landscaping, lawns, or similar heavily managed vegetation. Post-Project site restoration in these areas would likely consist of replacement landscaping with similar ornamental species. No native plant communities would be disturbed on the Oregon side of the river.

  On the Washington side of the river, vegetation would be cleared within temporary work zones to allow construction equipment to access the site, to construct the replacement bridge abutments and stormwater treatment facilities, and to remove the existing bridge. A portion of the area to be cleared would be within a forested riparian area that is within the 200-foot shoreline jurisdiction of the Columbia River, and is regulated by the City of White Salmon under its Shoreline Master Program (City of White Salmon 2016). A large oak tree that is present east of the existing bridge would be preserved and would not be affected.

  Temporarily disturbed areas within ODOT and WSDOT rights-of-way would be replanted consistent with applicable ODOT and WSDOT requirements and design standards. Temporarily disturbed vegetation within the riparian shoreline buffer on the Washington side of the river would be conducted consistent with requirements in the City of White Salmon Critical Areas Ordinance (White Salmon Municipal Code Chapter 18.10) (and Shoreline Master Program (City of White Salmon 2016).

- Compensatory Mitigation: The Project would result in permanent impacts to wetland and aquatic habitats, and a compensatory mitigation plan would likely be required by federal, state and local regulations to offset these permanent impacts. The compensatory mitigation plan would be developed during the permitting phase of the project. The mitigation plan would identify the amount, type, and specific locations of any proposed compensatory mitigation actions, specific impact avoidance and minimization measures to be implemented, as well as the goals, objectives, and performance standards for measuring success. Full implementation of the compensatory mitigation plan would be a condition of the applicable permits of the agencies with jurisdiction (i.e., USACE Section 404 permit, the Oregon Department of Environmental Quality [DEQ] and the Washington State Department of Ecology [Ecology] Section 401 permits, the Oregon Department of State Lands [DSL] Removal-Fill permit, WDFW Hydraulic Project Approval, and City of White Salmon Shorelines and Critical Areas permits), and the mitigation would comply fully with all applicable permit terms and conditions.

The method of delivery for Project final design and construction has not been determined at this time. Traditional delivery methods, such as design-bid-build, and alternative delivery methods, such as design-build and public-private-partnerships to name a few, will continue to be considered by the Port. As part of Oregon's HB 2017, the Port was provided legal authority by the state to enter into a public-private-partnership.

3. METHODOLOGY

Cumulative impacts were previously analyzed in Chapter 5 of the Project's Draft EIS.

3.1. Area of Potential Impact

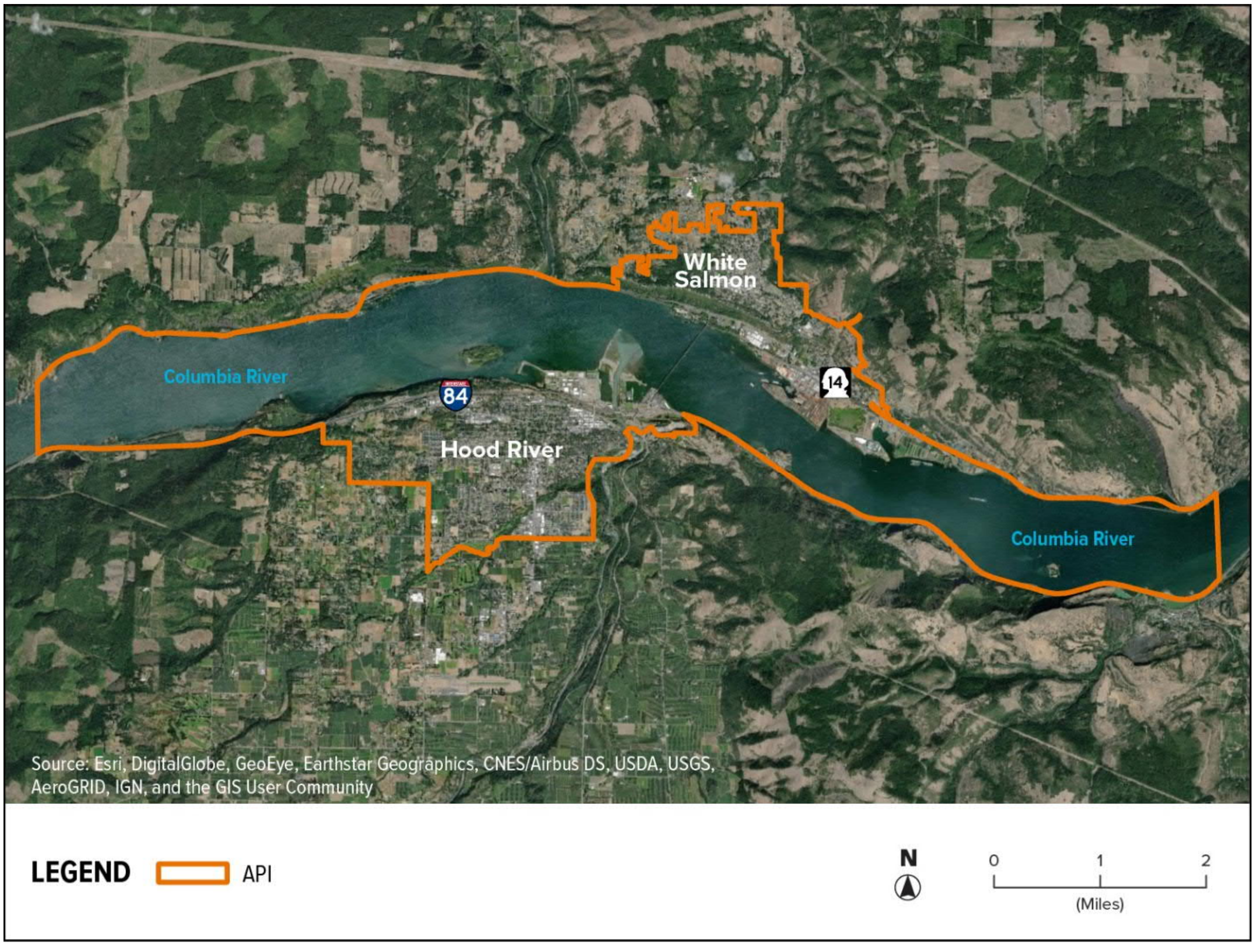
The area of potential impact (API) for the cumulative impacts analysis is shown below in Exhibit 12. The API encompasses the urban growth boundary of the City of Hood River, the city limits of White Salmon and Bingen, and a 5-mile stretch upstream and downstream of the bridge bounded by SR 14 on the Washington side and I-84 on the Oregon side.

3.2. Regulations, Standards, and Guidelines

Guidelines consulted for preparing the cumulative impacts analysis included:

- Considering Cumulative Effects Under NEPA (Council on Environmental Quality (CEQ) 1997)
- ODOT EIS Template (ODOT 2010)
- Practitioner's Handbook: Assessing Indirect Effects and Cumulative Impacts Under NEPA (American Association of State Highway and Transportation Officials (AASHTO) 2016)

Exhibit 12. Cumulative Impacts API



3.3. Sources of Existing Data

Direct and indirect impacts identified in the individual resource and discipline analyses were reviewed to determine which resources may have cumulative impacts to consider, the historical context and current health of resources, and which impacts could contribute to a cumulative impact. The following additional data sources were reviewed to help characterize the historical context and current health within the cumulative impacts API:

- SR-35 Columbia River Crossing Draft EIS (FHWA 2003)
- Population and employment data (U.S. Census Bureau, Washington State Office of Financial Management (OFM), Washington State Employment Security Department (ESD), Oregon Department of Administrative Services (OAS), Oregon Employment Department (OED), and Portland State University Population Research Center)
- Historical maps
- Aerial photographs
- Klickitat County and Hood River County interactive mapping programs

- Historic information available online (i.e., websites of the City of Hood River, Friends of the Columbia Gorge, GorgeConnection, Hood River County Chamber of Commerce, Mt. Adams Chamber of Commerce, Oregon Secretary of State, and the Port)

3.4. Data Collection or Development

In addition to existing planning documents available online (i.e., local agencies' capital improvement plans, master plans, and other adopted planning documents), data on other current and reasonably foreseeable future actions (RFFAs) within the API was collected through coordination with planning staff at local agencies including the City of Hood River, City of White Salmon, Hood River County, Klickitat County, Skamania County, and the Port.

3.5. Impact Analysis Techniques

The practice of cumulative impact analysis has somewhat evolved since the Draft EIS was prepared. The ODOT EIS Template (2010) presents an eight-step process that was used to update the Project's cumulative impacts analysis. The eight steps are as follows:

1. Identify the resources that may have cumulative impacts to consider in the analysis
2. Define the geographic and temporal API for each affected resource
3. Describe the current health and historical context for each
4. Identify direct and indirect impacts that may contribute to a cumulative impact
5. Identify other historic, current, and reasonably foreseeable actions that may affect resources
6. Assess potential cumulative impacts to each resource; determine magnitude and significance
7. Report the results
8. Assess and discuss potential mitigation measures for all adverse impacts

The cumulative impact analysis built upon information derived from the direct and indirect impacts analyses for each environmental resource. The cumulative impacts analysis evaluates the impact on the environment resulting from each alternative when added to other current projects and RFFAs, summarizes the impacts, and identifies the contribution of the Project to cumulative impacts in the affected area. Where feasible, the cumulative impacts analysis is quantitative, such as acres of wetlands filled (if this information is available for RFFAs). Qualitative analyses are presented where quantitative data are not available and to provide a comprehensive understanding of the resource and how it is affected.

3.6. Agency Coordination

As noted in Section 3.4, coordination with local agencies was used to identify current projects and RFFAs for consideration in the cumulative impacts analysis.

4. AFFECTED ENVIRONMENT

4.1. History of the Project Vicinity

This section describes the historical context of the project vicinity's natural setting, early human history, and regional development.

4.1.1. Natural Setting

The cumulative impacts API comprises the Columbia River and areas landward within the Columbia River Gorge. The base rocks underlying the stratigraphic column in the Columbia River Gorge are part of the Ohanapecosh formation, composed of a mixture of old andesitic lava flows and the sedimentary debris eroded from them. The Eagle Creek formation overlies the Ohanapecosh formation and is composed of silts and sandstones derived from volcanic sources. These formations are exposed on the west end of the Columbia River Gorge; however, in the API they are covered by a combination of Miocene basalt flows of the Columbia River Basalt Group and Pleistocene basalt flows of the High Cascades.

Beginning approximately 15 million years ago, a series of massive basalt flows formed the Columbia River Basalt Group, which constitutes five distinct formations and reaches a maximum thickness of 16,000 feet. These flows spilled into ancient Columbia River canyons multiple times, each time changing the river's course, and over time pushed the Columbia River north into its current location. Growth of the Cascade Mountains subsequently uplifted and folded the basalt flows as the Columbia River continued to cut through the Columbia River Gorge.

The API is located in the transition zone between the wet western side of Oregon and Washington and the arid central and eastern side. The northern side of the Columbia River Gorge has a dry microclimate due to the southern exposure of the steeply sloped topography. The southern side, comprised of north facing slopes, receives less sunlight, which results in wetter conditions. The north side of the Columbia River Gorge near the City of White Salmon is dominated by oak, Douglas fir, Ponderosa pine and shrubs, while a mixture of Douglas fir, Ponderosa pine, and shrubs exists along the southern side of the Columbia River Gorge near the City of Hood River. Rainfall averages approximately 30 inches per year in the API, compared to approximately 77 inches per year at Bonneville Dam (20 miles west) and approximately 14 inches per year at The Dalles (20 miles east). The API is characterized by partially vegetated thin, rocky soils with exposed bedrock outcroppings and talus slopes (WSP 2019d).

A variety of wildlife species use the Columbia River and adjacent riparian and hillside habitats. The Columbia River is known to support threatened and endangered fish species including salmon, steelhead, bull trout, Pacific Eulachon, and North American green sturgeon, as well as a variety of other native and non-native aquatic species. Federally listed terrestrial wildlife species with the potential to occur in the API or for which suitable habitat is present include gray wolf, northern spotted owl, yellow-billed cuckoo, and Oregon spotted frog. Several state-listed species also have the potential to occur within the API, including western gray squirrel, Washington ground squirrel, fisher, California mountain kingsnake, and western pond turtle. The Columbia River and the greater Columbia River Gorge area also support a number of sensitive bird species, including but not limited to the bald eagle, peregrine falcon, Vaux's swift, and western grebe. It should be noted that the species listed here are of special concern to federal, state, local, and tribal agencies; the Columbia River and the Columbia River Gorge support an immense number of fish and wildlife species, and this list is by no measure a complete account of the variety of species present within the API.

Additional details are available in the Fish and Wildlife, Geology and Soils, and Vegetation and Wetlands technical reports.

4.1.2. Early Human History

Human occupation in the Northwest Coast is believed to have begun following the retreat of glacial ice across the landscape in the Late Pleistocene period. Archaeological sites identified in this region indicate that early precontact culture (before European settlement) was highly mobile and relied heavily upon large game. Between 12,000 to 7,000 years ago, socio-economies appear to have changed to a foraging strategy that included smaller inland game, aquatic animals, and a variety of plants. Sites from this period are typically encountered on high marine and river terraces. After 5000 BP, populations appear to become larger and more complex as groups utilized a wider range of resources, including salmon and shellfish, land mammals, and plant resources such as berries, roots, and bulbs.

The API is in an area that was traditionally utilized by several Indian groups and bands. At White Salmon, the Chilluckittequaws were known as the Woocksockwilliacums, who were comprised of several bands whom roughly extended from 10 miles below The Dalles west to the White Salmon River. The Chilluckittequaws at Hood River were called Smock-shops by Lewis and Clark and generally lived on the Columbia River. The Columbia River, White Salmon River, and Hood River and their tributaries were fished; and, a variety of plants, vegetables, berries and nuts were gathered from the shoreline and adjacent uplands by tribes who generally practiced a seasonal round of resource procurement. Generally, family groups would winter in large villages along major waterways and would move to higher elevations during the summer.

Several ethnographic villages and place names were recorded within, and in the vicinity of, the API by early ethnographers. Lewis and Clark recorded a number of encampments along the Columbia River with villages at the confluence of the John Day River (near Maryhill Museum), on Miller Island (at the confluence of the Deschutes River), at Celilo Falls, Ten and Five Mile Rapids, and multiple spots along the Bonneville Pool including Fort Rock and the Bad Place. During their travels in October 1805, Lewis and Clark reported observing 14 Indian houses “scattered” on the north bank of the Columbia River above the mouth of the White Salmon River, and in April 1806, on their way back upriver, Lewis and Clark reported a large village consisting of approximately 20 houses spread over several miles.

