Washington State Department of Transportation

I-5 Marvin Road to Mounts Road

Planning and Environmental Linkages Study

Draft Report | June 2023

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A special thanks to:

The Nisqually Indian Tribe

This section of I-5 passes through the Nisqually River valley, an environmentally sensitive and important area for Endangered Species Act-listed steelhead and chinook salmon, and the traditional home of the Nisqually Indian Tribe. The Nisqually Indian Tribe is signatory to the Medicine Creek Treaty of December 26, 1854. The treaty established the Nisqually Reservation boundaries and memorialized other rights, including fishing in usual and accustomed grounds. The Treaty Rights reserved by the Nisqually Indian Tribe in the Medicine Creek Treaty are acknowledged as part of the background conditions for the project. The current configuration of the I-5 structure has impinged on natural ecosystems and therefore affected tribal treaty resources. There is a need for the project to restore natural functions of the Nisqually River Delta to improve the availability of and access to treaty resources for tribes. Given the significance of this area and its location in the tribe's ancestral areas, WSDOT executed a Memorandum of Understanding (MOU) with the Nisqually Indian Tribe regarding their desire to work cooperatively toward the planning, design, permitting, and construction of the project.

ACRONYMS AND ABBREVIATIONS

ACG - Agency Coordination Group

CBO - Community-Based Organization

CFR - Code of Federal Regulations

DOT - Department of Transportation

EA - Environmental Assessment

EAG - Executive Advisory Group

EIS - Environmental Impact Statement

EJ - Environmental Justice

EPA - Environmental Protection Agency

Ecology - Washington State Department of Ecology

FHWA - Federal Highway Administration

FTA - Federal Transit Administration

GHG - Greenhouse Gas

GP - General Purpose

HCT - High Capacity Transit

HOV - High Occupancy Vehicle

JBLM - Joint Base Lewis McChord

LEP - Limited English Proficiency

LTS - Level of Traffic Stress

LWCF - Land and Water Conservation Fund

MIC – Manufacturing and Industrial Center

MOVES - Motor Vehicle Emission Simulator

MSAT - Mobile Source Air Toxic

NAAQS - National Ambient Air Quality Standards

NEPA - National Environmental Policy Act

NRCS - National Resources Conservation Service

NRHP - National Register of Historic Places

PEL - Planning and Environmental Linkages

RCO - Washington Recreation and Conservation Office

ROW - Right of Way

SR - State Route

SOV - Single Occupancy Vehicle

STRAHNET - Strategic Highway Network

SUP – Shared-Use Path

TAG - Technical Advisory Group

TDM - Transportation Demand Management

TRPC - Thurston Regional Planning Council

USC - United States Code

WSDOT - Washington State Department of Transportation

EXECUTIVE SUMMARY

ES - 1. Introduction and Purpose and Need

This report presents the results of a Planning and Environmental Linkages (PEL) Study conducted by the Washington State Department of Transportation (WSDOT), in cooperation with the Federal Highway Administration (FHWA). This PEL Study evaluated and identified a long-term solution for northbound and southbound Interstate 5 (I-5) between the Marvin Road interchange (Exit 111) to the Mounts Road interchange (Exit 116). The southern terminus of the project area is at Milepost 110.55 and the northern terminus is at Milepost 117.25.

Previous studies that evaluated this portion of I-5 include the *Interstate 5: Tumwater to Mounts Road Mid and Long-Range Planning Study* (WSDOT and TRPC 2020), conducted from 2018-2020, and the *Interstate 5 Tumwater to Mounts Road Planning and Environmental Linkages Study* (WSDOT and TRPC 2022b), conducted from 2020-2022. The 2022 corridor PEL Study that evaluated I-5 between the Tumwater and Mounts Road interchanges identified strategies for regional congestion management and logical sections of the corridor to study further. The previous corridor PEL recommended two improvements for the Marvin Road (Exit 111) to Mounts Road (Exit 116) section–adding a lane to the northbound I-5 on-ramp at the Nisqually Cutoff Road/Martin Way E interchange and adding one lane in each direction to I-5 from Marvin Road to Mounts Road (WSDOT 2022b).

This PEL Study was commenced to study and identify a long-term solution for I-5 between Marvin Road and Mounts Road interchanges. The PEL Study followed FHWA guidance and the WSDOT draft PEL handbook regarding the integration of transportation planning and the environmental review process established by the National Environmental Policy Act (NEPA). FHWA promotes the use of PEL studies to integrate environmental issues and public involvement with project planning and shorten the time required to take projects from planning to implementation. Following this PEL Study, the analysis of I-5 within the study area will move directly into the NEPA environmental documentation phase to implement the I-5 and Nisqually River Delta area environmental habitat restoration improvements.

The PEL Study developed a Purpose and Need statement. The purpose defines the transportation problem to be solved. The need provides evidence that supports the defined transportation problem. The need statements are described in Section 1.7.2 of this PEL Study. The purpose of the project is to:

- ***Enhance mobility and connectivity*** on I-5 for passenger vehicles, freight, transit, and active modes and provide support for ***increased person and freight throughput.***

- Improve local and mainline I-5 ***system resiliency***.
- Enable ***environmental restoration and ecosystem resiliency*** at the I-5 crossing of the Nisqually River Delta area.
- Support ***economic vitality*** through reliable and efficient freight movement and access to major employers.

ES - 2. Agency and Public Coordination

WSDOT collaborated closely with federal, state, and local partners. Three groups were formed to provide guidance and input: An Agency Coordination Group (ACG), a Technical Advisory Group (TAG), and an Executive Advisory Group (EAG). WSDOT also consulted with tribal governments, including the Cowlitz Indian Tribe, Nisqually Indian Tribe, Squaxin Island Tribe of Indians, and the Confederated Tribes and Bands of the Yakama Nation. Table ES-1 lists the various advisory group and PEL study participants.

Table ES-1. PEL Study Participants

Agency Coordination Group	Technical Advisory Group	Executive Advisory Group	CBOs, Special Interest Groups, Public
Billy Frank Jr. Nisqually National Wildlife Refuge	Billy Frank Jr. Nisqually National Wildlife Refuge	City of DuPont	**Community and Social Service Groups**
Department of Archaeology and Historic Preservation	City of DuPont	City of Lacey	Housing Authority of Thurston County
Department of Natural Resources	City of Lacey	City of Lakewood	Multicultural Child & Family Hope Center
Environmental Protection Agency	City of Lakewood	City of Olympia	Pierce County Building and Construction Trades Council
Federal Emergency Management Agency	City of Olympia	City of Tumwater	Sound Outreach Pierce County
Federal Highway Administration	City of Tumwater	City of Yelm	Thurston County Chamber of Commerce
Federal Transit Administration	City of Yelm	Federal Highway Administration	United Way Thurston County
Joint Base Lewis McChord	Federal Highway Administration	Intercity Transit	
National Marine Fisheries Service	Foothills Rails to Trails Coalition	Joint Base Lewis-McChord	**Interested Parties**
National Oceanic and Atmospheric Administration	ForeverGreen Trails	Nisqually Indian Tribe	Alliance for a Healthy South Sound Executive Committee
Natural Resources Conservation Service	Friends of Nisqually NWRC	Pierce County	South Puget Sound Salmon Enhancement Group
Nisqually Indian Tribe	Intercity Transit	Pierce Transit	Thurston County Noxious Weeds
Squaxin Island Tribe of Indians	Joint Base Lewis-McCord	Port of Olympia	
	Nisqually Indian Tribe	Port of Tacoma	
	Nisqually Land Trust	Thurston County	
	Nisqually River Council	Thurston Regional Planning Council	
	Pierce County	Town of Steilacoom	
	Pierce Transit		
	Port of Olympia		
	Port of Tacoma		
	Sound Transit		

Agency Coordination Group	Technical Advisory Group	Executive Advisory Group	CBOs, Special Interest Groups, Public
US Army Corps of Engineers US Coast Guard US Fish and Wildlife Service US Geological Survey Washington Department of Fish and Wildlife Washing Department of Ecology	South Sound Military & Communities Partnership Squaxin Island Tribe of Indians Thurston County Thurston Regional Planning Council Town of Steilacoom Washington Environmental Council Washington State Patrol		Thurston Economic Development Council Washington Trucking Association

A total of five coordination meetings were held with each of the advisory groups during this PEL process to provide progress updates and collect feedback. Meeting materials and recordings are available on the study webpage (*I-5 Marvin Rd to Mounts Rd PEL Study Webpage*).

WSDOT also implemented an extensive outreach program to comply with the PEL authority requirement to provide notice and opportunities for input to community members. Community Based Organizations (CBOs) representing minority communities and communities with low-incomes or who provide mobility services to communities were interviewed and three online open houses were also held to collect input on this PEL study.

ES - 3. Alternatives Evaluation Summary

This PEL Study evaluated a set of alternatives in a two-stage evaluation process: Initial Evaluation and Detailed Evaluation. A set of evaluation criteria were developed based on the Purpose and Need to assess proposed alternatives. Unreasonable alternatives were eliminated in the Initial Evaluation, and the better-performing alternatives were assessed more thoroughly in the Detailed Evaluation. This process was informed by federal, state, and local agencies; tribes; and other advisory-level partners through their regular coordination meetings including the ACG, TAG, and EAG. Each group reviewed and gave feedback on the evaluation process, criteria, and alternatives considered. The community also had the opportunity to provide input on the alternatives identification and evaluation process through a project website.

The range of reasonable alternatives evaluated in the Initial Evaluation were identified based on information in the *Interstate 5: Tumwater to Mounts Road Mid- and Long-Range Strategies Report* (April 2020) and the *Interstate 5 Tumwater to Mounts Road PEL Study* (March 2022). This range of alternatives include:

- Alternative 1 – Operations Improvements - Operations, Land Use, Transportation Demand Management, Transit, and Part Time Shoulder Use strategies evaluated separately in the Corridor PEL were combined to form Alternative 1 (Bridge Options A through C). Three general purpose (GP) lanes in each direction would be provided on I-5.
- Alternative 2 – Widen I-5 for high occupancy vehicles (HOV) lanes (Bridge Options A through D) - Adds one HOV lane in each direction between Marvin Road and Mounts Road; one HOV lane and three GP lanes in each direction would be provided on I-5. The HOV lane is anticipated to operate 24 hours/day and 7 days/week with a 2+ occupancy designation requiring 2 or more people in each vehicle, similar to the I-5 HOV lane operations north of Mounts Road. The HOV lane provides WSDOT with operational flexibility to change the occupancy designation or allow single occupant vehicle use during weekday evenings or weekends.
- Alternative 3 – Widen I-5 for GP lanes (Bridge Options A through D) - Adds one GP lane in each direction between Marvin Road and Mounts Road; four GP lanes in each direction would be provided on I-5.
- Alternative 4 – Convert I-5 lanes from GP to HOV Lanes - Converts an existing GP lane to HOV use in each direction between Marvin Road and Mounts Road (Bridge Options A through C); one HOV lane and two GP lanes in each direction would be provided on I-5.

A shared-use path (SUP) is common to all four alternatives and would provide a 4.7-mile continuous facility for pedestrians, bicyclists, and other users from the Marvin Road Interchange (Exit 111) to the Mounts Road Interchange (Exit 116) vicinities. The SUP would have a minimum width of 14 feet, north of the southbound I-5 travel lanes and separated by a concrete barrier. The location on the north side of I-5 provides views of the Billy Frank Jr. Nisqually National Wildlife Refuge, the McAllister Creek and Nisqually River deltas, Puget Sound, and the Olympic Mountains.

Bridge Options A through D for Alternatives 2 and 3 and Bridge Options A through C for Alternatives 1 and 4 explored different bridge length options through the Nisqually River delta area including the Nisqually River crossing. This provided a range of options to consider for I-5 as well as providing ecosystem and habitat mitigation in the Nisqually River delta area.

Based on the results of the Initial Evaluation, the following alternatives and bridge options were determined to be unreasonable and not recommended for advancement into the Detailed Evaluation:

- Alternative 1 – Operations Improvements: this alternative does not meet the project Purpose and Need in the Enhance Mobility and Connectivity and Economic Vitality categories.
- Alternative 4 – Lane Conversion from GP to HOV Lane: this alternative does not meet the project Purpose and Need in the Enhance Mobility and Connectivity and Economic Vitality categories.
- Bridge Option D – High-level Long Span Bridge: this bridge option does not meet the project Purpose and Need in the Enhance Mobility and Connectivity and Economic Vitality categories, and performs low in the two WSDOT policy categories, Equitable Outcomes and Relative Cost.

The highest performing alternatives from the Initial Evaluation phase were advanced into the Detailed Evaluation. These alternatives include:

- Alternative 2 – Widen I-5 for HOV lanes (Bridge Options A through C)
- Alternative 3 – Widen I-5 for GP lanes (Bridge Options A through C)

The Detailed Evaluation was consistent with the Initial Evaluation, except that it includes one additional measure of "Consistency with WSDOT Policies," and evaluates each alternative on a five-point scale, compared to a three-point scale used in the Initial Evaluation. This provided additional differentiation on each alternative's performance.

Alternative 2 – Widen I-5 for HOV lanes performed the highest in the Detailed Evaluation because it adds capacity for transit vehicles. This alternative was also more consistent with WSDOT policies and improved multimodal access to opportunities. All bridge options (Bridge Option A, B, and C shown on Figure ES-1) performed similarly and were recommended for further evaluation in the NEPA environmental process.

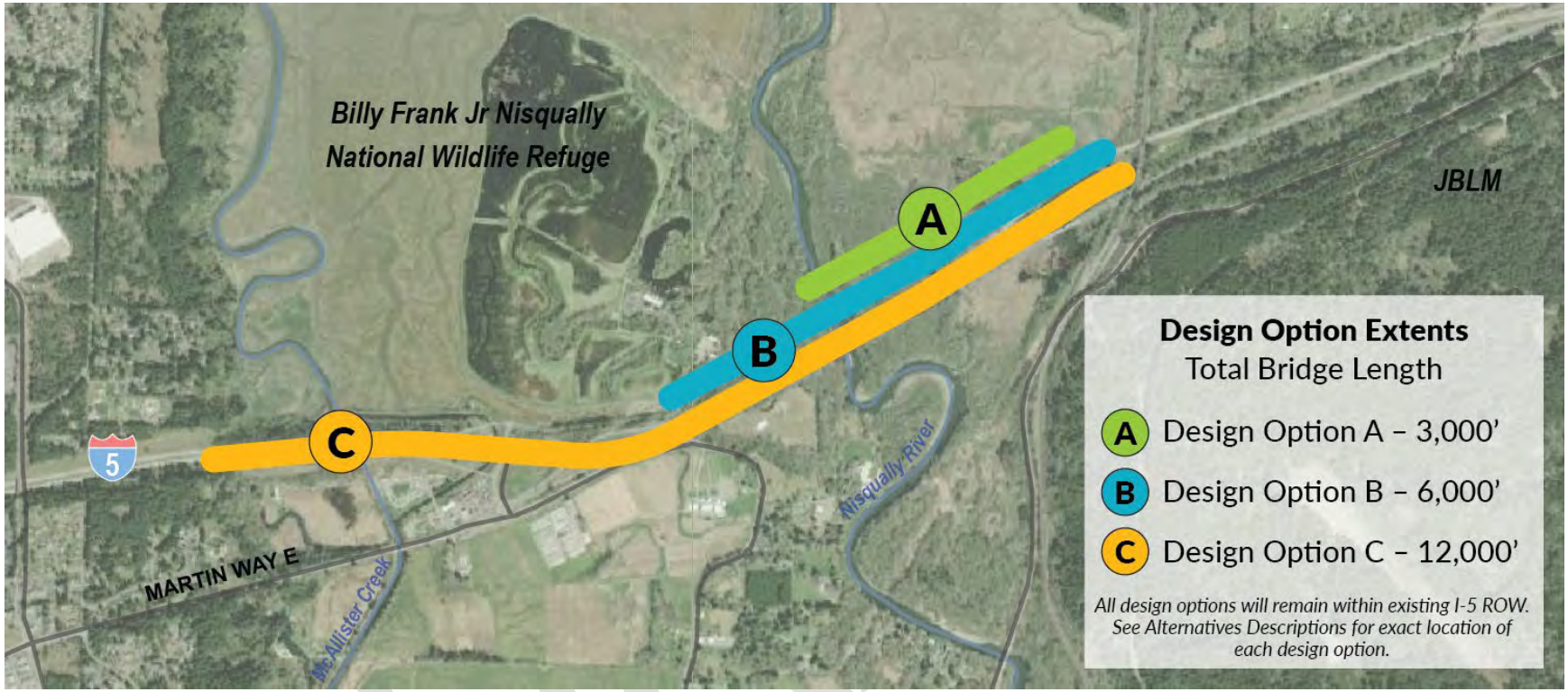


Figure ES-1. Recommended Bridge Options for Advancement into NEPA

ES - 4. Environmental Resource Considerations

Environmental resource considerations were evaluated as part of this PEL study and are summarized in Table ES-2.

Table ES-2. Potential Environmental Effects

Environmental Discipline	Study Area Boundaries	Potential Effects	Benefits
Stormwater and Water Quality	0.25 mile from ROW	Construction, in particular the removal of fill, could cause periods of turbidity. Increased pollution-generating impervious surface from road widening could contribute stormwater runoff to waterbodies that are currently on the 303(d) list.	Stormwater runoff from all roadway surfaces within the study area (I-5 mainline and interchanges) would be treated before discharge, with the potential for significant improvements to water quality.
Wetlands and Other Waters	500 feet from ROW	Temporary and permanent effects to wetlands and streams would occur. In-water work will be required. Potential upstream migration of saltwater could result from removal of I-5 embankment fill.	Removal of I-5 embankment fill would allow the creation of 20 or more acres of new wetlands and improve the hydrology, functions, and habitat value of existing wetlands. Fill removal would allow reconnection of historic distributary channels and restore more natural flow patterns.
Fish, Wildlife, and Vegetation	500 feet from ROW (ESA action area will extend beyond this limit)	In-water work could impact ESA-listed species and habitats. Temporary and permanent effects to wetlands and streams would occur, and some habitat is likely to be removed.	Creation of new wetlands and restoration of natural drainage patterns would restore ecosystem functions and improve habitat for fish and wildlife species.
Floodplains & Sea Level Rise	Approximately 500 feet from ROW	Project could result in changes to flood levels in the immediate vicinity. The extent of frequently flooded areas could increase due to the removal of fill, both in the near term and in the future as sea levels rise and peak stream flows increase.	I-5 would be more resilient to climate change and to the effects of channel migration.
Geology and Soils	Nisqually River Delta region	There is the potential for landslides and seismic hazards in the study area.	The new roadway and bridge structures would be designed to stabilize potential landslide areas and to withstand seismic shaking and liquefaction.
Visual Quality	0.5 mile from ROW	Changes in elevation and position of I-5 could have visual effects on surrounding viewers, especially those in the natural areas and residences in close proximity to the roadway.	The new bridge structures could give travelers on I-5 better views of the Nisqually Delta area.
Air Quality, Greenhouse	0.5 mile from ROW	Increases in traffic over time could contribute to pollution and GHG emissions causing effect on sensitive and nationally significant natural areas.	Decreases in traffic congestion could have a positive effect on localized air quality from reduced travel times.

Environmental Discipline	Study Area Boundaries	Potential Effects	Benefits
Gases, and Energy			
Cultural Resources	600 feet from ROW	Project could result in temporary effects to the Medicine Creek Treaty National Memorial Site. The project area has a high likelihood of encountering previously unknown archaeological sites.	Reconnection of historic stream channels and associated habitat would help restore a traditional cultural landscape and would also benefit tribal treaty fishing. Archaeological testing can be destructive; however, identification of resources can inform effective management.
Noise	Varies with landform	Widening I-5 could move traffic noise sources closer to sensitive receivers in the corridor. Future predicted noise levels exceed the WSDOT noise abatement criteria (66 dBA) potentially requiring noise abatement measures.	None identified at this time.
Hazardous Materials	0.5 mile from ROW	Moderate risk of encountering hazardous materials during construction due to five active cleanup sites and 37 sites of potential concern located within 0.5-mile.	None identified at this time.
Land Use, Farmlands, and Section 6(f)	0.5 mile from ROW	Likely effects to wildlife refuge from construction and/or ROW acquisition. Potential effects to prime, unique and farmlands of statewide importance by removal of fill and changes to the channel migration zone.	Mitigation for temporary construction impacts could include improvements to affected properties, such as invasive species removal and stormwater system enhancements.
Section 4(f)	0.5 mile from ROW	Likely effects to wildlife refuge and National Memorial site from construction and/or ROW acquisition. Potential effects to historic resources from construction and changes to I-5.	Improvements to the wildlife refuge's ecosystems through restoration of the Nisqually River system. See also Wetlands and Other Waters.
Socioeconomic Impacts and Environmental Justice	1.0 mile from ROW	Project construction and changes to I-5 could create a hardship for businesses in the immediate vicinity of the project corridor, some of which employ, serve, and/or are owned by EJ populations.	Congestion relief and reduced travel times would make transit options more reliable. Improvements to water quality and the fish habitat will benefit the tribes.

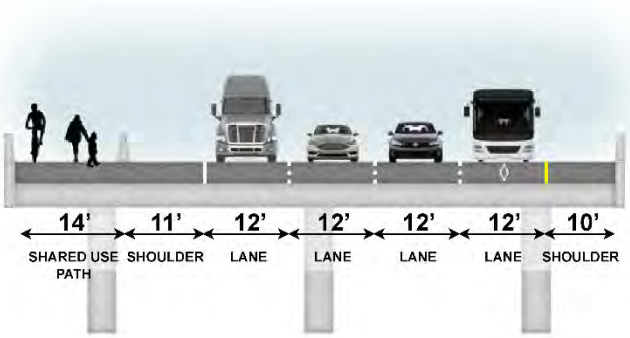
1 *Source: I-5 Marvin to Mounts Road PEL Study Existing Conditions Memoranda.*

ES - 5. Final Study Recommendations

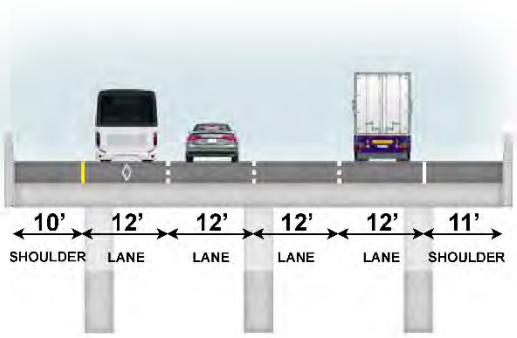
Alternative 2 – Widen I-5 for HOV Lanes (shown on Figure ES-2) was identified as the preferred alternative based on the Detailed Evaluation and is recommended for advancement into NEPA. This alternative adds one HOV lane in each direction from Marvin Road to Mounts Road and performed higher overall in the Detailed Evaluation compared to ***Alternative 3 – Widen I-5 for GP Lanes***.

- In the ***Enhance Mobility and Connectivity*** category, Alternative 2 improves travel times and reduces congestion for general purpose vehicles/trucks and HOV/transit vehicles.
- In the ***Economic Vitality*** category - Alternative 2 performs high in the Access to Opportunity criteria.

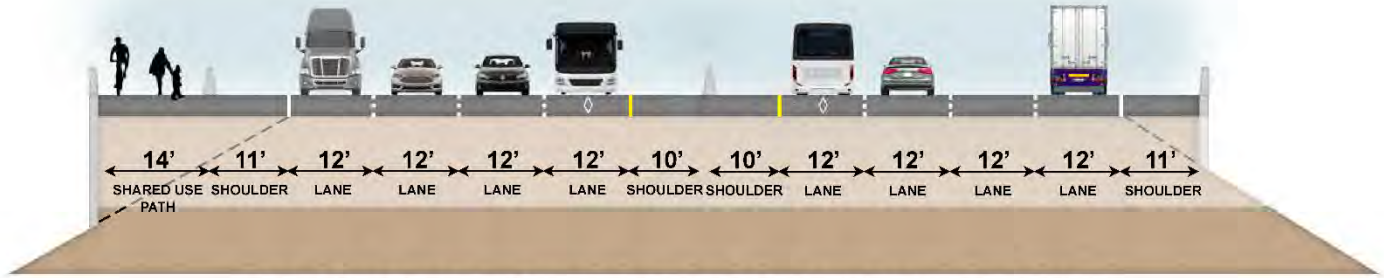
Alternative 2 includes the shared-use path on the north side of I-5 depicted in Figure ES-**3**.



SB I-5 TYPICAL SECTION ON BRIDGES



NB I-5 TYPICAL SECTION ON BRIDGES



SB AND NB I-5 TYPICAL SECTION ON EXISTING GROUND

Figure ES-2. Alternative 2 Cross Section Recommended for Advancement into NEPA

Figure ES-3. Shared-Use Path Conceptual Design

ES - 6. Next Steps

Alternative 2 – Widening for HOV Lanes will be advanced forward into NEPA. The NEPA process will include additional design, analysis, and community outreach to fully evaluate the potential environmental effects of implementation. The preferred alternative is unlikely to have significant impacts that could not be mitigated. A NEPA Environmental Assessment (EA) is recommended to fully analyze the effects of the project, identify mitigation, engage the public, and inform decision makers. Implementation of the preferred alternative would require permits from federal, state, and local agencies.

WSDOT will continue to expand the community and agency outreach completed as part of this PEL process as the project moves into NEPA. WSDOT will continue to engage the Agency, Technical, and Executive Advisory Groups and tribes by holding regular meetings throughout the NEPA process to gain their input on the analysis and key decision points. The conceptual design from this PEL for Alternative 2 will be advanced into the NEPA phase to show the construction and permanent footprint of the preferred alternative.

1 INTRODUCTION AND PURPOSE AND NEED

1.1 PEL Study Requirements

Chapter Overview

- Overview of a PEL study's approach to transportation planning and connection to NEPA review
- Description of the study area with a summary of I-5 corridor transportation characteristics
- Authority of 23 USC 168 to allow federal agencies to incorporate decisions from PEL study into the environmental review process under NEPA
- Outline of the PEL's purpose and need

Planning and Environmental Linkages (PEL) is an approach to transportation decision-making that involves early consideration of environmental, community, and economic goals in the planning process, utilizing the information, analysis, and products generated during planning to guide the National Environmental Policy Act (NEPA) review process. By consolidating the planning and early environmental review during a PEL study, duplication of work is minimized. Streamlined project development may also help expedite permit decisions. The overall timeline for project delivery may be reduced by the PEL process, which initiates early communication and collaboration with relevant agencies, tribes, and interested parties, refines a project's purpose and need, conducts a preliminary screening of alternatives, and collaboratively develops better environmental outcomes. PEL collaboration includes transportation planners, NEPA practitioners, resource agency staff engaged in conservation planning or NEPA, tribal nations, and the public.

The planning products produced during this planning process may be adopted during a subsequent environmental review process in accordance with 23 USC 168. We may adopt the Purpose and Need and identified alternative(s), assessed during this PEL process, into the NEPA environmental review process. Our goal is to not revisit these points once NEPA begins in Summer 2023.

PEL approaches are covered by two statutes: 23 USC 168 established the integration of planning and environment review, providing a process by which lead and cooperating agencies may adopt or incorporate by reference a planning product to use during the environmental review process to the maximum extent practicable and appropriate; and 23 USC 139(f)(4)(E) allows for the incorporation of planning analyses and products developed in a PEL process to be carried forward into the environmental review process under NEPA. Together, these two statutes allow certain federal agencies to incorporate decisions made by state department

of transportations (DOTs) during corridor studies into the environmental review process under NEPA provided that the outcomes meet NEPA requirements.

The Washington State Department of Transportation (WSDOT) partners with the Federal Highway Administration (FHWA) for PEL studies. The 2023 *I-5 Marvin to Mounts Road PEL* was developed in partnership with FHWA and the Nisqually Indian Tribe. The PEL development process built upon existing plans for the corridor and included four concurrence points consistent with FHWA processes (Figure 1). Additional information regarding previous plans along the corridor, funding directions, and additional project context is detailed in Section 1.6. Appendix B. WSDOT PEL Questionnaire documents PEL development, outreach efforts, key environmental factors, and a range of reasonable alternatives for future environmental review.

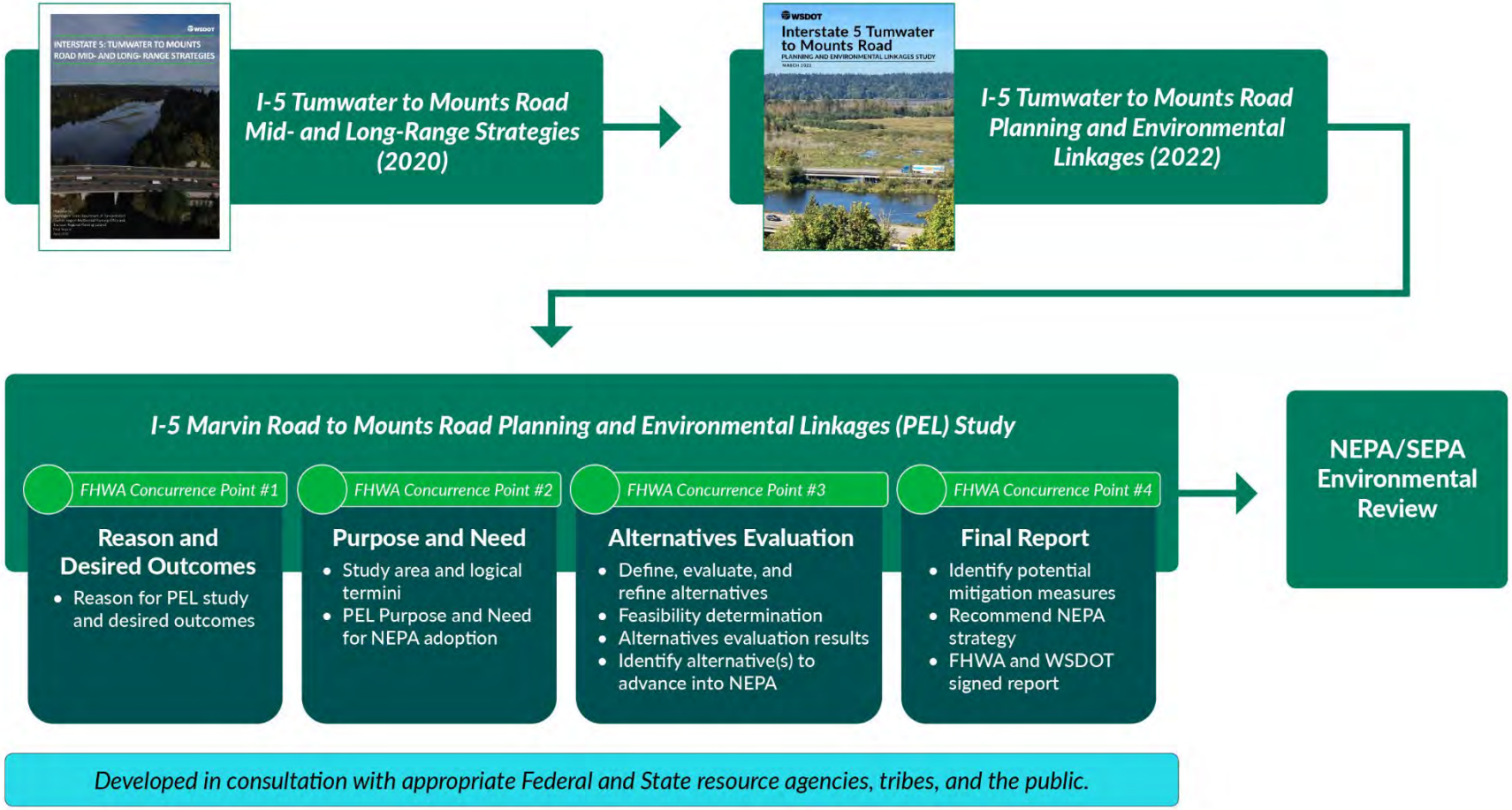


Figure 1. PEL Development Process

FHWA Concurrence Points

The first FHWA concurrence point is the reason for the study along with several desired outcomes. These include the intention to formally adopt specific products into the NEPA process, as outlined by 23 USC 168. These products include the Purpose and Need, Preliminary Screening of Alternatives, Elimination of Unreasonable Alternatives, and Programmatic Mitigation. The aim is to incorporate these elements into the NEPA process to ensure a more robust and effective process. An additional outcome includes early and recurring input opportunities for communities and partners to ensure that the process is inclusive and representative of all interested parties. Another identified outcome is the adoption of a specific NEPA strategy, which could either be an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). The NEPA process will commence in the summer of 2023.

The second FHWA concurrence point is the development of the project Purpose and Need, which is a component of any NEPA document, whether it be an EA or EIS. The primary function of the Purpose and Need is to determine the range of alternatives that will be considered in the NEPA document, as well as to set boundaries that will limit the range of alternatives that can be dismissed without detailed study.

The third FHWA concurrence point is the development and evaluation of a conceptual range of alternatives. Four conceptual alternatives and four bridge options are developed and evaluated. An initial and detailed evaluation is conducted for the alternatives and options to compare their potential benefits and impacts for 19 evaluation criteria in six categories consistent with the project Purpose and Need and WSDOT policies. Alternatives are refined during the evaluation, and the most viable alternative and options are selected to advance into the NEPA process.

The final FHWA concurrence point will be met with FHWA's approval of this report, which provides the project purpose and need, explains the alternatives evaluation results, identifies the preferred alternative to advance into NEPA, details potential environmental effects, and recommends a NEPA strategy. In compliance with FHWA guidance, Appendix B contains the WSDOT PEL Questionnaire prepared for this study. Appendix A contains the three PEL concurrence documents initiated by WSDOT and signed by FHWA.

Concurrence Letter 1 – Reason for the Study and Desired Outcome (FHWA letter signed and dated 9/8/2022)

Concurrence Letter 2 – Purpose and Need (FHWA letter signed and dated 3/2/2023)

Concurrence Letter 3 – Alternatives Evaluation (FHWA letter signed and dated 5/11/2023)

Outreach and Engagement

WSDOT's outreach approach for this PEL study was consistent with NEPA regulations (40 CFR 1501.8 and 40 CFR 1508.1), which require coordination with agencies that have jurisdiction or specific expertise related to any environmental matters that should be considered under NEPA review. WSDOT collaborates with agencies for input on the Purpose and Need, Alternatives Development and Evaluation, environmental resources, and other issues related to resources within their jurisdiction. FHWA is the lead federal agency for this PEL.

The Nisqually Indian Tribe participated in the project because the I-5 crossing of the Nisqually River Delta falls within the tribe's ancestral lands and holds significant historical, cultural, and environmental value. Having adjudicated Treaty rights in the Nisqually River and McAllister Creek, the Nisqually Indian Tribe has invested heavily in restoring and preserving habitat in the area. Other agencies were invited to join three coordination groups: the Technical Advisory Group (TAG), the Executive Advisory Group (EAG), and the Agencies Coordination Group (ACG), which are described further in Chapter 2.

1.2 NEPA Process Principles

The PEL and NEPA processes are distinct from one another. The purpose of the PEL is to bring environmental considerations into the planning process so that decisions made in the planning phase can inform the environmental review under NEPA. The PEL was developed to be integrated into a subsequent NEPA process while adhering to NEPA standards, including documentation of the process using the PEL Questionnaire. The intent to use deliverables for the NEPA process was highlighted throughout the development of this PEL to all participants, providing coordinating agencies and tribes opportunities for review and comments. This PEL was developed to meet standards established by NEPA regulations and guidance, including terminology consistent with NEPA vocabulary and document titles, such as:

- Purpose and Need
- Logical Termini
- Preliminary Range of Alternatives
- Selected Alternatives
- Screening of Alternatives Analysis
- Preferred Alternative
- Existing Environmental Conditions

1.3 Study Area

The project limits (Figure 2) for this PEL study are from the I-5 Marvin Road interchange (Exit 111) to the Mounts Road interchange (Exit 116).

- South end terminus (Milepost 110.55): The Marvin Road/SR 510 interchange (Exit 111) provides primary access to Yelm, to eastern Thurston County and for freight traffic to and from Quiemuth Village. Quiemuth Village is over 4,600 acres in area with over 1,900 acres of vacant land for mixed use office, industrial, retail, and residential development.
- North end terminus (Milepost 117.25): The Mounts Road interchange (Exit 116) provides access to DuPont, Yelm and Nisqually Road SW. An approved and fully funded separate project is under way to construct high occupancy vehicle (HOV) lanes from the Joint Base Lewis McChord (JBLM) Main Gate interchange (Exit 119) to the vicinity of the Mounts Road interchange (Exit 116), beginning in 2023. HOV improvements will be a continuation of the I-5 Tacoma/Pierce County HOV program, which has existing HOV lanes within the city of Tacoma and funded HOV improvements from SR-16 to Mounts Road.

This section of I-5 is important regionally and nationally because it is the primary north-south route connecting regional and international economic centers through west coast ports. As the primary regional transportation corridor connecting Thurston County with Pierce County, it is classified as a T-1 (tier 1) freight corridor with more than 10 million tons of freight moved annually. It passes through the Nisqually River valley near the river's estuary, the traditional home of the Nisqually Indian Tribe and important habitat for Endangered Species Act-listed species including Chinook salmon, steelhead, and bull trout. This portion of I-5 is also important for access and base operations at JBLM.

The proposed project area includes 11 bridge structures as a part of Interstate 5. In the Nisqually River Delta area, bridge structures are located over the Nisqually River and adjacent north and south overflow channels. These structures provide flood capacity to accommodate high river flow events.

Information on the northbound and southbound truss bridges crossing the Nisqually River are shown in Table 1 below. While the older northbound bridge meets the legal height requirements for trucks (15-foot, 1-inch clearance), it fails to meet the vertical clearance requirement for current design guidelines (16 feet, 6 inches). This creates a risk of damage from oversize loads.

Table 1. Nisqually River Bridges Characteristics

Bridge #	Bridge Name	Sufficiency Rating (0-100)	Built	Vertical Clearance	Inspection Report Issues
5/345E	Nisqually River (Northbound)	48	1937	15’1”	Monitor channel migration, numerous cracks in steel stringers repaired and monitored
5/345W	Nisqually River (Southbound)	78.23	1967	17”1”	4/21/2022 Nisqually River Channel Migration memo describes long-term threat to the bridges.

The southern terminus of I-5 at Marvin Road (Exit 111) is the location where recent interchange improvements were made to expand capacity to support development. A growing logistics center and multiple population and commercial centers are accessible through the I-5 Marvin Road interchange (Exit 111), making this a key regional destination and logical southern terminus for extending I-5 improvements.

Figure 2. Project Study Area

1.4 Existing Transportation Conditions

I-5 is an important interstate freeway for travel, including freight, commuter, and recreational traffic in the south Puget Sound. It has three general purpose (GP) traffic lanes in each direction and a speed limit of 60 mph. I-5 is designated as an interstate freeway and is a part of the National Highway System. The transportation study area includes a 4.7-mile stretch of I-5 between the Marvin Road and Mounts Road interchanges, with three interchanges in the area: Marvin Road NE, Brown Farm Road NE/Nisqually Cut Off Road SE, and Mounts Road/Nisqually Road SW. The Marvin Road NE interchange is a diverging diamond interchange, the Brown Farm Road NE/Nisqually Cut Off Road SE interchange is similar to a typical diamond interchange, and the Mounts Road/Nisqually Road SW interchange is a diamond interchange.

While I-5 is the primary highway through the study area, a network of other state highways and local roads serve residents, travelers, and businesses both inside and outside the region, with around 2,400 centerline miles of roads in Thurston County. However, very few local roads provide alternate paths to I-5 between Marvin Road NE and Mounts Road. There are only a few locations to cross I-5 in the study area, which concentrates traffic on certain local roads and encourages the use of I-5. This causes congestion and reduces the likelihood of people using active modes.

I-5 crosses two active rail lines within the study area. I-5 has a grade-separated crossing under the BNSF Railway (BNSF) double track mainline connecting Portland, Tacoma, and Seattle. This line is a major corridor for interstate and international freight movements carrying both BNSF and Union Pacific rail traffic. I-5 also has a grade-separated crossing under a single-track rail line owned by Sound Transit. This line carries Amtrak Cascades and Coast Starlight service as well as BNSF and Tacoma Rail freight service to JBLM and local businesses.

Travel Patterns

The study area is connected to Tacoma, Seattle, Yelm, Dupont, and Olympia via I-5, with over 121,000 trips crossing the Thurston-Pierce border daily. A significant number of Thurston County residents commute out of county, primarily to Pierce and King Counties, and outbound commuters are expected to increase by approximately 53 percent by 2045. Commute modes and peak periods of travel are changing, with longer commutes and an increase in telework due to the COVID-19 pandemic. Biking, walking, transit, and carpooling have remained stable in terms of proportion of commuters but are all growing in terms of total number, and E-bikes are gaining popularity as a transportation mode.

WSDOT used StreetLight data[1] to understand travel patterns in the I-5 corridor, with origins and destinations categorized into 13 subareas. The subareas were all within Thurston and Pierce counties. Origins and destinations on I-5 north of the Pierce/King County line were not included in the study area. Major destinations and origins included JBLM, Quiemuth Village, and the Tacoma Tideflats Manufacturing and Industrial Center (MIC). Analysis was conducted for February through April in 2019 and 2022, with results showing little variation in overall patterns between the 2 years. Unless otherwise noted, the a.m. peak is considered to be 6 a.m. to 9 a.m., and the p.m. peak is considered to be 4 p.m. to 7 p.m. The commute hours for JBLM are shifted 1 hour earlier for each time period to account for the earlier reporting schedule: morning commute is 5 a.m. to 8 a.m., and the evening commute is 3 p.m. to 6 p.m.

JBLM was identified as a key subarea, generating 106,000 off-site vehicle trips per day. The Nisqually Road bridge, to the south of I-5, and the I-5/Mounts Road interchange were also evaluated.

The largest share of origin-destination pairs traveling across the I-5 northbound and southbound truss bridges across the Nisqually River are between Thurston and Pierce County, Thurston County and JBLM, and between Quiemuth Village and locations in Pierce County. The largest share of origin-destination pairs across the Nisqually Road bridge are between Thurston and Pierce County, Thurston County and JBLM, and Thurston County and I-5 on the northern edge of the study area. The patterns are similar to that of the I-5 bridge but with notably fewer origin-destination pairs between Pierce County and Quiemuth Village and Pierce County and the I-5 subareas on the northern edge of the study area.

The 2022 commute and non-commute travel patterns for JBLM were evaluated and show that many workers may take trips throughout the base during midday. During the morning commute, Pierce County makes up the largest share of trips heading to JBLM, while in the evening commute, Pierce County is also the destination with the largest share of trips leaving JBLM. Thurston County, the I-5 bridge at the Nisqually River Delta, and Quiemuth Village are also important origins and destinations for JBLM throughout all time periods.

System Performance

WSDOT publications, such as the annual Corridor Capacity Report and the Multimodal Mobility Dashboard, have documented recurring performance issues on this segment of I-5. Data shows routine congestion and reduced vehicle throughput on this segment of I-5. WSDOT also analyzed traffic speed data through the National Performance Measurement Research Dataset and found that

[1] StreetLight Data is a data service that collects anonymized travel data from devices such as smartphones, GPS systems, and fleet management systems. The data is used to provide information on travel patterns for GP traffic, trucks, buses, pedestrians, and cyclists; it should be noted that the data may not accurately represent the overall population or travel behavior. It was used in conjunction with other information to better understand travel behaviors.

average speeds on I-5 near the Nisqually River bridges are below the maximum throughput speed ranges in the afternoon and evening, indicating congested conditions. The maximum throughput speed is the speed at which a highway segment has the most vehicle throughput. The maximum throughput speed range is between 70 percent to 85 percent of the posted speed limit, which is between 42 and 51 mph for a posted speed limit of 60 mph.

Non-recurring congestion, which refers to unpredictable events that can reduce the capacity of a roadway, including crashes, inclement weather, and special events, account for roughly half of all congestion. Crash data that was evaluated for the time period of 2017 through 2021 showed that the occurrence of crashes generally correlated with peak commute periods, with the highest number of crashes happening during the peak evening commute on Fridays and the peak morning commute on Thursdays.

Freight Network

WSDOT designated I-5 as a Truck Freight Economic Corridor, recognizing it as the state's most important north-south interstate corridor for the role it plays in linking Washington's trade with the rest of the U.S., Canada, Mexico, and Asia via Washington Ports. More than 10 million tons of freight move through Thurston County on I-5 each year. A rapid rise in freight movement in the study area has been influenced by population and employment growth in the Puget Sound regions as well as increased economic activity at the state level. Quiemuth Village and the Tacoma Tideflats MIC were included as subareas when evaluating freight travel patterns. Quiemuth Village is an emerging freight generator and logistics hub, with a major travel nexus to the Tacoma Tideflats MIC and rail hubs in Pierce and King counties. Truck travel patterns differ from private vehicles; the largest share of truck trips using the I-5 Bridge at the Nisqually River Delta are between Thurston and Pierce County, Pierce County and I-5, Pierce County and Lewis County, and to/from north or south of the study area, depending on the direction of travel, via I-5.

Trucks on I-5 contribute to and are impacted by traffic congestion, which increases travel time and costs and leads to higher levels of greenhouse gas (GHG) emissions and other harmful pollutants. The Freight and Goods Transportation System classifies I-5 as a T-1 truck freight corridor, meaning that more than 10 million tons of freight are moved through the corridor annually. This segment of I-5 in particular is an important freight corridor, providing the only high-speed, north-south interstate corridor on the west side of the Cascade Mountains for trucks serving major seaports in Seattle, Tacoma, and Vancouver B.C., Seattle-Tacoma International Airport, and JBLM. Trucks on this section of I-5 make up about 10.4 percent of all traffic. Approximately 14,000 trucks use this section of I-5 daily, the third-highest daily truck volume across the state. Freight traffic has increased, on average, by 9.5 percent between 2019 and 2022. The truck percentage is highest during overnight hours. A weight restriction of 21,500 pounds has been placed on the northbound Nisqually River bridge, requiring freight overloads to use the center lane. The I-5 Fort Lewis Weigh Station is located on northbound I-5 at Milepost 117.51, just north of the study area. This weigh station is the second busiest weigh station in Washington State. For northbound trucks to access the weigh station, they must be in the far-right lane.

Active Transportation Network

According to the Thurston Regional Planning Council's (TRPC) 2017 Regional Household Travel Survey, only 8 percent of daily trips in the study area are walking trips and about 1.5 percent are biking trips. However, local agencies are committed to developing facilities that encourage alternative modes of transportation; there are currently over 100 miles of bike infrastructure in Thurston County as well as a large, interconnected sidewalk system, but there are no dedicated bicycle or pedestrian facilities between Thurston and Pierce counties. Because I-5 is the most direct route between Dupont and Lacey, part of the study area on I-5 is open to bicycle use. However, only bicyclists in the “highly confident” category are likely to use sections of I-5, as it is likely considered too dangerous by most users.[2]

Some new facilities are under construction, such as a connection between Gravelly Lake Drive SW and Thorne Lane SW, and a shared-use path between Yelm in Thurston County and Roy in Pierce County is in the planning stages. Even with these improvements, there is a need to continue to improve travel for persons using active modes within the study area. Figure 3 displays the trails network in Thurston County.

[2] *Federal Highway Administration; Bikeway Selection Guide; P. 13 https://safety. fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf#page=15*

Figure 3. Thurston County Trails[3]

Source: Thurston Regional Planning Council

Transit Network

Based on the TRPC 2017 Regional Household Travel Survey, about 1.9 percent of daily trips are transit trips. The study area is served by Intercity Transit and Amtrak Cascades. Intercity Transit provides bus service between north Thurston County urban areas and Yelm. Intercity Transit operates one bus route, Route 620, that runs between the Olympia Transit Center and Lakewood Transit Center via I-5 at approximately 60-minute headways. Bus service does not currently provide a travel time benefit compared to single occupancy vehicle (SOV) trips due to the lack of HOV lanes on I-5 through this area. There are limited transit connections between Thurston and Pierce counties.

[3] *Thurston County Regional Council Countywide Bike Map. https://www.trpc.org/504/Countywide-Map-Disclaimer*

Transit connections to the Seattle area are available through transfers from Intercity bus service to Sound Transit bus service and Sounder commuter rail in Lakewood and Tacoma. Sound Transit has a planned expansion of Sounder commuter rail service to Dupont by 2045.

Amtrak Cascades provides intercity passenger rail service from Centennial Station in unincorporated Thurston County, near Lacey. Centennial Station is served by Intercity Transit bus routes 64 and 94. The passenger rail service schedules do not align with peak commuting travel times in the study area and only provide a travel time benefit compared to SOV trips when there is traffic congestion on I-5.

Safety

Crash data from 2017 through 2021 was analyzed for the study area, which showed a total of 1,440 crashes on mainline I-5 and ramps. There was a 30 percent decrease in total crashes between 2019 and 2020 but a 63 percent increase between 2020 and 2021. There were 39 types of primary contributing factors for the crashes that occurred in the study area. The most common primary contributing factor was following too closely, which accounted for 412 crashes, or about 23 percent of total crashes. There were 2 crashes resulting in fatalities, and 12 crashes resulting in serious injuries. Fatal and serious injury crashes accounted for less than 1 percent of total crashes in the study area in the 5-year period. Most crashes, or about 78 percent of crashes, resulted in property damage only.

Surrounding Land Uses

The study area is located primarily in Thurston County at the southern end of the Puget Sound with the eastern portion in southern Pierce County near DuPont and part of JBLM. At 736 square miles, Thurston County is the eighth smallest county in Washington. Thurston County is a mostly rural county but has several urban and suburban areas. About 13 percent of the land area is incorporated or unincorporated urban area, 70 percent is rural, 1 percent is tribal reservation, and 16 percent is state or federal forest land. Lacey, Olympia and Tumwater are the largest cities in Thurston County and together form the north urban area. In southern Thurston County are the cities of Rainier, Tenino, and Yelm; the Town of Bucoda; and unincorporated Grand Mound. There are three tribal reservations: the Confederated Tribes of the Chehalis Reservation, the Squaxin Island Reservation, and the Nisqually Indian Tribe Reservation.

The western boundary of Pierce County starts at the Nisqually River. The land east of the river to the eastern end of this PEL study corridor and south of I-5 is owned by the Department of Defense (JBLM) and is mostly undeveloped. The north side of I-5, from the Nisqually River to Mounts Road, is part of the Billy Frank Jr. Nisqually National Wildlife Refuge. This area transitions to rural

residential as I-5 climbs out of the valley. Immediately north of the Mounts Road Interchange is the Eagle's Pride Golf Course, which is owned and operated by JBLM.

Please see Section 6.11 Land Use, Farmlands, and Section 6(f) for more information on land use in the study area.

1.5 Forecasting

The traffic forecast and operations analysis will be conducted for the Existing Year 2023 and Horizon Year 2045. Year 2045 was selected because it is at least 20 years in the future, consistent with WSDOT's *Interstate 5: Tumwater to Mounts Road Planning and Environmental Linkages Study* (2022),and is consistent with TRPC's recently adopted Population and Employment forecast. Interim years (assuming a straight-line growth percentage) may be analyzed to support a practical implementation plan for the preferred alternative.

1.6 Planning Context

The *Interstate 5: Tumwater to Mounts Road Mid and Long-Range Planning Study* was conducted from 2018 to 2020. The corridor planning study was developed for the section of I-5 between 93rd Ave SW (SR 121) in Tumwater (Exit 99) and Mounts Road near DuPont (Exit 116), which experiences frequent congestion due to high traffic volumes and weaving at interchanges. Three locations experience recurring congestion during peak commute periods; within the study area of this PEL study, recurring congestion occurs near the Nisqually River bridges (WSDOT and TRPC 2020).

Recommendations identified in the study's *Next Steps* included:

- Prepare for federal documentation requirements with a PEL study.
- Work with the Nisqually Indian Tribe to analyze hydrologic study results and develop recommendations.

This section of I-5 passes through the Nisqually River valley, an environmentally sensitive and important area for Endangered Species Act listed steelhead and chinook salmon, and the traditional home of the Nisqually Indian Tribe. The Nisqually Indian Tribe is signatory to the Medicine Creek Treaty of December 26, 1854. The treaty established the Nisqually Reservation boundaries and memorialized other rights, including fishing in usual and accustomed grounds. The Treaty Rights reserved by the Nisqually Indian Tribe in the Medicine Creek Treaty are acknowledged as part of the background conditions for the project.

A PEL process was developed from 2020 to 2022 to refine the information provided by the corridor planning study. The study area for the previous PEL was I-5 from Tumwater (Exit 99) to Mounts Road (Exit 116). The corridor PEL identified strategies for regional

congestion management, logical sections of the corridor to study further, and a strategic plan for the Nisqually River bridges that considers ecosystem benefits to the Nisqually River estuary for salmon productivity and flood control. The corridor PEL recommended two improvements for the Marvin Road (Exit 111) to Mounts Road (Exit 116) section: adding a lane to the northbound I-5 on-ramp at the Brown Farm Road NE/Nisqually Cut Off Road SE interchange and adding one lane in each direction to I-5 from Marvin Road to Mounts Road (WSDOT and TRPC 2022b).

In 2021, the state Legislature provided initial implementation funding to accelerate work along I-5 between the Marvin Road (Exit 111) and Mounts Road (Exit 116) interchanges through the Nisqually River Delta. This funding supports preliminary engineering, design, and right of way (ROW) acquisition to increase capacity, address flood risk, and enhance the Nisqually River Delta ecosystem. This focused PEL will document a more detailed alternatives development and evaluation process for the Marvin Road (Exit 111) to Mounts Road (Exit 116) section. After completing this PEL, this section will move directly into the NEPA environmental documentation phase to implement the I-5 capacity and Nisqually River Delta environmental habitat restoration improvements.

1.7 Purpose and Need

The PEL study developed a Purpose and Need statement to guide the development of a range of reasonable alternatives. The purpose defines the transportation problem to be solved. The need provides evidence that supports the defined transportation problem. The Purpose and Need was developed with agency and community input (described further in Chapter 2).

Purpose

The purpose of the project is to:

- ***Enhance mobility and connectivity*** on I-5 for passenger vehicles, freight, transit, and active modes and provide support for increased person and freight throughput.
- Improve local and mainline I-5 ***system resiliency***.
- Enable ***environmental restoration and ecosystem resiliency*** at the I-5 crossing of the Nisqually River Delta area.
- Support ***economic vitality*** through reliable and efficient freight movement and access to major employers.

The project needs related to each purpose statement are documented in the following section.

Evaluation criteria were developed in each of these project purpose categories to provide a direct connection between the project purpose and alternatives evaluation process, including decisions to eliminate alternatives from advancing into NEPA. Alternatives evaluation methodology and results are detailed in Chapter 4 Alternatives Evaluation Summary.

Need

Enhance Mobility and Connectivity

Traffic volumes in this corridor exceed highway design capacity during peak travel periods, including weekends. From 2012 to 2019, average weekday traffic volumes on I-5 increased from 111,000 to 125,000, or an average annual increase of 1.5 percent. In 2020, daily traffic dropped to 106,000 due to travel changes from the COVID pandemic but rebounded to 119,000 in 2021. Daily traffic volumes are expected to increase along the corridor, with year 2045 weekday volumes expected to be 20 to 30 percent higher than today. The amount of freight moved by truck is expected to increase 55 percent by the year 2050 (WSDOT 2022d). Emerging technologies, such as connected and autonomous vehicles will also affect how everyone travels in the more distant future beyond the year 2045.

Upon completion of the I-5 JBLM Corridor South project, the new auxiliary/HOV lane will terminate at the Mounts Road overpass (WSDOT and FHWA 2021). This will create a southbound lane transition and reduction from four lanes to three lanes, causing traffic congestion to occur during the afternoon commute period and other high traffic volume periods. In the northbound direction, the uphill section from the Nisqually River Delta to Mounts Road will continue to operate at or above capacity during morning commute hours.

Intercity Transit provides bus transit service between Olympia, Lakewood, and Tacoma, with connections to the Sounder commuter rail service into Seattle. Amtrak Cascades also provides intercity passenger rail service along a parallel rail corridor to I-5. Without improvements on I-5, buses would experience increased traffic congestion, increased travel times, and variable schedule reliability for transit riders in the corridor.

In 2022, the TRPC received funding to examine options for multimodal high capacity transit (HCT) to serve travelers on the I-5 corridor between central Thurston and Pierce counties (SB 5689). Existing estimated daily boardings for HCT – including commuter rail and express buses – in Thurston and Pierce counties are estimated to range from 2,500 to 4,000 (TRPC 2022). Future population and employment growth in the area indicates a need for increased transit, though light rail ridership potential is low and commuter rail may be cost prohibitive (TRPC 2022).

Phase 1 findings of TRPC's study support implementation of HOV lanes on I-5 between DuPont and Tumwater. Current growth projections for the area indicate that there is not enough ridership potential to support HCT services like bus rapid transit or light rail. The Phase 1 report also stated that commuter rail may not be competitive for federal funding support and may be cost prohibitive

from a purely local funding perspective. Phase 2 of TRPC's HCT work will further evaluate the potential costs of such investments and when in the future developing light and/or commuter rail might be prudent from a cost/ridership perspective.

Enhancing express bus service between Thurston County and Pierce County with connections to other regional and local transit systems is consistent with expected population and employment growth within the 20-year project planning horizon. The alternatives included in this PEL study would not preclude other forms of HCT beyond the 20-year horizon.

There is a need to establish a regional active transportation connection between Thurston and Pierce counties on or adjacent to the I-5 ROW. Bicyclists currently use the shoulder of I-5 between Exits 111 (Marvin Road) and 116 (Mounts Road) because there are no existing active transportation connections on local roadways or regional trails in this area. There are narrow shoulders on the bridges that cross the Nisqually River creating unsafe conditions for people riding bicycles in the corridor.

Transportation System Resiliency

WSDOT's *Strategic Plan* identifies transportation system resilience a high-priority goal, emphasizing the need to prepare for climate change impacts. The I-5 Nisqually bridge crossings are vulnerable to flooding because climate change has caused sea level rise and increased extreme flood events. There is a need to address erosion and channel migration that will progressively increase to the point of jeopardizing the stability of the I-5 causeway and/or the bridge crossing. The dynamic nature of the Nisqually River between the revetment walls upstream (south) of the I-5 bridge crossing is creating these conditions, posing risks to I-5, fish and wildlife habitat areas, and river hydrogeomorphic processes.

Photo documentation of the river channel has shown substantial migration in recent years. An oxbow forming upstream of the bridge crossing moved at the rate of 35.5 feet per year between 1990 and 2022; the meander can be expected to be at the I-5 roadway embankment in approximately 13 years (WSDOT 2022a).

This channel migration has the potential to cause temporary lane reductions or closures of I-5 in one or both directions for emergency repairs (WSDOT and TRPC 2022b). This section of I-5 is the only substantive north-south highway route highway route in the area serving regional traffic. Even short-term closures would result in long detours and significant delays affecting much of western Washington. In addition to the channel migration risk, the northbound I-5 bridge over the Nisqually River, built in 1937, has a Sufficiency Rating of 48 and is nearing the end of its expected service life. The bridge has substandard vertical clearance, risking strikes from oversize loads which could damage overhead trusses. The northbound bridge undergoes regular monitoring and repair of cracks in various structural elements.

Environmental Restoration and Ecosystem Resiliency

The I-5 crossing currently impedes sediment transport and channel migration, restricts tidal flow dynamics, impacts river hydraulics and geomorphology, occupies estuarine wetlands, and generally interrupts the natural functions and processes that create and

maintain habitat in the Nisqually River basin, delta estuary, and nearshore (WSDOT and TRPC 2022b). The current crossing also limits the restoration potential in the Nisqually River and delta by the Nisqually Indian Tribe and other salmon recovery partners.

An improved I-5 Nisqually River delta crossing is also needed to improve ecosystem resiliency. As sea level rises due to climate change, fresh/saltwater mixing extends further up river, decreasing the available estuary habitat for salmon to adapt. Under climate change conditions, extreme river flow events are expected to become more frequent; salmon need floodplain access and off-channel habitat to find refuge from extreme flood flows (WSDOT and TRPC 2022b).

The current configuration of the I-5 structure has impinged on natural ecosystems and therefore affected tribal treaty resources. There is a need for the project to restore natural functions of the Nisqually River Delta to improve the availability of and access to treaty resources for tribes.

Economic Vitality

The Nisqually River is an important historical fishing location for the Nisqually Indian Tribe. Continued navigability of the river for commercial fishing and other private vessels is needed to maintain the economic vitality of these marine activities.

WSDOT designated I-5 as a Truck Freight Economic Corridor, recognizing it as the state's most important north-south interstate corridor for the role it plays in linking Washington's trade with the rest of the U.S., Canada, Mexico, and Asia via Washington Ports. I-5 also connects marine and air cargo port complexes with essential state warehouse districts, industrial lands, intermodal transportation hubs, and major population centers. More than 10 million tons of freight move through Thurston County on I-5 each year. Within the project area in Thurston County, I-5 traffic has increased 13 percent from 2012 to 2019, to 125,000 vehicles per day. Truck volumes from 2012 to 2019 also increased 13 percent to over 14,600 trucks per day (WSDOT and FHWA 2021). Truck volumes on I-5 at the border between Pierce County and Thurston County are some of the highest in the state (WSDOT and TRPC 2021).

The traffic increase in the study area has been Influenced both by population and employment growth in the south Puget Sound region, and by increased economic activity at the state level, fostering a rapid rise in freight movement. Thurston County employment is expected to increase approximately 50 percent from 129,000 to 194,000 by 2040 (WSDOT and FHWA 2022b). The growth in population and jobs will add to traffic congestion on this corridor. Tourism trips are also increasing within the corridor leading to added congestion within the project limits.

Maintaining I-5 access and connectivity is needed for the operational viability of JBLM and the Washington State National Guard at Camp Murray, both of which are secure military bases. JBLM is located on the eastern end of the project area in Pierce County and is currently the largest single employer site in Washington State, with roughly 52,000 military personnel and civilian jobs on site, generating 106,000 off-site vehicle trips per day (SSMPC 2022). This section of I-5 is also part of the national Strategic Highway Network

(STRAHNET). STRAHNET is a system of public highways that are a key part of the deployment of the U.S. Armed forces. It provides defense access, continuity, and emergency capabilities for movements of personnel and equipment in both peace time and war.

The Marvin Road (Exit 111) interchange provides access to Quiemuth Village – an emerging freight generator and logistics hub – with a major travel nexus to the Tacoma Tideflats MIC and rail hubs in Pierce and King counties. The area includes the planned Quiemuth Village, a 200-acre town center site consisting of both a destination retail component and an intensely developed mixed-use district with commercial, retail, and residential uses (Triway 2006). Up to 500 residential units are anticipated within Quiemuth Village.

Concurrence on Purpose and Need

Input on the Draft Purpose and Need was sought from the agencies, jurisdictions, tribes, and other interested parties engaged during this PEL process. WSDOT received feedback on the Draft Purpose and Need Statement from the Agency Coordination Group (ACG), Executive Advisory Group (EAG) and Technical Advisory Group (TAG) through meeting discussion and comments in January and February 2023 (described in more detail in Chapter 2). FHWA attended all advisory group meetings, reviewed the feedback received, and has provided concurrence on the Purpose and Need to carry forward into NEPA (Concurrence Point 2).

2 AGENCY AND PUBLIC COORDINATION

Chapter Overview

- Engagement requirements for PEL study and connection to future NEPA review
- Outreach and coordination efforts undertaken for the study and how the gathered information informed analyses and outcomes

One of the statutory requirements to adopt planning products into the environmental review process under PEL authority 23 USC 168(d) is to provide public notice, through publication or other means, to federal, state, local and Tribal governments of the planning products that may be relied on during subsequent environmental review. Those entities must be given the opportunity to participate in the PEL process. The following section describes the agency and public coordination efforts undertaken by WSDOT during this PEL study. For a complete list of all outreach activities, see Appendix C.

WSDOT formed three advisory groups, met with community-based organizations (CBOs), and provided materials virtually to provide a forum for tribal, community, and partner-informed decision making on the Purpose and Need, the range of alternatives, screening criteria, evaluation results, and a preferred alternative to study in a NEPA environmental review. The various advisory groups and PEL study participants are listed in Table 2.

Table 2. PEL Study Participants

Agency Coordination Group	Technical Advisory Group	Executive Advisory Group	CBOs, Special Interest Groups, Public
Billy Frank Jr. Nisqually National Wildlife Refuge Department of Archaeology and Historic Preservation Department of Natural Resources Environmental Protection Agency Federal Emergency Management Agency Federal Highway Administration Federal Transit Administration Joint Base Lewis McChord National Marine Fisheries Service National Oceanic and Atmospheric Administration National Resources Conservation Service Nisqually Indian Tribe Squaxin Island Tribe of Indians	Billy Frank Jr. Nisqually National Wildlife Refuge City of DuPont City of Lacey City of Lakewood City of Olympia City of Tumwater City of Yelm Federal Highway Administration Foothills Rails to Trails Coalition ForeverGreen Trails Friends of Nisqually NWRC Intercity Transit Joint Base Lewis-McCord	City of DuPont City of Lacey City of Lakewood City of Olympia City of Tumwater City of Yelm Federal Highway Administration Intercity Transit Joint Base Lewis-McChord Nisqually Indian Tribe Pierce County Pierce Transit Port of Olympia	**Community and Social Service Groups** Housing Authority of Thurston County Multicultural Child & Family Hope Center Pierce County Building and Construction Trades Council Sound Outreach Pierce County Thurston County Chamber of Commerce United Way Thurston County

Agency Coordination Group	Technical Advisory Group	Executive Advisory Group	CBOs, Special Interest Groups, Public
US Army Corps of Engineers US Coast Guard US Fish and Wildlife Service US Geological Survey Washington Department of Fish and Wildlife Washington Department of Ecology	Nisqually Indian Tribe Nisqually Land Trust Nisqually River Council Pierce County Pierce Transit Port of Olympia Port of Tacoma Sound Transit South Sound Military & Communities Partnership Squaxin Island Tribe of Indians Thurston County Thurston Regional Planning Council Town of Steilacoom Washington Environmental Council Washington State Patrol	Port of Tacoma Thurston County Thurston Regional Planning Council Town of Steilacoom	**Interested Parties** Alliance for a Healthy South Sound Executive Committee South Puget Sound Salmon Enhancement Group Thurston County Noxious Weeds Thurston Economic Development Council Washington Trucking Association

2.1 Agency Coordination

As part of WSDOT's commitment to engage partners early in the planning process, the study team implemented several activities to target involvement of state and local agencies in the planning efforts for this PEL.

FHWA

As the federal lead agency and partner for the I-5 Marvin to Mounts Road PEL study, FHWA is providing input and guidance throughout the process. WSDOT and FHWA met monthly for regular status updates, to review the project schedule and deliverables, and to strategize on the planning process. FHWA also participated in Tribal coordination and attended all advisory group meetings. Involvement in the various outreach and engagement activities allowed them to hear, first-hand, the input received from the participants on the Purpose and Need, range of alternatives, alternatives evaluation process and results, and identified preferred alternative for the study.

Tribal Consultation

At the onset of this PEL process, WSDOT sent letters to initiate government-to-government consultation with seven tribes and asked for input on the planning products produced during the PEL process. Three letters were sent to request input on the Draft Purpose and Need, the range of alternatives, and the Draft PEL report.

Based on previous planning work on the project, guidance from cultural resources experts, location of Usual and Accustomed fishing grounds, tribal consultation areas, and past history of projects in the area, WSDOT requested consultation with the following tribes at the beginning of this PEL process: The Confederated Tribes of the Chehalis Reservation, Cowlitz Indian Tribe, Nisqually Indian Tribe, Puyallup Tribe of Indians, Squaxin Island Tribe of Indians, the Muckleshoot Indian Tribe, and the Confederated Tribes and Bands of the Yakama Nation. In addition to requesting participation in the advisory groups, WSDOT also offered individual meetings with each of the Tribes to discuss questions and issues each may have about the project and to present the outcome of other engagement efforts if the Tribe was unable to or did not consult.

WSDOT staff was invited to a Nisqually Indian Tribe's Tribal Council meeting to discuss the project alternatives and evaluation. The Tribal Council members provided input on the initial evaluation of alternatives and options. Agreement from the Nisqually Tribal Council is anticipated to support advancing a single alternative into the NEPA Environmental Assessment.

Advisory Groups

Agency Coordination Group

WSDOT convened an Agency Coordination Group to:

- Represent their agency and environmental resources in the study area
- Provide data and input on direction of study
- Advise on alternative evaluation criteria and alternatives
- Help build consensus and support for alternative(s) selection

The ACG is comprised of agency representatives from federal and local resource agencies and tribes. The first ACG was held in January 2023, followed by four more meetings held in February, March, April, and May 2023. Each meeting format included a PowerPoint presentation from the project team, poll questions to gauge understanding and support, open discussion, and a question-and-answer session. An agenda and meeting materials were sent in advance of each meeting and a meeting summary and request

for feedback was shared following each meeting. Meeting materials summarizing meeting outcomes and what we heard, along with a recording of each meeting, are available to view on the study webpage (*I-5 Marvin Rd to Mounts Rd PEL Study webpage*).

Technical Advisory Group

WSDOT convened a Technical Advisory Group to:

- Represent their agency and communities in the study area
- Provide data and input on direction of study
- Advise on alternative evaluation criteria and alternatives
- Help build consensus and support for alternative(s) selection

The TAG is comprised of agency representatives from federal, state and local resource agencies, including tribes. The first TAG was held in January 2023, followed by four meetings held in February, March, April, and May 2023. Meeting formats included a PowerPoint presentation from the project team, poll questions to gauge understanding and support, open discussion, and a question-and-answer session. An agenda and meeting materials were sent in advance of each meeting and a meeting summary and request for feedback was shared following each meeting. Meeting materials summarizing meeting outcomes and what we heard, along with a recording of each meeting, are available to view on the study webpage (*I-5 Marvin Rd to Mounts Rd PEL Study webpage*). TAG members were advised to share information with executive leadership following the meetings.

Executive Advisory Group

WSDOT convened an Executive Advisory Group to:

- Provide input on policy direction
- Share useful information/data and input
- Help build consensus and support for alternative(s) selection

The EAG is comprised of elected leaders from study area jurisdictions, tribes and counties. The Executive Advisory Group meetings were held following each TAG meeting. A total of five EAG meetings were held between January and May 2023. Similar to the TAG, the EAG members received an agenda and meeting materials in advance of each meeting and a meeting summary and request for feedback was shared following each meeting. Meeting materials summarizing meeting outcomes and what we heard, along with a recording of each meeting, are available to view on the study webpage (*I-5 Marvin Rd to Mounts Rd PEL Study webpage*). EAG

members also received an email notification in advance of each public comment period to include Purpose and Need, Alternatives Review and the Draft PEL Report.

Advisory Group Feedback

WSDOT received feedback from the advisory groups through meeting discussion and comments. The groups provided input on the Draft Purpose and Need Statement, the range of alternatives, specific resources that should be studied and issues to be aware of, the evaluation criteria, and the alternative evaluation results. Upon requesting members' agreement with the results of the PEL process, the majority of the participants supported the results presented in this report. FHWA participated in all advisory group meetings and concurs that the PEL results are supported by the advisory groups. Feedback received from advisory group members is detailed in meeting summaries on the study webpage (*I-5 Marvin Rd to Mounts Rd PEL Study Webpage*). Key takeaways from what we heard at each meeting are highlighted below.