4.1.3. Regional Development

White settlement in the region, including the present-day cities of White Salmon and Hood River, began in earnest with the migration west on the Oregon Trail during the early-1800s. The City of White Salmon was formally incorporated in 1907 and the City of Hood River in 1895. The City of White Salmon is part of Klickitat County. The City of Hood River was initially part of Wasco County, but in 1908 it was incorporated into the newly formed Hood River County (Hood River County Chamber of Commerce 2019).

The Lewis and Clark expedition established a United States claim to the Pacific Northwest, arriving in the Columbia River Gorge in October 1805. White settlement lead to the eventual removal of several Indian groups and bands in the region onto designated reservations. Multiple treaties were signed in 1855 between the U.S. government and four federally-recognized tribes with ties to the Columbia River that ceded millions of acres of their lands in the region to the U.S (CRITFC 2020a).

By the 1840s, fur trading, the main industry in the Klickitat area, was in decline and the economic engine that drove the region’s development turned to permanent land settlement and land claims. Industry in the area changed as fur trading was replaced mainly by timber and wheat ranching, as well as fruit orchards, and salmon fishing (Mt. Adams CoC 2019). While incorporated in 1907, the City of White Salmon was first settled in 1852 with many of the early settlers to Klickitat County coming east from the Willamette Valley in Oregon. By 1860, the first sawmill was established in Klickitat County and by 1903, 23 lumber mills and 7 mills producing various wood products were located in the County.

Rail service arrived in Klickitat County along the north bank of the Columbia River in the early 1900s, allowing farmers to transport their crops by rail and lumber mills to ship finished wood to market. The first highway through the Columbia River Gorge was a wagon route connecting Washougal in Clark County to Lyle in Klickitat County. SR 14 was established in 1967 as a scenic two-lane road close to the Columbia River, providing an east-west connection along the Washington side of the Columbia River Gorge (Becker 2006). Since the 1980s, downturns in the logging industry have impacted the economy in Klickitat County, requiring the County to focus on other industries, including sheep and cattle raising, wheat, orchards, viticulture, recreational tourism, and industrial development (Becker 2006). The existing Hood River Bridge supports continued growth in these sectors within the County. The traditional economy in Skamania County, established in 1854, was salmon harvesting. With the development of industrial canning technology in the 1870s, fishermen were able to take vast quantities of salmon to export domestically and internationally. As transportation down the river improved with the canals and locks, logging and milling became profitable and surpassed salmon harvesting as the dominate economic activity in the County. The fishing industry ultimately suffered from overfishing and from the construction of the Bonneville Dam in the 1930s (Wilma 2006).

Beginning in 1923, the U.S. Army Corps of Engineers surveyed the Columbia River and recommended 10 dams to provide for navigation, hydro power, flood control, and irrigation in 1931. Construction of the Bonneville Dam, below the Cascades in Skamania County, began in 1933 and the lock was ready for traffic in 1938. The Bonneville Power Administration was formed to distribute the electric power produced from all the Columbia River dams (Wilma 2006). A consequence of dam building on the Columbia River was that traditional tribal fishing grounds along the river were inundated behind the dams; taking away the rights of tribes to fish at their usual and accustomed places that were reserved to them by the aforementioned treaties signed in 1855 (CRITFC 2019).

Logging and forest products in Washington state have experienced a long, slow decline beginning in the 1930s. In the last years of the twentieth century, the economy shifted away from logging, and tourism became the dominant industry in Skamania County. Skamania Lodge opened in Stevenson in 1993 with 195 rooms. By 2005, Skamania Lodge had grown to 254 rooms with a 19-hole golf course and convention center and is now the County’s largest private employer.

In Hood River County, beginning in the late 1800s, apple orchards were successfully established and became a significant contributor to the local and regional economy. In addition, the orchards contributed to the area’s reputation as a recreational and holiday destination. After a killing freeze struck the orchards in 1919, many farmers converted their apple orchards to pear orchards, and the area is now one of the world’s highest producers of Anjou pears (Hood River County Chamber of Commerce 2019). The County is also a tourism and recreation destination and significant contributor to the regional viticulture and craft beverage industries.

The area around the southern end of the existing Hood River Bridge was a pear orchard from roughly 1919 until construction of the Bonneville Dam in 1938, at which time the area was flooded (Dames and Moore 1965). The existing Hood River Bridge was originally built in 1924 as a fixed channel span bridge.

Prior to the construction of the bridge, ferry services were utilized to cross the Columbia River. The bridge served as the second crossing over the Columbia River connecting Washington and Oregon (Scott 2017). The vertical lift span was added in 1938 to accommodate the completion of the Bonneville Dam and subsequent raised water levels.

The Port purchased the bridge in 1950 and since that time has completed numerous repairs and upgrades. In the early 1950s, the Port replaced timber trestles beneath the bridge approaches with two steel-girder spans and replaced the original wood deck with steel. In the 1960s and 1970s, the Port undertook three substantial fill projects along the waterfront to support development of the Hood River Marina and Port Marina Park, to create additional land for light industrial and commercial businesses, and to support the growing recreational and tourism industries in the area. Beginning in the 1990s, the Port began focusing on light industrial and recreational development along the Columbia River waterfront. Waterfront parcels continue to be improved and marketed to private developers for light industrial, commercial, and recreational uses (Port of Hood River 2014).

The Columbia River Gorge National Scenic Area (CRGNSA) Act was passed by Congress and signed into law in November 1986. The Act mandates the protection and enhancement of scenic, cultural, natural, and recreational resources within the Columbia River Gorge, spanning 85 miles and 292,500 acres for special protection on both sides of the Columbia River (CRGC 2019). Washington and Oregon were authorized under the Act to enter into a bi-state compact that created the Columbia River Gorge Commission. The Act delegates authority to the Gorge Commission and the U.S. Forest Service to adopt and implement a Management Plan that regulates land use in the National Scenic Area (excluding Urban Areas) (FOCG 2019).

The regional development of the API is further described in the Project's Land Use and Transportation Technical Reports.

4.2. Regional Growth and Development Trends

The cities of White Salmon, Hood River, and Bingen account for three of the 13 designated Urban Areas in the CRGNSA. Under the CRGNSA Act, Urban Areas are the primary focus for future growth and economic development. Properties within Urban Areas are exempt from CRGNSA development rules and regulations of the CRGNSA Management Plan (Management Plan), and thus there is more pressure for urban development in the designated Urban Areas than outside of these designated areas.

While development of much of the Columbia River Gorge is restricted under the CRGNSA regulations, the cities of Hood River, White Salmon, and Bingen, have developed (and would continue to develop) under their exempt status as Urban Areas within this bi-state compact.

The existing Hood River Bridge connects the cities of White Salmon, Bingen, and Hood River. Residents routinely cross the bridge for work, shopping, recreation, and other services – including multiple daily bridge crossings for many local residents. The City of Hood River offers more of these types of services due to its size; thus, a higher percentage of the routine cross-river trips tend to be generated by Washington residents (The Gilmore Research Group 2001).

Exhibit 13 shows that all of the communities within the API have experienced population growth over the past few decades. While population growth on the Oregon side has historically outpaced that on the Washington side, recent estimates show higher growth rates on the Washington side, consistent with statewide growth trends. The estimated population growth of the City of Bingen was 3.5 percent between 2010 and 2018, and the City of White Salmon is estimated to have increased by 17.8 percent over the same period. The combined populations of the cities of White Salmon and Bingen grew 2.5 percent between 2000 and 2010, and are estimated to have grown 14.3 percent between 2010 and 2018. The City of Hood River grew by 22.9 percent between 2000 and 2010; however, this growth is estimated to have slowed to 8.9 percent since 2010.

Over the past 25 years, unemployment in Klickitat County and Skamania County has slowly been reduced as the County's economies have become less dependent on resource-based jobs that tend to have large seasonal and cyclical patterns. Klickitat County's current unemployment rate is 6.6 percent (WSP 2019i) and Skamania County's is roughly 6.2 percent (ACS 2013).

Washington's Employment Security Department (ESD) studies employment growth and projects future employment by workforce development area (WDA) for nonfarm employment. Klickitat County and Skamania County are part of the South Central WDA, along with Yakima and Kittitas Counties. From 1990-2016, the South Central WDA had an employment growth rate of 0.83 percent. The projected employment growth rate from 2016-2026 is 1.23 percent (ESD 2018). ESD has projected employment by industry through 2027. By 2027, Government, followed by Education and Health Services, and Health Services and Social Assistance are projected to be the top three industries by employment numbers, totaling 75,500 employees in the South Central WDA. The greatest gain in jobs from 2017-2027 is projected to be in the Education and Health Services industry with an increase in 4,200 employees (ESD 2019). Both Klickitat County and Skamania County are projected to continue to gain population through 2030.

The State of Oregon's Employment Department tracks economic and nonfarm employment data in Oregon. In Hood River County, employment grew from roughly 9,450 employees in 2005 to 11,910 employees in 2019, an increase of 26 percent. Hood River County's unemployment rate also dropped from 6.9 percent in 2005 to 3.5 percent in 2019 (State of Oregon 2019). Similar to Washington, Oregon projects future employment by different regions, with Hood River County located in the Columbia River Gorge region, along with Gilliam, Sherman, Wasco, and Wheeler Counties. Total employment in the Columbia River Gorge region is expected to increase by 11 percent from 2017 to 2027. By 2027, Trade, Transportation, and Utilities, followed by Natural Resources and Mining, and Private Education and Health Services are projected to be the top three industries by employment numbers, totaling 14,480 employees in the Columbia River Gorge region. The greatest gain in employees from 2017-2027 is projected to be in Ambulatory Health Care Services, with an increase in 200 employees (State of Oregon 2019). Hood River County is projected to continue to gain population through 2030.

The projected increase in population and employment in the API is supported by the rise of the White Salmon-Hood River area as a tourist and recreation destination, which suggests that the region is capitalizing on its comparative advantage in providing a range of outdoor opportunities. In addition, both Klickitat County and Hood River County have several advantages for regional and interstate trade. One is easy access to I-84, which follows the Columbia River and is an important route connecting I-5 and the Portland metropolitan region to points east. Another advantage is the presence of railroads, specifically the BNSF Railway line on the Washington side and the Union Pacific Railroad (UPRR) line on the Oregon side. Additionally, the high share of primary sector industries like agriculture and manufacturing is a factor supporting export-oriented trade.

Exhibit 13. Population Growth in Jurisdictions within the API

Jurisdiction	Population									
	1920	1950	1980	2000	2010	2000-2010 Growth Rate	2018	2010-2018 Growth Rate	2020 Projected	2030 Projected
Washington										
City of Bingen	0	736	679	672	712	6.0%	737	3.5%	-	-
City of White Salmon	619	1,353	1,853	2,193	2,224	1.4%	2,619	17.8%	3,181	3,358
Klickitat County	9,268	12,049	15,822	19,161	20,318	6.0%	22,107	8.8%	24,470	27,049
Skamania County	2,357	4,788	7,919	9,872	11,066	12.1%	11,924	7.8%	12,332	13,426
State of Washington	1,356,621	2,378,963	4,132,156	5,894,121	6,724,540	14.1%	7,535,591	12.1%	7,698,939	8,509,161
Oregon										
City of Hood River	3,195	3,701	4,329	5,831	7,167	22.9%	7,806	8.9%	10,282	11,811
Hood River County	8,315	12,740	15,835	20,411	22,346	9.5%	23,428	4.8%	25,628	29,979
State of Oregon	783,389	1,521,341	2,633,156	3,421,399	3,831,074	12.0%	4,190,713	9.4%	4,252,100	4,768,000

Sources: Oregon Department of Administrative Services 2013; Portland State University 2006; U.S. Census Bureau 2018; U.S. Census Bureau. 1920, 1950, 1980, 2000, and 2010; Washington State Office of Financial Management 2007; and City of White Salmon 2012.
Note: Population projections are not available for the City of Bingen.

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Steady growth in residential, commercial, industrial, and recreational uses in both communities, as detailed in Section 5 below, are supported by the steady employment growth in Klickitat, Skamania, and Hood River counties and population growth in the cities of White Salmon, Bingen, and Hood River, as identified in Exhibit 13.

4.3. Other Current and Reasonably Foreseeable Future Actions

Exhibit 14 identifies projects that comprise other current and RFFAs within the API that could impact environmental and community resources. This list of other current actions and RFFAs are the projects evaluated to characterize conditions in the foreseeable future under each resource in Section 5. Additional information on the current projects and RFFAs is included in Attachment A.

Current projects and RFFAs include multiple residential and commercial developments and recreational uses in the City of White Salmon, industrial development and expansion in Bingen, and new and expanded Port-related and other planned developments in the City of Hood River. There are also several planned improvements to roadways, utilities and facilities to support foreseeable developments.

5. POTENTIAL CUMULATIVE IMPACTS BY RESOURCE

5.1. Air Quality and Greenhouse Gases

The proposed Project is not anticipated to contribute to negative cumulative impacts to air quality in the API. The Project is anticipated to contribute to minor cumulative impacts to greenhouse gas (GHG) emissions. Additional detail on air quality and GHG emissions is provided in the Air Quality Technical Report.