Environment

- Honor Treaty Right Obligations to the Nisqually Indian Tribe.
- Minimize effects on wetlands and restore aquatic ecosystems and connectivity.
- Consider a design that will be resilient to sea-level rise, storm surge, river flow, and capacity to address all the nuances of sediment transportation.
- Consider river navigability for all waterway uses in addition to tribal use.
- Consider studying tsunami and lahar risks
- Consider studying effects on salinity.
- Concerns of what fill removal could have on the Billy Frank Jr. Nisqually National Wildlife Refuge, residents, farmers, and other surrounding properties.
- Consider studying what happens to flood plains when fill is removed from the corridor.
- Consider potential mitigation strategies needed for permitting processes, like Shoreline Permitting and the Coastal Zone Management Act.
- Consider cultural resource surveying and assess need for surveying critically, in partnership with tribes, to avoid further impact to cultural resources.

I-5 Corridor Widening and Transit Use

- Consider future planning efforts for widening I-5 and adding HOV lanes.
- Create capacity for future High-Capacity Transit infrastructure.

Environmental Justice

- Engage community members in development of mitigation strategies for Environmental Justice communities spanning all phases of the project.

Shared-Use Path

- Consider connecting the shared-use path to the Billy Frank Jr. Nisqually National Wildlife Refuge.
- Consider whether the shared-use path could be mitigation for visual quality impacts.
- Place the Shared-Use Path on the north side of I-5.

Construction and Traffic Staging

- Communicate how access will be maintained to Billy Frank Jr. Nisqually National Wildlife Refuge and surrounding businesses during construction.
- Communicate construction cost and timing and traffic staging during construction.

Other Consulted Parties

Some agencies, jurisdictions, and organizations were unable or chose not to participate in the formal outreach activities during this PEL study. Those entities were provided the same project information sent to all other interested parties and given an opportunity to meet with the project team separately. WSDOT requested the following agencies participate: Washington Department of Natural Resources, BNSF Railway, and Alliance for a Healthy Sound. When these agencies could not participate, WSDOT briefed the BNSF liaison, and made a presentation to Washington DNR and Alliance for a Healthy Sound to ensure they were aware of PEL progress and activities.

2.2 Community Engagement

WSDOT developed a Community Engagement Plan and conducted extensive outreach with the community to incorporate their values into the PEL and project designs and to comply with the PEL authority requirement to provide notice and opportunities for input from community members. The WSDOT team made extra efforts to ensure PEL input from under-represented communities by meeting people where they were – through their community-based organizations (as described below). WSDOT conducted a demographic analysis, using 2020 Census data, to identify communities in the project area. Translation was not needed as fewer than 5 percent of the surrounding communities spoke languages other than English. WSDOT offered translation services upon request as part of the public materials. See Chapter 6 Environmental Considerations for more information on Socioeconomics and Environmental Justice in the study area. The various components to the Public and Community Participation strategy are described below.

Community Based Organizations (CBO)

The study team interviewed CBOs representing minority communities and communities with low-incomes or who provide mobility services to communities. WSDOT offered interviews online at a time that was convenient for the interviewee. The study team offered a questionnaire to two groups who wished to participate but were not able to arrange a time to meet with the team. See Appendix C to view more detailed interview summaries.

Purpose:

- Understand community awareness of the project and opportunities to engage in this PEL.
- Gather input on how the people they represent use I-5 within the study area.
- Gather insights on how to best engage these audiences in the upcoming NEPA process.

Organizations:

- Housing Authority of Thurston County
- Multicultural Child and Family Hope Center
- Pierce County Building and Construction Trades Council
- Sound Outreach

- Thurston County Chamber of Commerce
- United Way of Thurston County

Key takeaways:

- Maintain access through the corridor for people getting to work.
- Increased traffic commuting north due to issues with affordable housing Concerns about construction impacts.
- Curiosity around what the corridor changes will include and what they will look like.
- Frustration over not enough transit in Thurston County and along this corridor.

Open Houses

WSDOT hosted three online open houses on the agency's digital community engagement platform, "engage.wsdot.wa.gov." The format for WSDOT's online meeting experiences includes an introduction to the project and its purpose, complemented by maps and photos to make it easier for visitors to acclimate themselves to the project area and proposed improvements. The website included a project schedule, next steps, and contact information, along with probing questions on a comment form to encourage participation and input. WSDOT held online open houses for the public to learn more about the project, how to participate in this PEL process, and how their input will be considered in project designs.

Notification of the online open houses were shared through the project webpage, WSDOT's blog, Facebook, Twitter, and Reddit. A postcard announcing the Draft PEL Report was mailed to 60,000 residents in the region in advance of the public review period which started on June 1, 2023.

Public Review of Purpose and Need: The WSDOT team held an online open house from January 17 to January 31, 2023 for the public to comment on the Purpose and Need. Approximately 50 comments were received. What we heard:

- Build bypass roads and bridges for alternate routes during peak traffic or due to road closures.
- Create a separated shared-use path in the corridor.
- Prioritize transit, cycling, and other forms of transportation over highway expansion.
- Build for HCT compatibility, including passenger rail.

Public Review of Range of Alternatives: The WSDOT team held an online open house from February 15 to March 1, 2023 for public comments on the screening alternatives. Over 250 comments were received. What we heard:

- Consider an elevated roadway through this area to mitigate the impacts to fish and wildlife.
- Make special consideration for the effects the project has on the surrounding area.
- Ensure compatibility for future HCT, including passenger rail.
- Plan for a separated shared-use path for pedestrians and bicyclists.
- Recognize that with additional capacity comes induced demand and that mobility options can also take demand off the freeway.
- Keep I-5 open during construction.
- Consider improved/new alternate routes around I-5 (similar to I-405) and connecting with SR 512.
- Highlight the importance of and maintain access to the Brown Farm Road NE/Nisqually Cut Off Road SE interchange/Exit 114.

2.3 Information Distribution

WSDOT has been engaging with special interest groups and the public about their vision for the I-5 Marvin Road to Mounts Road corridor for over five years. First through the corridor planning process and 2020 report, then the initial PEL study that further refined the corridor study strategies to address peak-period commute traffic congestion and weaving occurring in hot spots in the study area (2022), and now in this PEL study. WSDOT has worked closely with partner agencies to reach communities through a variety of community engagement techniques.

- Project website for reference and sharing outcomes.
- WSDOT blog and promotion on Facebook, Reddit and Twitter.
- Project FAQ and talking points for project correspondence and media inquiries.
- Project contact list for email and phone follow-ups as needed and when the draft PEL is complete.

- CBO interviews representing minority communities and communities with low-incomes or who provide mobility services to communities.
- Project presentations to special interest groups that serve the study area, such as the Thurston Regional Planning Council, Nisqually River Council, and Alliance for a Healthy South Sound, to request their input.
- Project postcard mailed in June 2023 to 60,000 addresses in DuPont, Steilacoom, Lacey, Yelm, and JBLM.

3 ALTERNATIVES DESCRIPTION

Chapter Overview

- Alternatives and bridge options considered throughout PEL study

This section summarizes the alternatives that were considered as part of this PEL study. The four alternatives considered include two with no added travel lanes and two with one additional travel lane in each direction.

The four bridge options were developed to provide additional bridge length increments to remove additional portions of the existing I-5 fill through the Nisqually River Delta Area. Table 3 summarizes the key components of each alternative.

Table 3. Alternative Descriptions and Components Analyzed in the Initial Evaluation

Feature	Alternative 1 – Operations Improvements			Alternative 2 – Widen I-5 for HOV Lanes				Alternative 3 – Widen I-5 for GP Lanes				Alternative 4 – Convert I-5 Lanes from GP to HOV Lanes		
Bridge Option	*A*	*B*	*C*	*A*	*B*	*C*	*D*	*A*	*B*	*C*	*D*	*A*	*B*	*C*
I-5 Widening				X	X	X	X	X	X	X	X			
HOV/Lane Management				X	X	X	X					X	X	X
Bridge Replacement	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fill Removal	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Shared-use Path	X	X	X	X	X	X	X	X	X	X	X	X	X	X
New/Modified Nisqually Interchange						X	X*			X	X*			
McAllister Creek Realignment	X	X	X	X	X	X	X	X	X	X	X	X	X	X
I-5 Alignment Shift							X				X			

Note: Bridge Option lengths: Option A=3000', Option B=6000', Option C=12,000', Option D=14,000' High-Level Long Span

** The Brown Farm Road NE/Nisqually Cut Off Road SE Interchange would be removed with this option.*

3.1 Alternative 1: Operations Improvements

Description

Alternative 1 would include strategies to reduce SOV use without adding lanes, such as:

- Operations – Operational improvements include ramp meters, changeable message signs, reduced speed warning signs and other strategies to improve traffic flow and reduce traffic congestion from collisions.
- Land Use – Ensure consistency with local comprehensive plan and zoning efforts to minimize reliance on SOVs.
- Transportation demand management (TDM) – Provide support for alternative travel modes, such as walking, biking, and transit. A shared-use path for active transportation users would be provided to the north and west of the southbound lanes from the Marvin Road Interchange (Exit 111) to the Mounts Road Interchange (Exit 116).
- Transit – Support planned regional transit including enhanced express bus service.

TDM strategies.
Source: Washington TDM Board

Alternative 1 may include river channel improvements or one of three bridge replacement options with different structure lengths in the Nisqually delta area. Bridge Options A through C are described in Section 3.6. A shared-use path for active transportation users would be provided to the north and west of the southbound lanes from the Marvin Road Interchange (Exit 111) to the Mounts Road Interchange (Exit 116) (see Section 3.5 for more detail).

Considerations

WSDOT would rely on the Nisqually Indian Tribe, City of Lacey, City of Dupont, Thurston County, Pierce County, Intercity Transit, and other public and private entities to implement strategies and local improvements consistent with the operational improvements on I-5.

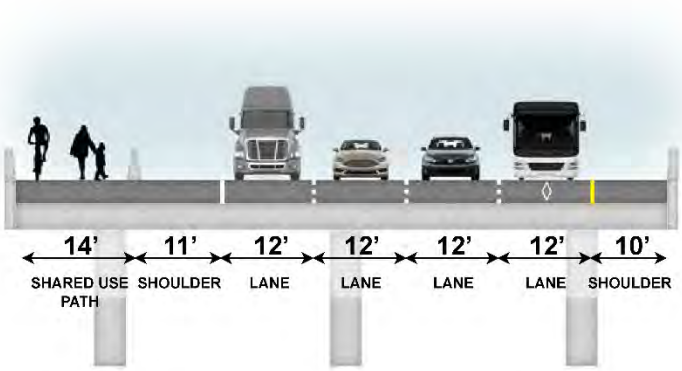
3.2 Alternative 2: Widen I-5 for HOV Lanes

Description

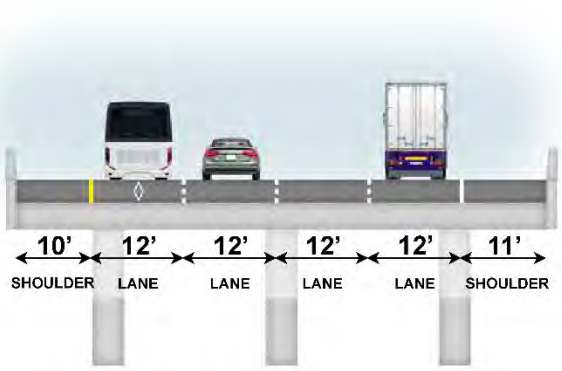
Alternative 2 would widen I-5 from Marvin Road to Mounts Road to include one additional HOV lane in each direction for transit vehicles, carpools with two or more passengers, and motorcycles. The alternative also includes a widened northbound on-ramp from Martin Way and the Nisqually interchange to provide an HOV bypass lane approaching the ramp meter. A shared-use path for active transportation users would be provided to the north and west of the southbound lanes from the Marvin Road Interchange (Exit 111) to the Mounts Road Interchange (Exit 116) (see Section 3.5 for more detail). Figure 4 shows the existing and future typical cross sections.

Considerations

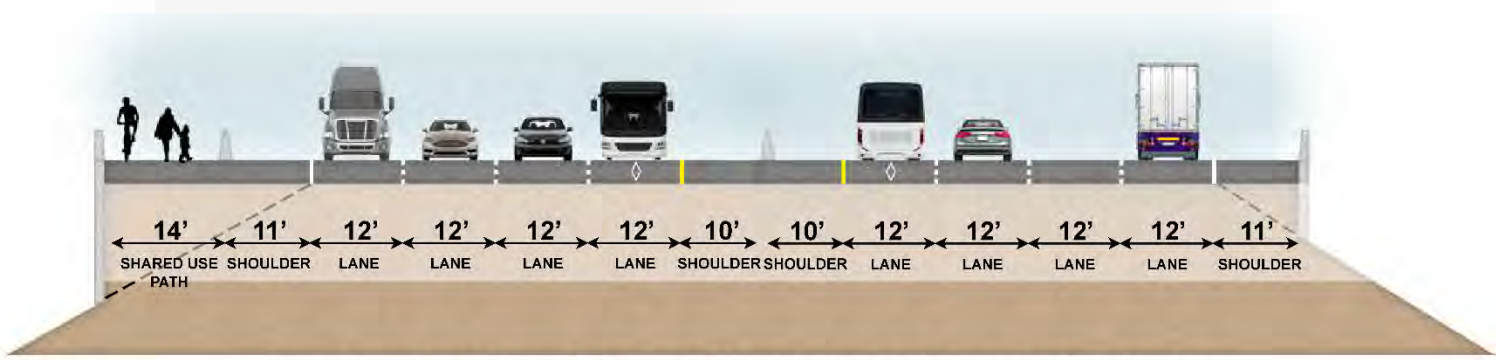
The Alternative 2 roadway configuration would be consistent with the recently completed and soon-to-be-under-construction improvements on I-5 from Mounts Road to Thorne Lane. Widening of I-5 for the proposed HOV lanes would require new bridges over the Nisqually River because the existing steel truss bridges cannot be widened. With the need to replace the existing bridges over the Nisqually River and the risk of channel migration eroding the existing I-5 causeway, Alternative 2 includes four bridge options with different bridge structure lengths in the Nisqually River delta area. Bridge Options A through D are described in Section 3.6. This alternative could be constructed in four phases, as described in Chapter 7 for Bridge Options A through C.



SB I-5 TYPICAL SECTION ON BRIDGES



NB I-5 TYPICAL SECTION ON BRIDGES



SB AND NB I-5 TYPICAL SECTION ON EXISTING GROUND

1

2 **Figure 4. Alternative 2 Conceptual Cross Section**

3.3 Alternative 3: Widen for General Purpose Lanes

Description

Alternative 3 would widen I-5 from Marvin Road to Mounts Road to include one additional GP lane in each direction for all vehicles. A shared-use path for active transportation users would be provided to the north and west of the southbound lanes from the Marvin Road Interchange (Exit 111) to the Mounts Road Interchange (Exit 116) (see Section 3.5 for more detail). Figure 5 shows the existing and future typical cross sections.

Considerations

The Alternative 3 roadway configuration would require a transition from the HOV lanes to the GP lanes included in the recently completed and soon-to-be-under-construction improvements on I-5 from Mounts Road to Thorne Lane. Widening of I-5 for the proposed GP lanes would require new bridges over the Nisqually River because the existing steel truss bridges cannot be widened. With the need to replace the existing bridges over the Nisqually River and the risk of channel migration eroding the existing I-5 causeway, Alternative 3 includes four bridge options with different bridge structure lengths in the Nisqually River delta area. Bridge Options A through D are described in Section 3.6. This alternative could be constructed in four phases as described in Chapter 7 for Bridge Options A through C.

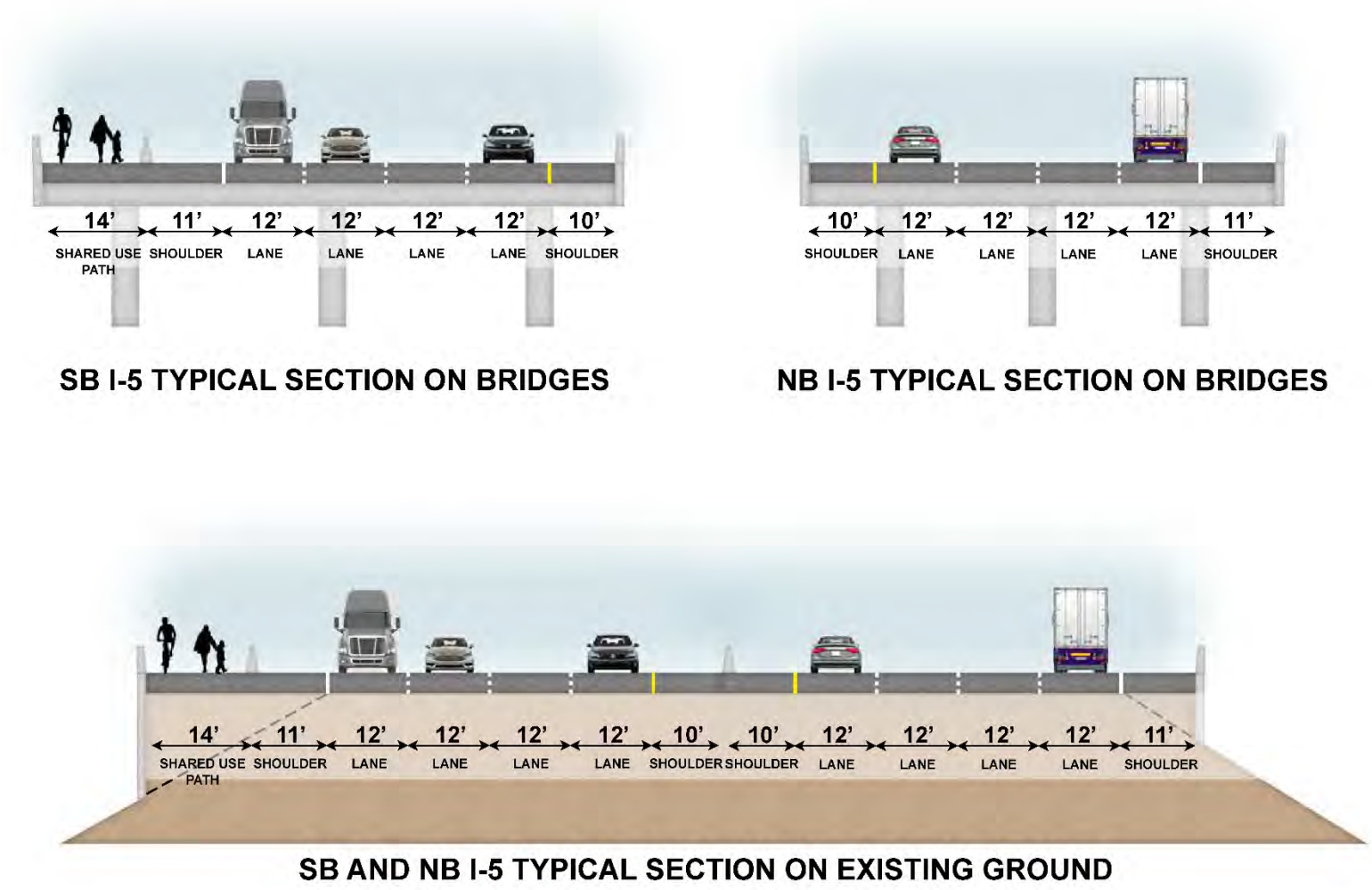


Figure 5. Alternative 3 Conceptual Cross Section

3.4 Alternative 4: Convert GP Lanes to HOV Lanes

Description

Alternative 4 would convert one lane in each direction on this portion of I-5 from GP use to HOV lanes. A shared-use path from Marvin Road Interchange (Exit 111) to Mounts Road Interchange (Exit 116) would be provided to the west of the southbound lanes (see Section 3.5 for more detail). Alternative 4 may include river channel improvements or one of three bridge replacement options with different structure lengths in the Nisqually delta area. Bridge Options A through C are described in Section 3.6.

Considerations

This alternative would provide additional person throughput without widening I-5. This would reduce GP capacity from three to two lanes in each direction.

Alternative 4 may include river channel improvements or one of three bridge replacement options with different structure lengths in the Nisqually delta area. Bridge Options A through C are described in Section 3.6.

3.5 Shared-Use Path

The shared-use path (SUP) is common to all four alternatives and would provide a 4.7-mile continuous facility for pedestrians, bicyclists, and other users from the Marvin Road Interchange vicinity (Exit 111) to the Mounts Road Interchange vicinity (Exit 116). Figure 6 shows a conceptual image of the SUP, showing an actual viewpoint near the Brown Farm Road NE/Nisqually Cut Off Road SE Interchange (Exit 114).

The SUP would be located north of the southbound I-5 travel lanes, have a minimum width of 14 feet, and be separated from traffic by a concrete barrier. The location on the north side of I-5 provides views of the Billy Frank Jr. Nisqually National Wildlife Refuge, the McAllister Creek and Nisqually River deltas, the Puget Sound, and the Olympic Mountains. One or more bump out locations along the path would be provided to allow SUP users to stop and enjoy the view. The path's west and east termini would connect the communities of Lacy/Thurston County and Dupont/Pierce County for people not using a car, improving access to many homes, businesses, and other resources.

The SUP would be within the I-5 limited access boundary. For the west/east termini, path users would access the facility from local roads at or near the vicinity of the Marvin Road and Mounts Road Interchanges. Path access would also be provided at Nisqually Road Interchange, providing a connection to the Billy Frank Jr. Nisqually National Wildlife Refuge. The SUP and its entry and exit points would comply with Americans with Disabilities Act (ADA) requirements for accessibility for persons with disabilities.

Figure 6. Shared-Use Path Conceptual Design

3.6 Bridge Options

The four bridge options have the following characteristics:

- Option A is the shortest option at 3000 feet. This option would replace the existing truss bridges over the Nisqually River and extend east over the north overflow channel.
- Option B at 6000 feet includes the Option bridge over the north overflow channel and extends the bridge over the south overflow channel. This option also includes a widened culvert at the original McAllister Creek crossing.
- Option C at 12,000 feet extends the bridge an additional 6000 feet to the west beyond Option B.
- Option D at 14,000 feet is the long span high level bridge providing the longest and highest bridge structure across the valley.

Figure 7 shows the relative bridge lengths and approximate terminus locations for Bridge Options A-D.

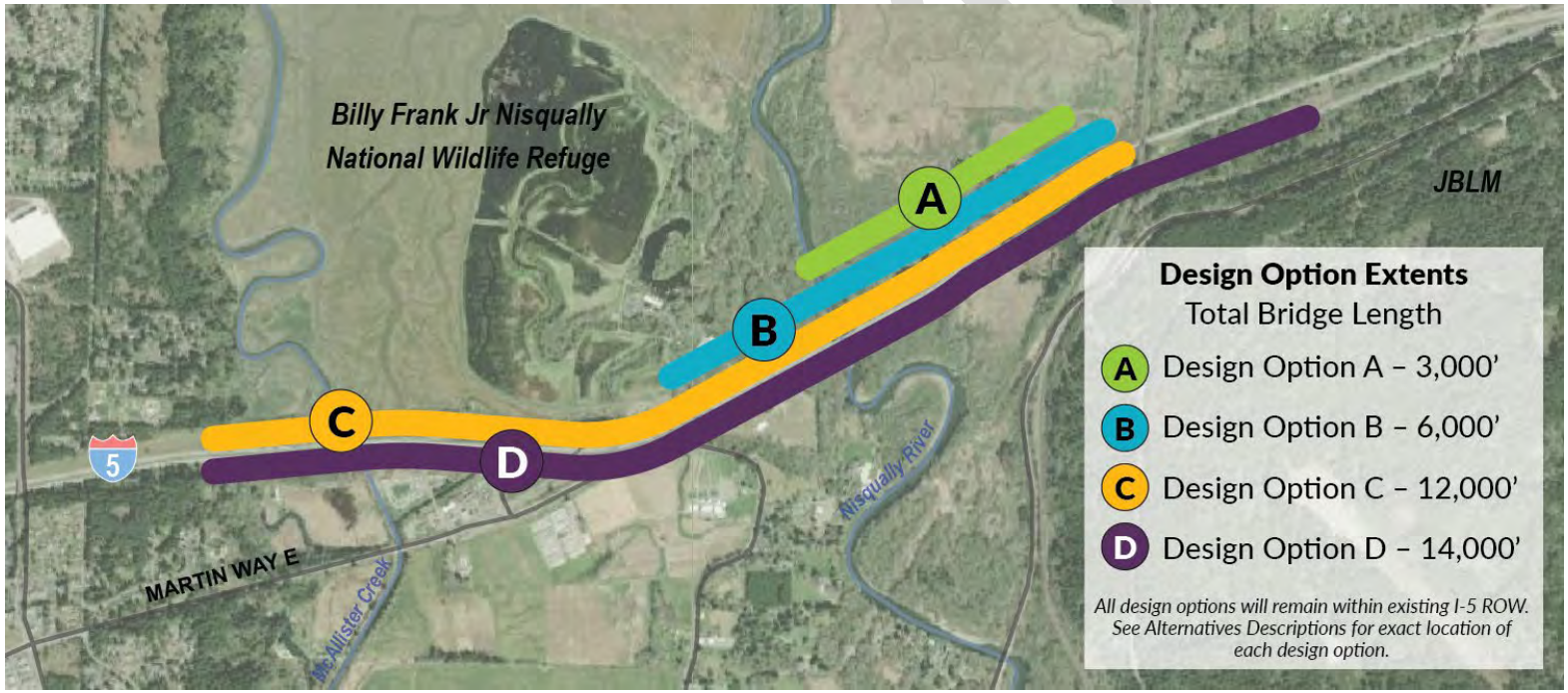


Figure 7. Relative Bridge Lengths and Approximate Terminus Locations

Bridge Option A

Description

Bridge Option A (Figure 8) is associated with all Alternatives, 1 through 4. This bridge option would include replacement of the Nisqually River bridges, fill removal, and an additional bridge structure approximately 3,000 feet in length. This section of I-5 passes through the Nisqually River valley, an environmentally sensitive and important area for Endangered Species Act-listed steelhead and chinook salmon, and the traditional home of the Nisqually Indian Tribe. The Nisqually Indian Tribe is signatory to the Medicine Creek Treaty of December 26, 1854. The treaty established the Nisqually Reservation boundaries and memorialized other rights, including fishing in usual and accustomed grounds. Potential environmental impacts are discussed in Chapter 6: Environmental Considerations.

Considerations

This bridge option would have the shortest elevated structure and the lowest cost compared to the other bridge options. Option A removes fill and extends the bridge structure over the Nisqually River to the North Overflow Channel. This would improve the resiliency of I-5 to withstand the continued movement of the Nisqually River and high water flow events. Option A would not remove fill or add bridge structures west of the Nisqually River. The existing Nisqually interchange would not require reconstruction with Option A.

Figure 8. Bridge Option A

Bridge Option B

Description

Bridge Option B (Figure 9) is associated with all Alternatives, 1 through 4. This bridge option would include replacement of the Nisqually River bridges, fill removal, and an additional bridge structure approximately 6,000 feet in length. This bridge option would also include new bridges and fill removal for a realigned McAllister Creek.

Considerations

This option would have a longer elevated structure compared to Design Option A, resulting in higher costs, but would provide additional environmental benefits. Option B removes fill and extends the bridge structure over the Nisqually River to the North and South Overflow Channels. This would improve the resiliency of I-5 to withstand the continued movement of the Nisqually River and high water flow events. Option B would not remove fill or add bridge structures west of the South Overflow Channel, except for a new bridge and fill removal for realigning McAllister Creek. The existing Nisqually interchange would not require reconstruction with Option B.

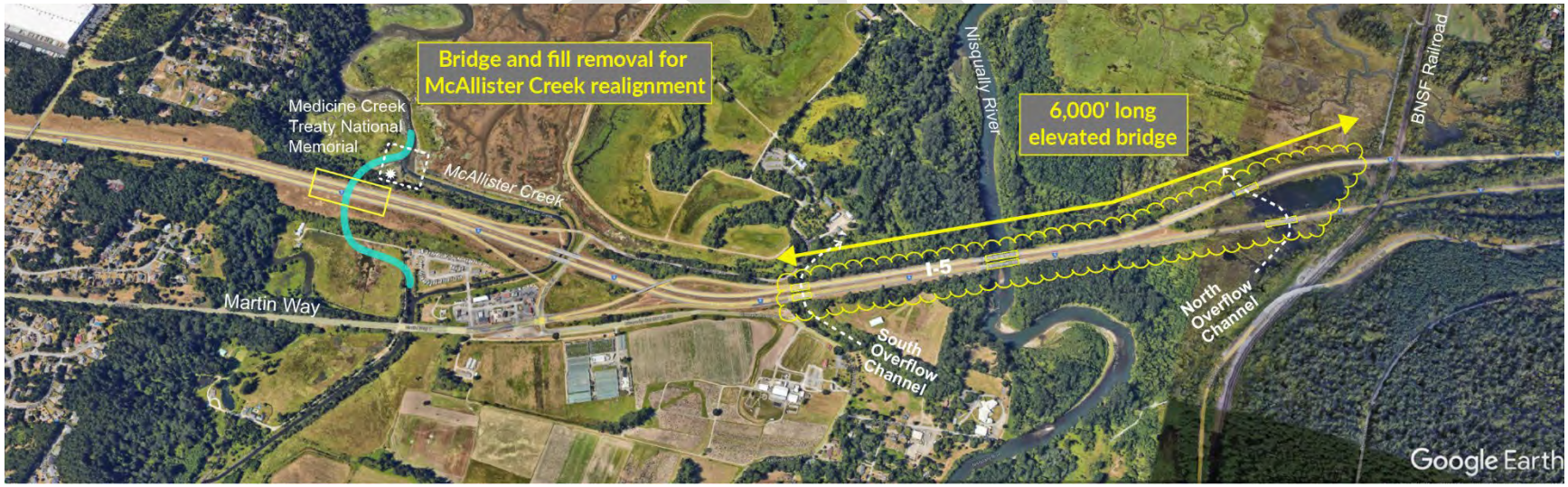


Figure 9. Bridge Option B

Bridge Option C

Description

Bridge Option C (Figure 10) would include replacement of the Nisqually River bridges, fill removal, and an additional bridge structure approximately 12,000 feet in length. This bridge option would also include a new elevated I-5 interchange at Exit 114.

Considerations

Option C would expand fill removal and add a bridge structure to encompass the entire lower elevation area from west of McAllister Creek to the BNSF rail line, including the North and South Overflow Channels. This would improve the resiliency of I-5 to withstand the continued movement of the Nisqually River and high water flow events. Option C also adds bridge structures from the South Overflow Channel to west of the realigned McAllister Creek. The existing Nisqually interchange would require reconstruction with Option C due to the new bridge height. I-5 freeway lanes would be modified to go over the Nisqually Cutoff Road, and ramps would need to be rebuilt to connect to the new elevated I-5 freeway lanes.

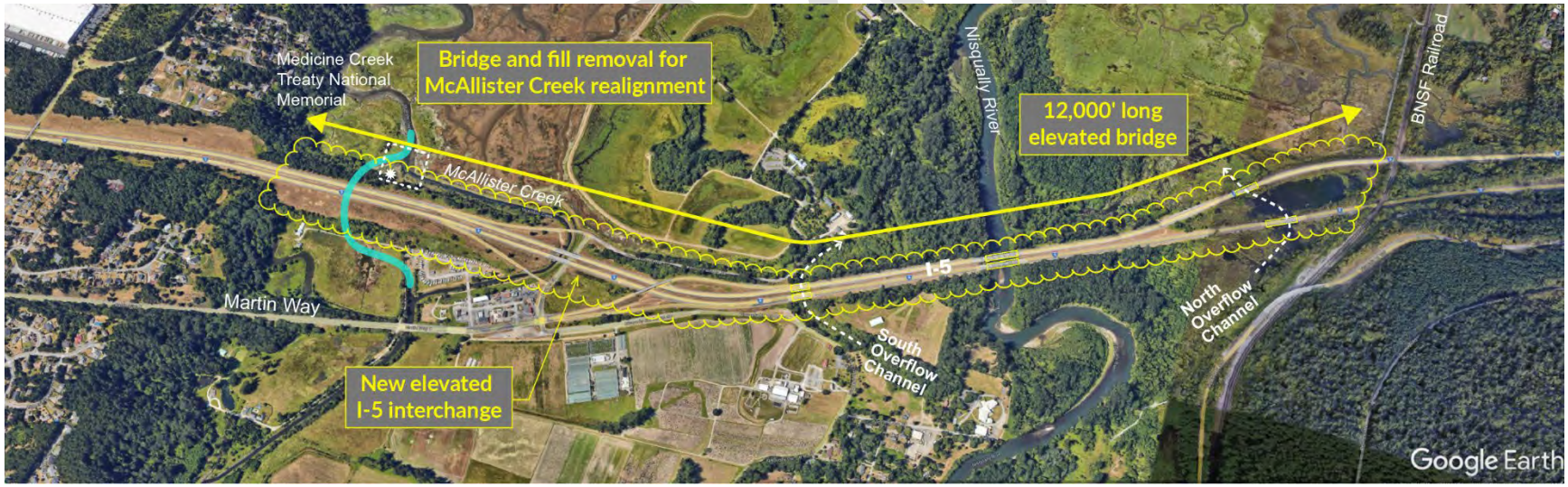


Figure 10. Bridge Option C

Bridge Option D

Description

Bridge Option D (Figure 11) would include a long-span, high-level bridge structure approximately 14,000 feet in length. This bridge option would remove the existing I-5 interchange at Exit 114. The Bridge Option D bridge would be too high for ramp connections to be made to the local roads at the interchange. Access to the Billy Frank Jr. Nisqually National Wildlife Refuge and the Nisqually Indian Tribe Reservation would be provided from the existing Marvin Road and Mounts Road interchanges.

Considerations

Bridge Option D includes the longest and tallest new bridge structure over the Nisqually River and Delta. This bridge option could be constructed while vehicles continued to operate on the existing alignment. The majority of the Bridge Option D alignment would be constructed on new ROW to the south side of the existing I-5 alignment. Bridge Option D was included as an option for alternatives with added lanes (Alternatives 2 and 3), but not alternatives maintaining 3 lanes in each direction (Alternatives 1 and 4). The lack of mobility benefits with Alternative 1 and Alternative 4 is not consistent with the highest cost of this option.

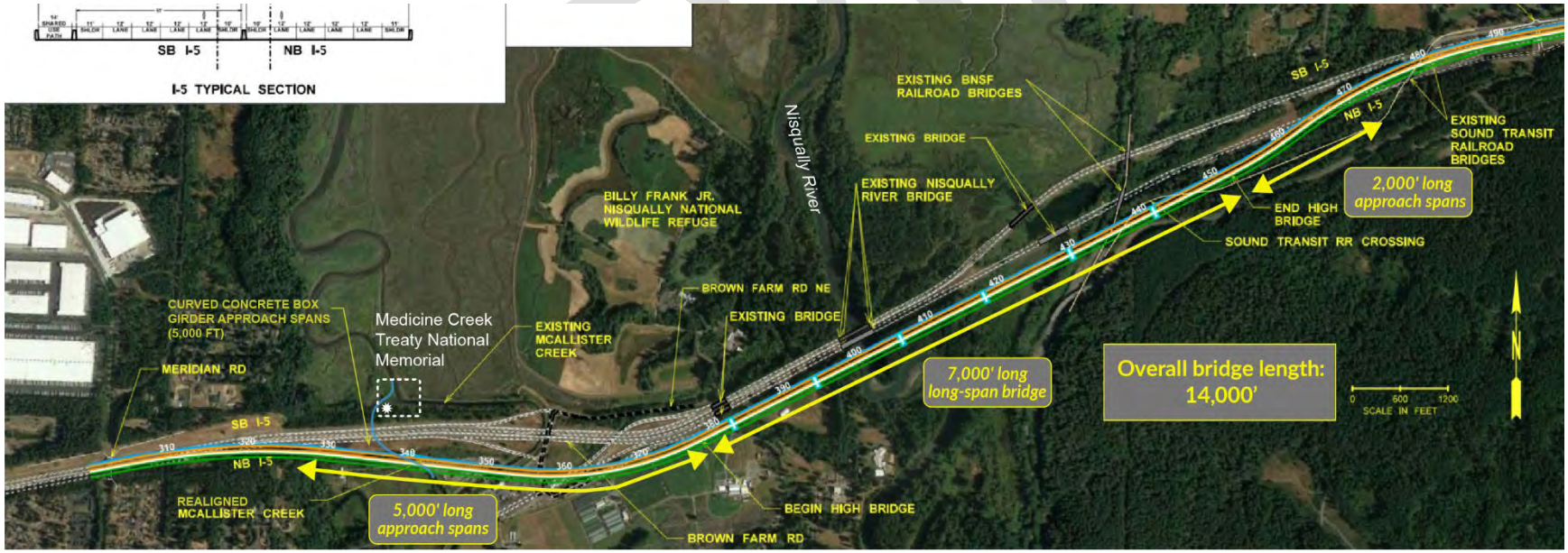


Figure 11. Bridge Option D

Long-Span Bridge Example

The following images in Figure 12 show the Port Mann Bridge in British Columbia, Canada. The Port Mann Bridge is an example of a cable-stayed bridge; this bridge type could be used to accommodate the high-level, long-span portion of the bridge structure over the Nisqually Delta. The Port Mann Bridge is similar in width and height to the Option D bridge. The length of the main cable stay bridge spans for Option D would be two to three times longer than the Port Mann Bridge with five or six towers instead of two.