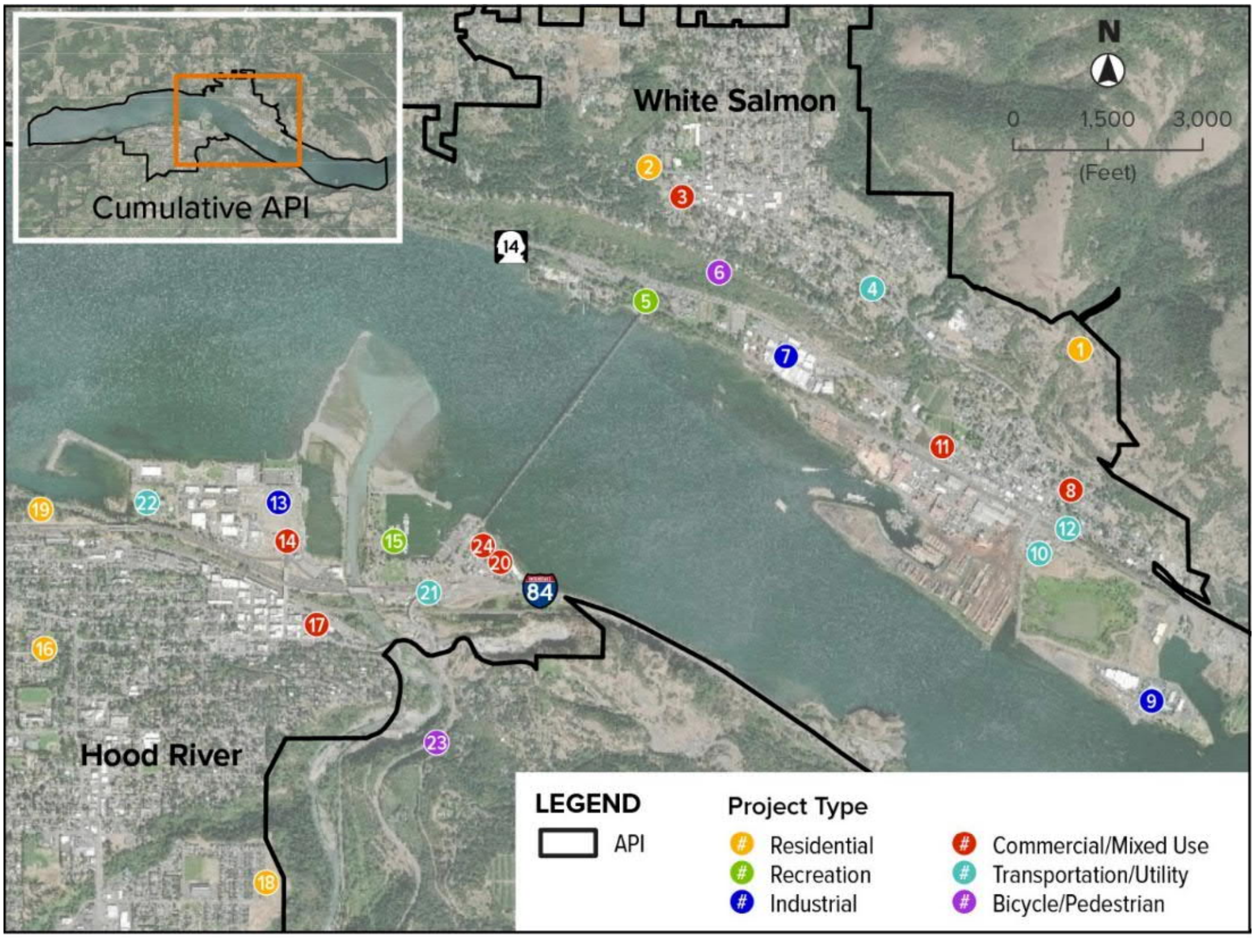
5.1.1. Trends Leading to Present Conditions

The air quality conditions in the API reflect the developed nature of the API, including residential, commercial, and industrial development and associated vehicular traffic. However, the API is located in an attainment area for all criteria pollutants as identified in the Clean Air Act. GHG emissions generally occur from human activities revolving around transportation, electricity generation, industry, and commercial and residential uses. As the API has been developed over time, GHG emissions generated in the API have increased.

5.1.2. How Conditions are Likely to Change without the Project

Planned growth and development in the Hood River, White Salmon, and Bingen area, as exemplified by the projects identified in Section 4 and future growth projections identified in Section 4.2, would be expected to cumulatively increase vehicular traffic and associated vehicular GHG emissions, as well as GHG emissions from businesses, homes, and industrial sites. Both Washington and Oregon track GHG emissions in an effort to inform policies related to state reduction goals; these efforts are expected to continue in the future.

Exhibit 14. Map of Current and Reasonably Foreseeable Projects



Current and Reasonably Foreseeable Projects

City of White Salmon

1. Dry Creek Planned Unit Development *(69 lots)*
2. SixS Planned Unit Development *(40 lots)*
3. Three Mixed-Use Buildings
4. Highway 141 Paving and Water Line Improvements *(from NW Garfield Avenue in White Salmon to SR 14 in Bingen)*
5. Bridge Park
6. Bicycle and Pedestrian Corridor *(connecting central White Salmon with the Columbia River, via Highway 141 and N. Dock Grade Road)*

City of Bingen/Klickitat County

7. Underwood Fruit Company Building Replacement
8. The Society Hotel
9. Bingen Point Business Park Build Out
10. Bingen Wastewater Treatment Plant Improvements
11. Potential Hotel and Subdivision Development
12. Bingen Point Access *(roundabout and BNSF undercrossing near SR 14 and Elm Street)*

City of Hood River/Port of Hood River/Hood River County

13. Light Industrial Subdivision *(7 lots)*
14. Commercial Site Development
15. Port of Hood River Marina Capital Improvements and Marina Master Plan Update
16. Multi-Family Residential Development *(30 dwelling units)*
17. Mixed-Use Development *(commercial development and 40 dwelling units)*
18. Sieverkropp Subdivision *(50 lots)*
19. Morrison Park Subdivision *(65 lots)*
20. Best Western Hood River Inn – Gorge Room Expansion
21. I-84 Exits 63 and 64 Interchange Improvements
22. Hood River Wastewater Treatment Plant Upgrades
23. Future Pedestrian and Bicycle Trail *(from Hood River to Parkdale, along the Hood River)*
24. New Hotel *(80 units – Marketplace building will be demolished and the site will be redeveloped)*

U.S. Environmental Protection Agency (EPA) regulations for vehicle engines and fuels are expected to cause overall mobile source air toxic emissions to decline substantially over the next several decades. Based on regulations now in effect, an analysis of national trends with EPA's MOVES2014 model forecasts a combined reduction of over 90 percent in the total annual emissions rate for the priority mobile source air toxics from 2010 to 2050, while vehicle-miles of travel are projected to increase by over 45 percent (FHWA 2016).

5.1.3. Direct and Indirect Impacts of the Project

Construction-related activities for the Project would result in direct, short-term impacts to air quality that include increases in particulate matter in the form of fugitive dust (from ground clearing and preparation, grading, stockpiling of materials, on-site movement of equipment, and transportation of construction materials), as well as exhaust emissions from material delivery trucks, construction equipment, and workers' private vehicles. Dust emissions typically occur during dry weather, periods of maximum demolition, construction activities, or high wind conditions. Project construction is expected to last 2.5 years and construction-related impacts would cease when construction is complete. Construction-related activities for the Project would also result in GHG emissions from the operation of construction equipment and vehicle delay caused by construction.

While the replacement bridge would marginally increase traffic capacity by providing wider, safer traffic lanes, it is not expected to induce growth or substantially change transportation demand or traffic patterns in the region. Because traffic patterns would remain similar, the build alternatives would not result in long term impacts on air quality during operation of the bridge.

Direct and indirect impacts on GHG emissions from the Project would include direct emissions from routine maintenance and indirect impacts from the emissions associated with the production of materials used in construction. GHG emissions from the Project that are not offset would have minor contributions to long-term atmospheric impacts that contribute to climate change.

5.1.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

The Project would not be anticipated to result in negative impacts on air quality under any of the build alternatives; so, it would not contribute to cumulative impacts on air quality in the API. Therefore, no mitigation for cumulative impacts to air quality is proposed.

The Project would contribute to minor cumulative impacts to GHG emissions as a result of bridge material production, construction, and yearly routine maintenance. These impacts would be partially offset by Project-specific design features. Any of the build alternatives would provide a shared use path, introducing a non-motorized travel option across the Columbia River and thereby potentially reducing GHG emissions from vehicular trips. The Project would be expected to improve traffic flow on the bridge and at the roundabout at the SR 14 intersection; and construction of the Project would prevent the eventual closure of the existing bridge at the end of its operational life thus preventing an increase in out of direction travel to cross the Columbia River if there would no longer be a direct, cross-river transportation connection at this location. However, the increase in out of direction travel associated with the closure of the bridge would be offset with projected increases in emissions standards and vehicle fleet mix. As Project GHG emissions would be minor, and be partially offset by design features, no mitigation for cumulative impacts to GHG emissions is warranted.

5.2. Historic Resources, Archaeological Resources, and Traditional Cultural Properties

The Project is anticipated to contribute to cumulative impacts on cultural and historic resources in the API. Additional detail on cultural and historic resources is provided in the Archaeological Survey Report and Historic Resources Technical Report.

5.2.1. Trends Leading to Present Conditions

The area of potential effects (APE) for cultural resources is wholly located within the cumulative API and includes portions of both Washington and Oregon around the existing bridge. The present cultural resource conditions in the API are a result of the early human history described in Section 4.1.2 and the subsequent modern development that has altered or may have removed some historic and cultural sites and resources over time. The majority of the APE and API has undergone a high level of ground disturbance from past development.

Archaeological investigations of the area have discovered precontact cultural materials in the APE, as the location is within the traditional territory of several tribal groups and bands. Additionally, several other precontact archaeological sites have been recorded within a 1-mile radius of the bridge. In the Washington portion of the APE, these previously recorded cultural resources include precontact archaeological sites and an ethnographic village. In the Oregon portion of the APE, fewer precontact sites have been previously recorded which is likely a result of environmental and historic anthropogenic actions. Of the previously recorded precontact and historic sites, many are located along Hood River and in upland areas adjacent to the APE. The White Salmon Treaty Fishing Access Site (TFAS) and the East White Salmon Fish Processing Facility (addressed in Section 5.12, Treaty Fishing Rights) are important cultural sites located on the northern bank of the Columbia River in the City of White Salmon. Both locations are operated and maintained by the Columbia River Inter-Tribal Fish Commission (CRITFC).

Ten historic resources that are listed or are potentially eligible to list on the National Register of Historic Places (NRHP) are located within the APE, including the existing Hood River Bridge. During the Draft EIS process, an assessment of the existing Hood River Bridge was conducted to determine its eligibility for the NRHP. This assessment has determined the bridge to be eligible for listing on the NRHP based on the bridge's role in inter-state transportation history, its association with builder C.N. McDonald, and its representation as a good and intact example of a Pennsylvania Petit bridge design (Aqua Terra 2019).

5.2.2. How Conditions are Likely to Change without the Project

Unknown archaeological resources, if present, are most likely to be disturbed by projects that require grading and ground disturbance. The greatest potential impact to archaeological resources is likely to occur from ground disturbance on previously undisturbed properties, such as development of new subdivisions.

As the region develops, changes in the cultural setting and potential impacts to cultural resources and sites may occur. Known cultural resources could be disturbed or destroyed by current projects and RFFAs; however, federal, state, and local regulations are in place to protect resources and would require mitigation of adverse impacts.

5.2.3. Direct and Indirect Impacts of the Project

All of the build alternatives would have no effect on one historic resource, no adverse effects on eight historic resources, and an adverse effect associated with the removal of the existing bridge. In compliance with Section 106 of the NHPA, FHWA, ODOT and the Port will prepare a mitigation plan to resolve the adverse effects associated with removing the existing bridge. The Oregon SHPO, Washington State DAHP, tribes, Section 106 consulting parties, and public will have an opportunity to provide input on the draft mitigation plan. The final mitigation plan will be published as part of the Programmatic Agreement in the combined Final EIS/ROD.

Apart from the existing bridge, Alternative EC-2 would also impact a small portion of the White Salmon TFAS and Alternative EC-3 would impact a small portion of the East White Salmon Fish Processing Facility. These impacts are associated with construction and right-of-way acquisition and are further described in Social and Economic Technical Report. Impacts are not anticipated to affect the use of the sites. Construction of the build alternatives would generate temporary noise and visual impacts within and beyond the APE that may disturb Native American cultural and ceremonial practices at traditional cultural properties (TCPs) within and near the APE.

Under Alternative EC-2, documented archaeological sites would be avoided by the bridge and connecting roadway alignment; however, associated bridge infrastructure could have adverse impacts to an archaeological site (precontact lithic scatter) that has been evaluated and recorded as eligible for listing on the NRHP. The bridge and connecting roadway alignment for Alternative EC-3 and associated bridge infrastructure would likely adversely impact this archaeological site. Based on the results of archaeological surveys identifying these sites, additional investigations are planned for the Project. Further findings will be summarized in the combined Final EIS/ROD.

5.2.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

Because all of the build alternatives would result in removal of the existing Hood River Bridge, the Project would contribute to adverse cumulative impacts to historic resources. Mitigation measures for this direct impact are already included in Section 5.2.3; no mitigation for this contribution to cumulative impacts on historic resources is warranted.

The current projects and RFFAs, as well as the build alternatives, could encounter unknown archaeological resources during ground disturbance; therefore, the Project has the potential to contribute to a cumulative impact on archaeological resources. Many of the current projects and RFFAs would include some level of ground disturbance and/or grading for construction. The build alternatives, added to other development activities, would result in an incremental increase in the risk of encountering or disturbing archaeological resources. However, an Inadvertent Discovery Plan would be prepared for the Project, and likely be required for current projects and RFFAs that include ground disturbance, which would identify measures to address any archaeological resources encountered during construction to minimize impacts to these resources.

As mentioned in Section 5.2.3, Alternative EC-2 could have adverse impacts to an archaeological site and Alternative EC-3 would likely adversely impact this site. Additional investigations are planned for the Project that would delineate site boundaries so impacts can be more specifically evaluated. If a finding of adverse impacts to any archaeological sites are confirmed, then a mitigation plan to resolve adverse impacts associated with the build alternatives will be reported in the combined Final EIS/ROD. Oregon SHPO, Washington State DAHP, and the tribes will be consulted with on the preparation of the mitigation plan. No other current projects and RFFAs have been identified in the vicinity of this site besides Bridge Park; it is unknown if any adverse impacts to archaeological resources would result from this park's development.

5.3. Energy

The Project would have minimal contributions to cumulative impacts on energy use in the API. Additional detail on energy is provided in the Energy Technical Report.

5.3.1. Trends Leading to Present Conditions

Increased growth and development, as detailed in Section 4.2, has led to the current energy consumption within the API. Transportation accounts for a major portion of the energy consumed in Washington and Oregon. Petroleum (e.g., gasoline, diesel fuel, jet fuel) was the predominant source of transportation energy consumption in Washington and Oregon in 2016, at approximately 98 percent in both states (EIA 2019).

5.3.2. How Conditions are Likely to Change without the Project

The construction and operation of current projects and RFFAs would increase energy consumption within the API from increased vehicle-miles traveled, vehicle delays, electricity generation, and operation of industrial, commercial, and residential uses, as well as outside of the API from the manufacturing of construction materials and the transport of materials to construction sites. Continued routine operation of the existing bridge would result in annual energy consumption of approximately 50 million British thermal units (mmBtu). Additionally, if the existing Hood River Bridge were to close in the future when it surpasses its operational life, vehicles would have to travel an additional 21 miles to 25 miles to an alternative route to cross the Columbia River, which would cause an increase in energy consumption by vehicles. These increases in energy consumption are anticipated to be minor as EPA's national control programs are projected to improve fuel economy and produce cleaner fuels, resulting in lower overall energy consumption from vehicles.