Figure 12. Port Mann Bridge

Source: Broer.no at Bridgeinfo.net

3.7 Railroad Crossings

Three options are under consideration for crossing the BNSF rail line.

1. Continue to use the existing rail bridges over I-5 but reduced lane and shoulder widths to allow for the additional I-5 lanes under the structures. A separate small bridge or tunnel would be needed for the shared-use path to cross under the rail line.
2. Replace the existing railroad bridges with longer structures to accommodate full-width I-5 lanes and shoulders and the shared-use path. In order to maintain rail traffic during construction, a temporary detour of the rail line would be needed around the work area. This would involve construction of extensive embankments and temporary bridges to accommodate the rail detour. Per discussion with BNSF staff, the detour would need to maintain current track operating speeds.
3. Construct new I-5 bridges over the BNSF rail line. This would be accomplished with minimal impacts to the rail line but would require a long I-5 bridge to provide clearance over the rail line. Per discussion with BNSF staff, the option to bridge I-5 over the railroad is preferred.

The existing Sound Transit rail line structures over I-5 would be replaced to accommodate the additional I-5 carpool lanes. The Sound Transit rail alignment allows for construction of new structures parallel to the existing ones to avoid impacts to rail service during construction of the bridges. Minor impacts to service would be needed to connect the new crossings with the existing lines.

4 ALTERNATIVES EVALUATION SUMMARY

4.1 Evaluation Process

Chapter Overview

- Evaluation criteria used during the initial and detailed screening of alternatives
- Evaluation results and selection of a preferred alternative to advance into NEPA review

The evaluation criteria selected to evaluate the proposed alternatives were developed based on the *Purpose and Need Memorandum* for the study. The Alternatives Screening was completed in two phases: Initial Evaluation and Detailed Evaluation. The Initial Evaluation consisted of a larger number of alternatives at a broader level, which eliminated unsuitable alternatives that did not meet the project's purpose and need. Alternatives with better performance were then advanced to the Detailed Evaluation, which provided a more thorough assessment of each alternative for inclusion in the NEPA documentation. This process was informed by federal, state, and local agencies; tribes; and other advisory-level partners through regular coordination meetings, including the following three advisory groups described in Chapter 2 throughout this PEL process.

Each group reviewed and provided input on the alternatives evaluation process, including review of the evaluation criteria, alternatives considered, initial evaluation, and detailed evaluation. The input received on the alternatives and evaluation criteria through the three advisory groups were incorporated into the alternatives evaluation, as appropriate. A project website also provided the opportunity for the public to provide input on the alternatives identification and evaluation process.

4.2 Baseline Alternative (No Action)

The Baseline Alternative would make no changes to the existing I-5 lane configuration or freeway operations. The existing I-5 roadway consists of three GP lanes in each direction separated by a median that is typically 40 feet in width and wider in some areas. No changes would be made to the Marvin Road (Exit 111), Brown Farm Road NE/Nisqually Cut Off Road SE (Exit 114), or Mounts Road (Exit 116) interchanges. Existing bridges over the Nisqually River, built in 1937 (northbound I-5) and 1967 (southbound I-5), would remain in place. The Baseline Alternative would not address Nisqually River channel migration that is expected to threaten the existing bridges and earthen causeways embankments approaching the bridges. If the channel migration continues in its current direction, substantial amounts of erosion-resistant armoring will be needed to preserve the existing I-5 causeways and bridge

piers. The I-5 causeway across the Nisqually floodplain will continue to impound upstream water during high flow events. Planned and funded projects in the future No Action alternative will be listed in the NEPA documentation.

4.3 Alternatives Development and Evaluation

Initial Alternatives List

The range of reasonable alternatives evaluated in the Initial Evaluation for the *I-5 Marvin Road to Mounts Road* section were identified based on information in the *Interstate 5: Tumwater to Mounts Road Mid- and Long-Range Strategies Report* (April 2020) and the *Interstate 5 Tumwater to Mounts Road PEL Study* (March 2022). This range of alternatives include:

- Alternative 1 – Operations Improvements - Operations, Land Use, Transportation Demand Management, Transit, and Part Time Shoulder Use strategies evaluated separately in the Corridor PEL were combined to form Alternative 1 (Bridge Options A through C). Three GP lanes in each direction would be provided on I-5.
- Alternative 2 – Widen I-5 for HOV lanes (Bridge Options A through D) - Adds one HOV lane in each direction between Marvin Road and Mounts Road; one HOV lane and three GP lanes in each direction would be provided on I-5. The HOV lane is anticipated to operate 24 hours/day and 7 days/week with a 2+ occupancy designation requiring 2 or more people in each vehicle, similar to the I-5 HOV lane operations north of Mounts Road. The HOV lane provides WSDOT with operational flexibility to change the occupancy designation or allow single occupant vehicle use during weekday evenings or weekends.
- Alternative 3 – Widen I-5 for GP lanes (Bridge Options A through D) - Adds one GP lane in each direction between Marvin Road and Mounts Road; four GP lanes in each direction would be provided on I-5.
- Alternative 4 – Convert I-5 lanes from GP to HOV Lanes - Converts an existing GP lane to HOV use in each direction between Marvin Road and Mounts Road (Bridge Options A through C); one HOV lane and two GP lanes in each direction would be provided on I-5.

A SUP is common to all four alternatives and would provide a 4.7-mile continuous facility for pedestrians, bicyclists, and other users from the Marvin Road Interchange (Exit 111) to the Mounts Road Interchange (Exit 116) vicinities. The SUP would have a minimum width of 14 feet, north of the southbound I-5 travel lanes and separated by a concrete barrier. The location on the north side of I-5 provides views of the Billy Frank Jr. Nisqually National Wildlife Refuge, the McAllister Creek and Nisqually River deltas, Puget Sound, and the Olympic Mountains.

Bridge Options A through D for Alternatives 2 and 3 and Bridge Options A through C for Alternatives 1 and 4 explored different bridge length options through the Nisqually River delta area including the Nisqually River crossing. This provided a range of options to consider for I-5 as well as providing ecosystem and habitat mitigation in the Nisqually River delta area.

Initial Evaluation – Purpose and Need

The Initial Evaluation methodology was developed to measure how well each alternative meets the Purpose and Need for the project. Evaluation criteria identified for the Initial Evaluation are based on the Purpose and Need statements for the project and other WSDOT policies, as summarized in Table 4. The analysis in the Initial Evaluation stage is primarily qualitative with some quantitative data used to develop performance ratings. A three-point rating scale was used to evaluate the alternatives, with light green representing low performance, green representing moderate performance, and dark green representing high performance.

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Table 4. Initial Evaluation Criteria and Methodology

Project Purpose Statements	Evaluation Criteria	Methodology (Qualitative Analysis)	Rating (Lower Performing → Higher Performing)
Enhance mobility and connectivity on I-5 for passenger vehicles, freight, transit, and active modes, and provide support for increased person and freight throughput	Accommodates Active Transportation Modes	Does the alternative accommodate active transportation?	3 – Includes low stress[4] nonmotorized facilities
			2 – Includes moderate stress nonmotorized facilities
			1 –Includes high stress nonmotorized facilities
	Accommodates Transit Modes	Does the alternative accommodate transit?	3 – Includes transit facilities entire length of project
			2 – Includes transit facilities for portion of project
			1 –Includes no transit facilities
	Provides Congestion Relief for General Purpose (GP) Vehicles/Trucks	Does the alternative provide congestion relief for GP vehicles and trucks?	3 – Congestion relief for GP vehicles/trucks (greater than 25%)
			2 – Some congestion relief for GP vehicles/trucks (5-25%)
			1 – No congestion relief (less than 5%)
	Provides Congestion Relief for Transit/HOV	Does the alternative provide congestion relief for transit and HOVs?	3 – Congestion relief for HOV/transit (greater than 15%)
			2 – Some congestion relief for HOV/transit (1-15%)
			1 – No congestion relief
	Effects on Adjacent Roadways	Does the alternative improve mobility on arterial roadways?	3 – Improves mobility on arterial streets
			2 – Provides some mobility improvements on arterial streets
			1 – Does not improve mobility on arterial streets
	Increases Person Throughput	Does the alternative increase person throughput?	3 – Increases person throughput
			2 – Moderately increases person throughput
			1 – Does not increase person throughput
	Increases Freight Throughput	Does the alternative increase freight throughput?	3 – Increases freight throughput
			2 – Moderately increases freight throughput
			1 – Does not increase freight throughput
	Complimentary to Local and Tribal Planning	Is the alternative complementary to local and tribal planning efforts, including land use plans and transportation plans?	3 – Complements local planning efforts
			2 – Partially complements local planning efforts
			1 – Does not complement local planning efforts

[4] Level of traffic stress (LTS) scores roadway facilities from 1 to 4 to rate comfortability of the facility for bicyclists and pedestrians, with lower scores indicative of less stress for active transportation users.

Project Purpose Statements	Evaluation Criteria	Methodology (Qualitative Analysis)	Rating (Lower Performing → Higher Performing)
Improve local and mainline I-5 system resiliency	Reduces the Risk of Infrastructure Failures	Does the alternative reduce the risk of infrastructure failure by addressing erosion and channel migration of the Nisqually River?	3 – Removes risks from erosion/channel migration
			2 – Reduces risks from erosion/channel migration
			1 – Does not address erosion/channel migration
	Reduces the Risk of Infrastructure Failures Due to Seismic Activity	Does the alternative increase resiliency of the Nisqually Bridge by enhancing its ability to withstand seismic activity?	3 – Removes risk from seismic activity
			2 – Reduces risk from seismic activity
			1 –Does not address risk from seismic activity
Enable environmental restoration and ecosystem resiliency at the I-5 crossing of the Nisqually River Delta area	Enables Environmental Restoration	Does the alternative improve the availability of and access to treaty resources for tribes by enabling the restoration of environmental functions of the Nisqually River Delta for improving fish passage, building, and maintaining habitat, reducing impacts to river hydraulics and geomorphology, etc.?	3 – Restores all environmental systems
			2 – Restores some environmental systems
			1 – Does not restore environmental systems
	Enables Ecosystem Resiliency	Does the alternative increase resiliency against the impacts of climate change?	3 – Increases resiliency by addressing the impacts associated with extreme river flood events and providing off-channel habitat for fish
			2 – Some improvements for resiliency by partially addressing the impacts associated with extreme river flood events and providing off-channel habitat for fish
			1 – Does not increase resiliency by not addressing the impacts associated with extreme river flood events and providing off-channel habitat for fish
Support economic vitality through reliable and efficient freight movement and access to major employers	Freight Reliability	Does the alternative improve freight reliability and reduce economic impacts of freight delay?	3 – Improves freight reliability
			2 – Partially improves freight reliability
			1 – Does not improve freight reliability
	Multimodal Access to Opportunities (jobs, services, and recreation)	Does the alternative improve access to opportunities (jobs, services, and recreation) by driving, transit, biking, and walking?	3 – Improves access to opportunity
			2 – Maintains access to opportunity
			1 – Does not maintain or improve access to opportunity
	River Navigability	Does the alternative promote equitable access and navigability of the Nisqually River for all waterway users, including the Nisqually Indian Tribe?	3 – Increases navigability
			2 – Does not affect navigability
			1 – Reduces navigability

Project Purpose Statements	Evaluation Criteria	Methodology (Qualitative Analysis)	Rating (Lower Performing → Higher Performing)
Support equitable outcomes	Minimizes Business and Residential Impacts or Displacements	Does the alternative minimize the potential business and residential impacts and displacements, especially for environmental justice (EJ) populations?	3 – No impacts and displacements
			2 – Minimal impacts and displacements
			1 – Moderate impacts and displacements
	Minimizes Negative Impact to Emergency Response	Does the alternative increase response times for emergency responders?	3 – Decreases emergency response times
			2 – No impacts to emergency response times
			1 – Increases emergency response times
	Minimizes Flood Risk Potential for EJ Populations	Does the alternative address the risk of flooding, particularly for EJ populations?	3 – Addresses the impacts associated with extreme river flood events, minimizing impacts to EJ populations
			2 – Partially addresses the impacts associated with extreme river flood events, some impacts to EJ populations
			1 –Does not address the impacts associated with extreme river flood events; impacts to EJ populations
Relative cost of alternatives	Planning-level Cost Comparison	Does the alternative have higher planning-level costs compared to the other alternatives?	3 – Planning-level cost is lower
			2 – Planning-level cost is moderate
			1 – Planning-level cost is higher

Each alternative was assigned a performance rating for each evaluation criteria based on the following methodology.

Accommodates Active Transportation

- High Performance (3): The alternative provides low-stress bicycle and pedestrian facilities (level of traffic stress [LTS 1] or LTS 2).
- Moderate Performance (2): The alternative provides moderate-stress bicycle and pedestrian facilities (LTS 3).
- Low Performance (1): The alternative provides high-stress bicycle and pedestrian facilities (LTS 4).

Accommodates Transit Modes

- High Performance (3): The alternative provides public transportation facilities for the entire length of the project.
- Moderate Performance (2): The alternative provides public transportation facilities for a portion of the project.
- Low Performance (1): The alternative does not provide public transportation facilities.

Provide Congestion Relief for General Purpose (GP) Vehicles/Trucks

- High Performance (3): The alternative provides the highest level of congestion relief for GP vehicles/trucks (improves freeway corridor travel times compared to future No Build scenario by more than 25 percent).
- Moderate Performance (2): The alternative provides some congestion relief for GP vehicles/trucks (improves freeway corridor travel times compared to future No Build scenario by between 5 and 25 percent).
- Low Performance (1): The alternative minimally or does not provide congestion relief for GP vehicles/trucks (improves freeway corridor travel times compared to future No Build scenario by less than 5 percent.

Provide Congestion Relief for Transit and HOVs

- High Performance (3): The alternative provides the highest level of congestion relief for transit/HOVs (improves max throughput travel time index compared to future No Build scenario by more than 15 percent).
- Moderate Performance (2): The alternative provides some congestion relief for transit/HOVs (improves max throughput travel time index compared to future No Build scenario by 1 to 15 percent).
- Low Performance (1): The alternative does not provide congestion relief for transit/HOVs.

Effects on Adjacent Roadways

- High Performance (3): The alternative improves mobility on adjacent arterial streets by reducing diversion from I-5.
- Moderate Performance (2): The alternative provides some mobility improvements on arterial streets by reducing some diversion from I-5; however, some diversion would still occur.
- Low Performance (1): The alternative does not improve mobility on arterial streets by reducing diversion from I-5; diversion would continue to occur and would reduce mobility.

Increases Person Throughput

- High Performance (3): The alternative increases person throughput on I-5.
- Moderate Performance (2): The alternative moderately increases person throughput on I-5; results in throughput reductions for some users.
- Low Performance (1): The alternative does not or minimally increases person throughput on I-5.

Increases Freight Throughput

- High Performance (3): The alternative increases freight throughput on I-5.
- Moderate Performance (2): The alternative moderately increases freight throughput on I-5.
- Low Performance (1): The alternative does not or minimally increases freight throughput on I-5.

Complementary to Local Planning

- High Performance (3): The alternative is complementary to both tribal and local jurisdiction planning efforts.
- Moderate Performance (2): The alternative is complimentary to either tribal or local jurisdiction planning efforts, or the alternative is neither supportive nor contrary to planning efforts.
- Low Performance (1): The alternative does not compliment or is contrary to tribal or local planning efforts.

Reduces the Risk of Infrastructure Failure

- High Performance (3): The alternative addresses channel migration and removes the risk of infrastructure failures due to erosion and flooding.

- Moderate Performance (2): The alternative partially addresses channel migration and reduces the risk of infrastructure failures due to erosion and flooding.
- Low Performance (1): The alternative does not address channel migration and does not remove/reduce the risk of infrastructure failures due to erosion and flooding.

Reduces the Risk of Infrastructure Failures Due to Seismic Activity

- High Performance (3): The alternative removes the risk of infrastructure failure due to seismic vulnerability.
- Moderate Performance (2): The alternative reduces the risk of infrastructure failure due to seismic vulnerability.
- Low Performance (1): The alternative does not reduce or remove the risk of infrastructure failure to due seismic vulnerability.

Enables Environmental Restoration

- High Performance (3): The alternative enables the restoration of environmental systems, addressing all aspects of environmental conditions, such as fish passage, habitat, wetlands, river hydraulics, geomorphology.
- Moderate Performance (2): The alternative enables the restoration of some environmental systems, addressing some but not all aspects of the environmental conditions.
- Low Performance (1): The alternative does not enable the restoration of environmental systems.

Enables Ecosystem Resiliency

- High Performance (3): The alternative increases resiliency against climate change by addressing the impacts associated with extreme river flood events and providing off-channel habitat for fish.
- Moderate Performance (2): The alternative provides some improvements for resiliency against climate change by partially addressing the impacts associated with extreme flood events.
- Low Performance (1): The alternative does not increase resiliency against climate change.

Freight Reliability

- High Performance (3): The alternative results in the lowest amount of future freight delay in the corridor.
- Moderate Performance (2): The alternative results in a moderate amount of future freight delay in the corridor.
- Low Performance (1): The alternative results in the highest amount of freight delay in the corridor.

Multimodal Access to Opportunity

- High Performance (3): The alternative improves access to jobs, recreation, and services through improved transportation options to and from commercial and recreational areas in Lacey, Nisqually, JBLM, Camp Murray, and nearby developments.
- Moderate Performance (2): The alternative maintains but does not substantially improve access to jobs, recreation, and services through improved transportation options.
- Low Performance (1): The alternative does not address or contribute to reduced access to jobs, recreation, and services through improved transportation options.

River Navigability

- High Performance (3): The alternative improves the ability of all users to navigate the Nisqually River, including the Nisqually Indian Tribe.
- Moderate Performance (2): The alternative maintains the ability of all users to navigate the Nisqually River, including the Nisqually Indian Tribe.
- Low Performance (1): The alternative reduces the ability of all users to navigate the Nisqually River, including the Nisqually Indian Tribe.

Minimizes Business and Residential Impacts or Displacements

- High Performance (3): The alternative does not result in disproportionate residential or business property impacts or displacements to EJ populations.
- Moderate Performance (2): The alternative results in minimal disproportionate residential or business property impacts or displacements to EJ populations.
- Low Performance (1): The alternative results in moderate disproportionate residential or business property impacts or displacements to EJ populations.

Minimizes Negative Impact to Emergency Response

- High Performance (3): The alternative decreases emergency vehicle response times in the project area compared to the future No Build alternative.
- Moderate Performance (2): The alternative has no impacts to emergency vehicle response times in the project area compared to the future No Build alternative.

- Low Performance (1): The alternative increases emergency vehicle response times in the project area compared to the future No Build alternative.

Minimizes Flood Risk for EJ Populations

- High Performance (3): The alternative addresses the impacts associated with extreme river flood events, minimizing impacts to EJ populations.
- Moderate Performance (2): The alternative partially addresses the impacts associated with extreme river flood events; some impacts to EJ populations.
- Low Performance (1): The alternative does not address the impacts associated with extreme river flood events; impacts to EJ populations.

Relative Cost of Alternatives

- High Performance (3): Lower range planning-level cost.
- Moderate Performance (2): Middle range planning-level cost.
- Low Performance (1): Higher range planning-level cost.

Initial Evaluation Results

The alternatives evaluation provides a direct linkage between the project purpose and need and the recommended elimination of unreasonable alternatives and options. The project Purpose and Need is defined in six categories: Four Purpose and Need categories – ***Enhance Mobility and Connectivity, System Resiliency, Environmental Restoration and Ecosystem Resiliency***, ***Economic Vitality*** – and two WSDOT policy categories – ***Equitable Outcomes*** and ***Relative Cost***. An alternative or option is defined as "unreasonable" if it does not meet the project Purpose and Need in one or more of the six categories.

The initial evaluation results, by criterion, alternative, and option, are summarized in Table 5. Initial evaluation results were presented to the ACG, TAG, and EAG meetings in March. The combined evaluation results were used to identify which alternatives or options are unreasonable based on not meeting the project purpose and need in one or more of the project purpose categories

Table 5. Initial Evaluation Results

	Alternatives	Alternative 1 – Operations Improvements			Alternative 2 – Widen I-5 for HOV Lanes				Alternative 3 – Widen I-5 for GP Lanes				Alternative 4 – Convert I-5 Lanes from GP to HOV Lanes		
	Bridge Options	A	B	C	A	B	C	D	A	B	C	D	A	B	C
Enhance mobility and connectivity on I-5 for passenger vehicles, freight, transit, and active modes and provide support for **increased person and freight throughput**	Accommodates Active Transportation Modes														
	Accommodates Transit Modes														
	Provides Congestion Relief for General Purpose (GP) Vehicles/Trucks														
	Provides Congestion Relief for Transit/HOV														
	Effects on Adjacent Roadways														
	Increases Person Throughput														
	Increases Freight Throughput														
	Complementary to Local and Tribal Planning														
Improve local and mainline I-5 **system resiliency**	Reduces the Risk of Infrastructure Failures														
	Reduces the Risk of Infrastructure Failures Due to Seismic Activity														
Enable **environmental restoration and ecosystem resiliency** at the I-5 crossing of the Nisqually River Delta area	Enables Environmental Restoration														
	Enables Ecosystem Resiliency														
Support **economic vitality** through reliable and efficient freight movement and access to major employers	Freight Reliability														
	Multimodal Access to Opportunities (Jobs, services, and Recreation)														
	River Navigability														
Support **equitable** outcomes	Minimizes Business and Residential Impacts or Displacements														
	Minimizes Negative Impact to Emergency Response														
	Minimizes the Flood Risk Potential for EJ Populations														
Relative cost of alternatives	Planning-level Cost Comparison														

Key: Lower Performing — Higher Performing

Initial Evaluation Summary:

- Alternatives 2 and 3 rate highest overall, with more high ratings than Alternatives 1 and 4.
- Alternatives 1 and 4 rate lowest overall, with Alternative 1 rated slightly lower than Alternative 4.
- Options B and C rate higher overall than Option D.
- Option A rates relatively high, similar to Options B and C, except for lower ratings in the Environmental Restoration and Ecosystem Resiliency category .
- Option D rates low in the Support Equitable Outcomes and Relative Cost of Alternatives categories.

Alternatives Not Advancing to the Detailed Evaluation

Based on the initial evaluation, ***Alternative 1 – Operations Improvements*** and ***Alternative 4 – Lane Conversion from GP to HOV lane*** are unreasonable and not recommended for advancement into the detailed evaluation because they do not meet the project Purpose and Need in the ***Enhance Mobility and Connectivity*** and ***Economic Vitality*** categories. Alternative 1 and Alternative 4 perform low in the ***Enhance Mobility and Connectivity*** category, with overall higher traffic congestion for GP vehicles, transit, and trucks. Alternatives 1 and 4 also perform low in the ***Economic Vitality*** category, with substantially higher travel times on I-5 for trucks and freight movement.

Specific Purpose and Need and WSDOT Policy categories where Alternative 1 and Alternative 4 perform low include:

- ***Alternative 1 – Operations Improvements*** does not add capacity to I-5 for GP vehicles and trucks or HOV/transit vehicles.
  - Alternative 1 has slower travel times and higher vehicle delay, and was rated low overall in the ***Enhance Mobility and Connectivity*** category.
  - Alternative 1 performed low/moderate in the ***Economic Vitality*** category primarily because of the lack of any congestion reduction or accessibility benefits for GP vehicles, transit, or trucks.
  - In the ***System Resiliency*** and ***Environmental Restoration and Ecosystem Resiliency*** categories, Alternative 1 was rated moderate-high; performance differences occur among Options A through D only.
  - In the ***Equitable Outcomes*** category, all alternatives performed the same except for the Emergency Response category, with low ratings for Alternative 1.
  - In the ***Relative Cost*** category, Alternative 1 was rated low to high depending on the bridge in Options A through D.
- ***Alternative 4 – Lane Conversion from GP to HOV lane*** provides added capacity for HOV/transit but reduces capacity for GP/trucks, resulting in slower travel times and higher vehicle delay.
  - Alternative 4 has slower travel times and higher vehicle delay and was rated low-moderate overall in the ***Enhance Mobility and Connectivity*** category.
  - Alternative 4 was rated low/moderate in the ***Economic Vitality*** category because the general-purpose lane conversion to an HOV lane would increase travel time for freight and GP vehicles.

- In the ***System Resiliency*** and ***Environmental Restoration and Ecosystem Resiliency*** categories, Alternative 4 rated high; performance differences occur among Options A through D only.
- In the ***Equitable Outcomes*** category, all alternatives were rated the same except for the Emergency Response criteria, with low/moderate performance for Alternative 4. Emergency response times would increase due to increased congestion.
- In the ***Relative Cost*** category, all alternatives performed the same with primary cost differences occurring among Options A through D.

Bridge Options Not Advancing to the Detailed Evaluation

Based on the Initial Evaluation results, ***Option D – High-level, long-span bridge*** is unreasonable and would not advance to the Detailed Evaluation because of low ratings in two of the four Purpose and Need categories, ***Enhance Mobility and Connectivity and Economic Vitality***, and ***Equitable Outcomes and Relative Cost*** categories. For Option D, ramp connections at the Brown Farm Road NE/Nisqually Cut Off Road SE interchange are not feasible due to the height of the high-level, long-span bridge. The long, steep interchange ramps would not be practicable to construct. Option D also has the highest estimated cost, more than double the estimated cost of the next highest Option C. Purpose and Need and WSDOT Policy categories where Option D rates low include:

- In the ***Enhance Mobility and Connectivity*** category, Option D performs low for the Improves Mobility on Arterial Streets and Complements Local Planning criteria. Option D would result in closure of the Brown Farm Road NE/Nisqually Cut Off Road SE interchange due to the height of the high-level, long-span bridge. This would result in longer travel times to access businesses, residences, and the Billy Frank Jr. Nisqually National Wildlife Refuge via the Marvin Road or Mounts Road interchange and local arterial streets.
- In the ***Economic Vitality*** category, Option D was rated low for the Improves Access to Opportunities (jobs, recreation, services) criteria due to the closure of the Brown Farm Road NE/Nisqually Cut Off Road SE interchange.
- In the ***Equitable Outcomes*** category, Option D had a low rating for the Emergency Response criteria. Option D would increase emergency response times due to increased travel times from closure of the Brown Farm Road NE/Nisqually Cut Off Road SE interchange.
- In the ***Relative Cost*** category, Option D was rated low due to the highest estimated project cost.

Based on the Initial Evaluation, ***Options A, B, and C*** are recommended for advancement to the Detailed Evaluation. These options include fill removal and reconstruction of I-5 on a bridge structure ranging from 3,000 to 12,000 lineal feet in the Nisqually River delta

area. These options performed higher overall in the Initial Evaluation than ***Option D – High-level, long-span bridge*** (14,000 lineal feet), which is unreasonable and not recommended for advancement to the Detailed Evaluation.

Detailed Evaluation – Preferred Alternative

The highest performing alternatives from the Initial Evaluation phase were advanced into the Detailed Evaluation. These alternatives included Alternative 2 – Widen I-5 for HOV Lanes and Alternative 3 – Widen I-5 for GP Lanes. Both alternatives add one lane in each direction from Marvin Road to Mounts Road and performed higher overall compared to Alternative 1 – Operations Improvements and Alternative 4 – Lane Conversion from GP to HOV lane:

- In the ***Enhance Mobility and Connectivity*** category, Alternatives 2 and 3 improve travel times and reduce congestion for GP vehicles/trucks and HOV/transit vehicles.
- In the ***Economic Vitality*** category, Alternatives 2 and 3 perform high in the Freight Reliability and Access to Opportunity criteria.
- In the System Resiliency and ***Environmental Restoration*** and ***Ecosystem Resiliency*** categories, Alternative 2 and Alternative 3 are rated moderate to high and rating differences occur among Options A through D only.
- In the ***Equitable Outcomes*** category, Alternatives 2 and 3 had high ratings in the Emergency Response criteria due to decreased emergency response times from reduced congestion.
- In the ***Relative Cost*** category, all alternatives were rated the same with primary cost differences occurring among Options A through D.

Bridge Options A through C for Alternatives 2 and 3 explore different options to widen I-5 through the Nisqually delta area including the Nisqually River crossing. This provides a range of options to consider for adding capacity to I-5 and providing ecosystem and habitat mitigation in the Nisqually River delta area.

The Detailed Evaluation criteria is consistent with the Initial Evaluation criteria but includes one additional measure of “Consistency with WSDOT Policies.” The Detailed Evaluation methodology also evaluates each alternative on a five-point scale, compared to a three-point scale used in the Initial Evaluation. This provides additional differentiation on each alternative’s performance. Evaluation criteria identified for the Detailed Evaluation were based on the purpose and need statements for the project, as summarized in Table 6. The data used in the analysis for the Detailed Evaluation is both qualitative and quantitative.

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Table 6. Detailed Evaluation Criteria and Methodology

Project Purpose Statements	Evaluation Criteria	Methodology (Qualitative Analysis)	Rating (Lower Performing → Higher Performing)
Enhance mobility and connectivity on I-5 for passenger vehicles, freight, transit, and active modes and provide support for increased person and freight throughput	Accommodates Active Transportation Modes	Does the alternative accommodate active transportation?	5 – Includes LTS 1 nonmotorized facilities
			4 – Includes LTS 2 nonmotorized facilities
			3 – Includes LTS 3 nonmotorized facilities
			2 – Includes LTS 4 nonmotorized facilities
			1 – Does not include nonmotorized facilities
	Accommodates Transit Modes	Does the alternative accommodate transit?	5 – Includes dedicated transit-only facilities the entire length of project
			4 – Includes transit facilities (not dedicated) the entire length of project
			3 – Includes dedicated transit-only facilities for portion of the project
			2 – Includes transit facilities (not dedicated) for portion of the project
			1 –Includes no transit facilities
	Provides Congestion Relief for General Purpose (GP) Vehicles/Trucks	Does the alternative provide congestion relief for GP vehicles and trucks?	5 – High congestion relief for GP vehicles/freight (greater than 20%)
			4 – Moderate congestion relief for GP vehicles/freight (15-20%)
			3 – Some congestion relief for GP vehicles/freight (10-15%)
			2 – Low congestion relief for GP vehicles/freight (5-10%)
			1 – Minimal or no congestion relief for GP vehicles/freight (less than 5%)
	Provides Congestion Relief for Transit/ HOV	Does the alternative provide congestion relief for transit and HOVs?	5 – High congestion relief for Transit/HOV (greater than 20%)
			4 – Moderate congestion relief for Transit/HOV (15-20%)
			3 – Some congestion relief for Transit/HOV (10-15%)
			2 – Low congestion relief for Transit/HOV (5-10%)
			1 – Minimal or no congestion relief for Transit/HOV (less than 5%)
	Effects on Adjacent Roadways	Does the alternative improve mobility on arterial roadways?	5 – High improvement in mobility on arterial streets
			4 – Moderate improvement in mobility on arterial streets
			3 – Some improvement in mobility on arterial streets
			2 – Low improvement in mobility on arterial streets
			1 – Does not improve mobility on arterial streets
	Increases Person Throughput	Does the alternative increase person throughput?	5 – High increase in person throughput for GP vehicles (greater than 15%)
			4 – Moderate increase in person throughput for GP vehicles (10-15%)
			3 – Some increase in person throughput for GP vehicles (5-10%)
			2 – Low increase in person throughput for GP vehicles (0-5%)
			1 – Minimal or no increase in person throughput for GP vehicles
	Complimentary to Local and Tribal Planning	Is the alternative complementary to local and tribal planning efforts, including land use plans and transportation plans?	5 – Complements local planning efforts
			3 – Partially complements local planning efforts
			1 – Does not complement local planning efforts
	Consistency with WSDOT Policies	Is the alternative consistent with WSDOT Strategic Plan Vision for a Safe, Sustainable, and Integrated Multimodal Transportation System?	5 – Consistent with WSDOT Policy
			3 – Partially Consistent with WSDOT Policy
			1 – Not Consistent with WSDOT Policy

Project Purpose Statements	Evaluation Criteria	Methodology (Qualitative Analysis)	Rating (Lower Performing / Higher Performing)
Improve local and mainline I-5 system resiliency	Reduces the Risk of Infrastructure Failures	Does the alternative reduce the risk of infrastructure failure by addressing erosion and channel migration of the Nisqually River?	5 – Removes risks from erosion/channel migration in the entire river delta area
			4 – Removes risks from erosion/channel migration in most of river delta area
			3 – Removes risks from erosion/channel migration in some of the river delta area
	Reduces the Risk of Infrastructure Failures Due to Seismic Activity	Does the alternative increase resiliency of the Nisqually Bridge by enhancing its ability to withstand seismic activity?	5 – Removes risk from seismic activity
			3 – Reduces risk from seismic activity
			1 – Does not address risk from seismic activity
Enable environmental restoration and ecosystem resiliency at the I-5 crossing of the Nisqually River Delta area	Enables Environmental Restoration	Does the alternative improve the availability of and access to treaty resources for tribes by enabling the restoration of environmental functions of the Nisqually River Delta for improving fish passage, building, and maintaining habitat, reducing impacts to river hydraulics and geomorphology, etc.?	5 – Enables restoration of all environmental systems in the entire river delta area
			4 – Enables restoration of environmental systems in most of the Nisqually River Delta area
			3 – Enables restoration of environmental systems in some of the Nisqually River Delta area
			2 – Enables restoration of environmental systems in a small portion of river delta area
			1 – Does not enable restoration of environmental systems
	Enables Ecosystem Resiliency	Does the alternative increase resiliency against the impacts of climate change?	5 – Addresses impacts associated with flood events in the entire river delta area
			4 – Addresses impacts associated with flood events in most overflow channels in the Nisqually River Delta area
			3 – Addresses impacts associated with flood events in some overflow channels in the Nisqually River Delta area
			2 – Partially addresses impacts associated with flood events in some overflow channels in the Nisqually River Delta area
			1 – Does not address the impacts associated with flood events in some overflow channels in the Nisqually River Delta area
Support economic vitality through reliable and efficient freight movement and access to major employers	Freight Reliability	Does the alternative improve freight reliability and reduce economic impacts of freight delay?	5 – Provides high improvement in freight reliability
			4 – Provides moderate improvement in freight reliability
			3 – Provides some improvement in freight reliability
			2 – Provides minimal improvement in freight reliability
			1 – Does not improve freight reliability
	Multimodal Access to Opportunities (jobs, services, and recreation)	Does the alternative improve access to opportunities (jobs, services, and recreation) by driving, transit, biking, and walking?	5 – Improves access to opportunity
			3 – Maintains access to opportunity
			1 – Does not maintain or improve access to opportunity
	River Navigability	Does the alternative promote equitable access and navigability of the Nisqually River for all waterway users, including the Nisqually Indian Tribe?	5 – Increases navigability for all users
			3 – Does not affect navigability
			1 – Reduces navigability

Project Purpose Statements	Evaluation Criteria	Methodology (Qualitative Analysis)	Rating (Lower Performing / Higher Performing)
Support equitable outcomes	Minimizes Business and Residential Impacts or Displacements	Does the alternative minimize the potential business and residential impacts and displacements, especially for EJ populations?	5 – No impacts and displacements
			4 – Minimal impacts and displacements (up to 3)
			3 – Some impacts and displacements (up to 8)
			2 – Moderate impacts and displacements (up to 10)
			1 – High impacts and displacements (more than 10)
	Minimizes Negative Impact to Emergency Response	Does the alternative increase response times for emergency responders?	5 – Decreases emergency response times
			4 – No impacts to emergency response times
			3 – Minimal increase to emergency response times
			2 – Moderate increase to emergency response times
			1 – High increases emergency response times
	Minimizes Flood Risk Potential for EJ Populations	Does the alternative address the risk of flooding, particularly for EJ populations?	5 – Addresses the impacts associated with extreme river flood events and sea level rise in the entire river delta area, no impacts to EJ populations
			4 – Addresses the impacts associated with extreme river flood events and sea level rise in most of river delta area, no impacts to EJ populations
			3 – Partially addresses the impacts associated with extreme river flood events and sea level rise in entire river delta area, some impacts to EJ populations
			2 – Partially addresses the impacts associated with extreme river flood events and sea level rise in some of river delta area, some impacts to EJ populations
			1 – Does not address the impacts associated with extreme river flood events and sea level rise; impacts to EJ populations
Relative Cost of Alternatives	Planning-level Cost Comparison	Does the alternative have higher planning-level costs compared to the other alternatives?	5 – Lowest planning-level cost
			4 – Lower planning-level cost
			3 – Moderate planning-level cost
			2 – Higher planning-level cost
			1 – Highest planning-level cost

1

Each alternative was assigned a performance rating for each evaluation criteria based on the following methodology.

Accommodates Active Transportation

- High Performance (5): The alternative provides low-stress bicycle and pedestrian facilities (LTS 1).
- Higher Performance (4): The alternative provides lower stress bicycle and pedestrian facilities (LTS 2).
- Moderate Performance (3): The alternative provides moderate-stress bicycle and pedestrian facilities (LTS 3).
- Lower Performance (2): The alternative provides high-stress bicycle and pedestrian facilities (LTS 4).
- Low Performance (1): The alternative does not provide bicycle and pedestrian facilities.

Accommodates Transit Modes

- High Performance (5): The alternative provides dedicated (transit-only) public transportation facilities for the entire length of the project.
- Higher Performance (4): The alternative provides public transportation facilities (not dedicated) for the entire length of the project.
- Moderate Performance (3): The alternative provides dedicated (transit-only) public transportation facilities for a portion of the project.
- Lower performance (2): The alternative provides public transportation facilities (not dedicated) for a portion of the project.
- Low Performance (1): The alternative does not provide public transportation facilities.

Provide Congestion Relief for General Purpose (GP) Vehicles/Trucks

- High Performance (5): The alternative provides the highest level of congestion relief for GP vehicles/trucks (improves freeway corridor travel times compared to future No Build scenario by more than 20 percent).
- Higher Performance (4): The alternative provides a higher level of congestion relief for GP vehicles/trucks (improves freeway corridor travel times compared to future No Build scenario by between 15 and 20 percent).
- Moderate Performance (3): The alternative provides some congestion relief for GP vehicles/trucks (improves freeway corridor travel times compared to future No Build scenario by between 10 and 15 percent).

- Lower Performance (2): The alternative provides lower congestion relief for GP vehicles/trucks (improves freeway corridor travel times compared to future No Build scenario by between 5 and 10 percent).
- Low Performance (1): The alternative minimally or does not provide congestion relief for GP vehicles/trucks (improves freeway corridor travel times compared to future No Build scenario by less than 5 percent).

Provide Congestion Relief for Transit and HOVs

- High Performance (5): The alternative provides the highest level of congestion relief for transit/HOVs (improves freeway corridor travel times compared to future No Build scenario by more than 20 percent).
- Higher Performance (4): The alternative provides a higher level of congestion relief for transit/HOVs (improves freeway corridor travel times compared to future No Build scenario by between 15 and 20 percent).
- Moderate Performance (3): The alternative provides some congestion relief for transit/HOVs (improves freeway corridor travel times compared to future No Build scenario by between 10 and 15 percent).
- Lower Performance (2): The alternative provides lower congestion relief for transit/HOVs (improves freeway corridor travel times compared to future No Build scenario by between 5 and 10 percent).
- Low Performance (1): The alternative minimally or does not provide congestion relief for transit/HOVs (improves freeway corridor travel times compared to future No Build scenario by less than 5 percent).

Effects on Adjacent Roadways

- High Performance (5): The alternative provides a high improvement in mobility on adjacent arterial streets by reducing diversion from I-5.
- Higher Performance (4): The alternative provides a moderate improvement in mobility on adjacent arterial streets by reducing diversion from I-5.
- Moderate Performance (3): The alternative provides some mobility improvements on arterial streets by reducing some diversion from I-5; however, some diversion would still occur.
- Lower performance (2): The alternative provides minimal mobility improvements on arterial streets by minimally reducing diversion from I-5.
- Low Performance (1): The alternative does not improve mobility on arterial streets by reducing diversion from I-5; diversion would continue to occur and would reduce mobility.

Increases Person Throughput

- High Performance (5): The alternative provides the highest increase in person throughput on I-5 (greater than 15 percent).
- Higher Performance (4): The alternative provides a moderate increase in person throughput on I-5 (between 10 and 15 percent).
- Moderate Performance (3): The alternative provides some increase in person throughput on I-5 (between 5 and 10 percent).
- Lower Performance (2): The alternative provides a low increase in person throughput on I-5 (between 0 and 5 percent).
- Low Performance (1): The alternative does not increase person throughput on I-5.

Increases Freight Throughput

- High Performance (5): The alternative provides the highest increase in freight throughput on I-5 (greater than 15 percent).
- Higher Performance (4): The alternative provides a moderate increase in freight throughput on I-5 (between 10 and 15 percent).
- Moderate Performance (3): The alternative provides some increase in freight throughput on I-5 (between 5 and 10 percent).
- Lower Performance (2): The alternative provides a low increase in freight throughput on I-5 (between 0 and 5 percent).
- Low Performance (1): The alternative does not increase freight throughput on I-5.

Complementary to Local Planning

- High Performance (5): The alternative is complementary to both tribal and local jurisdiction planning efforts.
- Moderate Performance (3): The alternative is complimentary to either tribal or local jurisdiction planning efforts, or the alternative is neither supportive nor contrary to planning efforts.
- Low Performance (1): The alternative does not compliment or is contrary to tribal or local planning efforts.

Consistency with WSDOT Policies

- High Performance (5): The alternative meets WSDOT Strategic Plan Vision for a Safe, Sustainable, and Integrated Multimodal Transportation System.
- Moderate Performance (3): The alternative partially meets WSDOT Strategic Plan Vision for a Safe, Sustainable, and Integrated Multimodal Transportation System.
- Low Performance (1): The alternative does not meet WSDOT Strategic Plan Vision for a Safe, Sustainable, and Integrated Multimodal Transportation System.

Reduces the Risk of Infrastructure Failure

- High Performance (5): The alternative addresses channel migration and removes the risk of infrastructure failures due to erosion and flooding in the entire river delta area.
- Higher Performance (4): The alternative addresses channel migration and removes the risk of infrastructure failures due to erosion and flooding in most of the river delta area.
- Moderate Performance (3): The alternative addresses channel migration and removes the risk of infrastructure failures due to erosion and flooding in some of the river delta area.
- Lower Performance (2): The alternative addresses channel migration and removes the risk of infrastructure failures due to erosion and flooding in a small portion of the river delta area.
- Low Performance (1): The alternative does not address channel migration and does not remove/reduce the risk of infrastructure failures due to erosion and flooding.

Reduces the Risk of Infrastructure Failures Due to Seismic Activity

- High Performance (5): The alternative removes the risk of infrastructure failure due to seismic vulnerability.
- Moderate Performance (3): The alternative reduces the risk of infrastructure failure due to seismic vulnerability.
- Low Performance (1): The alternative does not reduce or remove the risk of infrastructure failure to due seismic vulnerability.

Enables Environmental Restoration

- High Performance (5): The alternative enables the restoration of environmental systems, addressing all aspects of environmental conditions, such as fish passage, habitat, wetlands, river hydraulics, and geomorphology in the entire river delta area.
- Higher Performance (4): The alternative enables the restoration of environmental systems, addressing all aspects of environmental conditions, such as fish passage, habitat, wetlands, river hydraulics, and geomorphology in most of the river delta area.
- Moderate Performance (3): The alternative enables the restoration of environmental systems, addressing all aspects of environmental conditions, such as fish passage, habitat, wetlands, river hydraulics, and geomorphology in some of the river delta area.
- Lower Performance (2): The alternative enables the restoration of environmental systems, addressing all aspects of environmental conditions, such as fish passage, habitat, wetlands, river hydraulics, and geomorphology in a small portion of the river delta area.
- Low Performance (1): The alternative does not enable the restoration of environmental systems.

Enables Ecosystem Resiliency

- High Performance (5): The alternative increases resiliency against climate change by addressing the impacts associated with extreme river flood events and providing off-channel habitat for fish in the entire river delta area.
- Higher Performance (4): The alternative increases resiliency against climate change by addressing the impacts associated with extreme river flood events and providing off-channel habitat for fish in most overflow channels of the river delta area.
- Moderate Performance (3): The alternative increases resiliency against climate change by addressing the impacts associated with extreme flood events in some overflow channels of the river delta area.
- Lower Performance (2): The alternative provides some improvements for resiliency against climate change by partially addressing the impacts associated with extreme flood events in some overflow channels of the river delta area.
- Low Performance (1): The alternative does not increase resiliency against climate change.

Freight Reliability

- High Performance (5): The alternative provides the highest improvement in freight reliability and results in the lowest amount of future freight delay in the corridor.
- Higher Performance (4): The alternative provides a moderate improvement in freight reliability and results in a lower amount of future freight delay in the corridor.
- Moderate Performance (3): The alternative provides some improvement in freight reliability and results in a moderate amount of future freight delay in the corridor.
- Lower Performance (2): The alternative provides minimal improvement in freight reliability and results in a higher amount of future freight delay in the corridor.
- Low Performance (1): The alternative results in the highest amount of freight delay in the corridor or does not improve freight reliability.

Multimodal Access to Opportunity

- High Performance (5): The alternative improves access to jobs, recreation, and services through improved transportation options to and from commercial and recreational areas in Lacey, Nisqually, JBLM, Camp Murray, and nearby developments.
- Moderate Performance (3): The alternative maintains but does not substantially improve access to jobs, recreation, and services through improved transportation options.
- Low Performance (1): The alternative does not address or contribute to reduced access to jobs, recreation, and services through improved transportation options.

River Navigability

- High Performance (5): The alternative improves the ability of all users to navigate the Nisqually River, including the Nisqually Indian Tribe.
- Moderate Performance (3): The alternative maintains the ability of all users to navigate the Nisqually River, including the Nisqually Indian Tribe.
- Low Performance (1): The alternative reduces the ability of all users to navigate the Nisqually River, including the Nisqually Indian Tribe.

Minimizes Business and Residential Impacts or Displacements

- High Performance (5): The alternative does not result in disproportionate residential or business property impacts or displacements to EJ populations.
- Higher Performance (4): The alternative results in minimal (up to 3) disproportionate residential or business property impacts or displacements to EJ populations.
- Moderate Performance (3): The alternative results in some (up to 8) disproportionate residential or business property impacts or displacements to EJ populations.
- Lower Performance (2): The alternative results in moderate (up to 10) disproportionate residential or business property impacts or displacements to EJ populations.
- Low Performance (1): The alternative results in higher (more than 10) disproportionate residential or business property impacts or displacements to EJ populations.

Minimizes Negative Impact to Emergency Response

- High Performance (5): The alternative decreases emergency vehicle response times in the project area compared to the future No Build alternative.
- Higher Performance (4): The alternative has no impact to emergency vehicle response times in the project area compared to the future No Build alternative.
- Moderate Performance (3): The alternative results in a minimal increase to emergency vehicle response times in the project area compared to the future No Build alternative.
- Lower Performance (2): The alternative results in a moderate increase to emergency vehicle response times in the project area compared to the future No Build alternative.
- Low Performance (1): The alternative results in a high increase to emergency vehicle response times in the project area compared to the future No Build alternative.

Minimizes Flood Risk for EJ Populations

- High Performance (5): The alternative addresses the impacts associated with extreme river flood events and sea level rise; no impacts to EJ populations in the entire river delta area.
- Higher Performance (4): The alternative addresses the impacts associated with extreme river flood events and sea level rise in most of the river delta area; no impacts to EJ populations.
- Moderate Performance (3): The alternative partially addresses the impacts associated with extreme river flood events and sea level rise in entire river delta area; some impacts to EJ populations.
- Lower Performance (2): The alternative partially addresses the impacts associated with extreme river flood events and sea level rise in some of the river delta area; some impacts to EJ populations.
- Low Performance (1): The alternative does not address the impacts associated with extreme river flood events; impacts to EJ populations.

Relative Cost of Alternatives

- High Performance (5): Lowest range planning-level cost.
- Higher Performance (4): Lower range planning-level cost.
- Moderate Performance (3): Moderate planning-level cost.
- Lower Performance (2): Higher planning-level cost.
- Low Performance (1): Highest planning-level cost.

Detailed Evaluation Results

The detailed evaluation results, by criterion, alternative, and option, are summarized in Table 7. Detailed evaluation results were presented to the ACG, TAG, and EAG at meetings in April. The combined evaluation results were used to identify which alternatives or options are unreasonable based on not meeting the project purpose and need in one or more of the project purpose categories.

Table 7. Detailed Evaluation Results

	Alternatives	Alternative 2 – Widen I-5 for HOV Lanes			Alternative 3 – Widen I-5 for GP Lanes		
	Bridge Options	A	B	C	A	B	C
Enhance mobility and connectivity on I-5 for passenger vehicles, freight, transit, and active modes and provide support for **increased person and freight throughput**	Accommodates Active Transportation Modes						
	Accommodates Transit Modes						
	Provides Congestion Relief for General Purpose (GP) Vehicles/Trucks						
	Provides Congestion Relief for Transit/HOV						
	Effects on Adjacent Roadways						
	Increases Person and Freight Throughput						
	Complementary to Local and Tribal Planning						
	Consistency with WSDOT Policies						
Improve local and mainline I-5 **system resiliency**	Reduces the Risk of Infrastructure Failures						
	Reduces the Risk of Infrastructure Failures Due to Seismic Activity						
Enable **environmental restoration and ecosystem resiliency** at the I-5 crossing of the Nisqually River Delta area	Enables Environmental Restoration						
	Enables Ecosystem Resiliency						
Support **economic vitality** through reliable and efficient freight movement and access to major employers	Freight Reliability						
	Multimodal Access to Opportunities (Jobs, Services, and Recreation)						
	River Navigability						
Support **equitable** outcomes	Minimizes Business and Residential Impacts or Displacements						
	Minimizes Negative Impact to Emergency Response						
	Minimizes the Flood Risk Potential for EJ Populations						
Relative cost of alternatives	Planning-level Cost Comparison						

Key: Lower Performing … Higher Performing

Detailed Evaluation Summary:

- Alternative 2 rates higher overall, with more high ratings in the ***Enhance Mobility and Connectivity*** and the ***Economic Vitality*** categories than Alternative 3. Alternative 2 improves travel times and reduces congestion for all vehicles, including transit/HOV and improves multimodal access to opportunities.
- All the bridge options had similar performance.

5 RECOMMENDED ALTERNATIVE AND BRIDGE OPTIONS

5.1 Evaluation of Draft Final Recommendations

Chapter Overview

- Final recommendations for alternative and bridge options to be advanced into NEPA review
- Description of analysis results to support recommendations

NOTE: Section will be added after meeting #5 to document committee feedback on the recommendation. This section will summarize the process for reviewing the Draft Final Recommendations and will describe the results of this review and will include reasoning for elimination of any alternatives from the final recommendations.

5.2 Final Recommendation for a Preferred Alternative

Based on the detailed evaluation, ***Alternative 3 – Widen I-5 for GP Lanes*** was not selected as the preferred alternative and is not recommended for advancement into NEPA because it does not meet the project Purpose and Need in the ***Enhance Mobility and Connectivity*** category. Alternative 3 performs lower in the ***Enhance Mobility and Connectivity*** category with overall higher traffic congestion for transit vehicles. Alternative 3 also performs lower in this category because it does not provide a transit priority facility, which is inconsistent with WSDOT policy.

Specific Purpose and Need and WSDOT Policy categories where Alternative 3 performs low include:

Alternative 3 – Widen for GP Lanes does not add capacity to I-5 for HOV/transit vehicles.

- Alternative 3 does not provide a transit priority facility, which is inconsistent with WSDOT policy, and has lower congestion relief for transit vehicles; this alternative was rated lower in the ***Enhance Mobility and Connectivity*** category.
- Alternative 3 performed lower in the ***Economic Vitality*** category primarily because it does not provide improved multimodal access to opportunities for transit users.

Alternative 2 – Widen I-5 for HOV Lanes was identified as the preferred alternative and is recommended for advancement into NEPA. This alternative adds one HOV lane in each direction from Marvin Road to Mounts Road and performed higher overall in the

detailed evaluation compared to ***Alternative 3 – Widen I-5 for GP Lanes***. Alternative 2 also provides an active transportation facility in the I-5 corridor.

- In the ***Enhance Mobility and Connectivity*** category, Alternative 2 improves travel times and reduces congestion for general purpose vehicles/trucks and HOV/transit vehicles.
- In the ***Economic Vitality*** category - Alternative 2 performs high in the Access to Opportunity criteria.

Bridge Options Advancing

Based on the Detailed Evaluation results, all bridge options evaluated in the Detailed Evaluation are advancing. ***Options A, B, and C*** are recommended for advancement to the NEPA review phase. These options include fill removal and reconstruction of I-5 on a bridge structure in the Nisqually River delta area ranging from 3,000 to 12,000 lineal feet. These options performed similarly in the Detailed Evaluation and will be evaluated further during the next project phase in the NEPA environmental process.

6 ENVIRONMENTAL CONSIDERATIONS

Chapter Overview

- Existing conditions described by environmental disciplines
- Potential environmental effects and benefits to be further studied during NEPA review

Table 8 describes the potential environmental impacts and benefits identified through documentation of the existing conditions within the project study area. Each environmental discipline that will be studied in detail during the NEPA phase is listed, along with its respective study area and a brief description of the types of effects that may be encountered.

Table 8. Potential Environmental Effects

Environmental Discipline	Study Area Boundaries	Potential Effects	Benefits
Stormwater and Water Quality	0.25 mile from ROW	Construction, in particular the removal of fill, could cause periods of turbidity. Increased pollution-generating impervious surface from road widening could contribute stormwater runoff to waterbodies that are currently on the 303(d) list.	Stormwater runoff from all roadway surfaces within the study area (I-5 mainline and interchanges) would be treated before discharge, with the potential for significant improvements to water quality.
Wetlands and Other Waters	500 feet from ROW	Temporary and permanent effects to wetlands and streams would occur. In-water work will be required. Potential upstream migration of saltwater could result from removal of I-5 embankment fill.	Removal of I-5 embankment fill would allow the creation of 20 or more acres of new wetlands and improve the hydrology, functions, and habitat value of existing wetlands. Fill removal would allow reconnection of historic distributary channels and restore more natural flow patterns.
Fish, Wildlife, and Vegetation	500 feet from ROW (ESA action area will extend beyond this limit)	In-water work could impact ESA-listed species and habitats. Temporary and permanent effects to wetlands and streams would occur, and some habitat is likely to be removed.	Creation of new wetlands and restoration of natural drainage patterns would restore ecosystem functions and improve habitat for fish and wildlife species.
Floodplains & Sea Level Rise	Approximately 500 feet from ROW	Project could result in changes to flood levels in the immediate vicinity. The extent of frequently flooded areas could increase due to the removal of fill, both in the near term and in the future as sea levels rise and peak stream flows increase.	I-5 would be more resilient to climate change and to the effects of channel migration.
Geology and Soils	Nisqually River Delta region	There is the potential for landslides and seismic hazards in the study area.	The new roadway and bridge structures would be designed to stabilize potential landslide areas and to withstand seismic shaking and liquefaction.
Visual Quality	0.5 mile from ROW	Changes in elevation and position of I-5 could have visual effects on surrounding viewers, especially those in the natural areas and residences in close proximity to the roadway.	The new bridge structures could give travelers on I-5 better views of the Nisqually Delta area.

Environmental Discipline	Study Area Boundaries	Potential Effects	Benefits
Air Quality, Greenhouse Gases, and Energy	0.5 mile from ROW	Increases in traffic over time could contribute to pollution and GHG emissions causing effect on sensitive and nationally significant natural areas.	Decreases in traffic congestion could have a positive effect on localized air quality from reduced travel times.
Cultural Resources	600 feet from ROW	Project could result in temporary effects to the Medicine Creek Treaty National Memorial Site. The project area has a high likelihood of encountering previously unknown archaeological sites.	Reconnection of historic stream channels and associated habitat would help restore a traditional cultural landscape and would also benefit tribal treaty fishing. Archaeological testing can be destructive; however, identification of resources can inform effective management.
Noise	Varies with landform	Widening I-5 could move traffic noise sources closer to sensitive receivers in the corridor. Future predicted noise levels exceed the WSDOT noise abatement criteria (66 dBA) potentially requiring noise abatement measures.	None identified at this time.
Hazardous Materials	0.5 mile from ROW	Moderate risk of encountering hazardous materials during construction due to five active cleanup sites and 37 sites of potential concern located within 0.5-mile.	None identified at this time.
Land Use, Farmlands, and Section 6(f)	0.5 mile from ROW	Likely effects to wildlife refuge from construction and/or ROW acquisition. Potential effects to prime, unique and farmlands of statewide importance by removal of fill and changes to the channel migration zone.	Mitigation for temporary construction impacts could include improvements to affected properties, such as invasive species removal and stormwater system enhancements.
Section 4(f)	0.5 mile from ROW	Likely effects to wildlife refuge and National Memorial site from construction and/or ROW acquisition. Potential effects to historic resources from construction and changes to I-5.	Improvements to the wildlife refuge's ecosystems through restoration of the Nisqually River system. See also Wetlands and Other Waters.
Socioeconomic Impacts and Environmental Justice	1.0 mile from ROW	Project construction and changes to I-5 could create a hardship for businesses in the immediate vicinity of the project corridor, some of which employ, serve, and/or are owned by EJ populations.	Congestion relief and reduced travel times would make transit options more reliable. Improvements to water quality and the fish habitat will benefit the tribes.

Source: I-5 Marvin to Mounts Road PEL Study Existing Conditions Memoranda.

6.1 Stormwater and Water Quality

Natural water bodies in the I-5 Marvin Road to Mounts Road study area were identified and characterized in terms of their current water quality, as well as the land uses and soil types within their drainage basins. The description of land use includes a qualitative overview of existing pollution-generating impervious surface (PGIS) and non-pollution-generating impervious surface (NPGIS) within the study area. Existing stormwater infrastructure that carries runoff from I-5 is also described, including water quality treatment facilities. In addition, groundwater resources and wellhead protection areas in the study area are identified.

Data Sources and Data Collection Methods

Existing conditions were characterized within the study area to provide a baseline against which potential effects of the project will be discussed during the NEPA phase. The baseline was developed by qualitatively evaluating water resources through field surveys, literature review, available GIS data, and a review of other existing conditions analyses. Mapped water resources are approximate, and no detailed delineations were made for this analysis. Field observations were conducted from publicly accessible roads and ROWs. No new flow or water quality data was collected.

Existing Conditions

Existing water bodies within the study area include the Nisqually River, McAllister (Medicine) Creek, and Red Salmon Creek, as well as unnamed tributaries to these water bodies. Other water bodies, including Medicine Creek and Puget Sound, are located close to the study area, but are not expected to be directly affected by the proposed project. The three named streams are described briefly below.

- McAllister (Medicine) Creek originates 2.5 miles south of the study area in a spring-fed wetland complex known as Medicine Springs or McAllister Spring. The creek meanders north through agricultural fields and along the toe of the steep slope to the west. A low-gradient tributary from the east, named Medicine Creek on some maps, joins the creek near Hartman Road SE. McAllister Creek crosses under Martin Way, the I-5 northbound off-ramp, the I-5 mainline, and the I-5 southbound on-ramp before the constructed channel directs it due west back to a meandering tidal channel. North of the study area, the creek and its floodplain are regularly inundated by the tide and are indistinguishable from the Nisqually River estuary and mudflats.
- The Nisqually River originates on the south flank of Mount Rainier as snowmelt from the Nisqually Glacier. Its total length is approximately 81 miles, with a watershed area of approximately 517 square miles. The river is impounded by two hydroelectric dams (La Grande Dam and Alder Dam), forming a 7-mile-long reservoir named Alder Lake near Elbe/Eatonville. Through the study area, the water level of the Nisqually River is tidally influenced. The river frequently overtops its banks due to high runoff, high tides, or a combination of both. North of I-5, the river becomes the Nisqually Estuary, discharging to the Nisqually Reach in South Puget Sound.

- Red Salmon Creek flows into the estuary on the east side of the Nisqually Valley. The creek originates as runoff from hillslopes to the north, east, and south of the eastern end of the study area. The hydrologic connectivity of Red Salmon Creek and its tributaries has been affected by extensive fill prisms associated with the BNSF railroad line and I-5, along with several other local access roads. Red Salmon Creek flows through two culverts (BNSF railroad and Mounts Road SW) directly into the Red Salmon Slough, which is considered a feature of the Nisqually River Estuary.

Between milepost (MP) 112 and 117 within the study area, highway runoff discharges to adjacent water bodies via roadside ditches, direct pipe outfalls, and sheet flow over roadway embankments. The majority of this runoff enters surface water bodies without receiving water quality treatment or flow control. A substantial portion of highway runoff flows over the ground into the vegetated median or roadway embankments before draining to adjacent water bodies; runoff flowing over these vegetated areas receives a small amount of runoff treatment. Within the study area, the Washington State Department of Ecology (Ecology) classifies portions of the Nisqually River and two tributaries to Red Salmon Creek as having impaired water quality. Less serious water quality concerns have been documented for McAllister Creek. The primary water quality issues are high temperatures and the presence of fecal coliform bacteria. Figure 13 shows water quality impairments in the study area.

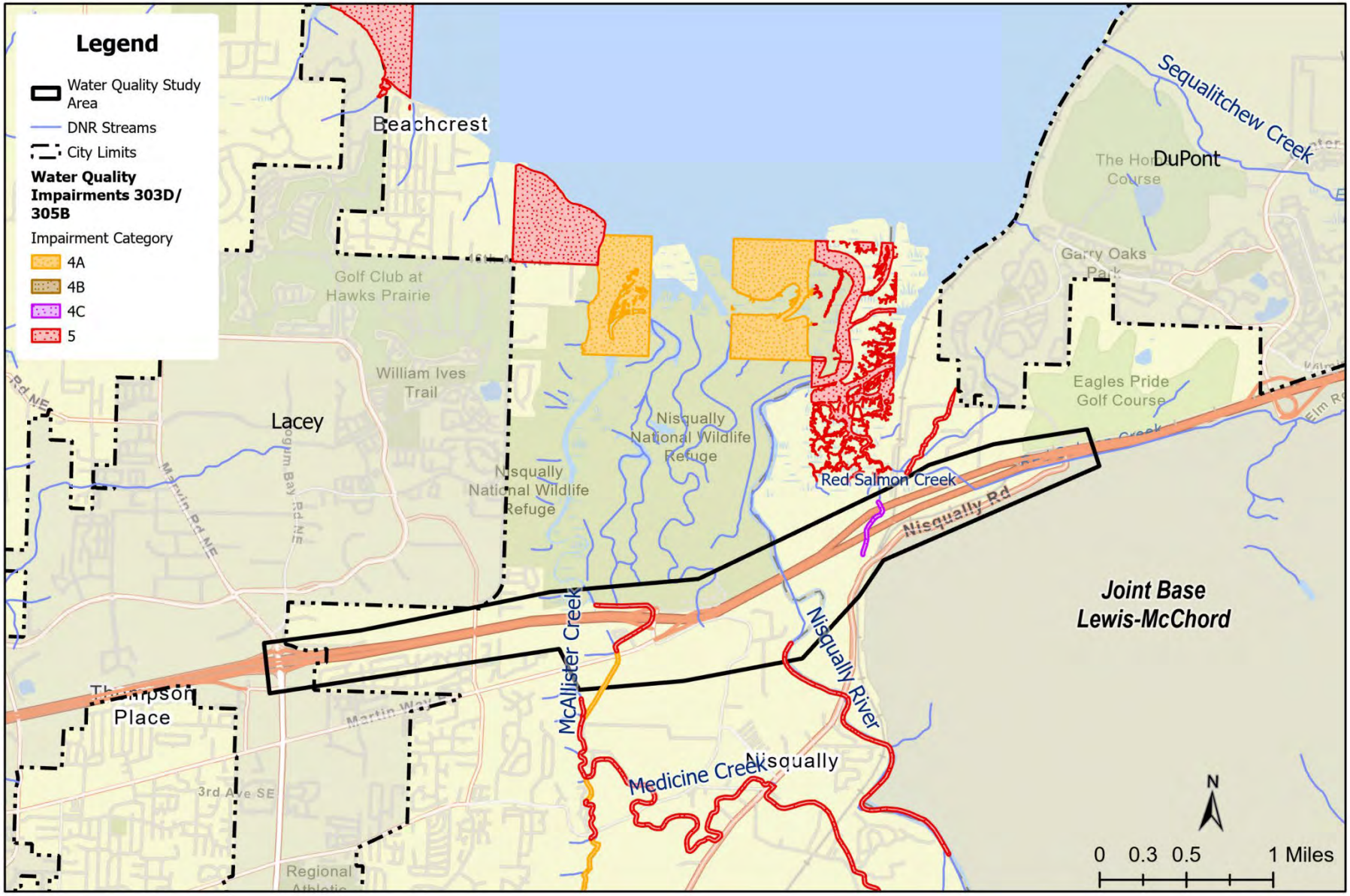

Figure 13. Water Quality Impairments

The study area also contains sensitive groundwater resources. The Central Pierce County Aquifer Recharge Area, which includes the entire portion of the study area within Pierce County, is designated as a Sole Source Aquifer by the U.S. Environmental Protection Agency, as most residents in this area rely on groundwater as their only source of drinking water. Within Thurston County, the portion of the study area west of the Nisqually River is within multiple Critical Aquifer Recharge Areas (CARAs). CARAs are divided into three categories of aquifer sensitivity: extremely sensitive (I), highly sensitive (II), and moderately sensitive (III). Most of the study area within Thurston County is within extremely sensitive category I CARAs.

Next Steps

During the NEPA phase, potential direct effects from construction activities will be qualitatively assessed based on the proximity of activities to surface water bodies and local drainage systems. Construction effects will be assessed regarding the potential for erosion and sediment transport, concrete work, material handling and transport, hazardous material storage and use, trenching, dewatering, and other construction-related activities applicable to water resources. Potential direct effects to water quality from project operation will be identified as follows:

- **Surface Water:** Changes in land use, including changes in PGIS, resulting from the project will be quantitatively evaluated and compared to existing conditions. Based on these calculations, potential effects to drainage systems and receiving waters from changes in stormwater runoff flows and water quality will be analyzed. The analysis will be coordinated with other evaluations, including Wetlands and Other Waters and Floodplains and Sea Level Rise, regarding potential channel erosion; other potential effects to streams, lakes, and wetlands; and measures used to provide climate change resilience in stormwater facility design.
- **Groundwater:** Estimated changes in impervious surfaces and resulting effects on infiltration of surface water will be qualitatively evaluated for potential effects to groundwater supply. Other effects to groundwater quality will be identified based on potential alterations to groundwater flow or supply, including the placement of retaining walls, cuts, or deep foundations for project facilities.

6.2 Wetlands and Other Waters

Wetlands, streams, and high tide lines in the study area were identified and assessed to characterize their functions and values and to aid project designers in avoiding or minimizing potential effects to these sensitive areas. These aquatic resources are regulated by the U.S. Army Corps of Engineers (USACE) as waters of the United States, by the Washington State Department of Ecology (Ecology) as waters of the state, and by Thurston and Pierce Counties through their municipal codes.

Data Sources and Data Collection Methods

The study area for wetlands and other waters includes the WSDOT ROW and the area extending 500 feet from the ROW. The additional 500-foot radius is included to account for any potential work outside the ROW as well as potential buffer impacts from off-site wetlands or streams. Wetlands were delineated using routine methods described in the Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement for Western Mountains, Valleys, and Coast Region (US Army Corps of Engineers 2010). Wetland boundaries were delineated based on on-site observations of vegetation, soils, and hydrology in conjunction with background information listed above. Wetlands were classified using the U.S. Fish and Wildlife Service classification system (Cowardin 1979; FGDC 2013) and the hydrogeomorphic classification System (HGM) (Brinson 1993), and were rated using the Washington State Wetland Rating System for Western Washington – 2014 Update (Hruby 2014).

The ordinary high water line (OHWL) of each stream was delineated using the following definition provided in the Washington Administrative Code (WAC): "… the mark on the shores of all water that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in ordinary years as to mark upon the soil or vegetation a character distinct from the abutting upland. …" (WAC 77.55.011). The mean elevation of the highest predicted tide over the 10-year period was applied to tidally influenced waters within the study area to establish the high tide line. Fish presence/absence was determined based on WDNR water type maps (2023a), WDFW fish distribution mapping (2023a), and field observations.

Existing Conditions

Wetlands and other waters identified within the project study area include:

- 23 freshwater and estuarine wetlands (typical emergent wetland shown in Figure 14)
- Three stream systems, including McAllister (Medicine) Creek, Nisqually Creek, and Red Salmon Creek and tributaries
- High tide line of tidally influenced waters of estuarine wetlands and McAllister (Medicine) Creek, Nisqually River, and Red Salmon Creek

Figure 14. Typical emergent wetland in the study area

Of the 23 wetlands identified, 13 are located within Thurston County and 10 are within Pierce County. All wetlands were rated using the 2014 Washington State Wetland Rating System for Western Washington and were assigned buffers based on the local municipal code. Using Ecology's four-tiered rating system, 11 wetlands rate as Category I, 6 wetlands are Category II, and 6 are Category III. These wetlands generally provide moderate to high levels of biological, chemical, and physical functions. Three of the wetlands are high-functioning estuarine wetlands. Two Wetlands of High Conservation Value are mapped by Washington Department of Natural Resources within and adjacent to the study area. Table 9 shows characteristics of the study area wetlands.

Four stream features were identified in the study area, representing a variety of watershed sizes and hydrologic functions. The three named stream features, from west to east, are McAllister (Medicine) Creek, the Nisqually River, and Red Salmon Creek. These streams are connected to floodplain wetlands, tidal sloughs, and tributaries upstream and downstream of the study area, but those connections were not assessed as part of this project. Additional unnamed features were identified in association with the three primary streams, either as seasonal tributary drainages or backwater sloughs. Several streams and associated wetlands provide suitable habitat for resident and anadromous fish. Table 10 shows characteristics of the study area streams.