5.3.3. Direct and Indirect Impacts of the Project

All of the build alternatives are anticipated to result in the same energy consumption from construction, routine maintenance, and upstream energy consumption from raw materials extraction, transportation, and production. The Project would be subject to federal, state, and local energy conservation measures.

5.3.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

The direct energy consumption analysis in the Energy Technical Report reflects future land use, employment, and growth and, therefore, includes cumulative impacts to energy consumption. Operational energy consumption from the replacement bridge (63 mmBtu) would be similar to the existing bridge (50 mmBtu), in addition to the one-time energy requirements of the construction process (959,841 mmBtu); therefore, the Project would have a minimal contribution to cumulative impacts on energy resources. As this contribution is expected to be minor, no mitigation for cumulative impacts is warranted.

5.4. Fish and Wildlife

The Project would result in a minimal contribution to cumulative impacts on fish and wildlife resources within the API. Additional detail on fish and wildlife resources, including species and habitat conditions within the study area is provided in the Fish and Wildlife Technical Report and Biological Assessment.

5.4.1. Trends Leading to Present Conditions

Fish and wildlife conditions in the API reflect the developed nature of the Columbia River and surrounding upland areas. Habitat loss through dam construction, forest practices, and urbanization over the past century have contributed to the degradation of habitat that supports fish and wildlife species in the API. The construction of 11 hydroelectric dams on the Columbia River and 4 dams on the Snake River limit anadromous fish migration and impact resident fish habitat in the API. These dams create impoundments that reduce flow rates, allow settling of sediments, and control water level elevations as compared to historical free-flowing conditions of the river. The controlled release of water from the dams and the removal of upland vegetation contribute to increased water temperatures that impact the water quality and the aquatic environment in the API. For this reason, baseline aquatic habitat conditions within the API are degraded from their natural condition. However, the aquatic habitats within the API do provide suitable habitat for a variety of aquatic species including salmon, steelhead, bull trout, Pacific Eulachon, and North American green sturgeon, as well as a variety of other native and non-native aquatic species.

Upland development also impacts the quantity and quality of terrestrial habitat and wildlife conditions. Development over time within the API has led to terrestrial habitats that consist primarily of either unvegetated impervious areas, managed landscaped areas, or natural habitats which have been fragmented by development and infrastructure. These habitats provide limited habitat function for terrestrial wildlife species. However, some of the forested habitats on the Washington side of the river do provide potentially suitable habitat for terrestrial and avian species, including sensitive species such as western gray squirrel, Washington ground squirrel, California mountain kingsnake, bald eagle, peregrine falcon, Vaux's swift, and western grebe.

5.4.2. How Conditions are Likely to Change without the Project

Over time, the API is likely to continue to see further development that may result in reduction in fish and wildlife habitat as a result of the projected regional growth, as described in Section 4.2.

Other current projects and RFFAS most likely to reduce available habitat include potential developments near the shoreline area and large subdivisions in relatively undisturbed areas. In general, areas within the API where future development is likely to be concentrated contain habitat of limited quantity and quality. Most of the developable upland portions of the API are located within areas that are already fragmented or otherwise disturbed by existing development. Current projects and RFFAs would likely continue to displace and reduce terrestrial habitat within local urbanizing areas.

Future projects may also include enhancements and mitigation strategies that could provide new habitat or otherwise offset many potential impacts to fish and wildlife. Most future projects that could adversely affect fish and wildlife would be subject to federal, state, and/or local regulations. Other current projects and RFFAs would be required to obtain applicable permits and comply with associated mitigation stipulations.

5.4.3. Direct and Indirect Impacts of the Project

The Project would directly impact fish and wildlife through construction and operation of the replacement bridge. Potential impacts to fish and wildlife associated with the Project include temporary impacts associated with water quality, terrestrial and underwater noise, and temporary habitat disturbance during construction; permanent impacts to terrestrial and aquatic habitats associated with the replacement structures; and beneficial impacts to water quality associated with improvements in stormwater treatment.

Temporary construction-related impacts to water quality, noise, and habitat disturbance have the potential to affect fish and wildlife habitat function within the API during construction. These impacts would be of short duration and localized, and conditions would return to baseline conditions following the completion of construction.

The primary permanent impacts to aquatic habitat function associated with the Project would be those associated with impacts to benthic (river bottom) habitats from new pier footprints and shading from overwater structures. Overwater shading can result in reduced primary productivity and reduced habitat suitability for aquatic species, particularly juvenile salmonids. Exhibit 15 provides a comparison of the impacts and restoration of aquatic habitat by alternative.

Exhibit 15. Comparison of Direct Impacts and Restoration to Aquatic Habitat

	No Action Alternative	Preferred Alternative EC-2	Alternative EC-1	Alternative EC-3
Net increase in overwater structure	None	150,503 ft^2	135,576 ft^2	151,912 ft^2
Net restoration of benthic habitat	None	23,337 ft^2	24,011 ft^2	23,337 ft^2

The foundation footprints for the replacement bridge represent a loss of physical benthic substrate for species that rely on aquatic habitats at the Project site. The extent of the impact to aquatic habitat function is tempered by the level of aquatic habitat function that are currently provided by the benthic habitat at the site. Aquatic habitat at the Project site has been modified from its natural condition by the degree of human alteration of the system. The Columbia River has been largely isolated from its historic floodplain, and hydrology is controlled by dams upstream and downstream of the Project site.

The existing bridge would be removed once the replacement bridge is in place, which would restore benthic habitat function to the areas currently occupied by the existing bridge foundations. The build alternatives would have less in-water piers then the existing bridge and, therefore, less foundation footprints, resulting in a net restoration of benthic habitat within the API under all build alternatives.

A number of factors are expected to reduce the potential impacts to aquatic habitat function that could otherwise occur associated with overwater shading. These include the height of the structure, the orientation of the structure, the density of the piling, and the piling material and reflectivity. Increased structure height diminishes the intensity of shading by providing a greater distance for light to diffuse and refract around the bridge deck surface. Under all build alternatives the replacement bridge structure would be elevated between approximately 20 and 94 feet above the water's surface over the length of the bridge, which would greatly reduce the potential impact of shading.

The net effect to habitat function from overwater coverage would be insignificant, and the proposed benthic habitat improvements would result in a net improvement in aquatic habitat quality at the site under all build alternatives.

All build alternatives would result in the removal of vegetation, which would reduce the availability of habitat for terrestrial species in the API. Quantities of vegetation removal, by alternative, are described in Section 5.13.3. While vegetation removal could result in the interruption or further fragmentation of previously contiguous vegetation corridors that can be used by local species as habitat for forage, cover, escape, nesting, and/or breeding, vegetation removal under all build alternatives would be limited. The vegetation that would be permanently disturbed is situated in areas that have previously been disturbed and/or fragmented from prior development, and habitat functions in these areas are currently limited. Additionally, construction BMPs would be implemented under the build alternatives to further minimize potential impacts to fish and wildlife species and habitats.

Stormwater from roads can cause turbidity and introduce contaminants to the river, which can impact fish and other aquatic species. Stormwater from the existing bridge is untreated, and discharges directly to the Columbia River. Under all build alternatives, stormwater from new impervious surfaces would be collected and treated prior to discharge, thereby removing a source of pollutants and contaminants, and resulting in an improved water quality condition in downstream waters. This has the potential to improve habitat conditions for fish and other aquatic species.

Potential indirect impacts from the operation of the bridge that could affect fish and wildlife include noise and lighting. Traffic noise would be reduced from existing conditions since the new deck would be constructed of concrete and not of steel grating. Lighting for the bridge would be focused on the bridge deck only so that nighttime lighting of the surface of the river would be minimal.

5.4.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

Cumulative impacts to fish and wildlife would result from the Project in combination with other RFFAs in the API. These impacts would occur incrementally over time as projects develop and help to reduce the Project's contribution to potential cumulative impacts which is expected to be minimal.

Given the size and location of the Project, the quantity of overwater and in-water construction from the Project are likely more substantial than those expected from current projects and RFFAs. Similarly, the extent of proposed stormwater treatment and water quality benefits from the proposed Project is also likely greater than benefits expected from current projects and RFFAs.

Project impacts to fish and wildlife resources would be minimized through compliance with federal, state, and local regulatory requirements; however, the Project could contribute to cumulative adverse impacts to these resources. Most future projects that could adversely affect fish and wildlife would be required to secure permits from federal, state, and/or local jurisdictions, which would require that impacts to fish and wildlife habitat be avoided and minimized. Federal permit review requires consultation under the Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act, which require the implementation of impact avoidance and minimization measures in order to further minimize potential impacts to federally listed threatened and endangered species and habitats. Compensatory mitigation potentially including restoration would also be required to document achievement of no-net-loss of function consistent with regulatory requirements.

The Project and other current projects and RFFAs would increase the amount of impervious surface area within the API, which could increase the quantity of stormwater runoff to the Columbia River and potentially impact aquatic organisms. All projects would be subject to stormwater regulations; therefore, risks of runoff to the Columbia River would be greatly diminished. Some projects, such as the replacement bridge, would have a net benefit on water quality in the Columbia River by providing stormwater containment and treatment, as well as spill prevention mechanisms where they currently do not exist in the API.

While the Project would contribute to incremental cumulative impacts on fish and wildlife resources, the Project and other current projects and RFFAs, would be required to avoid, minimize, and mitigate for impacts, and to achieve no net loss of fish and wildlife resources. In addition, projects would not be constructed simultaneously, helping to spread potential impacts over time. As such, the Project's contribution to cumulative impacts to fish and wildlife resources would be minimal and no mitigation for cumulative impacts is warranted.

5.5. Geology and Soils

The Project would result in minimal contributions to cumulative impacts to soils and geologic resources in the API. Additional detail on geology and soils is provided in the Geology and Soils Technical Report.

5.5.1. Trends Leading to Present Conditions

The geologic and soil conditions in the API are a result of prehistoric geologic movement that created the Cascade Mountains and Columbia River Gorge. Additional information is included in Section 4.1.1. The soils on the Washington side of the existing bridge are silt loams. These soils are moderately deep and well drained, although when wet they have a slow infiltration rate. Runoff potential is moderate. The soils on the Oregon side are composed of xerofluvents. These soils are generally well drained and permeable.

There are three major categories of geologic hazards within the API: erosion hazards, earthquake hazards, and volcanic hazards. The areas of greatest hazard from erosion are associated with the steep slopes on the north side of API. The north wall of the Columbia River Gorge rises approximately 400 feet above the river and is composed of steep basalt cliffs. Rocks and boulders falling from these cliffs have built steep talus slopes at their bases. These slopes lie at the angle of repose and are susceptible to movement, especially if the toe is disturbed or cut, such as by road construction. Flooding may also cause erosion. However, because dams control much of the Columbia River system, serious flooding is unlikely.

Within the API, the hazards most likely to occur from earthquakes include damage to structures from liquefaction, ground motion amplification, and landslides. Although part of the Hood River fault complex sits east of the API, these faults are considered to be inactive over the past 1.6 million years (University of Oregon 2003) and no major earthquake activity has been associated with the API or surrounding areas in recent history. Moderate earthquakes centered in the Willamette Valley and in areas to the east may periodically impact the API. Periodic massive subduction zone earthquakes would impact most of the Pacific Northwest.

Two nearby volcanoes, Mt. Hood and Mt. Adams, may also pose a geologic hazard to the API. A large eruption, landslide, or debris flow on Mt. Hood could cause a lahar (a watery flow of volcanic rock and mud) to rush down the Hood River valley and, depending on its size, cause catastrophic damage to the Hood River area.

5.5.2. How Conditions are Likely to Change without the Project

Over time, soils and geologic conditions are likely to continue to be impacted by geologic and natural events such as earthquakes and flooding, and by ground disturbing activities, such as development and infrastructure projects. Impacts to soils and geology from current projects and RFFAs, as well as ongoing maintenance, such as WSDOT work along SR 14 to address rock falls, could increase the potential for erosion and contribution of sediments to the Columbia River and surrounding areas. The primary concern related to geology and soils for all current projects and RFFAs in the area would be erosion of disturbed soils. As the existing bridge continues to age, it will become more susceptible to geologic and natural events.

5.5.3. Direct and Indirect Impacts of the Project

All of the build alternatives would require vegetation removal, grading, and fill placement, all of which would increase erosion potential. The area of ground disturbance during construction would vary by alternative ranging from 32.8 acres under Alternative EC-2 to 37.5 acres under Alternative EC-3. Alternatives. In addition, soil and geologic conditions would be impacted by construction of new piers in the Columbia River. The Project would be required to implement appropriate erosion and sediment control BMPs and adhere to seismic design standards, which would minimize any impacts to geology and soils.

In addition to the impacts that would result under all three build alternatives, Alternative EC-1 would require extensive modifications at the intersection of the replacement bridge, SR 14, and N. Dock Grade Road. The intersection and approaches along SR 14 would need to be brought up approximately 17 feet, requiring large amounts of fill material. This would require excavation and fill at the toe of a steep talus slope, resulting in a considerable impact to the stability of the slope. Additional infrastructure for all build alternatives would be subject to a high risk of damage from liquefaction and ground motion amplification if an earthquake of sufficient magnitude struck. However, the replacement bridge would be able to better withstand geologic and natural events than the existing bridge.

5.5.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

Alternative EC-1 would have the greatest contribution to cumulative impacts with the greatest amount of cut and fill and earthwork within a talus slope. Talus slopes are very unstable, and the risk of movement or failure of the slope increases considerably if the toe of the slope is cut. Construction in this area could result in a high impact to the stability of the slope. Special engineering solutions such as retaining walls or other anchoring devices to stabilize the toe of the slope would be necessary in this area to mitigate the potential impact. Additionally, all of the build alternatives have the potential to cause erosion from earthwork and vegetation removal, sediment runoff, and increased erosion hazards due to increased stormwater runoff.

All build alternatives would likely have minimal contributions to erosion and sedimentation. The Project, taken together with other current projects and RFFAs, would represent a larger potential for erosion and contribution of sediments to the Columbia River and surrounding areas than any of the projects by themselves. These projects, however, would not be constructed simultaneously and any negative impacts would not occur at the same time. In addition, with the implementation of appropriate erosion and sediment control measures (BMPs) and adhering to seismic design standards, the individual impacts of each project could be minimized, and the overall cumulative impacts would be reduced. Therefore, no mitigation for cumulative impacts is warranted.

5.6. Hazardous Materials

The Project is anticipated to contribute to a cumulative benefit to hazardous materials conditions in the API. Additional detail on hazardous materials is provided in the Hazardous Materials Technical Report.

5.6.1. Trends Leading to Present Conditions

Increased development in the API over time and past industrial development within the API has resulted in the presence of hazardous materials and site contamination. Information obtained from the Southwest Washington Regional Transportation Council (RTC) identified potential hazardous material located around the former City of Bingen and City of White Salmon docks, which are located on the submerged portions of the Vanguard Nursery property and the White Salmon TFAS. Potential hazardous materials may have resulted from activities associated with the use of these docks in the late 1800s (RTC 2003). In addition to upland sites that have the potential to include hazardous material contamination, the hazardous material conditions in the API are also influenced by the U.S. Navy transport of dismantled nuclear reactor compartments via barge on the Columbia River from Bremerton, Washington (downriver of the API) to the Port of Benton (upriver of the API).

5.6.2. How Conditions are Likely to Change without the Project

Existing hazardous materials conditions could be impacted by current projects and RFFAs involving ground disturbance that could expose existing contamination, and/or the development of new facilities that use hazardous materials, potentially creating new sites of concern. The removal of hazardous materials through site cleanup and the development of current projects and RFFAs could also benefit the hazardous material conditions in the API. In addition, the transport of hazardous materials (via railroad or the Columbia River) through the API could result in hazardous material spills or releases. Projects that involve the transport of hazardous materials would likely be required to prepare emergency response plans and clean up protocols to reduce potential impacts and contain any spills or releases.

5.6.3. Direct and Indirect Impacts of the Project

The build alternatives would require earthwork that could expose contaminated sediments and hazardous materials during construction. All build alternatives would potentially impact areas where historic and current land use has included the use, generation, storage, release, or disposal of hazardous materials and petroleum products. Removal of the existing bridge could result in exposure of hazardous materials, including asbestos and/or lead-based paint located within the existing bridge, tollbooth, and associated equipment shed. Alternative EC-2 would also require removal of the Northwest Pipeline meter station, which contains historic mercury contamination; any mercury contaminated soils encountered during construction would require cleanup.

Operation of the replacement bridge would not result in any direct negative impacts to hazardous materials and would benefit hazardous material conditions in the API. All build alternatives include a concrete deck, which would allow for containment and cleanup and provide better protection against spills of hazardous materials to the Columbia River than the existing grated deck. An additional benefit of the build alternatives is that a replacement bridge would provide wider travel lanes as well as a larger navigation opening and seismic upgrades (lifting weight limits), all of which would make it safer to transport hazardous materials across and on the Columbia River.

5.6.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

The Project, along with other current projects and RFFAs, could alter hazardous conditions over time through development and ground disturbing activities that could expose existing contaminated materials. Only minor impacts are anticipated, however, which would be mitigated for through the proper handling and disposal of any hazardous materials encountered during construction. For construction of the Project and other current projects and RFFAs, spill prevention plans would be required to account for unforeseen spills. Demolition of the existing bridge and associated equipment, as well as demolition and construction associated with other current projects and RFFAs, may present issues of lead-based paint and/or asbestos exposure. This would be mitigated by pre-removal surveys and assessments and, if necessary, implementation of a hazardous materials containment plan in accordance with regulatory requirements. A potential beneficial impact of the build alternatives, and other current projects and RFFAs, is the removal of hazardous materials that could exist, thus reducing future adverse impacts to human health and the environment. This removal could prevent potential migration of hazardous materials through soil and groundwater over time. In addition, the concrete deck of the build alternatives would prevent vehicle spills from discharging directly into the Columbia River, which occurs with the streel-grated deck of the existing bridge. Therefore, the Project would contribute to a cumulative benefit to hazardous materials conditions in the API and therefore, no mitigation is warranted.

5.7. Land Use

The Project is anticipated to result in a cumulative benefit to land use conditions in the API. Additional detail on land use is provided in the Land Use Technical Report.

5.7.1. Trends Leading to Present Conditions

The developed areas of the API contain a variety of land uses consisting of residential, commercial, recreational, industrial, and governmental uses, primarily in the cities of White Salmon, Bingen, and Hood River. The existing bridge has existed for over 90 years and development has oriented around this access. As such, land uses on both sides of the river have become dependent on this access for customers, employees, freight, and tourism. The City of Hood River has a higher concentration of existing development within the immediate vicinity of the existing Hood River Bridge than the other jurisdictions. Based on a review of aerial photography, historically, land uses surrounding the existing bridge landings were agricultural in nature. In the 1950s, the City of Hood River side began to develop with more commercial and transportation uses when the I-84 interchange was constructed. Since that time, both sides of the Columbia River have continued to develop with an increasing amount of commercial development and supporting infrastructure.

5.7.2. How Conditions are Likely to Change without the Project

As noted in Section 4.2, the cities of White Salmon, Bingen, and Hood River have experienced steady population growth in recent years, which has led to increased residential, commercial, and industrial development. Various projects are planned throughout the API, including new residential subdivisions, industrial subdivisions, utility and infrastructure improvements, commercial and mixed-use developments, and park and trail improvements. Land within the API is regulated through county and city comprehensive plans and zoning ordinances, as well as the CRGNSA Management Plan. The majority of current projects and RFFAs identified within the API are within designated Urban Areas, as development outside Urban Areas is limited by the CRGNSA Management Plan. The comprehensive plans for the cities of White Salmon, Bingen, and Hood River envision a mix of residential, commercial, industrial, and recreational uses within the city boundaries. As demonstrated through the projected population growth for all jurisdictions within the API, it is anticipated that land use conditions within Urban Areas will continue to intensify with or without the proposed Project.

Without the Project, the existing bridge would be closed at the end of its operational life. If the bridge were to close, either at the end of its operational life or because of damage from an unforeseen event, existing and future land uses would be impacted. As mentioned, land uses on both sides of the river have become intertwined over time and are now interdependent. The existing bridge allows workers, customers, freight, and visitors to cross the river rather freely. In the absence of a bridge in this location, the area could experience slower growth and businesses could reduce in size or go out of business. In addition, future businesses could be deterred from locating in the area or existing businesses could relocate elsewhere.

5.7.3. Direct and Indirect Impacts of the Project

Direct impacts for all build alternatives include full and partial property acquisitions in the cities of White Salmon and Hood River. Acquisitions would result in approximately 2.8 acres for Alternative EC-2, 18.8 acres for Alternative EC-1, and 3.4 acres for Alternative EC-3 being converted to transportation right-of-way. Alternative EC-2 would not displace any businesses or residences, while Alternative EC-1 would displace two businesses and one residence, and Alternative EC-3 would displace eight businesses and five hotel suites. The replacement bridge would enhance land use conditions in the API, as it would accommodate additional modes of travel between states, increase access for pedestrian and bicyclists, and improve the movement of goods and services throughout the region.

5.7.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

The conversion of approximately 18.8 acres under Alternative EC-1, 2.8 acres under Alternative EC-2, and 3.4 acres under Alternative EC-3 represents a conversion of approximately 4 percent, 0.06 percent, and 0.07 percent, respectively, of the approximately 4,600 acres of land within the cumulative API. This change to land use is negligible in the context of the other anticipated land use changes expected with the current projects and RFFAs. None of the build alternatives would be expected to cause induced growth in the area. Therefore, the Project would not contribute to cumulative impacts on land uses and development, and no mitigation for cumulative impacts is warranted. Due to the enhanced conditions under the Project outlined in Section 5.7.3, the replacement bridge would have a cumulative benefit to land use conditions within the API.

5.8. Noise

The proposed Project is not anticipated to contribute to cumulative impacts to noise conditions in the API. Additional detail on noise levels is provided in the Noise Technical Report.

5.8.1. Trends Leading to Present Conditions

The API contains a variety of existing land uses that contribute to the noise environment. The Oregon side of the API has a higher concentration of development within the immediate vicinity of the existing Hood River Bridge than the Washington side. Traffic noise from the existing bridge, SR 14, and I-84, including the hum generated by vehicles crossing the steel grated deck of the existing bridge, are the dominant noise sources in the area, with minor contributions from aircraft and trains along both Washington and Oregon shores. The primary noise receptors are the users of facilities adjacent to the bridge landings on the Washington and Oregon sides, as well as river users.

5.8.2. How Conditions are Likely to Change without the Project

Over time, land use changes, population growth, and increased traffic volumes are likely to occur as described in Section 4.2, which would increase noise levels in the API. Construction and operation noise would also continue to be regulated by local and state noise regulations, including some limitations on construction hours. Under the No Action Alternative, the existing Hood River Bridge would be closed at the end of its operational life, which would result in a reduction of noise levels without the noise impacts from vehicles crossing the existing steel grated bridge deck.

5.8.3. Direct and Indirect Impacts of the Project

Construction activities from the Project and other RFFAs would generate noise during the construction period, which would be temporary in nature and would be required to meet noise control standards. It is unlikely that other current projects and RFFAs near the bridge would be constructed simultaneously, therefore, Project construction noise would not likely be a cumulative noise impact.

A noise analysis was performed for the Project comparing existing roadway noise conditions to predicted roadway noise levels, which accounts for changes in population and employment for the area through 2045. The noise analysis was based on transportation demand forecasting modeling that generates projected traffic volumes and includes the impacts of unmet demand on the transportation system from future population growth, housing, and land use changes. Modeled noise levels for 2045 near the Project are projected to be within 3 A-weighted decibels (dBA) of existing noise levels.

5.8.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

Three dBA is generally considered the smallest change in sound level that a human can detect. As the amount of noise increase is projected to be negligible under the Project and future conditions in the area, no mitigation for cumulative noise impacts is warranted.

5.9. Social, Economic, and Environmental Justice

The Project is anticipated to contribute to a cumulative benefit to social and environmental justice conditions in the API. The Project would have minimal contributions to cumulative impacts to economic conditions in the API. Additional detail on social, economic, and environmental justice resources is provided in the Social and Economic Technical Report.

5.9.1. Trends Leading to Present Conditions

The cities of White Salmon, Bingen, and Hood River are economically and socially diverse communities. The local and regional economies within the API were built on agricultural and forest product industries. These industries continue to be a focus of economic growth with a recent rise in recreational, tourism, service-oriented, and manufacturing sectors. Additional information on development and economic trends is provided in Section 4.2.

Social diversity within the cities of White Salmon, Bingen, and Hood River include higher concentrations of racial minorities, Hispanic or Latino minorities, low-income households, limited English proficient households, no vehicle households, elderly and children, and disabled residents than the corresponding county averages.

In the cities of White Salmon and Bingen, more households depend on Social Security when compared to Washington state as a whole. The City of Bingen's median household incomes are higher than neighboring City of White Salmon and are on par with Klickitat County, and all three geographic areas have substantially lower median household incomes than the state. The proportion of the City of Hood River household incomes that depend on Social Security are lower than Hood River County and Oregon. The City of Hood River median household incomes are lower than Hood River County and lower than the state median.

The economies of Klickitat County and Hood River County can largely be viewed as an integrated regional economy. Although both counties have industrial and commercial enterprises, the region provides a bi-state workforce and access to complimentary businesses that strengthen each county's economy. The Hood River Bridge provides the only direct transportation connection between the cities of White Salmon and Bingen, Washington, and Hood River, Oregon. As a result, the communities and businesses on both sides of the Columbia River have access to a greater number of services, retail businesses, industrial operations, recreation and tourism activities, a shared workforce, and access to alternate routes via I-84, SR 14, and OR 35, which are particularly important in emergency situations.

There is a significant amount of interstate freight transport between Hood River County and Klickitat County via the Hood River Bridge for interrelated industries. For example, logging trucks connect the wood-related industries on either side of the river, and fruit haulers cross over from the growers in the Hood River Valley to the packing and storage facilities at the Underwood Fruit & Warehouse in Bingen. The economic growth experienced in the region has occurred with the bridge playing a key role connecting the economies on both sides of the river.

5.9.2. How Conditions are Likely to Change without the Project

Further deterioration of the existing bridge could occur, resulting in more restrictive weight limits which could impact interstate truck travel. Deterioration of the existing bridge could also lead to an increase in bridge tolling, due to increased maintenance costs. There are a variety of current projects underway and RFFAs in the vicinity of the bridge, including residential, recreational, industrial, environmental, commercial/mixed-use, transportation/utility and bicycle/pedestrian focused projects. These projects would likely benefit community populations through increased efficiencies in facility operations, development of new community hubs, and overall improvements to the API with concern to community livability.

Historical trends in population and community growth would be expected to continue until the existing Hood River Bridge reaches the end of its operational life. At that time, the bridge would be closed to all cross river vehicular traffic. All services that residents seek on opposite sides of the river would require substantial detours resulting in additional time to reach certain destinations and increased costs (e.g., fuel, automobile maintenance). The nearest bridges would require a 40-mile one-way detour for a trip that was previously 1 mile. Vehicles would travel 22 miles to 24 miles one-way and out-of-distance to cross the Columbia River at Cascade Locks (Bridge of the Gods) or The Dalles Bridge (US 197). Access, for residents of both counties, to community resources, such as places of worship, healthcare providers, and public services would be impacted. Native Americans, especially those traveling from Oregon to access in-lieu fishing sites on the Washington shoreline, would need to cross the Columbia River at The

Dalles or Cascade Locks. These detours could have a substantial impact on their travel depending on where their trips originate.

Populations and businesses on the Oregon side would still have connections to I-84 – the only nearby interstate highway. However, local Washington communities would need to travel over 20 miles to alternate bridge crossings of the Columbia River to reach I-84. In addition, it would be assumed that some Washington residents could substitute City of Hood River services with those found in the City of The Dalles, which would be about half the distance of traveling to the City of Hood River via alternate bridges.

The eventual closure of the Hood River Bridge would reduce the employment pool that currently supports industry and business on both sides of the Columbia River in the API. Moreover, the existing bridge closure could dampen opportunities for future economic growth in the region, particularly on the Washington side, due to the loss of this transportation link. In a worst-case scenario, White Salmon and Bingen could experience severe economic changes. These towns would lose direct connection to the only interstate in the area (I-84). As a result, tourists and recreationists coming to Hood River would not be able to cross over to Washington; freight would need to travel 20 miles up or down SR 14 before it could access I-84; new business may be deterred and locate in other areas with better interstate highway access; and White Salmon and Bingen could be bypassed altogether if regional traffic crosses the Columbia River at The Dalles or Cascade Locks bridges. The loss of business activity and jobs would lead to fewer tax revenues being collected. The most substantial being sales tax and business and occupation tax revenues in Washington and business income tax revenues in Oregon.