Table 9. Wetlands within the Study Area

Wetland	Local Jurisdiction	Cowardin Classification[b]	HGM Classification	Ecology/Local Jurisdiction Rating[c,d]	Habitat Score[c]	Wetland Size (sf/acres)	Standard Buffer Width[e] (ft)
W1	Thurston County	PEM/PFO	Depressional, Riverine	I	8	1,194,608/27.4	280
W2	Thurston County	PEM/PSS	Depressional	III	4	153,978/3.5	140
W3	Thurston County	PEM/PFO	Depressional	III	3	27,731/0.6	100
W4	Thurston County	EEM	Estuarine	I	--	239,514/5.5	220
W5	Thurston County	PEM	Depressional	II	5	66,374/1.5	160
W6	Thurston County	PEM/PFO	Depressional	II	5	85,523/2.0	220
W7	Thurston County	PFO	Riverine	I	8	3,258,279/74.8	280
W8*	Thurston County	PEM	Depressional	III	5	10,277/0.2	160
W9	Thurston County	PEM	Depressional	III	4	195,666/4.5	140
W10	Pierce County	EEM/PEM/PSS/PFO	Estuarine, Riverine	I	--	32,842,714/754.0	220
W11	Pierce County	PSS	Depressional, Riverine	II	7	2,208/0.1	240
W12	Pierce County	EEM/PEM/PFO	Depressional, Estuarine, Riverine	I	8	651,739/15.0	150
W13	Pierce County	PEM	Slope	III	7	6,771/0.2	50

Wetland	Local Jurisdiction	Cowardin Classification[b]	HGM Classification	Ecology/Local Jurisdiction Rating[c,d]	Habitat Score[c]	Wetland Size (sf/acres)	Standard Buffer Width[e] (ft)
W14	Pierce County	PEM/PFO	Slope, Depressional, Riverine	II	7	51,739/1.2	100
W15	Pierce County	PSS	Slope	III	6	3,217/0.1	50
W16	Pierce County	PFO	Slope, Depressional, Riverine	II	7	8,841/0.2	100
W17	Pierce County	PEM/PSS/PFO	Depressional, Riverine	I	8	43,336/1.0	150
W18	Pierce County	PFO	Depressional	II	7	2,618/0.1	100
W19	Pierce County	PFO	Depressional, Riverine	II	8	11,181/0.3	100
W20	Pierce County	PAB/PEM/PFO	Depressional, Riverine	I	8	44,848/1.0	150
W21	Thurston County	EEM	Estuarine	I	--	~60,956,470/1399.4	250
W22	Thurston County	PEM/PFO	Depressional, Riverine	I	8	~7,616,099/174.8	280
W23	Thurston County	PEM/PFO	Depressional, Riverine	I	9	~1,836,351/142.2	300

[b] NWI Class based on vegetation: EEM = estuarine emergent, PFO = palustrine forested, PSS = palustrine scrub-shrub, PEM = palustrine emergent, PAB = palustrine aquatic bed (Cowardin et al. 1979)

[c/d] Ecology rating (Hruby 2014) and Thurston County/Pierce County wetland rating

[e] Thurston County standard wetland buffer per TCC 24.30.045; Pierce County standard wetland buffer per PCC 18E.30.060

**W8 is non-jurisdictional by USACE because it has formed on road fill between the I-5 main line and Brown Farm Road NE/Nisqually Cut Off Road SE off-ramp.*

Table 10. Streams within the Study Area

Stream Name	Local Jurisdiction	WDNR Water Type[a]	Local Stream Typing[b]	Stream Buffer Width (feet) [c]
Backwater Slough of McAllister (Medicine) Creek	Thurston County	F/N	F	250
McAllister (Medicine) Creek	Thurston County	S	S	250
Nisqually River	Thurston/Pierce County	S	S	250 (Thurston County)/ 100 (Pierce County)
Red Salmon Creek	Pierce County	F	F1	150
Tributaries to Red Salmon Creek	Pierce County	F	F1	150

[a] WDNR Water Types: Type S=shoreline; Type F=fish-bearing; Type N=Non-fish bearing (WDNR 2023a)

[b] Local stream typing applied per Thurston County TCC 24.25.020 and Pierce County PCC 18E.40.060.

[c] Local jurisdiction stream buffers applied per Thurston County TCC 24.25.020 and Pierce County PCC 18E.40.060.

Next Steps

During the NEPA phase, project designers will work with environmental scientists to identify ways that the design can avoid or minimize effects to wetlands. The roadway design will be overlaid on the boundaries of delineated wetlands to identify areas where fill may be placed in wetlands or where wetland hydrology may be altered as a result of changes in the roadway footprint. Because the proposed project would remove a substantial amount of fill from the existing embankments and place the roadway on structure, areas that are currently buried beneath the existing fill slopes would become available to establish new wetlands. The ability to establish more natural stream flows under new bridge structures would also help to support new wetlands and improve the function of existing wetlands.

6.3 Fish, Wildlife, and Vegetation

The study area encompasses a wide variety of habitats that support a diverse array of fish and wildlife species. North of the study area is the Billy Frank Jr. Nisqually National Wildlife Refuge (Refuge), which is known for a high diversity of fish, migratory birds, and other wildlife. To the south of the study area, low-lying areas consist primarily of agricultural land uses, with a mix of commercial, residential, and undeveloped forested areas. On the east and west sides of the study area, steep, forested slopes frame the broad river valley with a mix of evergreen and deciduous species. Known aquatic resources with fish use or potential fish use within the study area include the Nisqually Delta estuarine system and the freshwater resources of the Nisqually River, McAllister (Medicine) Creek, and Red Salmon Creek. These aquatic resources also contain a variety of associated sloughs, tributaries, channels, and wetland features with documented or potential fish use.

Data Sources and Data Collection Methods

The study area for vegetation and wildlife includes all areas within 500 feet of the I-5 ROW to cover the area in which project construction could affect vegetation cover and habitat quality for terrestrial wildlife. The study area for potential effects to fish and fish habitat includes all rivers, streams, and waterbodies within 500 feet of the ROW, which includes aquatic resources in which project construction or operation could result in elevated levels of turbidity, sediment, and pollutants. Data sources used to support the existing conditions evaluation included of data sets from the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Washington Departments of Wildlife and Natural Resources, and Thurston and Pierce Counties. Important habitats were identified using aerial imagery; biologists then visited areas where these habitats were identified to document vegetation communities, evidence of wildlife presence, and potential habitat for species of concern. To document fish and fish habitat conditions in the study area, project ecologists reviewed existing information, performed an aerial photograph assessment, and conducted site visits on parcels where access was approved.

Existing Conditions

Vegetation

The study area contains a mosaic of vegetation communities. Upland forest (mixed and conifer) is the most prevalent habitat type, covering nearly 300 acres. Mixed upland forest dominates the valley sidewalls, while conifer forest is found in the eastern portion of the study area near JBLM. These forests have medium to high habitat value, depending on their age. Wetland habitats make up another 230 acres, with the most prevalent types being emergent wetlands (92.4 acres), forested wetlands (79.5 acres), and estuarine wetlands (48 acres). Estuarine and forested wetlands have high habitat value, while emergent wetlands have medium to high habitat value. Other, smaller areas of high habitat value include stream channels (12.8 acres) and oak woodlands (3 acres). The remainder of the study area is developed to various degrees and includes paved areas, maintained right of way, residential

development, agricultural fields, and lawns, all of which have low habitat value. There are also over 40 acres where invasive shrubs are the dominant habitat type. Figure 15 shows vegetation communities in the study area.

Wildlife

The dominant physical feature in the study area is I-5, including the roadway, maintained right of way, and associated stormwater facilities. All of these features offer low habitat value and do not support diverse or abundant wildlife communities. Habitat types with greater structural complexity, such as wetlands or upland forests, can support a more diverse array of wildlife species. Areas with the most abundant and diverse wildlife include those with complex habitat features, such as snags, logs, and large trees in forested areas or marshes and other aquatic features in estuarine areas. Areas along the edges of different cover types (e.g., forested and non-forested habitats) also support diverse and abundant wildlife communities. Wildlife species found in the less-developed portions of the study area include squirrels and other rodents, deer, raccoons, opossum, coyotes, and various species of birds. Other species, such as cougar and black bear, may also use those habitats while traveling between larger blocks of suitable habitat. Wetland habitats may support amphibians such as chorus frogs, red-legged frogs, northwestern salamanders, and long-toed salamanders.

The study area overlaps several areas identified as priority habitat areas by WDFW (2023a), all of them associated with the Nisqually River or its delta. Riparian areas are another priority habitat type that are not mapped by WDFW in the study area, but are present by along the Nisqually River and other streams. In addition, project biologists identified and mapped stands of Oregon white oak in the study area. Oak trees and stands of oak trees provide an important source of food, cover, nest sites, and arboreal movement routes for more than 200 species of vertebrate wildlife, including several species that are protected by state or federal law, such as the western gray squirrel.

Fish

The study area is in the Nisqually Basin Water Resource Inventory Area (WRIA) 11, Nisqually (WDFW 2023d). Aquatic resources with documented fish use or potential fish use within the study area include the Nisqually Delta, the Nisqually River, McAllister (Medicine) Creek, and Red Salmon Creek. Many of these resources have associated tributaries, sloughs, overflow channels, and wetland habitats that also provide documented or potential fish use. There are also several drainages in the eastern part of the study area that flow through culverts beneath I-5 and into the fish habitat of Red Salmon Creek.

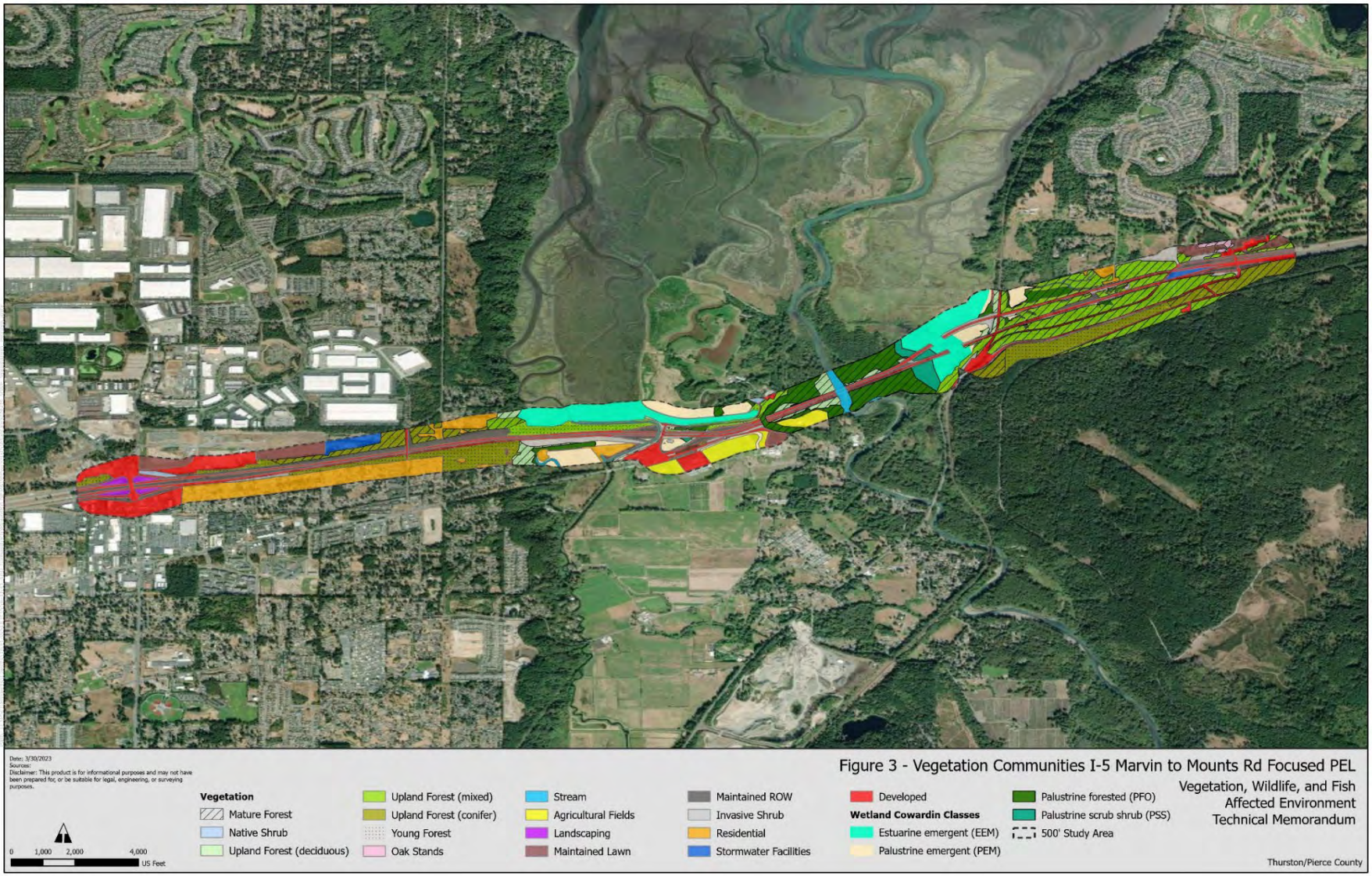

Figure 15. Vegetation Communities

The Nisqually Delta is one of the largest salmon-bearing tidal estuary ecosystems in Puget Sound. The diverse habitat types within the delta include brackish marshes with large freshwater inputs, tidally influenced forested riverine, emergent forest transition, estuary emergent marsh, delta mudflat, and nearshore habitats, all of which contribute to the survival of out-migrating salmon. Fish species documented in the delta include Endangered Species Act (ESA)-listed fall Chinook salmon, winter steelhead trout, and bull trout. Additional fish species include winter chum salmon, coho salmon, cutthroat trout, sockeye salmon, and pink salmon. The Nisqually Delta habitat is also important for many non-salmonid fishes, such as shiner perch, starry flounder, threespine stickleback, and sculpin. Salmon prey species documented in the Nisqually Delta include Pacific sand lance and Pacific herring.

The Nisqually River is one of the healthiest and least developed rivers in the region and one of the most important salmon and steelhead rivers flowing into Puget Sound. Fish species documented in the river include ESA-listed fall Chinook salmon, winter steelhead trout, and bull trout. Additional fish species include winter chum salmon, coho salmon, cutthroat trout, sockeye salmon, and pink salmon. Spawning habitat for fall Chinook salmon, coho salmon, and winter chum salmon is documented in the reach of Nisqually River within the I-5 corridor, while pink salmon and winter steelhead spawning is documented nearby.

McAllister (Medicine) Creek is known historically by the Nisqually Indian Tribe as Medicine Springs. The mouth of the creek, which lies within the Billy Frank Jr. Nisqually National Wildlife Refuge, is the site where the Treaty of Medicine Creek was signed in 1854. Since 2016, the tribe has transported up to 1 million Chinook smolts to the springs from its Clear Creek Hatchery. Documented fish species in the creek include ESA-listed fall Chinook salmon and winter steelhead trout. Additional fish species include winter chum salmon, coho salmon, cutthroat trout, sockeye salmon, and pink salmon. Spawning habitat for fall Chinook salmon is documented about 0.5 mile upstream of I-5. Winter chum salmon spawning is documented in McAllister (Medicine) Creek in the reach within the I-5 corridor.

Red Salmon Creek flows into the Nisqually Delta about 1,000 feet (305 meters) north of I-5. Natural resource maps identify two tributaries flowing into the tidally influenced wetland habitat upstream of the BNSF railroad culvert, denoted as North Tributary and South Tributary. Fish species documented in Red Salmon Creek include ESA-listed fall Chinook salmon and winter steelhead trout. Additional fish species include winter chum salmon, coho salmon, cutthroat trout, sockeye salmon, and pink salmon. Fish species documented in the North Tributary include Chinook salmon, winter steelhead trout, winter chum salmon, coho salmon, sockeye salmon, and pink salmon. Winter chum salmon is documented in the South Tributary. Spawning habitat for winter chum salmon is documented in Red Salmon Creek and the North Tributary.

ESA Listed Species

Within the study area the following species may be present: two plant species, 10 wildlife species, and five fish species that are listed (or proposed for listing) as threatened or endangered under the ESA. The study area includes designated critical habitat for three of the fish species (bull trout, Chinook salmon, and steelhead). Table 11 shows the ESA-listed species and their current status.

1 **Table 11. ESA Listed Species within the Habitat Area**

Common Name	Scientific Name	Federal Status	Critical Habitat Identified for Species?	Critical Habitat in Study Area?
Plant Species				
Golden paintbrush	*Castilleja levisecta*	Threatened	No	No
Marsh sandwort	*Arenaria paludicola*	Endangered	No	No
Wildlife Species				
Birds				
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	Yes	No
Northern spotted owl	*Stix occidentalis caurina*	Threatened	Yes	No
Streaked horned lark	*Eremophila alpestris strigata*	Threatened	Yes	No
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Yes	No
Mammals				
North American wolverine	*Gulo gulo luscus*	Proposed Threatened	No	No
Roy Prairie pocket gopher	*Thomomys mazama glacialis*	Threatened	Yes	No
Olympia pocket gopher	*Thomomys mazama pugetensis*	Threatened	Yes	TBD
Yelm pocket gopher	*Thomomys mazama yelmensis*	Threatened	Yes	No
Marine mammals				
Humpback whale (Central America DPS and Mexico DPS)	*Megaptera novaeangliae*	Endangered	Yes	No
Killer whale (Southern Resident DPS)	*Orcinus orca*	Threatened	Yes	No
Insects				
Taylor's checkerspot	*Euphydryas editha taylori*	Endangered	Yes	No
Fish Species				
Bull trout	*Salvelinus confluentus*	Threatened	Yes	Yes
Chinook salmon (PS ESU)	*Oncorhynchus tshawytscha*	Threatened	Yes	Yes
Steelhead (PS DPS)	*O. mykiss*	Threatened	Yes	Yes
Bocaccio rockfish (PS/GB DPS)	*Sebastes paucispinis*	Endangered	Yes	No
Yelloweye rockfish (PS/GB DPS)	*S. ruberrimus*	Threatened	Yes	No
Sunflower sea star	*Pycnopodia helianthoides*	Proposed Threatened	No	TBD

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Next Steps

Long-term effects to vegetation and wildlife habitat will be determined by evaluating the acreage of habitats of concern that would be affected by the proposed improvements. Effects on vegetation and wildlife will also be assessed qualitatively by considering such factors as the regional significance of the resource, habitat value, and the potential for enhancing or restoring unique plant communities or wildlife habitat or connectivity. The effects of potential increases in human access, noise, and light will also be considered.

Direct, long-term effects on fish and fish habitat will be determined by evaluating the area of stream, river, and estuarine habitat that would be permanently occupied by new structures, as well as the areas of permanent vegetation disturbance within the stream's regulatory buffer. Qualitative considerations will include such factors as the regional significance of the affected resource, fish habitat value (such as its role as a migration corridor or spawning), the potential for enhancing or restoring aquatic habitat or connectivity, and water quality changes resulting from project operation.

The analysis of effects on special-status fish and wildlife species, including those protected under the ESA, will be based on the extent and intensity of effects to habitats with which each species is associated. Impact analyses for these species will also address the potential for adverse effects related to increases in human access, noise, light, and changes to water quality during project operation.

6.4 Floodplains and Sea Level Rise

This section will begin by providing context for the resource and describe the key findings from the analysis of existing conditions and may include a table or graphic as appropriate.

Data Sources and Data Collection Methods

The study area for the floodplains and sea level rise analysis begins at the western edge of the McAllister Creek/Nisqually River Valley and ends at the eastern edge of the valley. Floodplain data sources include current Federal Emergency Management Agency (FEMA) flood insurance documents for Thurston County and Pierce County, Washington. FEMA is working with the state, counties, tribes, and local communities to update the Nisqually River flood risk mapping; it is currently anticipated that these new maps will be effective later in 2023. To evaluate future sea level rise, analysts used *Sea Level Rise in Washington State – A 2018 Assessment* (Miller et al. 2018) as a source for sea level rise projections out to the year 2150. For evaluation of climate change on future stream flows, two primary data sources were used: the University of Washington (UW) Climate Impacts Group (CIG) climate mapping tool and the Washington Department of Fish and Wildlife (WDFW) Culverts and Climate Change Web App.

Existing Conditions

The Nisqually River Valley within the project study area is mapped by FEMA as floodplain. Figure 16 shows the mapped FEMA flood hazards in the study area and the current estimate of existing floodplains. FEMA mapping identifies Special Flood Hazard Areas (SFHAs), which are high-risk areas designated by the letters A or V. They are defined as the land area covered by the floodwaters of the base flood (i.e., a flood event with a 1 percent chance of occurring in any given year, often referred to as the 100-year flood). In addition, the letter V indicates that wave and tidal effects are present. In areas designated by the letter X, the risk of flooding still exists, but is lower. Flood zones mapped in the study area include:

- Zone A (100-year flood): This zone is mapped along the Nisqually River upstream and downstream of the I-5 crossing and includes the overflow channels east and west of the mainstem.
- Zone AE (100-year flood with BFE): This zone covers most of the study area north of I-5, including the developed portions of the wildlife refuge and the McAllister Creek drainage. Base flood elevations in this area range between 12 and 15 feet.
- Zone VE (100-year flood with waves): This zone is mapped in the northern portion of the delta. It represents the area where flood elevations are affected by both storm events and tidal effects. Base flood elevations in this area range between 12 and 16 feet.
- Zone X: This zone represents the areas between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood. It is mapped south of I-5 and west of the Zone A floodplain associated with the Nisqually River.

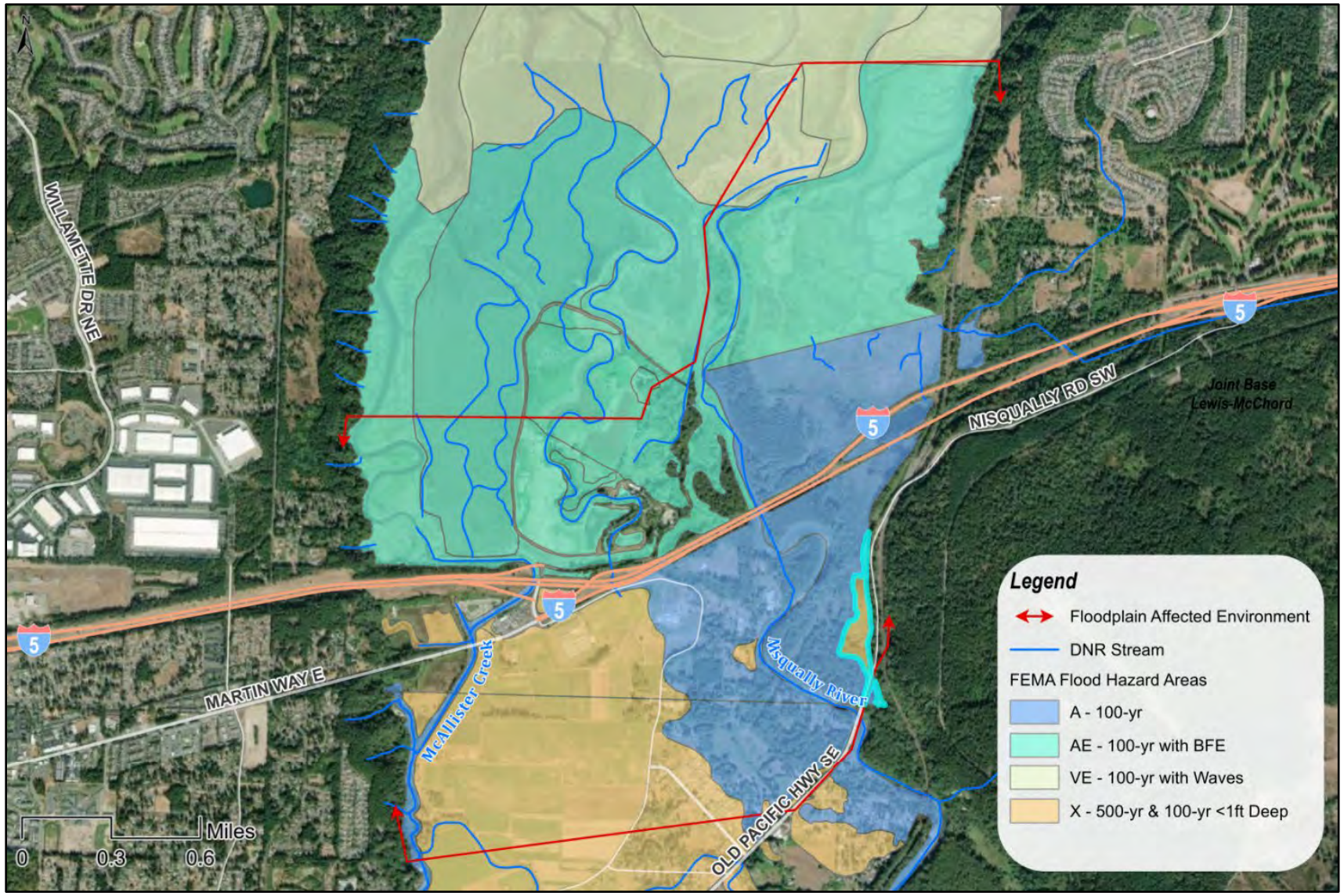

Figure 16. FEMA Flood Hazard Areas

The Nisqually River and McAllister Creek both show evidence of channel migration over time. Channel migration has been documented on the Nisqually River upstream of I-5, where hardening of the river channel has created a sharp bend approximately 450 feet south of I-5. At the observed rate of migration, WSDOT estimates that the meander can be expected to reach the I-5 embankment in approximately 20 years, where it would potentially threaten the integrity of the roadway.

Climate change is expected to result in steadily rising sea levels, which will affect water levels and the depth of inundation in the Nisqually Delta. The sea level rise visualization tool developed by the University of Washington Climate Impacts Group was used to retrieve the probabilities of different sea level rise amounts for the year 2100. Depending on the scenario evaluated, a potential range of sea level rise in the delta could be between approximately 2 and 5 feet. The change in areas potentially inundated in a 2- foot sea level rise scenario and a 5-foot sea level rise scenario are shown in Figure 17 and Figure 18. In addition to increasing the extent of inundation, sea level rise will change the salt water-fresh water balance in the estuary, potentially resulting in saltwater intrusion into inland areas currently used for agriculture.

Next Steps

During the NEPA process, potential impacts from project construction activities will be qualitatively assessed based on the proximity of these activities to surface water bodies and associated floodplains. Potential long-term impacts to floodplains from project operation will be identified as follows:

- **Shorelines:** Direct effects on shorelines will be qualitatively discussed based on potential alterations to areas within the designated shoreline area, if applicable.
- **Floodplains:** The bridge options will be reviewed to determine the extent to which they would reduce the amount of fill in the floodplain and/or change flood storage volume within the affected reach. Floodplain impact evaluations will also consider how climate-related changes in peak stream flows are likely to affect floodplain elevations and extents in the study area.
- **Channel Migration Zones:** Project bridge options will be reviewed to determine if they would potentially affect or alter existing channel migration zones. The evaluation of channel migration zones will also consider how climate-related changes in peak streamflow may affect channel morphology in the study area.
- **Sea Level Rise:** This analysis will evaluate the potential effects of more frequent and extensive inundation of low-lying areas. Potential impacts evaluated will include increases in coastal erosion and landslides that may weaken roadbed and bridge footings, damage stormwater drainage and tide gates, and require more frequent detours around flooded coastlines.

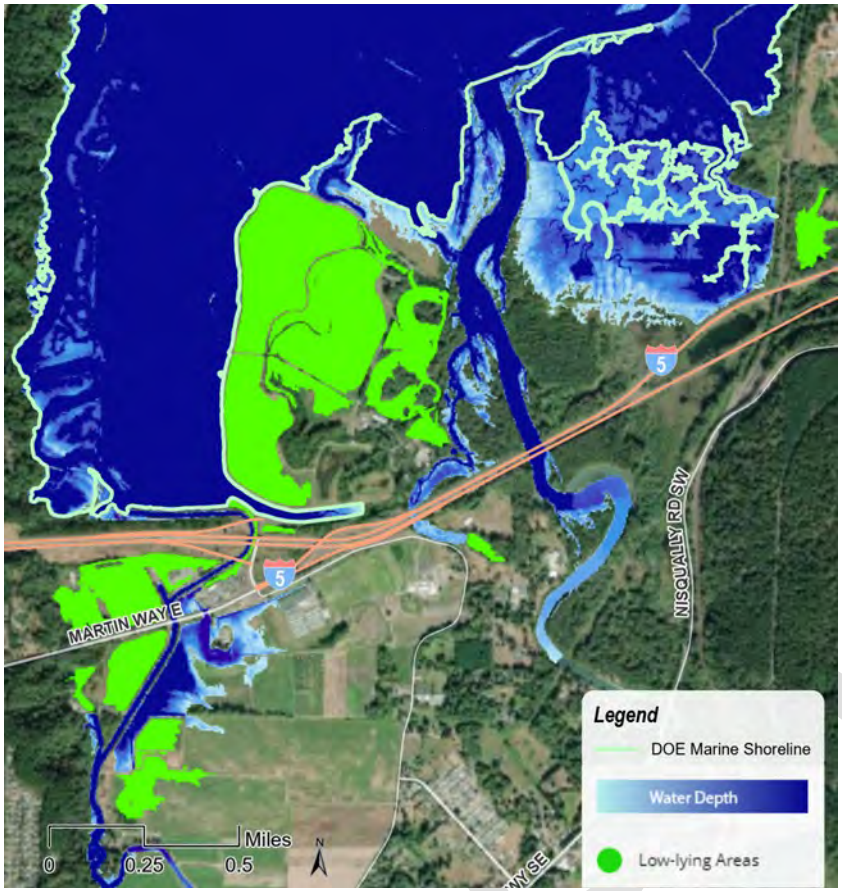

Figure 17. 2-foot Sea Level Rise

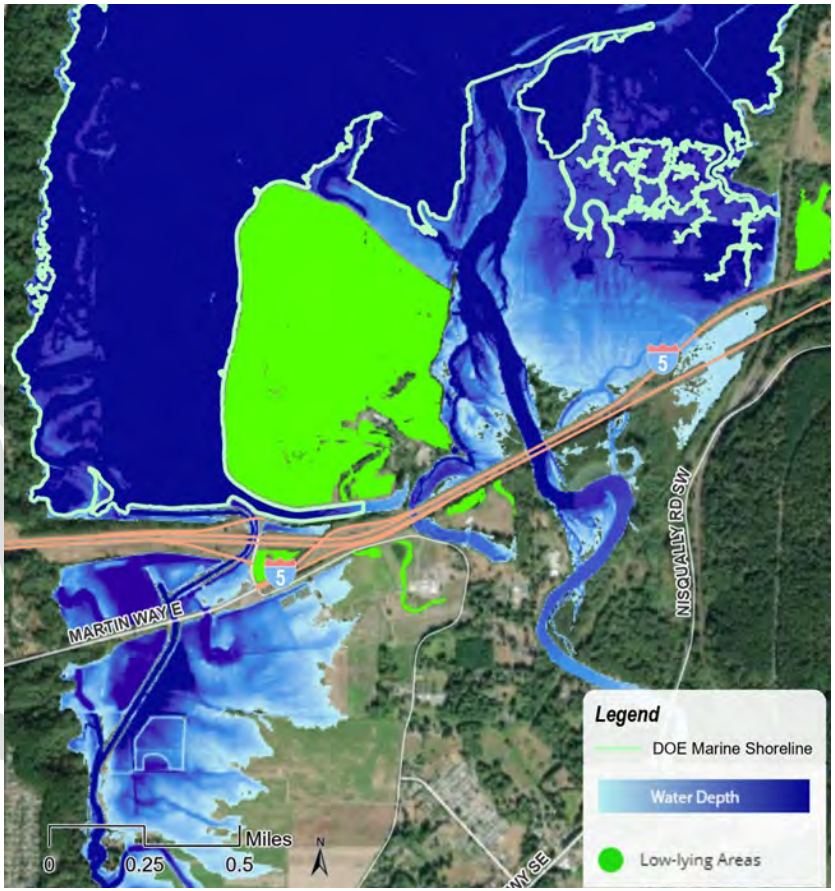

Figure 18. 5-foot Sea Level Rise

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6.5 Geology and Soils

The study area is located within the complex Nisqually River Delta region – where the Nisqually River and McAllister Creek form a tidal estuary as they meet Puget Sound – and contains specific geologic and soil conditions that will affect the design, location, and construction techniques employed in developing the project. Understanding relevant geologic and soil conditions is critical for ensuring the safety of those who will build and use the bridge infrastructure, reducing or eliminating effects to natural resources, and to minimizing potential schedule delays and cost increases.

Data Sources and Data Collection Methods

The geology and soils study area extends 100 feet on either side of existing ROW along the project corridor where soil disturbance and foundation work are anticipated with project improvements. Relevant geologic data included geologic hazards (steep slope areas, landslides, and earthquake-hazard-prone areas) and soil information. The data required to evaluate operational and construction effects was obtained from existing geotechnical reports for the study area, geologic units present within the study area, and will include one geotechnical boring in the vicinity of McAllister Creek (to be drilled in 2023). Pertinent geologic, seismic, and soils information was collected from the U.S. Geological Survey, Washington State Department of Natural Resources Division of Geology and Earth Resources, and the Natural Resource Conservation Service. Existing boring data was obtained during design and construction of existing bridges in the area. Existing boring logs, geotechnical reports, as-built drawings, and construction records in the project vicinity from WSDOT was used for the analysis and conceptual level geotechnical evaluation.

Existing Conditions

The study area encompasses the Nisqually River Valley, which lies close to sea level, and is bordered by steep slopes that rise to approximately 250 feet at the Marvin Road and Mounts Road interchanges. Across the valley, I-5 is raised approximately 10 to 15 feet above the existing grade on a series of structures and embankments. At the western edge of the valley, a wide embankment (approaching 500 feet in some areas) rises west of the McAllister Creek crossing to convey the highway up the slope toward Martin Way. The geology of the study area was influenced by repeated glaciations during the Pleistocene era, most recently the Vashon Stade of the Fraser glaciation, which ended about 13,500 years ago. Deposits from before and after the Vashon Stade are also found in the study area.

In the Nisqually River valley, the surface soils consist of thick deposits of silt, sand, gravel, and peat that are associated with the Nisqually River, the delta, and the tidal estuary. These soils are relatively loose and unconsolidated. The plateaus bordering the Nisqually River valley are underlain by soils that were deposited as the glaciers advanced and were compacted by the weight of the glacial ice. As the glaciers receded, meltwater streams flowed from them, depositing thick layers of sand and gravel with cobbles and boulders over portions of the study area.

A number of geologic hazards are present or potentially present in the study area. These include:

- Volcanic hazards: The closest active volcano to the study area is Mount Rainer, which is approximately 45 miles southeast of the study area. An eruption of Mount Rainier could result in lahar (volcanic debris and water) flows inundating the valley. However, because of the relative rarity of volcanic eruptions, this risk is considered low.
- Landslide hazards: Landslides are movement of a rock and/or soil mass on a slope caused by shear failure within the rock and/or soil. Within the study area, the Washington State Interactive Geologic Map identifies areas of previous landslide activity adjacent to the southbound side of I-5 along the slope between McAllister Creek and Martin Way. WSDOT has also identified two active landslides within the study area, one at either end of the Nisqually River valley (see Figure 19).
- Erosion hazards: Erosion hazard areas are those locations where the combination of slope and soil type makes the area susceptible to erosion by wind or water action. Water erosion can occur either by wave action, channel migration of rivers or streams, or surface runoff. The western slope of the Nisqually River valley has been identified as a potential erosion hazard area.
- Seismic hazards: The study area is in a moderately active seismic area. No known potentially active faults cross the study area. However, the soils in the Nisqually Delta are susceptible to liquefaction, a phenomenon in which earthquake shaking reduces the strength and stiffness of soils, potentially resulting in ground settlement, lateral spreading, and/or landslides. Figure 19 identifies the liquefaction susceptibility of study area soils.