5.9.3. Direct and Indirect Impacts of the Project

Direct economic impacts of all build alternatives would include acquisition and conversion of private property to public right-of-way, which is exempt from property taxes. Alternative EC-1 and Alternative EC-3 would also displace businesses, as described in Section 5.7.3. If displaced businesses relocate outside of local jurisdictions or choose not to reopen, this would reduce local tax revenues. Alternative EC-2 would not displace any businesses. Changes in parking availability, noise, visual conditions, or access could also impact economic conditions under each of the build alternatives.

Community connectivity would be enhanced through the creation of a new shared use path included in all the build alternatives, which would provide a new mode of travel for river crossing as well as the additional benefit of new views of the Columbia River Gorge and enhanced recreational opportunities. The addition of bicycle and pedestrian facilities would create a non-motorized travel option for river-crossing, benefiting low-income populations, households without vehicles, and children, and it would provide accessible facilities for the disabled. Improved pedestrian access can positively impact the convenience, visibility, and desirability of surrounding residential and commercial properties and patronage of nearby retail businesses. Additional pedestrian activity could create a synergy of business owners and employees being more interested in relocating where there is convenient pedestrian access to the replacement bridge, which could lead to more dense and mixed land uses around the Klickitat County and Hood River County communities and related increased economic activity.

All build alternatives would provide an improved regional connection between the Klickitat County and Hood River County communities without the width or weight restrictions that currently hinder or divert some freight shipments to other Columbia River crossings, potentially benefiting existing and future industrial and commercial businesses in the area. The replacement bridge would provide wider lanes and a shoulder in each direction for motor vehicles, providing more comfortable travel conditions for drivers and pull-over areas for disabled vehicles. Travel times for transit service providers using the bridge could be expected to improve, potentially benefitting transit-dependent households. The shared use path would increase opportunities for pedestrian and bicyclists to cross the river, which could draw more recreation and tourism business to the cities of White Salmon, Bingen, and Hood River.

In order to finance a replacement bridge, increased bridge tolls would need to be considered. It is likely that any changes to the tolling rates and/or system, including making the system entirely electronic, could introduce barriers and have a disproportionate burden on low-income bridge users. Although the final toll rates and bridge ownership are unknown at this time, four build alternative toll scenarios were developed for the Project and are included in the Social and Economic Technical Report.

5.9.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

As the primary cross-river connector between communities for employees, consumers, trade, and recreationalists, the replacement bridge would support other current projects and RFFAs as well as enhance community cohesion. Through implementation of the mitigation measures described in the Social and Economic Technical Report, including measures to mitigate the impacts of tolling on low-income populations, the Project would not be anticipated to contribute to cumulative impacts on social elements, including population and community growth, or environmental justice populations. Furthermore, creation of a new shared use path would improve pedestrian access and community connectivity, thus contributing to a cumulative benefit on social and environmental justice conditions in the API. Therefore, no mitigation for cumulative impacts to social and environmental justice conditions is warranted.

The replacement bridge, as well as other planned transportation and development projects, would be expected to benefit the regional economy, including job creation and increased spending for other developments. Construction employment would rise substantially as the replacement bridge is constructed. Although this employment increase would be of limited duration, no other planned capital improvement project in the region is as large as the Project. It is anticipated that there would be a short-term cumulative impact on the available labor force, the need to import specialty labor into the region, the potential for other projects to be delayed due to a lack of available labor, and the resultant strain on regional resources to accommodate the imported labor pool.

To reduce the cumulative impact of imported construction workers on available housing resources, the Port should consider requiring the contractor to submit a worker staffing and accommodation plan as either part of their bid proposal or as one of their early submittals after award of contract. No other mitigation to address cumulative impacts to economic conditions is warranted.

5.10. Park and Recreation Facilities

The Project is not anticipated to significantly contribute to cumulative impacts and has an overall net benefit to recreation in the API. Additional detail on recreation resources is provided in the Park and Recreation Technical Report.

5.10.1. Trends Leading to Present Conditions

Recreation-based activities are a substantial component of the regional economy. In general, park and recreation facilities in the API are associated with the Columbia River. The emergence of water-based recreational sports (windsurfing, kayaking, kiteboarding, etc.) have contributed to a shift in the regional economy from lumber and timber industries to tourism and recreation. The establishment of the

CRGNSA also played a major role in the preservation of the region's natural resources for economic and recreation purposes. Over the last decade, the Port has developed numerous waterfront sites for recreation that have contributed to the growth of the recreation and tourism industry.

5.10.2. How Conditions are Likely to Change without the Project

Recreation amenities and conditions in the API would likely be enhanced in the reasonably foreseeable future with or without the proposed Project through several planned improvements included in the current projects and RFFAs. These include the development of Bridge Park in the City of White Salmon, Phase 2 of the Waterfront Park in the City of Hood River, and the development of Confluence Business Park in the City of Hood River. In addition, bicycle and pedestrian improvements, such as the construction/extension of other trails in the API (e.g., the Historic Columbia River Highway trail) could improve connectivity and access to park and recreation facilities in the region.

At such a point that the existing bridge exceeds its operational life and the bridge is closed to all cross-river traffic, access to the park and recreation facilities would be altered for visitors traveling across the Columbia River to reach these destinations. Park users would have to utilize alternate travel routes via The Bridge of the Gods or The Dalles Bridge to access park and recreation facilities on the opposite side of the river. The inconvenience of reaching these facilities could deter people from using some sites. Closure of the bridge would reduce traffic noise levels at park and recreation facilities near the existing bridge with those facilities closest to the bridge experiencing the greatest reduction in noise levels.

5.10.3. Direct and Indirect Impacts of the Project

All three build alternatives would result in changes to the park and recreation facilities in closest proximity to the bridge. These changes would include: alterations to the conceptual configuration and available parking for Bridge Park; removal of parking spaces that serve the boat launch, Port offices, and maintenance facilities at Hood River Marina Park and Basin; and a longer, covered segment of the Waterfront Trail, potentially increasing security concerns under the bridge. These impacts and identified mitigation measures are described in greater detailed in the Park and Recreation Technical Report.

Construction of the new shared use path across the bridge would enhance regional recreation opportunities by improving bicycle and pedestrian connectivity to facilities on both sides of the Columbia River. Indirect impacts to park and recreation facilities could result in changes in visitation patterns due to cross-river pedestrian and bicycle access to park and recreation facilities, which could have minor indirect impacts on maintenance needs. If fewer park users are driving to reach these facilities, it could slightly reduce vehicle parking demand (particularly at sites closest to the bridge), although there could be greater demand for bicycle parking. Additionally, if tolls are increased for the replacement bridge, this could deter cross-river vehicle, pedestrian, or bicycle traffic, which could alter visitation patterns as park users may opt to visit sites that do not require crossing the bridge.

5.10.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

Recreation resources could be affected by other actions in the API that result in property acquisitions, access changes, or changes to the setting such as noise, water or air quality, or visual impacts. Most current projects and RFFAs would be anticipated to improve or have no adverse impact on parks and recreational facilities in the region. Likewise, the build alternatives would be anticipated to improve non-motorized access to park and recreation facilities with minimal adverse impacts on these facilities. Thus, the Project would contribute to a cumulative benefit to park and recreation facilities; therefore, no mitigation for cumulative impacts is warranted.

5.11. Transportation

The Project is anticipated to provide a beneficial contribution to transportation conditions in the API. Additional detail on transportation is provided in the Transportation Technical Report and the Navigation Impact Report.

5.11.1. Trends Leading to Present Conditions

The existing Hood River Bridge provides an essential transportation link between Oregon and Washington, connecting the communities of White Salmon, Bingen, and Hood River. The transportation conditions in the API are a result of steady growth in the region over the last several decades. The existing (2018) average daily traffic for the bridge is approximately 16,500. The bridge has experienced relatively stable traffic growth over the last 15 years. From 2002 to 2017, annual bridge volumes increased from approximately 3 million to 4.4 million annual trips, an average annual linear growth rate of 2.9 percent.

In addition to vehicle traffic, the bridge impacts commercial and recreational traffic on the Columbia River. The vertical lift span to the bridge was added in 1938 following an increase in commercial river traffic and the downstream construction of the Bonneville Dam. In 2017, there were 3,435 upbound vessel trips and 3,518 downbound vessel trips, which more than doubled from 2008 (USACE 2017).

5.11.2. How Conditions are Likely to Change without the Project

Projected traffic volumes in the API would be expected to increase regardless of whether the bridge is replaced or not. Current projects and RFFAs would contribute to anticipated population growth, which would in-turn increase traffic volumes in the API. The future vehicular traffic forecasts in the Transportation Technical Report, while not specifically including the impacts of the identified current projects and RFFAs, have included a representative growth rate for traffic to occur. A 2 percent growth factor was applied to 2018 volumes to develop 2045 peak hour traffic forecasts. The growth rate equates to a 54 percent increase in volume from 2018 to 2045 or approximately 90,000 additional vehicles per year.

Based on this projected growth rate, without the proposed Project, the following mobility issues were identified for 2045:

- The SR 14/Hood River Bridge intersection (traffic signal) would see volume demand in excess of available capacity during the a.m. and p.m. peak hours.
- Vehicles turning onto SR 14 from Oak Street (2-way stop) in downtown Bingen would experience severe delay during the a.m. and p.m. peak hours.
- US 30/OR 35/Button Bridge Road/Old Columbia River Drive [All-way Stop] would see volume demand in excess of available capacity during the p.m. peak hour.

The Navigation Impact Report indicates future vessel traffic is expected to be of a similar type and quantity as existing traffic. To continue to accommodate commercial and recreational river traffic, if the existing bridge is closed at the end of its operational life the bridge lift would be required to be left permanently up or removed as to not negatively impact river traffic.

5.11.3. Direct and Indirect Impacts of the Project

Under any of the build alternatives, a new intersection would be constructed with SR 14, resolving the motor vehicle capacity issues of severe delay and queuing identified above. The other future year (2045) mobility issues are anticipated to remain.

The build alternatives would offer other various transportation benefits. The replacement bridge would offer a new facility for people who want to walk or bicycle between Oregon and Washington, connecting to existing infrastructure on both sides of the river. The speed limits for the replacement bridge would be 35 mph, 10 mph higher than the existing bridge, decreasing travel time for motor vehicles. Response times for emergency responders would be expected to improve with wider lanes and shoulders, allowing vehicles to safely pull off on the bridge to make way for emergency response vehicles. Existing heavy vehicle height, width, and weight restrictions would be eliminated, allowing for more direct travel and travel time savings for some freight vehicles that are prohibited from using the current bridge.

Direct and indirect impacts to vessel navigation include temporary impacts during construction of the replacement bridge and the removal of the existing bridge. During the lowering and removal of the main lift span of the existing bridge, the navigation channel would be closed for one working week at a maximum. Mitigation measures to offset this impact are addressed in the Navigation Impact Report. In the long-term, vessel passage under the replacement bridge would improve as a result of a much wider clearance that would resolve the navigation hazards. The vertical clearance of the replacement bridge would be reduced; however, all vessels currently traveling past the Hood River Bridge today would be able to either travel under the replacement bridge or adjust the vessel in order to pass under the bridge.

5.11.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

Overall, the Project would benefit vehicle, marine, and pedestrian and bicycle travel across the river and would contribute to cumulative transportation benefits for the region. No mitigation for cumulative impacts is warranted.

5.12. Treaty Fishing Rights

The Project is not anticipated to contribute to cumulative impacts to treaty fishing and processing sites in the API. Additional detail on treaty fishing and processing sites is provided in the Social and Economic Technical Report

5.12.1. Trends Leading to Present Conditions

Tribal fishing communities have been present in the Columbia River Gorge for millennia. Fishing for salmon, steelhead, lamprey, sturgeon, and other species has been a focus of that presence. Fish caught in the Columbia River provide sustenance and ceremonial resources that were and continue to be of great importance to indigenous tribes on the river (CRITFC 2014). In 1855, four federally-recognized tribes with ties to the Columbia River entered into multiple treaties with the U.S. government, ceding millions of acres of their lands to the U.S. The tribes reserved lands that now constitute their reservations, as well as the rights to fish at their usual and accustomed places. This included both on and off their reservations, with those rights continuing to the present. The four tribes with those reserved rights are commonly referred to as the Columbia River treaty tribes and include the Confederated Tribes of the Warm Springs Reservation of Oregon, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes and Bands of the Yakama Nation, and the Nez Perce Tribe (CRITFC 2020a).

Beginning in 1923, the U.S. Army Corps of Engineers (USACE) surveyed the Columbia River and recommended numerous dams to provide navigation, hydropower, flood control, and irrigation (Wilma 2006). A consequence of the subsequent dam building on the Columbia River was that traditional tribal fishing grounds along the Columbia River were inundated behind the dams (CTUIR 2019). To account for the tribal fishing grounds that were inundated, the U.S. Congress set out to provide various sites along the river within what is now known as Zone 6; a 147-mile stretch of the river between the Bonneville and McNary dams reserved exclusively for commercial fishing by the Columbia River treaty tribes (CTUIR 2020b). In addition to the fishing sites, fish processing facilities were established along the Columbia River to process and sell fish in a safe and clean environment (USACE 2013). Three fishing sites and one fish processing facility are located near the existing bridge, including the White Salmon TFAS (bordering the existing bridge to the west), East White Salmon Fish Processing Facility (roughly 0.25 mile east of the existing bridge), Underwood In-Lieu site (roughly 1.5 miles west of the existing bridge), and Stanley Rock TFAS (roughly 1.5 miles east of the existing bridge) (CTUIR 2020c). Another fishing site, owned by the Nez Perce Tribe, is located roughly 1.25 miles west of the existing bridge near the Underwood In-Lieu site adjacent to the White Salmon River.

5.12.2. How Conditions are Likely to Change without the Project

The API is expected to continue to develop near the treaty fishing sites and processing facility with development regulated through county and city comprehensive plans and zoning ordinances, as well as the CRGNSA Management Plan. The treaty fishing access sites are owned by the Bureau of Indian Affairs (BIA) and are protected lands. Without the Project, the existing bridge would be closed in the future when it surpasses its operational life. In addition, due to the bridges age, condition, and seismic vulnerability, a substantial event such as an earthquake or barge strike could close the bridge temporarily or permanently. If the bridge were to close, either at the end of its operational life or because of damage from an unforeseen event, tribal fishers that cross the bridge to reach the fishing sites or processing facility would have to travel over 20 miles one-way to cross the Columbia River using The Dalles Bridge or the Bridge of the Gods. Relating specifically to the White Salmon TFAS, without the Project, spill and stormwater runoff protection near the site and long-term benefits to benthic habitat would not be provided.

5.12.3. Direct and Indirect Impacts of the Project

The four fishing sites and fish processing facility would experience different degrees of direct and/or indirect impacts from the Project that may contribute to cumulative effects. Due to the proximity of the replacement bridge alternatives to the White Salmon TFAS, especially under Alternative EC-2, impacts to this site would be the greatest compared to the other sites. The White Salmon TFAS is a roughly 10-acre site that includes camping areas, a fish cleaning station, floating dock and boat ramp, net repair and storage facilities, and parking. The site also includes a structure for ceremonial activities. Tribal fishers reside at the White Salmon TFAS year-round, with over-lapping short-term and long-term stays at the site.

Construction related impacts of the Project in combination with other current projects and RFFAs would temporarily include increased noise levels. The Project, other current projects, and RFFAs would likely be constructed at different times, possibly with some overlap, so noise impacts would likely occur over time and vary by construction activity types and location. Apart from Bridge Park, proposed under the existing bridge next to the White Salmon TFAS, no other current projects and RFFAs have been identified in the vicinity of the White Salmon TFAS. Increased noise from construction would be heard at the East White Salmon Fish Processing Facility, especially under Alternative EC-3, but would not impact the functionality of the site. Due to the Project and other current projects and RFFAs being concentrated near the existing bridge and the other three fishing sites (Stanley Rock TFAS, Underwood In-Lieu, and the Nez Perce Tribe property) being located in more rural locations along the shoreline, construction noise is not expected to significantly impact these sites.

Construction-related activities would also result in increased particulate matter in the form of fugitive dust, as well as exhaust emissions from material delivery trucks, construction equipment, workers' private vehicles. Any construction work performed would be required to take precautions limiting fugitive dust emissions to not to create a nuisance, as well as limit vehicle emissions. Dust and exhaust emissions from construction projects would be short-term in duration and likely occur at different times and locations. All projects would be required to comply with local and state standards that regulate air, dust, and noise impacts and stipulations to minimize the adverse effects.

The construction of projects near or along vehicle routes that tribal fishers take to sites could result in temporary traffic congestion and delays, as well as minor detours to get around construction areas. While vehicle access to fishing sites and the process facility may be impacted by construction, access would be required to be maintained for construction of the Project and other current projects and RFFAs. As mentioned, projects would likely be constructed at different times, limiting access impacts. Long-term, as the API continues to develop, tribal fishers may experience increased congestion and delays in reaching sites; however, roads would have to meet certain mobility standards and road improvement projects would be planned accordingly to address congestion overtime.

The Project would require in-water construction; some of the other current projects and RFFAs would be located near shorelines but would not involve in-water construction. River access to/from the fishing sites would be maintained throughout the duration of construction of the Project with some limitations for safe navigation around construction barges, equipment, and activities. These limitations would not significantly impact fishing vessel navigation to these sites or contribute to cumulative effects on river access to the fishing sites.

Based on the information presented above, cumulative impacts from construction noise, dust, emissions, and vehicle and vessel access from the Project and other current projects and RFFAs to the fishing sites and processing facility are expected to be minor and no mitigation is warranted.

Potential impacts to fish species and habitat from the bridge replacement project near the fishing sites would be mitigated through compliance with federal, state, and local regulatory ordinances, including employing BMPs prior to and during construction, and by securing permits that require no net loss of fish resources (see the Fish and Wildlife Technical Report). No other in-water projects that could impact fish species or habitats are occurring under current projects or RFFAs.

5.12.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

The Project, in combination with other current projects and RFFAs would contribute to increased impervious surfaces and stormwater runoff potential, which could have a cumulative impact to water quality and aquatic organisms near the fishing sites. Risks of runoff to the river would be greatly diminished by compliance with stormwater regulations and some projects, such as the replacement bridge, may benefit water quality in the Columbia River by providing stormwater containment and treatment, as well as spill prevention mechanisms, where they currently do not exist.

Based on the information presented above, cumulative impacts to fish species and habitat, as well as water quality near the fishing sites from the Project and other current projects and RFFAs are expected to be minor due to mitigation and compliance with regulations; no mitigation is warranted.

Alternative EC-2 would require permanent easements on/over a submerged portion of the White Salmon TFAS parcel for the placement of a bridge pier and overhead bridge deck. Alternative EC-3 would require a permanent easement for highway improvements along SR 14 (see the Social and Economic Technical Report). While these easements would not impact the functionality of the sites, they would constitute an encroachment of right-of-way uses on tribal land. Based on the type and location of the other current projects and RFFAs, no other easements or property acquisitions on the treaty fishing sites or processing facility are expected.

Future development near the existing bridge would include pedestrian and bicycle transportation improvements that would increase pedestrian and bicycle access for tribal fishers traveling to sites. However, increased development and densification near the White Salmon TFAS, such as the shared use path on the replacement bridge or Bridge Park on the parcel directly east of the White Salmon TFAS, would increase visibility of this fishing site that may lead to unauthorized access by non-tribal members. A decrease in privacy for ceremonial activities and residents of the site could also occur. These impacts would be mitigated by providing increased signage and fencing or other barriers to this site to reduce unauthorized access, as well as providing screening of the site on the replacement bridge near the shoreline (see the Social and Economic Technical Report).

5.13. Vegetation and Wetlands

The Project is anticipated to have minimal contributions to cumulative impacts on vegetation and wetland conditions in the API. Additional detail on vegetation and wetlands is provided in the Vegetation and Wetlands Technical Report.

5.13.1. Trends Leading to Present Conditions

The vegetation and wetland conditions in the API are varied based on the range of current and historical uses that occupy the land. As the API has developed over time, vegetation and wetlands have been reduced and altered, as well as become fragmented. On the Washington side, the shoreline area surrounding the existing bridge landing and extending east through Bingen is largely characterized by commercial and industrial development. The shoreline areas further east and west of the bridge location are primarily vacant, but the vegetation and wetland conditions in these areas have been impacted by the development of SR 14 and the BNSF Railway line. A terraced bank rises from the Columbia River to an elevation of approximately 600 feet. The area north of SR 14 and to the top of the bank is more densely vegetated.

Dams on the Columbia River constructed to generate hydroelectricity and to control water flow have reduced the presence of wetlands in the API. Construction of the Bonneville Dam and resulting Bonneville Pool behind the dam have flooded historic wetlands, and very few – if any – wetlands were created by the flooding in the API. In addition, the construction of the BNSF Railway and regional highway system, urbanization, and agricultural activities have further impacted wetlands locally and regionally. Wetlands habitats are mapped between SR 14 and the BNSF Railway line and south of the railroad, west of S. Dock Grade Road (USFWS 2019b). Additional wetland habitats were mapped south of the railroad east of the existing bridge (USFWS 2019b). The July 2019 wetland delineation for the Project determined that there are fewer wetlands than mapped.

The south side of the API is a highly developed urban area. Vegetation is sparse and consists mostly of non-native and ornamental species, with scattered native species. A public boat launch and parking area, retail and office buildings, and the interchange with I-84 and SR 35 occupy the area. The riverbank is heavily armored with riprap.

Specific vegetative species present in the API are identified in the Vegetation and Wetlands Technical Report. No special status species were identified within the vegetation and wetland API.

5.13.2. How Conditions are Likely to Change without the Project

Over time, the API is likely to continue to see further population growth and development, resulting in a reduction in vegetation and wetland areas. Other current projects and RFFAs most likely to impact vegetation and wetland conditions are developments near the shoreline area and large subdivisions in undisturbed areas. All development that adversely impact wetlands would be subject to federal, state, and local regulations, including applicable permits and associated mitigation stipulations. Other current projects and RFFAs could also include vegetation enhancements through project landscaping.

5.13.3. Direct and Indirect Impacts of the Project

The Project would directly impact vegetation and wetlands on the Washington side through construction and operation of the replacement bridge. No vegetation or wetland impacts would be anticipated on the Oregon side. For Alternative EC-2 and Alternative EC-3, a strip of the forest approximately 70 feet wide would need to be cleared of trees from the Columbia River to the BNSF Railway line to construct the land-based bridge pier and decking. Species in this area include, but are not limited to, Oregon white oak, Ponderosa pine, Douglas fir, and Oregon grape. Most of the native vegetation on the Alternative EC-1 proposed bridge landing site has been cleared. A few Oregon white oak trees and a large Douglas fir tree would be removed between SR 14 and the BNSF Railway tracks to allow for the replacement bridge abutment.

The north end of each build alternative contains regulated wetlands and potentially regulated wetland ditches between the Columbia River and SR 14. Although the impacted wetlands perform important functions and are valuable because of their relative rarity, they are not of high quality. Additionally, mitigation for these impacts would at a minimum replace or possibly improve local wetland functions.

In addition to the direct and indirect impacts, all build alternatives would require temporary vegetation removal during construction. While these areas would be replanted with native vegetation, exposed soil during construction could temporarily increase the presence of noxious and invasive weeds in disturbed areas because these plants frequently colonize these locations. A summary of vegetation and wetland impacts by all alternatives are included in Exhibit 16 below.

Exhibit 16. Vegetation and Wetland Impacts

	No Action Alternative	Preferred Alternative EC-2	Alternative EC-1	Alternative EC-3
Construction Impacts	No Impacts Anticipated	• 3.18 acres of riparian lowland impact • 0.14 acre of oak woodland impact • Potential temporary impacts to wetlands, wetland ditches, and wetland buffers	• 3.39 acres of riparian lowland impact • Potential temporary impacts to wetlands, wetland ditches, and wetland buffers	• 3.50 acres of riparian lowland impact • 0.43 acre of oak woodland impact • Potential temporary impacts to wetlands, wetland ditches, and wetland buffers
Direct Impacts	No Impacts Anticipated	• 2.18 acres of permanent vegetation impacts, including 0.14 acres of oak woodland impact • 0.10 acre permanent wetland impact • 0.16 acre of wetland buffer impact	• 4.53 acres of permanent vegetation impacts, including 0.7 acre of oak woodland impact • 0.34 acre permanent wetland impacts • 0.08 acre of wetland buffer impact	• 0.94 acre of permanent vegetation impacts • 0.10 acre permanent wetland impacts • 0.07acre of wetland buffer impacts

Impacts to special status plant species are not anticipated for any of the build alternatives.

Vegetation could be indirectly impacted by shade or shadows cast by the proposed replacement bridge, as well as a reduction in rainwater intercepted by the proposed impervious surfaces that could impact the vitality of vegetative species through changes in hydrologic regime from the built environment. The bridge deck would shade adjacent areas of vegetation for part of the day and would collect rainwater that would otherwise infiltrate or be intercepted by the vegetation. This additional shade could reduce the growth of existing plants or encourage more shade-tolerant population of plants in that area. Reduced rainfall could limit plant growth. Combined, these indirect impacts could result in a vegetative community different than what would be expected for the site without the Project.

5.13.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

Cumulative impacts to vegetation, including shoreline vegetation, could result from the Project and other current projects and RFFAs. The Project's contribution to cumulative impacts would likely be minimal due to the presence of existing development and the existing disturbed nature of the vegetation communities in the areas directly and indirectly impacted by the Project. In addition, the Project and other future development would need to comply with local, state, and federal regulations that require protection of wetlands that would minimize the cumulative impacts to these habitats. Impacts would also be minimized through landscape planting standards and the replanting of native vegetation. As such, the Project would only have a minimal contribution to cumulative impacts and no mitigation for cumulative impacts is warranted.

5.14. Visual Resources

The Project is not anticipated to contribute to cumulative impacts on visual resources within the Area of Visual Effect (AVE). Additional detail on visual resources is provided in the Visual Impact Assessment Report.

5.14.1. Trends Leading to Present Conditions

The visual resources in the API have been shaped by the natural landscapes of the river and mountains, as well as historic industrial working waterfronts on the Washington and Oregon sides of the Columbia River. The mountains on either side of the Columbia River offer expansive views of the Columbia River Gorge, but also define the limits from which the existing Hood River Bridge can be seen. The river and natural elements of the Columbia River Gorge, such as land form and vegetation, are the dominant visual features for most views in the AVE; however, the existing bridge and urban areas of White Salmon, Bingen, and Hood River can be prominent dependent on where the viewer is located in the Columbia River Gorge compared to these urban areas. The green color of the existing bridges steel components helps the bridge blend in visually with the vegetation along the northern shore of the river. The gray concrete piers, structure, and straight lines are consistent with the structures and land uses in the urban areas.

Visual resources in the CRGNSA continue to be controlled by the Management Plan (last updated in 2016) as well as NSA ordinances adopted under local municipal codes. The NSA was federally established to protect the scenic, cultural, and natural qualities of the Columbia River Gorge. The visual resources are impacted by the CRGNSA development criteria, as determined by the various CRGNSA designations. The cities of White Salmon, Bingen, and Hood River account for three of the total 13 designated Urban Areas in the NSA. Properties within the Urban Areas are exempt from CRGNSA rules and regulations, and thus urban development pressure in these areas is greater than any surrounding lands in the CRGNSA.

Views of the existing bridge and proposed replacement bridge extend to numerous vantage points within 5 miles of the bridge, primarily east and west along the Columbia River. Viewers include local residents and employees, motorists, visitors, a number of different recreationalists and river users.

Visual resources, such as the Columbia River, Hood River, White Salmon River, and the surrounding bluffs, are the physical features that make up the visible landscape, including land, water, vegetation and man-made elements. They tend to be more conceptual, esoteric, and open to wider interpretation than other resources. Due to their dramatic composition or relatively undisturbed state, they can have outstanding or remarkable value to the general public.

5.14.2. How Conditions are Likely to Change without the Project

Views of the existing bridge itself would be unlikely to change without the Project, as planned short-term improvements to the bridge are not expected to change existing views. If the bridge were left in place, the opportunity of motorists for views from the bridge would be eliminated when the bridge closes at the end of its operational life. If the bridge was removed, a visual change would occur for people in the area as they would then have an uninterrupted view of the Columbia River. There would no longer be light or glare from vehicles crossing the bridge and the bridge itself would not be illuminated and visible at night.

Given the CRGNSA regulations in place, it is anticipated that the visual character of the API would remain similar to its current state. Development would continue within the designated Urban Areas at a similar pace, and land use and development in the surrounding areas would continue to be constrained in both intensity and appearance by the CRGNSA Management Plan. Other current projects and RFFAs would continue to urbanize the API within the Urban Areas but would be unlikely to result in dramatic changes to the overall visual character of the AVE.

A review of other current projects and RFFAs found that planned and proposed improvements would create new development that would increase the intensity of uses and impact the visual quality in the API over time. Despite this potential, federal, state and local planning regulations are expected to determine future land use changes within the API and to maintain visual quality.