Next Steps

Following completion of this PEL study during the project design phase, a field investigation program will be designed to fill gaps in the existing data. This information will be evaluated to anticipate potential effects to various design features of the project. The investigations will be designed to identify and address any known or potential landslides, faults, or adverse foundation conditions that may be present. Measures to mitigate for potential geologic hazards will be incorporated into the project design.

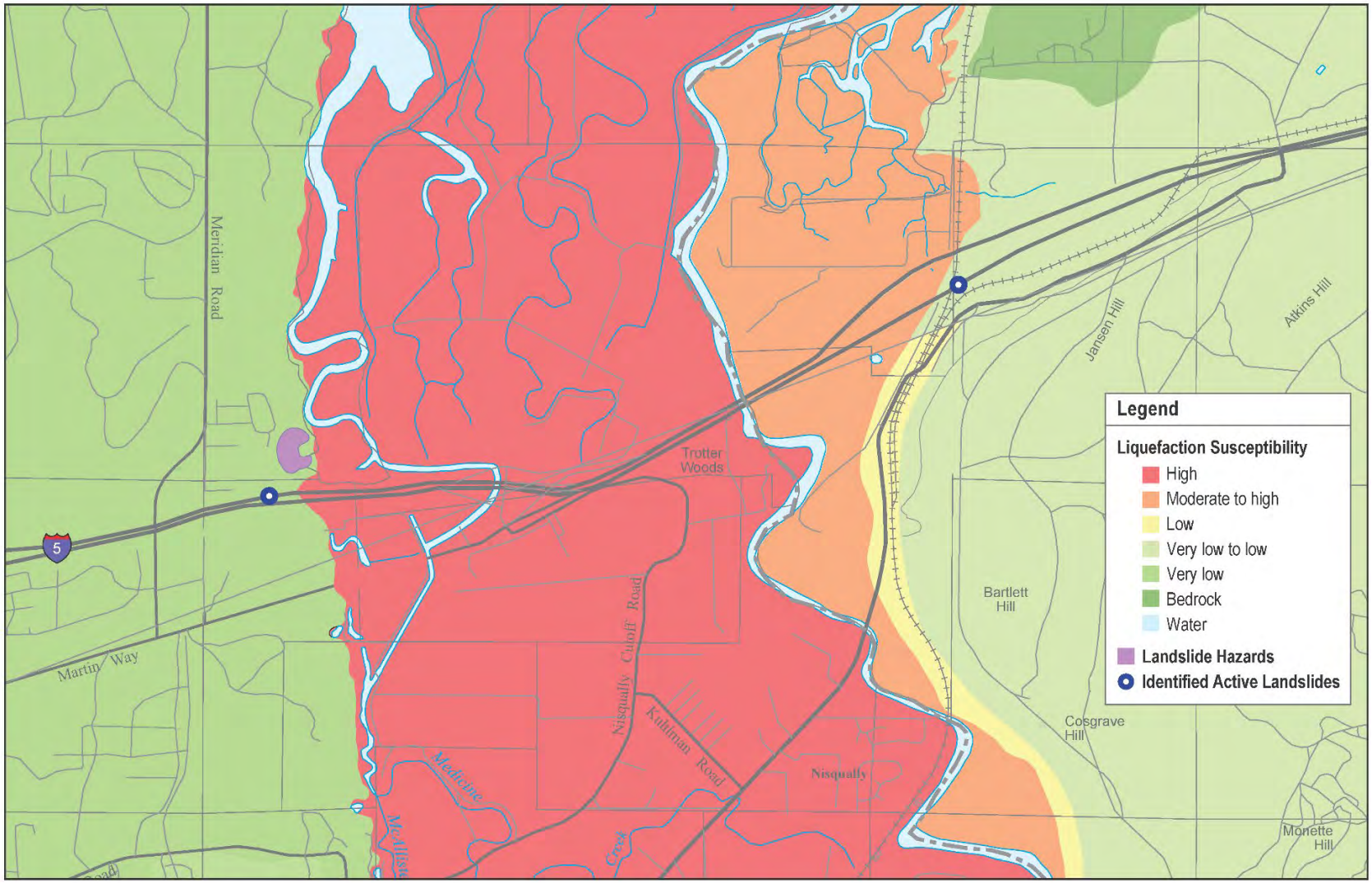


Figure 19. Study Area Geologic Hazards

6.6 Visual Quality

The study area for visual resources is the area of visual effect, which encompasses areas from which changes associated with the project would be potentially visible. The area of visual effect (AVE) is considered to consist of areas along both sides of the I-5 corridor that are within approximately 0.5 miles of the project footprint. The project area includes landscapes ranging from dense stands of trees that restrict views on portions of the route, to wide-open spaces containing buildings and landscaped areas. Effects to visual quality are determined by assessing changes to visual resources and the predicted viewer response to changes, with guidelines defining effects as being beneficial, neutral, or adverse.

Data Sources and Data Collection Methods

Existing conditions were documented using a combination of GIS mapping, field investigations, photographs, and a review of preliminary engineering plans and past visual quality analyses. The methodology and terminology used in identifying and assessing visual effects for this project is based on the FHWA *Guidelines for the Visual Impact Assessment of Highway Projects* (2015) and Chapter 459 of the WSDOT *Environmental Manual* (2022b).

Existing Conditions

This section of I-5 is a divided freeway with three lanes in each direction. The landscape is higher on either end of the corridor and lower through the center section in the Nisqually River valley. The study area was divided into three landscape units (Figure 20), which were then analyzed to determine the visual resources present, the primary viewers of those resources, and any potential effects on their viewing experience.

South of I-5, Landscape Unit 1 is characterized by residential and commercial uses with sparse vegetation. Additional residential areas are north of I-5, which has an industrial visual character with some forested areas. Views of the I-5 roadway and surrounding areas are mostly obstructed by roadside vegetation and grade changes. The closest viewers are the businesses adjacent to the I-5 ramps at the Marvin Road interchange (Exit 111), who have the highest degree of viewer exposure and awareness. Viewers driving along I-5 in Landscape Unit 1 have a low to average degree of viewer exposure and awareness due to high vehicle speeds, lack of notable features, and limited viewing angles.

Figure 20. Visual Quality Landscape Units

Source: Google Maps, 2023

Elevated above the valley floor, Landscape Unit 2 transitions into a more rural, natural environment with views of the Billy Frank Jr. Nisqually National Wildlife Refuge and Mt. Rainier. The area includes some commercial and agricultural businesses, with most buildings oriented away from the highway towards waterways and agricultural fields that add to the natural visual character. In Landscape Unit 2, visitors and residents at the Nisqually Commercial Park RV facility have the highest degree of viewer exposure and awareness of I-5. Visitors to the Billy Frank Jr. Nisqually National Wildlife Refuge have a low degree of viewer exposure and awareness due to vegetation blocking most views of I-5. South of I-5, remaining viewers have a low degree of viewer exposure and awareness. Viewers traveling along I-5 in have high awareness but limited viewer exposure due to the speeds of travel and limited viewing angles.

Landscape Unit 3 north of I-5 has rural residences and a golf course with mature vegetation separating most structures from the highway, while south of I-5, the land is mostly undeveloped and densely vegetated with mature forest, with no views of I-5 except at the Mounts Road interchange. Residential areas in Landscape Unit 3 are partially blocked by vegetation and residents in the homes closest to the roadway have the highest degree of viewer exposure and awareness of I-5. Most viewers driving along I-5 in this area have a low to average degree of viewer exposure and awareness due to their focus on the roadway, speeds of travel, lack of notable visual features, and trees adjacent to the roadway.

Next Steps

The visual impact assessment process consists of four phases: establishment, inventory, analysis, and mitigation. In each of the four phases, the methodology considers the relationship between the affected environment (visual resources) and the affected population (viewers). Effects that would reduce visual quality are defined as adverse or slightly adverse effects. A project would have adverse or slightly adverse effects if it would degrade visual quality or obstruct or alter views. Beneficial effects would include enhancing visual resources, blocking undesirable views (such as of traffic on I-5) or creating better views and improving visual quality.

6.7 Air Quality, Greenhouse Gases, and Energy

The study area for air quality, GHGs, and energy will include all areas within 0.5 mile of the project corridor and any other roadway links impacted by the project alternatives. The project area is designated by the Environmental Protection Agency (EPA) as in attainment for all National Ambient Air Quality Standards (NAAQS) and does not require a detailed project-level analysis to demonstrate that there would be no exceedance of the NAAQS.

The project site is adjacent to the Billy Frank Jr. Nisqually National Wildlife Refuge and has a high ecological stewardship priority rank. Climate change impacts, such as the expectation of more frequent extreme storm events, rising sea levels, and higher stream flows, make the impact of GHGs emissions a particular concern, especially as a bend in the Nisqually River is moving towards I-5 and is expected to reach the interstate within 17 to 30 years.

Data Sources and Data Collection Methods

The data sources include the Project Traffic Engineers analysis and data, WSDOT traffic data, air pollutant monitor data from the Puget Sound Clean Air Agency, mobile source air toxic (MSAT) emissions trends presented in FHWA's Interim Guidance, data from the Washington State Department of Ecology (Ecology), and input files from the EPA Motor Vehicle Emission Simulator (MOVES).

Existing Conditions

The Nisqually River delta was determined by Ecology to be impaired by pollutants and is included on the state 303(d) list as among the waters prioritized for clean-up and requiring a Total Maximum Daily Load (TMDL) plan.

Currently, a bend in the Nisqually River is moving towards I-5 and is expected to reach the interstate within 17 to 30 years. This, combined with the expectation of more frequent extreme storm events, rising sea levels, and higher stream flows due to climate change, make the impact of GHG emissions a particular concern.

Ecology, PSCAA, and ORCAA operate air quality monitoring stations to obtain data on actual ambient air quality concentrations. Information from these stations determines whether the region meets NAAQS and assists in providing background level concentrations in the project vicinity.

Areas of the country exceeding the NAAQS for a given pollutant are classified as “non-attainment” areas. From 1992 to 1995, Pierce County was designated as a non-attainment area for carbon monoxide and ozone. Based upon monitoring results, which showed no exceedances for several years, the EPA in 1996 re-designated the entire Puget Sound area as a “maintenance” area for these pollutants. In 1992, portions of the industrial areas of Pierce and Thurston Counties were declared to be PM10 non-attainment areas but were redesignated as “maintenance” areas in 2001 and 2000 respectively. Former non-attainment areas that have been re-designated as maintenance areas are required to continue to maintain air quality by adhering to a “maintenance plan” developed as

part of the re-designation process. Transportation projects must demonstrate “conformity” with the control measures specified in the Washington State Implementation Plan (SIP) adopted as part of this re-designation process.

The I-5 Mounts to Marvin Road project lies within an area that is in attainment for all the priority pollutants. At the nearest point, it is located approximately 3.5 miles from the monitoring station operated by the ORCAA located at Lacey-College Street. The built environment of the monitoring station area is dissimilar to most of the project site and therefore, its data does not represent project area conditions.

Next Steps

A quantitative analysis of MSATs is expected to be required in accordance with FHWA guidance. The project's impact on GHG emissions will be evaluated quantitatively by comparing existing emissions to projected emissions with and without the project. If an EIS is required, a quantitative analysis of energy use and emissions for criteria pollutants and GHGs will be conducted using EPA MOVES and traffic data. Induced traffic from the project will be reflected in the emissions burden produced for future Build years.

6.8 Cultural Resources and Historic Bridges

The cultural resources study area for this PEL study included all areas within 600 feet of existing highway centerlines in order to identify planning-level cultural resources considerations within the corridor where the majority of improvements are anticipated to take place and where the project is most likely to have direct effects on recorded and unrecorded cultural resources. The project will be reviewed under Section 106 of the *National Historic Preservation Act of 1966*, as amended (Section 106; 54 USC §300101 et seq.).

Data Sources and Data Collection Methods

Existing literature was used to identify recorded cultural resources and previous efforts to identify and study cultural resources within the study area. The Washington State Department of Archaeology and Historic Preservation maintains WISAARD, an online system hosting prior cultural resources investigations and recorded historical and archaeological sites. Prior investigations and recorded sites were tabulated, and their locations relative to the study area were reviewed. Reports were reviewed for findings and recommendations relevant to this PEL study.

Existing Conditions

The study area has seven recorded historic resources, including four transportation-related structures, one landscaping feature, one residential property, a National Heritage Area, and the location of the Medicine Creek Treaty signing, shown in Figure 21. Five of these have completed Historic Property Inventory (HPI) forms recorded with the Washington State Department of Archaeology and Historic Preservation (DAHP). The National Heritage Area does not involve federal regulatory authority, and the Medicine Creek Treaty signing location is memorialized elsewhere near the study area.

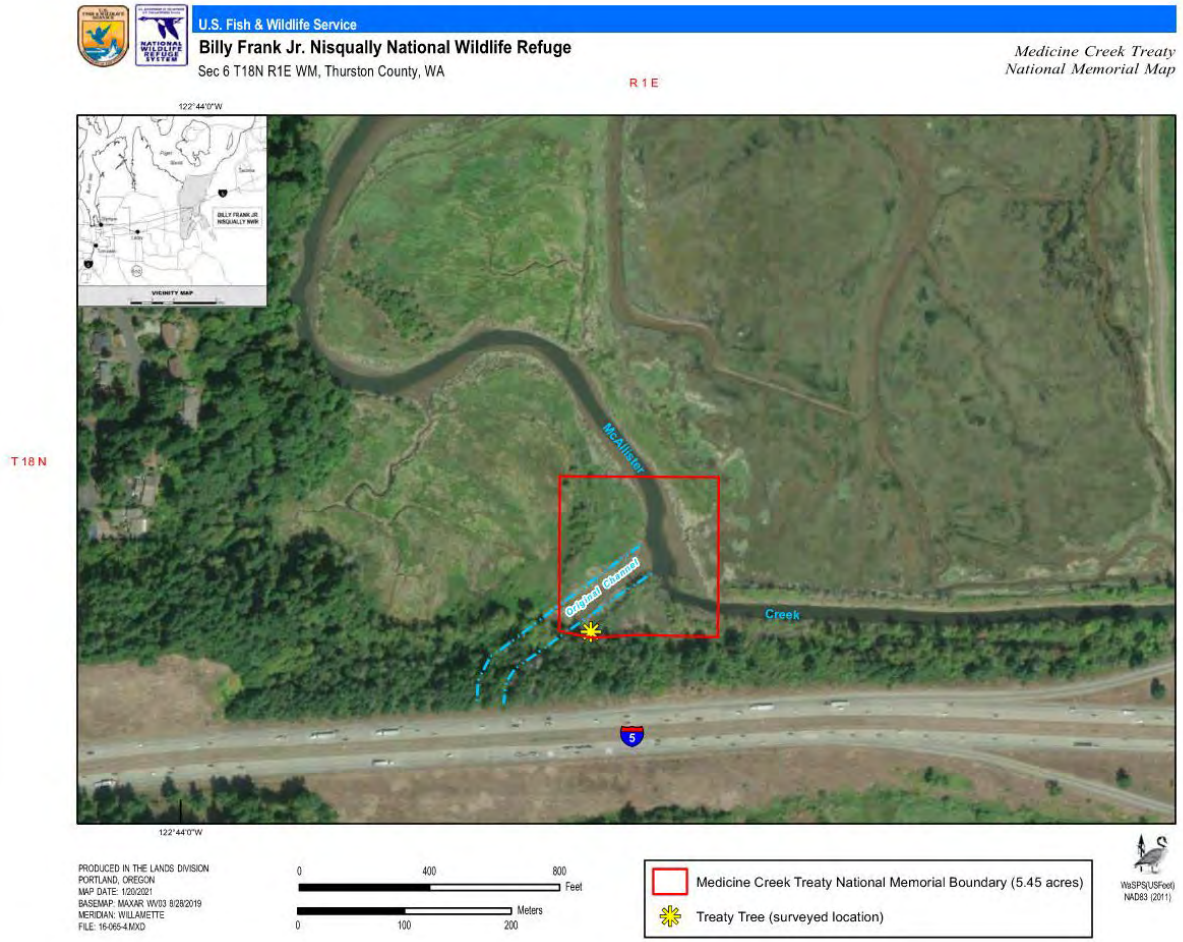


Figure 21. Medicine Creek Treaty Nisqually National Memorial Site

There are six recorded archaeological sites in the study area that represent both recent historic land use and Native use prior to Euroamerican settlement. All sites have been identified using traditional archaeological methods and are within 1.5 feet of the ground surface. The study area is classified as high to very high risk for containing archaeological resources according to DAHP's statewide predictive model. Only about 5 percent of the study area has been surveyed for archaeological resources so far, and it is possible that additional resources may be identified with further surveying.

Next Steps

Next steps will include review of geologic and cultural contexts, including recorded properties and prior investigations, allowing for recommendations for survey needs and methodologies, such as adequacy of pedestrian survey and traditional shovel probing, techniques to be employed to consider deeply buried sites, and research questions to be answered by a potential geoarchaeological study.

The assessment of cultural and historic resources completed for this PEL study does not provide recommendations for effect or resource eligibility determinations under Section 106 of the National Historic Preservation Act, as amended (Section 106) found within 36 CFR 800. Such determinations will be informed by future reconnaissance and intensive survey of the project alternatives that are advanced for further consideration under NEPA.

6.9 Noise

As defined in the 2020 WSDOT Manual and in 23 CFR Part 772, the noise study area includes all receptors within the Project limits that might experience project related traffic noise impacts. The noise analyst performed a detailed reconnaissance of the project vicinity to identify all noise-sensitive properties. For this PEL, the study area includes all noise-sensitive properties along I-5 between Mounts Road and the Marvin Road interchange.

Data Sources and Data Collection Methods

Land uses are categorized by the FHWA along with the noise abatement criteria in 23 CFR 772. Table 12 provides a summary of the FHWA land use categories that are used throughout this memorandum.

Table 12. FHWA Land Use Categories

Land Use Type	Land use Description
A	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	Residential (single and multi-family units)
C	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F
F	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	Undeveloped lands that are not permitted

On-site noise monitoring and concurrent traffic counts were performed at 12 locations in the Project study area. These sites were selected to provide traffic noise modeling validation and to aid in the understanding of existing noise levels along the corridor. The noise monitoring was performed on March 17, 2023, and April 14, 2023.

Noise measurements were taken in accordance with methods provided in the 2020 WSDOT Policy and in accordance with the American National Standards Institute (ANSI) procedures for community noise measurements (ANSI/ANA S12.9-2013/Part1). The equipment used for noise monitoring were Bruel & Kjaer Type 2238 Sound Level Meters. All meters were calibrated prior to and after the measurement period using a Bruel & Kjaer Type 4231 Sound Level Calibrator. Complete system calibration is performed on an annual basis by an accredited instrument calibration laboratory. System calibration is traceable to the National Institute of Standards and Testing (NIST). The system meets or exceeds the requirements for an ANSI Type 1 noise measurement system.

Noise monitoring sites were located within residential yards or the public right-of-way with clear line of sight to the roadway, when possible, in order to take concurrent traffic counts with the noise measurements. For locations where traffic could not be counted, synchronized terminals were installed and matched with traffic counts taken at a nearby location over the same time period. Additionally, two locations were chosen to establish the noise behind the existing noise wall south (east) of I-5 between Marvin Road NE and Meridian Road NE. Overall, the noise levels ranged from 64.4 to 74.5 dBA Leq.

Existing Conditions

Existing Land Uses

Residences, a school and religious facility, and hotel-uses (FHWA Category B, C, and E) are located in mixed-use areas of Lacey, East Olympia, and Dupont along with high- and low-density commercial properties, parks and recreation areas, agricultural uses, and railway alignments.

The south end of the Project, which includes East Olympia and Lacey, at the I-5 and Marvin Road NE ramps, is predominantly a mix of high-density commercial and residential uses as well as some hotels. East of the hotels is a dense housing development that runs along the south side of I-5 from Marvin Road NE to Meridian Rd NE. Residences in the area are located along a bluff over I-5 with many residences shielded by an existing noise wall. The noise wall ends just east of where Quinault Loop NE ends. The remaining houses are shielded by a berm.

East of Meridian Road NE to Brown Farm Road NE is predominantly single-family residences with some agricultural and commercial uses. Most of the residences are found within dense housing developments. However, there are some low-density residences south of I-5. The Buddhangkura Buddhist Temple, located south of I-5, is the only place of worship found within the project area. West of Brown Farm Road NE is the Nisqually Commercial Park, LLC, an RV park. The Wa-He-Lute Indian School is located south of I-5. However, while the school's main building is outside the Project study area, there is an outdoor learning space within the study area.

East of the Nisqually River to the Mounts Road SW ramps there are very few residential uses. South of I-5 is a railway alignment and undeveloped lands owned by JBLM.

Parks, recreation facilities, and natural area-uses (FHWA Category C) are also located within mixed used areas of Lacey, East Olympia, and Dupont near some low- and high-density commercial and industrial properties, residences, agricultural uses, and railway alignments.

North of I-5 from Marvin Road NE to Meridian Road NE is primarily industrial and commercial. There are some commercial uses owned by the Nisqually Indian Tribe west of Marvin Road NE and Thurston County owns most of the land east of Marvin Road NE to Meridian Road NE, operating the Thurston County Waste and Recovery Center.

The Billy Frank Jr. Nisqually National Wildlife Refuge is located north of I-5. Park uses within the Project area include walking trails, the Medicine Creek Treaty National Memorial, and sensitive wildlife habitats. East and west of Mounts Road SW and north of I-5 is the Eagles Pride Golf Course and Grill. Both the golf course and outdoor restaurant seating are within the Project study area.

Noise Measurements

Traffic along I-5 was the primary noise source at most of the monitoring locations. Secondary noise sources included local road traffic (Martin Way, Nisqually Cut Off Road NE, Nisqually Road NE, and ramps to and from I-5), along with typical neighborhood activities. The highest traffic noise measurement of 74.5 dBA Leq occurred north of I-5 near the Nisqually Refuge. The lowest noise measurement of 64.4 dBA Leq was recorded within the Nisqually Refuge near the maintenance facility. The two measurements taken near the existing noise wall were 64.9 dBA Leq near the Best Western where the wall begins, and 69.3 dBA Leq behind the west end of the noise wall on Quinault Loop NE.

Next Steps

The noise analysis will predict existing and future design year traffic noise levels. Future design-year peak-hour noise levels will be predicted using traffic projected for the year 2045. Comparative tables and graphics will be created to provide an easy method of comparing noise levels between the existing conditions, future No Build scenario, and future Build scenario. The tables will include land use noise levels for existing conditions, No Build scenario, and Build scenarios along with the Project NAC. The table columns will show the incremental change in noise between the existing conditions, No Build scenario, and the Build scenario at all modeled receiver locations. Detailed vicinity maps will show all noise modeling locations, with locations exceeding the NAC clearly identified.

The noise analyst will use various data sources (traffic counts, speeds, project design, ground cover, etc.), existing roadway configurations, measured noise levels, speeds, and traffic counts and data to build and validate a traffic noise model. Noise measurement sites will be used as noise validation locations. The noise model must validate to match the measured levels within ± 2 dBA to be considered acceptable under the 2020 WSDOT Manual.

In accordance with FHWA and WSDOT requirements, noise abatement measures will be considered at locations along the Project alignment where traffic noise levels are predicted to approach or exceed the NAC. Given the limited right of way and topographical conditions, noise walls are expected to be the primary method of abatement for the project. The abatement analysis will provide location, length, height, profile, estimated cost, and number of benefiting noise-sensitive properties for each proposed barrier. The analysis will include a complete discussion of affected areas that do not meet the WSDOT criteria for abatement and specifically note reasons for not including mitigation.

6.10 Hazardous Materials

The hazardous materials study area includes all areas within 1.0 mile of the project corridor, which extends between Exit 111 and Exit 116 on I-5. The study area was defined based on the WSDOT *Guidance & Standard Methodology for WSDOT Hazardous Materials Discipline Reports* (WSDOT 2021), which follows the regulatory record search radius standards defined in ASTM 1527, Section 8.2.1. These standards identify a 1.0 mile search radius for federal Superfund sites and a 0.5 mile search radius for state-identified hazardous waste and cleanup sites.

Data Sources and Data Collection Methods

The Ecology Facility/Site database was used primarily to identify any known sources of hazardous materials within the study area, and the EPA National Priorities List was used to identify any Superfund sites in the project vicinity. A list of known sites was compiled and will be carried forward into the preliminary design phase of the project to determine whether any further investigation is warranted. In addition, a windshield survey was performed on January 27, 2023, from public ROWs or accessible public properties, to record the physical settings and conditions at ground surface as they may relate to environmental contamination, illegal dumping or disposal activities, and/or improper storage of hazardous or regulated materials. Historical aerial photographs and topographic maps were also reviewed along with existing documentation of previous environmental investigations in the project study area.

Existing Conditions

Within 1 mile of the project corridor, 109 active potential hazardous waste sites were identified in Ecology records, as shown on Figure 22. These sites have been further differentiated by relative risk of adverse impact. No high impact sites were identified in the study area. Fifty-seven sites within the study area were identified as having a moderate impact risk due to their potential for contamination of soils and/or groundwater, with the remaining 52 sites identified as low impact. Of the 57 sites that were identified as having a moderate impact risk, 37 were identified as sites of potential concern. Sites located greater than 0.5 mile from the project corridor are not recommended for further investigation, as the likelihood of contamination migrating from this distance to the project corridor in concentrations exceeding cleanup levels is low.

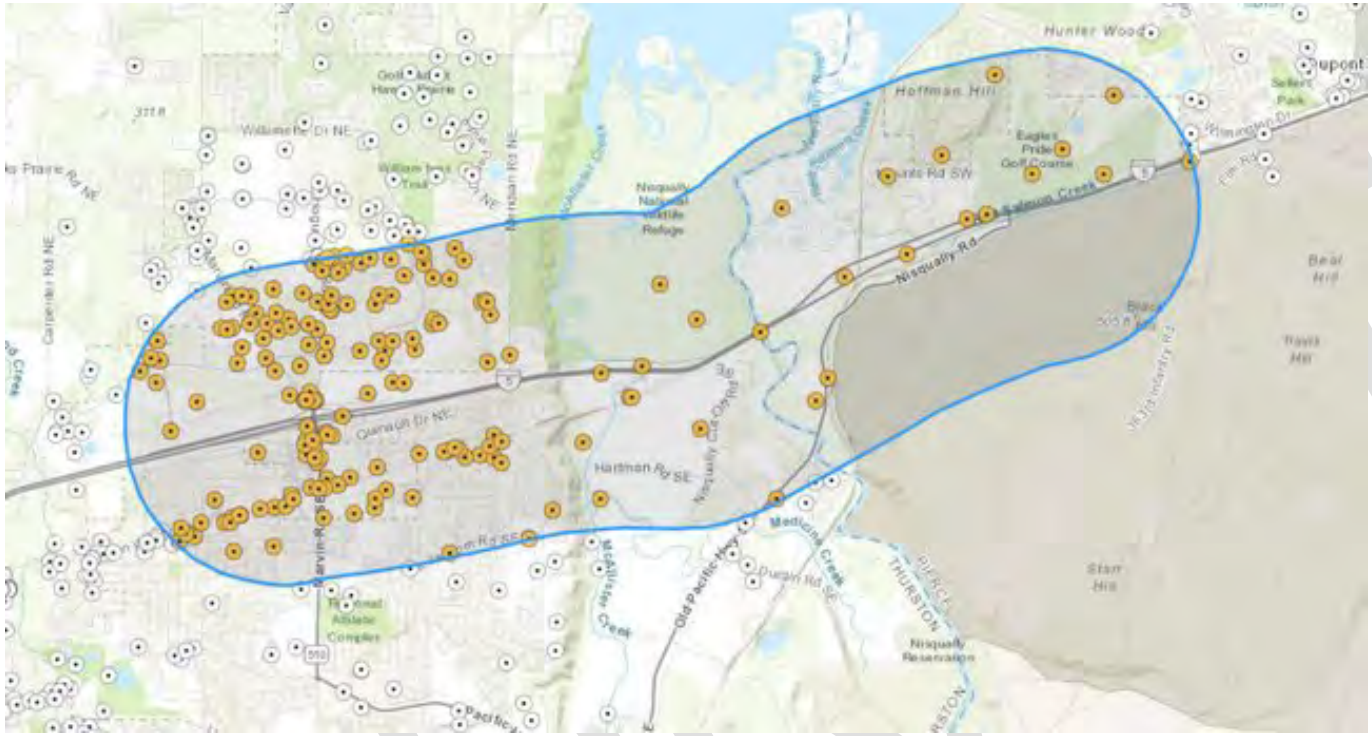


Figure 22. Active Hazardous Materials Sites

Next Steps

Assessment for the potential of contamination is necessary to ensure that proper measures are taken during construction to prevent further contamination, and that contaminated materials are properly handled and disposed. A risk evaluation will assess the level of complexity of potential mitigation that could be required based on the potential for contamination. WSDOT will implement two levels of mitigation complexity: straightforward for small to medium sites with less toxic contaminants, and complicated for larger sites with widespread or difficult-to-treat contaminants requiring extensive research and regulatory involvement.

6.11 Land Use, Farmlands, and Section 6(f)

The Land Use, Farmlands, and Section 6(f) study area generally includes all areas within 0.5 mile of the project corridor, where the majority of improvements will take place and where the project is most likely to have effects on existing land uses. As the project moves from the planning phase into design, the study area may be amended, and the analysis refined as needed.

Land Use in the study area is regulated by both federal and state statutes including Section 6(f) of the Land and Water Conservation Fund (LWCF) Act (54 USC 2003 § 200301-200310), implemented by the Washington Recreation and Conservation Office (RCO) (RCW 79A.25).

Data Sources and Data Collection Methods

Information on existing land use was compiled using existing documents, maps, aerial photographs, and GIS data. Land use and zoning designations and critical areas regulations were obtained from Thurston and Pierce Counties and the City of Lacey. A reconnaissance-level site inspection of the project study area was conducted to verify existing land uses. Findings were then be compared to current regional, county, municipal, and neighborhood subarea zoning and comprehensive land planning of record. A review of plans was conducted to ensure that the proposed project will support, and is in compliance with, established plans and policies. In addition, studies previously prepared by WSDOT for the project corridor were reviewed and updated as necessary.

The viability of land in long-term agricultural use and the importance of individual farms are the focus of the State of Washington's various farmland protection actions. The National Resources Conservation Service (NRCS) web-based Web Soil Survey was used to determine soil types within the study area and identify Farmland that falls into one of three distinct categories, Prime Farmland, Unique Farmland, or Farmland of Statewide or Local Importance. Land that falls within these categories was overlain with current land use and other GIS data (e.g., critical areas) to help determine whether there are areas within the project study area that should be evaluated for effects to Farmlands.

The LWCF is a federal grant program that helps pay for the acquisition of outdoor recreation sites and facilities. Property within the study area that has used funds from the federal LWCF were identified by examining the National Park Service database of Section 6(f) investments.

Existing Conditions

The Marvin Road interchange (Exit 111) at the southern end of the alignment lies within the City of Lacey. In regard to land use, the areas immediately surrounding the Marvin Road interchange include commercial, residential, and light industrial uses. There is a mix of commercial uses on the south side that include big box and other retail stores, restaurants, offices, hotels, and offices centered

around Marvin Road. Further east and west of the interchange, the land uses transition to low-, medium-, and high-density residential neighborhoods within the city's urban growth area.

The study area located in Thurston County spans from the eastern end of the Marvin Road interchange to the Nisqually River and valley. Land use in this area varies from commercial and low-density residential on the west side of the study area to public parks, trails, and preserves along with Nisqually agriculture moving eastward toward the Nisqually River.

The western boundary of Pierce County starts at the Nisqually River. The land east of the river to the eastern end of this PEL Study corridor and south of I-5 is owned by the Department of Defense (JBLM) and is mostly undeveloped. The north side of I-5, from the Nisqually River to Mounts Road, is part of the Billy Frank Jr. Nisqually National Wildlife Refuge. This area transitions to rural residential as I-5 climbs out of the valley. Immediately north of the I-5/Mounts Road interchange is the Eagle's Pride Golf Course, which is owned and operated by JBLM.

For farmlands, an evaluation of the NRCS web-based Web Soil Survey shows that much of the project corridor lies within, or directly adjacent to, prime farmland, unique farmland, or farmland of statewide or local importance. Based on a search of the RCO project database, there are no projects within the study area that were acquired or developed with LWCF grants. Therefore, there are no Section 6(f) Resources in the study area.

Next Steps

If effects to land use are identified, potential mitigation measures will be developed in accordance with local and state standards. Short-term effects from construction, such as disruptions to access, will be mitigated by restoring the site to preconstruction conditions or better after completion of the project. Short-term effects from construction, such as temporary use of agricultural land, will be mitigated by restoring the site to preconstruction conditions or better after completion of the project. If the project requires the permanent conversion of prime, unique or farmlands of statewide or local importance to a non-farm use, WSDOT will coordinate with the NRCS to determine appropriate mitigation. WSDOT will coordinate with the NRCS to determine the appropriate approval process and identify mitigation.

6.12 Section 4(f)

The project is located within Thurston and Pierce counties and the City of Lacey. The study area includes all areas within 0.5 mile of the project corridor, which extends between Exit 111 and Exit 116 on I-5. Section 4(f) of the Department of Transportation Act of 1966 applies to historic sites of significance, significant publicly owned parks and recreation areas, wildlife and waterfowl refuges, as well as historic sites of nation, state, or local significance.

Data Sources and Data Collection Methods

The FHWA provides guidance on Section 4(f) evaluations through the Environmental Review Toolkit, including the Section 4(f) Policy Paper (FHWA 2012). In addition, the WSDOT Environmental Manual Chapter 457 and WSDOT Environmental Guidance website also provide guidance. For properties that are not clearly defined by the Section 4(f) designation of publicly owned parks, recreation areas, refuges, or historic sites, FHWA provides information for determining Section 4(f) applicability for these types of properties:

- Wildlife Management Areas
- School Playgrounds
- Fairgrounds
- Public Multiple-Use Land Holdings
- Wild & Scenic Rivers
- Bodies of Water
- Planned Facilities
- Bikeways
- Trails
- Scenic Byways

Information on existing facilities was compiled using existing documents, maps, aerial photographs, and GIS data obtained from federal and state agencies, Thurston and Pierce counties, the City of Lacey, and the Nisqually Indian Tribe. A reconnaissance-level site inspection of the project study area was conducted on January 27, 2023, to verify existing facilities and resources. The Cultural Resources Assessment prepared for the project was also reviewed to determine the presence of historic resources that could be classified at Section 4(f) properties.

Once Section 4(f) properties are identified in the study area, potential use of the resource is determined. "Use" in the Section 4(f) context is defined in 23 CFR 774.17 (Definitions) and can be one of three forms: permanent conversion to transportation use, temporary occupancy (whole or in part), or constructive use. FHWA's Section 4(f) Policy Paper states that "A constructive use occurs when the proximity impacts of a proposed project adjacent to, or nearby, a Section 4(f) property result in substantial impairment to the property's activities, features, or attributes that qualify the property for protection under Section 4(f)" (FHWA 2012). If FHWA determines that the project may use Section 4(f) property, the evaluation includes either:

1. Preparing a *de minimis* impact determination, where there is either a Section 106 finding of no adverse effect or no historic properties affected on a historic property, or a determination that the project would not adversely affect the activities, features, or attributes qualifying a park, recreation area, or refuge for protection under Section 4(f).
2. Applying one of five programmatic Section 4(f) evaluations, where a specific set of criteria, based upon common experience, allows the standardization of avoidance alternatives.
3. Preparing an individual Section 4(f) evaluation, where the project results in a use of Section 4(f) property and options 1 and 2 do not apply.

Existing Conditions

A recreational facility must be open to the public to be considered a Section 4(f) resource. Most publicly owned facilities, such as parks and trails, are considered significant resources. The recreational facilities within the study area are the Billy Frank Jr. Nisqually National Wildlife Refuge, Hawk's Prairie Off-Leash Dog Park, the Closed Loop Park Demonstration Garden, and the Eagle's Pride Golf Course.

FHWA considers all refuges that are part of the National Wildlife Refuge System Administration Act as significant Section 4(f) resources. In addition, all publicly owned lands and waters where the primary function is the conservation, restoration, or management of wildlife and waterfowl resources, are considered wildlife and waterfowl refuges for the purpose of Section 4(f). There is one refuge within the study area, the Billy Frank Jr. Nisqually National Wildlife Refuge.

The historic site the Medicine Creek Treaty National Memorial and Treaty Tree, located within the Billy Frank Jr. Nisqually National Wildlife Refuge, is considered a significant 4(f) resource as it is likely eligible for listing on the National Register of Historic Places (NRHP), pursuant to the National Historic Preservation Act. This site is not currently listed on the NRHP; however, it has not been fully evaluated to date. For the purposes of this PEL study and Section 4(f) existing conditions, it is assumed the Medicine Creek Treaty National Memorial site will be eligible for listing on the NRHP. Other historic resources identified as part of the cultural resources survey prepared for the project under NEPA would also be considered Section 4(f) resources.

Next Steps

All prudent measures will be considered to avoid or minimize harm and provide necessary mitigation measures to Section 4(f) resources. If required, the form of mitigation will be negotiated between WSDOT, FHWA, and the official with jurisdiction. If an individual Section 4(f) analysis is required and concludes that there is no feasible and prudent avoidance alternative, then the alternative that causes the least overall harm to the Section 4(f) property must be chosen. A list of factors to consider in making this determination is presented in 23 CFR 774.3I, including "the ability to mitigate adverse effects to Section 4(f) property; the relative severity of remaining harm, after mitigation, to Section 4(f) property; and the relative significance of each Section 4(f) property."

The Medicine Creek Treaty National Memorial and Treaty Tree site will be evaluated and a recommendation made to the State Historic Preservation Office during the NEPA phase of the I-5 Marvin to Mounts Road project. See also the Next Steps for Cultural and Historic Resources, above.

6.13 Socioeconomic Impacts and Environmental Justice

The study area includes all areas within 1 mile of the project corridor where the project is most likely to have effects on socioeconomics and EJ populations. Federal and state laws, statues, regulations, and guidance and how they relate to EJ were examined, including Title VI of the *Civil Rights Act of 1964* (42 USC 2000d – 2000d-7) and the *Civil Rights Restoration Act of 1987* prohibit discrimination on the grounds of race, color, national origin, age, or disability. Factors considered in socioeconomic vulnerability include limited English proficiency (LEP), census data, high school diploma attainment, people of color, population living in poverty, transportation expense, housing affordability, and unemployment.

Data Sources and Data Collection Methods

Demographic information was gathered for areas within approximately 1 mile of the project corridor. Demographic information on LEP, race and ethnicity, and low-income was collected from the U.S. Census Bureau and the Washington State Office of the Superintendent of Public Education. Information on health disparities was collected from the Washington Environmental Health Disparities Map and other resources as identified through the EJ Assessment guidance.

Existing Conditions

Minority populations include racial and/or ethnic minority groups that have been historically marginalized and can therefore be socially and economically disadvantaged. The minority racial and ethnic groups in the study area are shown in Table 13.

Table 13. Race/Ethnicity within the Study Area

Race/Ethnicity	Number of Persons	Percent of Total
Total population	15,955	-
White alone	10,811	67%
Black or African American alone	1,004	6%
Hispanic	2,158	14%
American Indian and Alaska Native alone	285	2%
Asian alone	1,659	10%
Native Hawaiian and Other Pacific Islander alone	139	1%
Some other race alone	343	2%
Two or more races	1,714	11%
Total minority population	5,144	33%

Source: U.S. Census Bureau, 2016-2020 American Community Survey 5-Year Estimates; EPA EJ Screen Report.

The U.S. Department of Health and Human Services identified the poverty guideline figure for a four-person household in 2020 to be $26,500 per year. Because the Census data provides income information in ranges of $5,000, this evaluation defines a low-income household as one with a household income of less than $25,000 per year. Approximately 14% of households within the study area can be characterized as low-income, as shown in Table 14.

Table 14. Low-Income Households within the Study Area

Household Income Level	Number of Households	Percent of Total
Total households	6,313	-
Less than $15,000	300	5%
$15,000-$25,000	572	9%
$25,000-$50,000	1,029	16%
$50,000-$75,000	1,253	20%
$75,000 or more	3,158	50%
Total low-income households (<$25,000)	872	14%

Source: U.S. Census Bureau, 2016-2020 American Community Survey 5-Year Estimates; EPA EJ Screen Report attached.

LEP populations include people who speak a language other than English and speak English “less than very well,” as self-identified in the census data (Table 15). Project information must be provided in languages other than English when an LEP population of five percent or 1,000 persons, whichever is greater, has been identified in a project area. None of the languages spoken in the study area meet this criterion.

Table 15. LEP Population within the Study Area

Population by Ability to Speak English	Number of Persons	Percent of Total
Total population > 5 years old	14,664	-
Speak only English	12,412	84.6%
Speak English "very well"	1,271	8.7%
Speak English "well"	499	3.4%
Speak English "not well"	469	3.2%
Speak English "not at all"	14	0.0%
Total population speaking English "less than very well" ("well" + "not well" + "not at all")	**982**	**6.7%**

Source: U.S. Census Bureau, 2016-2020 American Community Survey 5-Year Estimates; EPA EJ Screen Report attached.

In addition to the EJ populations identified above, a number of other socioeconomic indicators help us understand more about the community. The prevalence of these socioeconomic indicators within the study area is shown in Table 16, and is compared to that of Pierce County, Thurston County, and Washington State as a whole.

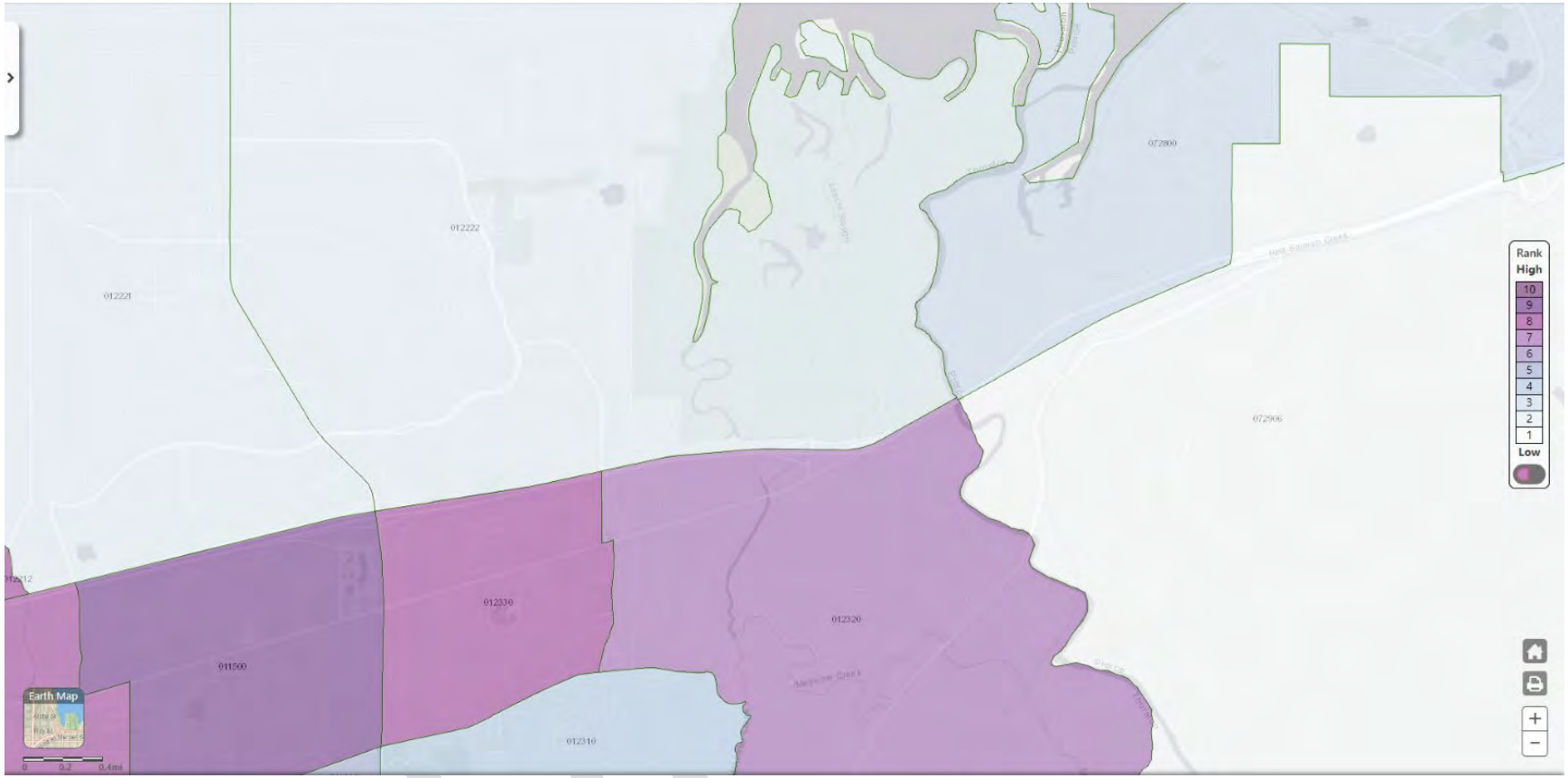
Table 16. Socioeconomic Indicators

	Study Area	Pierce County	Thurston County	Washington State
Home Ownership				
Own	**54%**	63%	66%	63%
Rent	**46%**	37%	34%	37%
Internet Access				
Without internet access	**10%**	10%	10%	10%
Cellular data plan as the only internet subscription	**7%**	9%	8%	9%
Unemployment Rate	**6%**	5%	6%	5%
Elderly Population (Age 65+)	**10%**	14%	17%	15%
Disability				
All	**11%**	14%	16%	13%
Hearing difficulty	**3%**	4%	5%	4%
Vision difficulty	**2%**	2%	3%	2%
Cognitive difficulty	**3%**	6%	7%	6%
Ambulatory difficulty	**5%**	6%	7%	6%
Self-care difficulty	**2%**	3%	2%	2%
Independent living difficulty	**4%**	6%	7%	6%
Households Without Vehicles	**6%**	5%	5%	7%

Source: U.S. Census Bureau, 2016-2020 American Community Survey 5-Year Estimates; EPA EJ Screen Report attached.

The Washington Environmental Health Disparities (EHD) Map is an interactive mapping tool that evaluates environmental health risk factors in communities and compares communities across the state for environmental health disparities. It estimates a cumulative environmental health impact score for each census tract reflecting pollutant exposures and factors that affect people's vulnerability to environmental pollution. The model takes into account both threat (represented by indicators that account for pollution burden) and vulnerability (represented by indicators of socioeconomic factors and sensitive populations) to help compare health and social factors that may contribute to disparities in a community.

The study area ranked high for poor health outcomes (8 to 10 out of 10), including cardiovascular disease, cancer, low birth weight, and lack of health insurance coverage and moderately high for health disparities. The study area poses a medium level of risk for environmental exposures (4 to 6 out of 10), with factors including diesel exhaust PM2.5 emissions, ozone concentration, PM2.5 concentration, proximity to heavy traffic roadways, and toxic releases from facilities. The study area also measured high for socioeconomic vulnerability (6 to 10 out of 10), which includes factors such as LEP census data, high school diploma attainment, people of color, population living in poverty, transportation expense, housing affordability, and unemployment. The overall health disparities are shown on Figure 23 indicate the study area rank high (7 to 9 out of 10).



Source: WA Dept. of Health Environmental Health Disparities (EHD) Database

Figure 23. Environmental Health Disparities in the Project Study Area

Next Steps

During the NEPA phase of the project, both long- and short-term effects will be considered for all alternatives, including the No Build alternative. These effects may include relocation or in place accommodation of utility lines, service outages, or delayed response time of emergency services due to detours. If an EJ population has been identified in the study area, access to public services and utilities will be included in the determination of "disproportionately high and adverse impacts." Information on the project's potential effects will be evaluated further to determine whether the project will have a disproportionately high and adverse effect to Environmental Justice populations in the project area, as defined by FHWA Implementing Order 6640.23.

An Environmental Justice Assessment will also be conducted, in compliance with the state Environmental Justice law under Chapter 70A.02 RCW. This process is still being developed by WSDOT and other state agencies.

An extensive public outreach effort will also be completed during the NEPA phase. Information gathered during this community and interested parties engagement will inform the Socioeconomic Impacts and Environmental Justice analysis through the collection of first-hand information from the people who live and work in the project area. The need for project information to be translated into other languages will be identified at that time. Further analysis will be conducted and will focus on socioeconomic, economic, and relocation impacts, and will also incorporate the findings of other work in this PEL analysis, such as air quality, noise, transportation, hazardous materials, visual effects, and other environmental resources.

Mitigation for short-term effects will be developed in consultation with the affected parties. The design intent is to avoid or minimize permanent effects. If long term effects are identified, mitigation measures will be developed in consultation with the affected parties. A general overview of Uniform Relocation Assistance and Real Property Acquisition Policies will be described if displacements are identified.

6.14 Navigation

The Nisqually River and McAllister Creek are the main navigable waterways in the study area and are navigable to watercraft, including recreational and commercial users. The Nisqually Tribe has ownership and reserved treaty rights to navigate and fish in and along the Nisqually River. Project effects on navigable watercraft from the alternatives and options are not expected, except for possible temporary impacts from construction. If mitigation measures to minimize construction impacts to the navigable waterways are needed, they will be identified in the NEPA phase. The United States Coast Guard (USCG) was a participant in this PEL study and will also be coordinated with during the NEPA phase.

Next Steps

During the NEPA phase, a Navigation Report will be completed to determine if the potential effects to navigation from construction require mitigation.

7 NEXT STEPS AND IMPLEMENTATION

Chapter Overview

- Anticipated permits from federal, state, and local agencies
- Coordination and outreach for NEPA process

This section describes the process for moving the preferred alternative forward into NEPA, including additional design, analysis, and community outreach that will be needed to fully evaluate the potential environmental effects of implementation. A discussion of planned projects, including potential future passenger rail service improvements in or adjacent to the I-5 corridor, is also provided for context and future coordination during NEPA.

NEPA Analysis and Documentation

One of the main benefits of a PEL study is that it allows planning analyses and decisions to be carried forward into the NEPA environmental review process. This helps reduce duplication between the planning and environmental review processes which can lead to more efficient project delivery. To fully analyze the potential effects of implementation of the preferred alternative, the NEPA phase will include the completion of impact assessments for each discipline identified during this PEL process. The Existing Conditions memoranda will be expanded into full Discipline Reports with the inclusion of those impact assessments and mitigation measures, where appropriate, based on the preliminary design of the preferred alternative and bridge design. An analysis of cumulative impacts associated with the preferred alternative and potential mitigation measures will also be completed in the NEPA phase. Additional data collection, modeling, and coordination with agencies is anticipated. The next steps required to complete the Discipline Reports are described in Section 6, and in Appendix D.

Anticipated Permits

Implementation of the preferred alternative would require permits from federal, state and local agencies. Anticipated permits, the agencies that issue them, and the project activities that would trigger each are described in Table 17. Other permits and approvals may also be required and will be identified once the project design has been further developed.

Table 17. Permits and Approvals

Permit/Approval	Responsible Agency	Trigger
Federal		
National Environmental Policy Act Compliance	Federal Highway Administration	Requires Federal agencies to assess the environmental effects of proposed major Federal actions prior to making decisions.
Clean Water Act Section 404 Permit	U.S. Army Corps of Engineers	Required for work that discharges dredged or fill material into waters of the US.

Permit/Approval	Responsible Agency	Trigger
Rivers and Harbors Act Section 9 Permit	U.S. Coast Guard	Required for the construction of bridges and other structures in or over navigable waters.
Rivers and Harbors Act Section 10 Permit	U.S. Army Corps of Engineers	Required for the construction of bridges and other structures in or over navigable waters.
Endangered Species Act Section 7 Consultation	National Marine Fisheries Service and U.S. Fish and Wildlife Service	Required when an action carried out, funded, or authorized by a federal agency may affect a species listed as threatened or endangered under the Act, or any critical habitat designated for it.
National Historic Preservation Act Section 106 Consultation	Washington Department of Archaeology and Historic Preservation	Requires federal agencies to consider the effects on historic properties of projects they carry out, assist, fund, permit, license, or approve.
Land and Water Conservation Fund (LWCF) Act Section 6(f) Compliance	National Park Service/Washington State Recreation and Conservation Office	Section 6(f) provides protection for recreational properties purchased or approved with LWCF funds and requires in-kind replacement of lands converted to other uses.
Department of Transportation Act Section 4(f) Compliance	Federal Highway Administration	Requires that property from publicly owned public parks, recreation areas, wildlife or waterfowl refuges, or historic site listed or eligible for listing on the National Register of Historic Places not be used for transportation purposes unless there is no feasible or prudent alternative.
Sole-Source Aquifer Consultation under the Safe Drinking Water Act	U.S. Environmental Protection Agency	Protect drinking water systems which are the sole or principal drinking water source for an area and which, if contaminated, would create a significant hazard to public health.
State and Local		
State Environmental Policy Act Compliance	Washington State Department of Transportation	Requires Washington State agencies to assess the environmental effects of proposed major Federal actions prior to making decisions.
Clean Water Act Section 401 Water Quality Certification	Washington State Department of Ecology	Requires that compliance with state water quality standards be verified prior to federal agencies issuing a permit or license to conduct any activity that may result in any discharge into waters of the United States.
Clean Water Act Section 402 National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit	Washington State Department of Ecology	Regulates direct discharges from “point sources” to surface waters, including discharges of stormwater runoff from construction sites more than 1 acre in size.
Coastal Zone Management Act Consistency Determination	Washington State Department of Ecology	Requires that Federal actions that are reasonably likely to affect any land or water use or natural resource of the coastal zone be consistent with enforceable policies of a State's federally approved coastal management program.
Shoreline Management Act Review	Washington State Department of Ecology	Requires review of proposed substantial developments within designated shoreline zones (typically within 200 feet upland from the

Permit/Approval	Responsible Agency	Trigger
		ordinary high water mark) for consistency with shoreline planning policies and regulations.
Hydraulic Project Approval	Washington State Department of Fish and Wildlife	Requires that hydraulic projects (defined as those that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state) be completed in a manner that protects fish and their aquatic habitats.
Aquatic Lands Use Authorization	Washington State Department of Natural Resources	Required for projects taking place on or over state-owned aquatic lands.

Mitigation Strategies

Potential mitigation strategies have been identified for each environmental discipline based on the preliminary identification of project effects and benefits, as described in Table 8. The project team will expand the analyses during NEPA to include detailed evaluations and identification of specific project effects and mitigation, if needed. During the conceptual development of the preferred alternative, WSDOT incorporated approaches that will help minimize potential adverse effects—for example, roadway widening within the existing right-of-way, which will result in fewer wetland and stream impacts and avoid the need for residential or business displacements. The preferred alternative is anticipated to have extensive benefits to the natural environment, with adverse effects primarily associated with temporary construction activities. Benefits to the natural environment include expansion of existing wetlands adjacent to I-5, improved wildlife and ecosystem connectivity, and reduced highway footprint in the Nisqually River floodplain. Potential mitigation strategies for effects to the built environment include targeted outreach to the surrounding communities and property owners, coordinating with local jurisdictions on other planned projects in the area, and working with our project partners to identify compensatory measures, if needed (e.g., noise walls, historic resource inventory, etc.). WSDOT's continued coordination with resource and permitting agencies will play a vital role in refining the NEPA mitigation strategies into actionable measures.

Coordination Process for NEPA

It is WSDOT's intent to re-initiate and expand upon the community and agency outreach that was completed as part of this PEL process (as described in Section 2, above) as the project moves into NEPA. WSDOT will continue to engage the Agency, Technical, and Executive Advisory Groups and tribes by holding regular meetings throughout the NEPA process to gain their input on the analysis and key decision points. At that time, the resource agencies and tribes will be invited to be either Cooperating or Participating agencies during the NEPA process.

Other outreach will include, at a minimum:

- Continue government-to-government coordination with the tribes.
- Focused outreach to disadvantaged and overburdened communities.
- Maintaining the project website with up-to-date information and project materials.
- Holding online and in-person open houses to provide project progress updates to the surrounding communities and solicit input.
- Holding regular briefings with non-governmental, community organizations and other groups that have requested them.
- Direct engagement with adjacent property owners to keep them apprised of the project progress and process, and to gain their input on aspects of the project that may directly impact them.
- Close coordination with BNSF and Sound Transit.

Conceptual Design

The conceptual design developed for the PEL Study will be modified in NEPA to show the temporary footprint needed during different construction phases, construction staging areas, and available right-of-way. The permanent footprint will show the location of improvements in the corridor including stormwater facilities and earthwork limits in areas outside of the areas with new bridge structures. The conceptual design work will include plan and cross-section views of the improvements including the shared-use path and stormwater facilities. The conceptual design will also include construction staging plans to identify construction staging areas within or adjacent to the WSDOT right-of-way. The conceptual design plans will be used as the basis for technical studies in each of the environmental disciplines included in the NEPA Environmental Assessment.

Implementation

A potential construction sequence for the preferred alternative is described below. This is assuming that the new roadway and structures would be built on the existing I-5 ROW with the minimum necessary amount of construction on temporary easements outside of the existing ROW. Figure 24 illustrates the proposed sequence of work.

- Phase 1 – Construct temporary widening of southbound I-5 into the median and shift the southbound I-5 lanes. Construct temporary widening of northbound I-5 at spot locations, including temporary bridges (Nisqually River truss bridge and south overflow channel bridge)

- Phase 2 – Construct the new southbound I-5 and shared-use path roadway and temporarily relocate the existing southbound and northbound I-5 lanes (six total) onto the new roadway. Demolish the existing I-5 northbound and southbound roadways and embankments.
- Phase 3 – Construct the new northbound roadway, relocate northbound I-5 traffic onto the new northbound lanes, and build the shared-use path on the north side of the southbound lanes.

Table 18 describes the trade-offs and benefits of 1) construction staging alternatives partially on new ROW to reduce construction time and costs versus construction staging alternatives within existing ROW and 2) whether to widen to the southbound side or the northbound side. The construction staging approach used for this analysis is based on 1) construction staging alternatives within existing ROW and 2) to widen to the southbound side as described in Table 18. This approach would cost more and take longer to construct but would avoid ROW needs from sensitive properties and would result in the SUP being on the Puget Sound side of I-5, providing the best environment for active transportation users. The construction sequence shown in Figure 24 matches this construction staging approach.

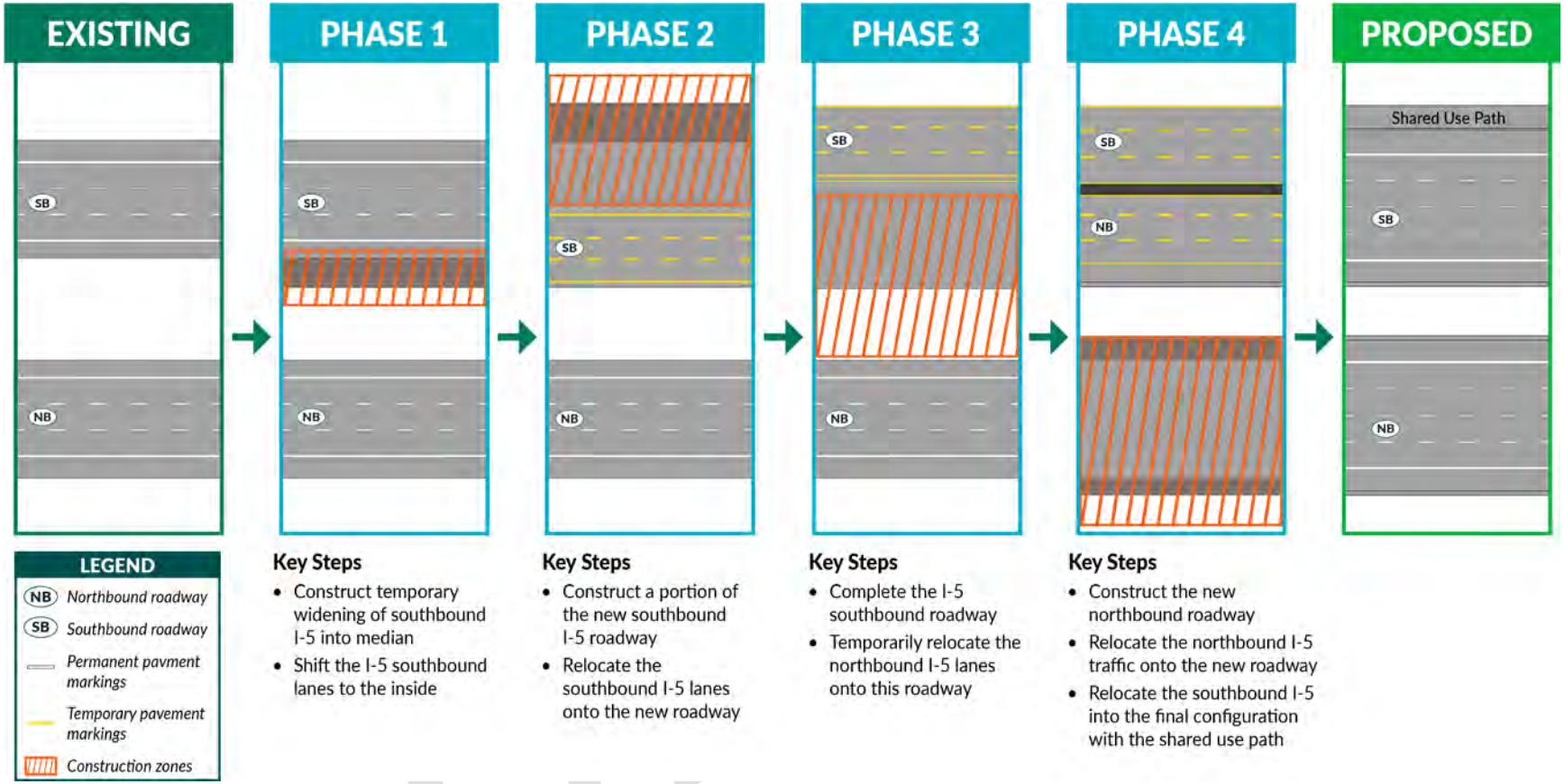


Figure 24. Construction Sequence

1

Table 18. Construction Sequencing Advantages and Disadvantages

	Construction Sequencing Alternatives outside of Existing ROW (New ROW Required)		Construction Sequencing Alternatives within Existing ROW	
Alternative	**Widen to southbound side**	**Widen to northbound side**	**Widen to southbound side**	**Widen to northbound side**
Description	• Construct with new ROW required, beginning with southbound bridge construction followed by northbound bridge construction. • No impact to existing I-5 capacity during construction.	• Construct with new ROW required, beginning with northbound bridge construction followed by southbound bridge construction. • No impact to existing I-5 capacity during construction.	• Construct within existing ROW, beginning with temporary shifting of the southbound roadway to the existing median, southbound bridge construction, followed by northbound bridge construction.	• Construct within existing ROW, beginning with temporary shifting of the northbound roadway to the existing median, northbound bridge construction, followed by southbound bridge construction.
Process	• Acquire new ROW on the southbound side. • Build new southbound roadway (4 lanes and shared-use path). • Shift all I-5 traffic to the southbound structure. • Remove/replace the existing I-5 roadway and embankments with the northbound structure.	• Acquire new ROW on the northbound side. • Build new northbound roadway (4 lanes and shared-use path). • Shift all I-5 traffic to the northbound structure. • Remove/replace the existing I-5 roadway and embankments with the southbound structure.	• Construct temporary southbound roadway in the existing median. Construct temporary northbound roadway widening and bridges at the Nisqually River bridge and south overflow channel. • Shift southbound roadway to the median with reduced lane (3 lanes) and shoulder widths. Shift northbound roadway to temporary structures and widening sections. • Construct new southbound roadway and shared-use path structure within the existing right of way and southbound roadway footprint. • Shift both the southbound and northbound I-5 roadways onto the bridge (3 lanes in each direction). • Construct new northbound structure within the footprint of the existing northbound roadway.	• Construct temporary northbound roadway in the existing median. Construct temporary southbound roadway widening and bridges at the Nisqually River bridge and south overflow channel • . • Shift northbound roadway to the median with reduced lane (3 lanes) and shoulder widths. Shift southbound roadway to temporary structures and widening sections • • Construct new northbound roadway and shared-use path structure within the existing right of way and northbound roadway footprint. • Shift both the southbound and northbound I-5 roadways onto the bridge (3 lanes in each direction). • Construct new southbound structure within the footprint of the existing southbound roadway.
Advantages	• Shortest possible construction timeline with two stages: 1. Initial southbound bridge construction 2. All traffic on southbound bridge while the northbound roadway is constructed • Most work completed in one stage with decreased lanes and shoulder widths. • Shared-use path on the (preferred) Wildlife Refuge side of the freeway. • Initial bridge construction on downstream side of existing I-5 embankment (provides protection from Nisqually River scour and minimizes effects to river riparian zone).	• Shortest possible construction timeline with two stages: 1. Initial northbound bridge construction 2. All traffic on northbound bridge while the southbound roadway is constructed • Most work completed in one stage with decreased lanes and shoulder widths.	• No ROW acquisition. • Shared-use path on the (preferred) Puget Sound side of the freeway.	• Minimal new ROW needed for the roadway footprint (possible minor ROW acquisition in vicinity of the Brown Farm Road NE/Nisqually Cut Off Road SE interchange and the Nisqually Cut Off Road).
Disadvantages	• ROW needed from the Wildlife Refuge. • Results in Section 4(f) and 6(f) effects. • The Brown Farm Road access road likely relocated.	• Initial bridge construction on upstream side of existing I-5 embankment (results in more effects to Nisqually River riparian zone; potential for construction effects within river channel depending on amount of channel migration prior to construction). • Shared-used path on non-preferred side (northbound side). • ROW needed on the northbound side of I-5 (effects to Nisqually Commercial Park RV facility, commercial businesses at the Brown Farm Road NE/Nisqually Cut Off Road SE Interchange, Nisqually Cut Off Rd, and JBLM, depending on bridge length).	• Four stages would be needed to complete the project. • Construction duration at least 50% longer • Construction costs higher due to inefficiency of southbound bridge construction and extended overhead costs.	• Initial bridge construction on upstream side of existing I-5 embankment (results in more effects to Nisqually River riparian zone; potential for construction effects within river channel depending on amount of channel migration prior to construction). • Four stages would be needed to complete the project. • Construction duration at least 50% longer • Construction costs higher due to inefficiency of northbound bridge construction and extended overhead costs. • Shared-used path on non-preferred side (northbound side).

2

Planned Projects in the I-5 Corridor

Planned projects in the vicinity of the I-5 Marvin Road to Mounts Road project will be considered during the NEPA phase. These include planned projects on I-5 north and south of the Marvin Road to Mounts Road section in or adjacent to the I-5 corridor:

- I-5/JBLM area improvements to widen I-5 from 3 to 4 lanes with and added HOV lane from Mounts Road to Thorne Lane. The final construction phase of this project is expected to be completed in 2025.
- Yelm Roundabouts on SR 507 at SR 702, Vail Road and Bald Hill Road are scheduled to be completed in the 2025/2027 biennium. These projects will improve traffic flow on a parallel corridor to I-5 within Thurston County.
- NEPA strategy and existing conditions work to support NEPA on Section 1—US-101 interchange to Pacific Avenue and Section 2—Pacific Avenue to Marvin Road from WSDOT and TRPC 2022b will begin in 2023 concurrent with advancing Section 3 into the NEPA Environmental Assessment.
- Advancement of the part time shoulder use alternative on southbound I-5 from the Sleater-Kinney Road NE on-ramp to the Henderson Boulevard SE on ramp (WSDOT and TRPC 2022b) will begin in 2023.
- I-5 Statewide System Master Plan—This early planning study will explore different operating concepts that may impact how shorter sections of the I-5 HOV lane system operate in the future. The I-5 Master Plan will lay out the initial blueprint for future corridor improvements and operational strategies to enhance mobility and economic vitality.

Future Passenger Rail Service Improvements in the I-5 Corridor

I-5 crosses two active rail lines within the study area south of Mounts Road:

- A Sound Transit owned rail corridor crossing of I-5 just south of Mounts Road. The Amtrak Cascades and Coast Starlight passenger rail service currently operate in this corridor plus BNSF and Tacoma Rail freight service to JBLM and local businesses.
- The BNSF rail corridor crossing I-5 approximately 0.5 miles south of Mounts Road. This line is a major corridor for interstate and international freight movements for both BNSF and Union Pacific rail traffic.

Both rail corridors merge into a single rail line south of the I-5 overpasses and continue to the Amtrak Olympia/Lacey station, southwest Washington, and Oregon. Potential future passenger rail improvements in these or other corridors are important to consider in the NEPA phase for broader systemwide transportation effects, project coordination, and public outreach.

Rail service improvements are currently being considered in three planning efforts in various stages of planning and implementation:

- **Amtrak Cascades Improvements**—WSDOT received grant funding from FRA in 2019 to prepare a Service Development Plan (SDP) for Amtrak Cascades, including an alternatives analysis to identify a wide range of reasonable operational strategies. This work will be the starting point for environmental review and SDP completion. The Amtrak Cascades SDP will provide a summary of possible alternatives to improve the Amtrak Cascades service over the next 20 years. It offers a blueprint for future capital improvements and service changes and is at the core of the Federal Railroad Administration (FRA) requirements for improving and expanding intercity passenger rail service on the corridor.
- **Ultra-High Speed Ground Transportation**—Washington, Oregon, and British Columbia are studying how ultra-high-speed ground transportation (UHSGT) might serve as a catalyst to transform the Pacific Northwest. The Cascadia UHSGT system is envisioned to connect the metro areas of Vancouver, BC; Seattle, WA; Portland, OR, with frequent service with speeds as high as 250 miles per hour (400 kilometers per hour). The UHSGT Business Case Analysis (July 2019) explored service and routing concepts with options for an Olympia/Lacey station along a core route or a central Olympia station along a branch service that could potentially be in the vicinity of I-5. To date, the UHSGT planning work has not defined specific alignment options or right-of-way needs across or near the Nisqually River delta.
- **Phase 2 of TRPC's HCT Study** to further evaluate the potential costs of HCT investments is scheduled to start in 2023. The purpose of the Phase 2 is to:
    - Further evaluate the potential costs of commuter and light rail and when in the future developing light and/or commuter rail might be prudent from a cost/ridership perspective.
    - Further identify travel sheds and ridership potential for HCT Modes
    - Identify which HCT modes to evaluate and the best fit for the region
    - Compare the region to other metro areas
    - Coordinate with regional commuter and light rail providers to link any Thurston County HCT to their existing or planned services.
    - Collaborate with business, freight, tribes, transit, vulnerable communities on HCT needs, gaps, and solutions for the region

- Provide feasibility, costs, and implementation schedules of different high-capacity transportation options: light rail, commuter rail, or bus rapid transit.
- Improve public understanding of existing transit services, options for connecting Thurston to the North via high-capacity transportation, costs of such investments, and a timeline for developing each of the options.
- Inform options to improve I-5 from Mounts Road through Tumwater so that any I-5 improvements can support high-capacity transportation options.

Coordination between future phases of the I-5 Marvin Road to Mounts Road improvements and these intercity and regional passenger rail projects will be important to maintain through the NEPA, design, and construction phases.

NEPA Recommendation

Implementation of the preferred alternative would have both adverse and beneficial effects on the environment, as described in Table 8 in Section 6 above. Based on the analysis of existing conditions in the project study area and the preferred alternative, as well as coordination with the resource and permitting agencies and tribes, WSDOT and FHWA have determined that it is unlikely that the project would have any significant effects that cannot be mitigated. A NEPA EA is recommended to fully analyze the effects of the project, identify mitigation, engage the public, and inform decision makers.

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