5.14.3. Direct and Indirect Impacts of the Project

The most prominent change in visual resources anticipated to result from the Project would be the replacement bridge itself, including changes to the existing landings in the cities of Hood River and White Salmon and connections to existing transportation systems. The landings would be located in urban areas where views of construction activity and development are typical. All build alternatives would create new views of the surrounding landscape for pedestrians and bicyclists on the bridge. Moreover, replacement of the existing bridge with a bridge of relatively comparable scale, form and harmonious materials would not alter the memorability or vividness of the surrounding landscape or negatively alter views of the landscape. The replacement bridge would have to adhere to the visual standards of the CRGNSA Management Plan.

5.14.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

Because the replacement bridge would be of a comparable scale and form of the existing bridge, and materials and architectural detail would be designed so that the bridge is harmonious with the landscape, the Project would not adversely alter landscape views toward the bridge. The Project would not be anticipated to contribute to cumulative impacts on visual quality within the AVE. No mitigation for cumulative impacts is warranted.

5.15. Waterways and Water Quality

The Project is not anticipated to contribute to cumulative impacts to waterways and water quality conditions in the API. Additional detail on waterways and water quality conditions is provided in the Waterway and Water Quality Technical Report.

5.15.1. Trends Leading to Present Conditions

The waterways and water quality conditions in the API are a result of increased development on and adjacent to the portion of the Columbia River in the API. The existing Hood River Bridge crosses the main stem of the Columbia River at river mile 169.8. The Oregon side of the river has been heavily modified through marina construction, armoring of the river bank, and construction of beaches and jetties, and retains little if any natural riparian habitat.

Since the publishing of the Draft EIS, Ecology, and Oregon DEQ, through their partnership with EPA Region 10, have made efforts to improve water quality for the segment of the Columbia River within the API. Although water quality in and around the API has generally improved, water quality concerns in specific segments of the surface water resources in the API remain and are being addressed. Specific water quality concerns are identified in the Waterways and Water Quality Technical Report.

5.15.2. How Conditions are Likely to Change without the Project

The existing bridge has a steel grated deck that is open to the Columbia River below, which allows oil, heavy metals, and dirt from vehicles crossing the bridge to fall through the grating and directly into the river. Hazardous materials from an accidental spill on the bridge can enter the river unconstrained. Without the proposed Project, untreated stormwater and snowmelt from the existing bridge would continue to discharge directly to the Columbia River through the deck. Additionally, other current projects and RFFAs have the potential to impact water quality through stormwater runoff and increases in impervious surfaces. All existing and future development would be subject to water quality and stormwater regulations to offset potential impacts.

5.15.3. Direct and Indirect Impacts of the Project

The greatest impact to water quality from the build alternatives would be from the installation of the bridge piles and footings. This impact would be temporary and would cease once the piles are in place. Removal of the piers for the existing bridge would disturb the river bed sediments and create localized turbidity plumes. Additional water quality concerns during removal of the existing bridge include possible materials entering the water during dismantling of the decking.

Direct impacts from the build alternatives include an increase in impervious surface from the bridge deck as well as the approach areas and roadway improvements on both the Washington and Oregon sides of the river. While the bridge deck increases impervious surface area, it is also a benefit as it allows stormwater to be collected and treated in detention ponds and a bioswale, removing the majority of particulates prior to discharge into the river and improving water quality.

5.15.4. Project Contribution to Cumulative Impacts and Recommended Mitigation

All current projects and RFFAs near the Columbia River, as well as the Project, could increase turbidity and present spill hazards during construction. Each project would contribute minor impacts to the Columbia River, but taken together they would cumulatively contribute to greater potential impacts to the Columbia River than any of them by themselves. The Project and future development would also increase impervious surfaces in the area, which would increase the quantity of stormwater runoff.

The build alternatives, and other projects, and RFFAs would be subject to water quality regulations. Compliance with applicable regulations and permits obtained for each project would reduce the risk of water quality degradation during construction. Moreover, the Project would benefit water quality in the long term by containing and treating stormwater and potential spills prior to reaching the Columbia River. As such, the Project would not contribute to adverse cumulative impacts to waterways and water quality; no mitigation for cumulative impacts is warranted.

5.16. Summary of Cumulative Impacts by Resource

Exhibit 17 provides a summary of cumulative impacts by resource area and any proposed mitigations.

Exhibit 17. Project Contribution to Cumulative Impacts by Resource and Recommended Mitigation

Resource	Project Contribution to Cumulative Impacts	Recommended Mitigation for Cumulative Impacts
Air Quality and GHG	The Project would not contribute to cumulative impacts to air quality. The project would result in minor contributions to cumulative impacts to GHG emissions from bridge material production, construction, and yearly routine maintenance.	No mitigation recommended.
Historic Resources, Archaeological Resources, and Traditional Cultural Properties	The Project would remove the existing Hood River Bridge, therefore resulting in an adverse contribution to cumulative impacts on historic resources. The Project's contribution to cumulative impacts on archaeological resources and traditional cultural properties is pending based on additional site investigations and consultation with Oregon SHPO, Washington State DAHP, and the tribes.	No mitigation for cumulative impacts to historic resources. Mitigation for cumulative impacts to archeological resources and traditional cultural properties is pending based on additional site investigations and consultation with Oregon SHPO, Washington State DAHP, and the tribes. A mitigation plan to resolve any adverse impacts would be reported in the combined Final EIS/ROD.
Energy	The Project would result in a minimal contribution to cumulative impacts on energy consumption due to energy needed to construct and maintain the replacement bridge.	No mitigation for cumulative impacts is recommended.
Fish and Wildlife	The Project would result in a minimal contribution to cumulative impacts to fish and wildlife resources due to removal of benthic habitat and an increase in overwater shading, but an improvement in stormwater treatment.	No mitigation for cumulative impacts is recommended.
Geology and Soils	The Project would result in a minimal contribution to cumulative impacts to soils and geologic resources due to ground disturbance and installation of bridge piers.	No mitigation for cumulative impacts is recommended.
Hazardous Materials	The Project would provide a beneficial contribution to a cumulative hazardous material conditions by providing a solid surface bridge deck which prevents spills to the river and removal of existing contamination if encountered.	No mitigation is recommended.

Resource	Project Contribution to Cumulative Impacts	Recommended Mitigation for Cumulative Impacts
Land Use	The change in land use resulting from the Project is negligible and no cumulative impacts are anticipated. The Project is anticipated to have a beneficial contribution to cumulative land use conditions in the API from the accommodation of additional travel modes between states, increased bicycle and pedestrian access, and improvement of the movement of goods and services throughout the region.	No mitigation for cumulative impacts is recommended.
Noise	The Project would not contribute to cumulative noise conditions.	No mitigation is recommended.
Socio, Economic, and Environmental Justice	The Project is anticipated to provide a beneficial contribution to cumulative social and environmental justice conditions in the API through improved pedestrian facilities and community connectivity. The Project would have minimal contributions to cumulative impacts on economic conditions from a possible shortage of available housing resources during construction due to imported construction labor.	To reduce the cumulative impact of imported construction workers on available housing resources, the Port should consider requiring the contractor to submit a worker staffing and accommodation plan as either part of their bid proposal or as one of their early submittals after award of contract. No other mitigation for cumulative impacts to social, economic, or environmental justice is recommended.
Park and Recreation Facilities	The Project would provide a beneficial contribution to cumulative to park and recreation conditions due to improved bicycle and pedestrian connectivity provided by the new shared use path.	No mitigation is recommended.
Transportation	The Project would provide a beneficial contribution to cumulative transportation conditions through improved mobility and reliability.	No mitigation is recommended.
Treaty Fishing Rights	The Project would result in a minimal contribution to cumulative impacts to treaty fishing sites and the processing facility. The Project and other current projects and RFFAs could increase visibility of the White Salmon TFAS, leading to unauthorized access by non-tribal members, as well as decreased privacy for ceremonial activities and residents of the site.	Providing increased signage and fencing or other barriers to the White Salmon TFAS to reduce unauthorized access. Providing screening of the White Salmon TFAS on the replacement bridge near the Washington shoreline.
Vegetation and Wetlands	The Project would have minimal contributions to cumulative impacts on vegetation and wetland conditions due to vegetation removal and minor wetland fill.	No mitigation for cumulative impacts is recommended.
Visual Resources	The Project would not contribute to cumulative impacts on visual resources.	No mitigation is recommended.
Waterways and Water Quality	The Project would not contribute to cumulative impacts to waterway and water quality conditions.	No mitigation is recommended.

6. PREPARERS

Individuals involved in preparing this technical report are identified in Exhibit 18.

Exhibit 18. List of Preparers

Name	Role	Education	Years of Experience
Nicole McDermott	Cumulative Technical Lead	MLA, Landscape Architecture BA, Architecture	12
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Attachment A

Current and Reasonably Foreseeable Projects

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Current and Reasonably Foreseeable Future Actions

Exhibit A-1 identifies projects that comprise other current and reasonably foreseeable future actions (RFFA) along with the proposed bridge replacement within the cumulative impacts API that could impact environmental and community resources. This list of other current projects and RFFAs are the projects evaluated to characterize conditions in the foreseeable future under each resource in the Cumulative Impacts Technical Report. RFFAs are based on the Project's design year (2045) horizon. The projects listed in Exhibit A-1 are shown on Exhibit 14 in Section 4 in the report.

A variety of future actions are anticipated occur in proximity to the bridge replacement that signify continued growth in the region. Current projects and RFFAs include multiple residential developments and recreational uses in White Salmon, industrial development and expansion in Bingen, and new and expanded port development and operations in Hood River. There are also several planned improvements to roadways, utilities and facilities to support foreseeable land uses.

Exhibit A-1: Table of Current and Reasonably Foreseeable Projects

Jurisdiction	Project	Estimated Completion Date	Source
City of White Salmon	Dry Creek planned unit development – 69 dwelling units	2020	City of White Salmon, building permit data (2019)
	SixS subdivision/planned unit development – 40 dwelling units	2020	City of White Salmon, building permit data (2019)
	IBC mixed-use buildings – three residential and commercial mixed-use buildings, units to be determined	2020	City of White Salmon, building permit data (2019)
	Highway 141 paving and water line improvements – from NW Garfield Avenue in White Salmon to SR 14 in Bingen	2020	WSDOT, Project Search, and City of White Salmon, personal communication between Pat Munyan, Jan Brending, and Erika Castro-Guzman, City of White Salmon, and Scott Keillor, WSP (2019)
	Bridge park – located along the shoreline underneath the existing bridge. Land currently owned by Klickitat County and will be transferred to the City of White Salmon	2025	City of White Salmon, Parks, Open Space, and Recreation addendum to the Comprehensive Plan (2016)
	Bicycle and pedestrian corridor connecting central White Salmon with the Columbia River, via Highway 141 and N. Dock Grade Road	2030	City of White Salmon, Personal communication between Pat Munyan, Jan Brending, and Erika Castro-Guzman, City of White Salmon, and Scott Keillor, WSP (2019)

Jurisdiction	Project	Estimated Completion Date	Source
City of Bingen/Klickitat County	Underwood Fruit Company building replacement due to fire damage	2020	Good Fruit Grower, "Underwood Fruit Plans to Rebuild After Fire" (2017)
	The Society Hotel – New hotel with 6 rooms and 20 cabins	2019	Lacamas Magazine, "The Society Hotel Bingen Opens Its Doors to Columbia Gorge Travelers" (2019)
	Full build-out of the Bingen Point Business Park expected within the next 25 years. 30 acres of vacant land remains. Projected 10-15,000 square feet of industrial development per acre at full build-out	2045	City of Bingen, personal communication between Betty Barnes, mayor, and Scott Keillor, WSP (2019)
	Bingen Wastewater Treatment Plant – capacity upgrades and future expansion. Facility currently serves Bingen and White Salmon	2020	Department of Ecology, Wastewater Regionalization – Final Report to the Legislature (2009) and personal communication between Betty Barnes, mayor, and Scott Keillor, WSP (2019)
	Dickey Farms site for sale – potential hotel and subdivision	2025	City of Bingen, personal communication between Betty Barnes, mayor, and Scott Keillor, WSP (2019)
	Planned undercrossing of BNSF line via new roundabout on SR 14	2022	WSDOT, SR 14 – East of Bingen – Port of Klickitat Access Improvements (2019)
City of Hood River/Port of Hood River/Hood River County	Seven-lot employment subdivision proposed at the Confluence Business Park (Lot 1)	2020	Port of Hood River, Lot 1 subdivision plan from Fall newsletter (2017)
	Port of Hood River Barman site commercial development	2020	Port of Hood River, Strategic Business Plan 2014-2018 (2013)
	Port of Hood River Marina capital improvements and Marina Master Plan update	2025	Port of Hood River, personal communication between Kevin Greenwood, Port of Hood River, and Scott Keillor, WSP (2019)

Jurisdiction	Project	Estimated Completion Date	Source
City of Hood River/Port of Hood River/Hood River County (Cont.)	Marina Beach restoration and dredging	2021	Port of Hood River, personal communication between Kevin Greenwood, Port of Hood River, and Scott Keillor, WSP (2019)
	Multi-family dwelling building – 30 dwelling units	2020	City of Hood River, building permit data (2019)
	Mixed-use commercial/residential building – 40 dwelling units	2020	City of Hood River, building permit data (2019)
	Sieverkropp (Phase 4) Subdivision – 50 lots	2020	City of Hood River, building permit data (2019)
	Morrison Park – 5-acre property, development includes half of the area devoted to parkland and half devoted to residential (65 dwelling units)	2023	City of Hood River, Ordinance No. 2048 (2019)
	Best Western Hood River Inn – Gorge Room expansion	2020	Best Western Hood River Inn, personal communication between Chuck Hinman, Best Western Hood River Inn, and Scott Keillor, WSP (2019)
	New hotel – projected 80 units. Marketplace building will be demolished and the site will be redeveloped	2022	Best Western Hood River Inn, personal communication between Chuck Hinman, Best Western Hood River Inn, and Scott Keillor, WSP (2019)
	I-84 Exits 63 and 64 interchange improvements	2025	DKS Associates et al, I-84 Exit 63 and 63 Interchange Area Management Plan (2011)
	Hood River Wastewater Treatment Plant upgrades	2022	City of Hood River, Water/Sanitary Sewer Capital Improvement Projects Continue, City Connect (2018)
	Future pedestrian and bicycle trail from Hood River to Parkdale, along the Hood River	2030	Hood River County, personal communication between Eric Walker, Hood River County, and Scott Keillor, WSP (2019)