Vegetation, Wildlife, and Aquatic Species Supplemental Memorandum

Multnomah County | Earthquake Ready Burnside Bridge Project

Portland, OR

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Earthquake Ready Burnside Bridge Vegetation, Wildlife, and Aquatic Species Supplemental Memorandum

Prepared for

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Acronyms, Initialisms, and Abbreviations

ADA	Americans with Disabilities Act
API	Area of Potential Impact
BMP	best management practice
CSZ	Cascadia Subduction Zone
EIS	environmental impact statement
EQRB	Earthquake Ready Burnside Bridge
ESA	Endangered Species Act
OHWM	ordinary high water mark
SWH	Shallow water habitat

Executive Summary

Impacts to vegetation, wildlife, and aquatic species were assessed for the Refined Long-span Alternative (4-lane Version) and compared to what was evaluated in the Draft EIS. The impacts from the Refined Long-span Alternative are the same type of impacts anticipated from the Draft EIS Long-span Alternative, but at a different magnitude, based on the amount of removal and fill below the ordinary high water mark (OHWM) of the Willamette River and in other upland vegetated areas. Direct temporary and permanent impacts are anticipated from construction and from the proposed bridge structure itself. Tree and vegetation removal would be required in the riparian area as well as in Tom McCall Waterfront Park to provide construction staging areas and to construct work bridges. Noise from construction equipment and removal of vegetation could impact wildlife through unfavorable conditions and reduction of available habitat. Approximately 77 trees and 1.0 acre of vegetation would be removed with the Refined Long-span Alternative, which is less than the Draft EIS Long-span Alternative.

Aquatic species could be impacted through temporary and permanent removal and fill in the river, which could lead to physical alteration of aquatic habitat, hydroacoustic (underwater noise) impacts, and changes to water quality. Protected species are present in the Willamette River, including salmonids and other fish that are listed as threatened or endangered under the Endangered Species Act (ESA). The total amount of fill and removal below the OHWM would result in a net removal of material with the Refined Long-span Alternative with either movable span option. The Draft EIS Long-span Alternative would result in a net fill with a Bascule Lift, and a net removal with the Vertical Lift. The Refined Long-span Alternative with a Bascule Lift would result in more net removal than the Drafts EIS Long-span Alternative with a Bascule Lift or a Vertical Lift. The Refined Long-span Alternative with a Vertical Lift would result in more removal than the Draft EIS Long-span Alternative with a Bascule Lift, but less removal than the Draft EIS Long-span Alternative with a Vertical Lift.

The total approximate area of structure below the OHWM associated with the Refined Long-span Alternative ranges from 0.4 acre to 0.6 acre, depending on the movable span option. The Refined Long-span Alternative with the Bascule Lift Option (0.4 acre of permanent structure below OHWM) has a smaller area of permanent structure than the Draft EIS Long-span Alternative with the Bascule Lift Option, and an equal amount as the Draft EIS Long-span Alternative with the Vertical Lift Option. The Refined Long-span Alternative with the Vertical Lift Option has a larger area of permanent structure (0.6 acre) than the Draft EIS Long-span Alternative with the Vertical Lift Option, but less than Draft EIS Long-span Alternative with the Bascule Lift Option. Of the 0.4 acre to 0.6 acre of in-stream habitat loss below OHWM, approximately 113 square feet of shallow water habitat would be permanently lost with the Refined Long-span Alternative, which is less than the Draft EIS Long-span Alternative.

The construction period for the Refined Long-span Alternative is the same as the Draft EIS Long-span Alternative, which is 4.5 years. The duration of pile driving is the same as the Draft EIS Long-span Alternative, lasting from 135-145 days. Mitigation measures would be implemented to avoid, minimize, or compensate for impacts to vegetation,

wildlife, and aquatic species. This may include best management practices (BMPs) during construction, on-site restoration after construction, and the purchase of mitigation bank credits.

1 Introduction

In support of the Supplemental Draft Environmental Impact Statement (EIS) for the Earthquake Ready Burnside Bridge (EQRB) Project, this supplemental technical memorandum has been prepared to evaluate the impacts of potential design refinements to the Preferred Alternative on vegetation, wildlife, and aquatic species within the project's Area of Potential Impact (API). The intent of the design modifications is to reduce the overall cost and improve the affordability of the EQRB Project. This technical memorandum is a supplement to the Draft EIS technical reports and as such does not repeat all of the information in those reports, but instead focuses on the impacts of the design modification options, how they compare to each other, and how they compare to the version of the Preferred Alternative that was evaluated in the *EQRB Draft Environmental Impact Statement* (Multnomah County 2021b).

Much of the information included in the Draft EIS and Draft EIS technical reports, including project purpose, relevant regulations, analysis methodology and affected environment, is incorporated by reference because it has not changed, except where noted in this technical memorandum.

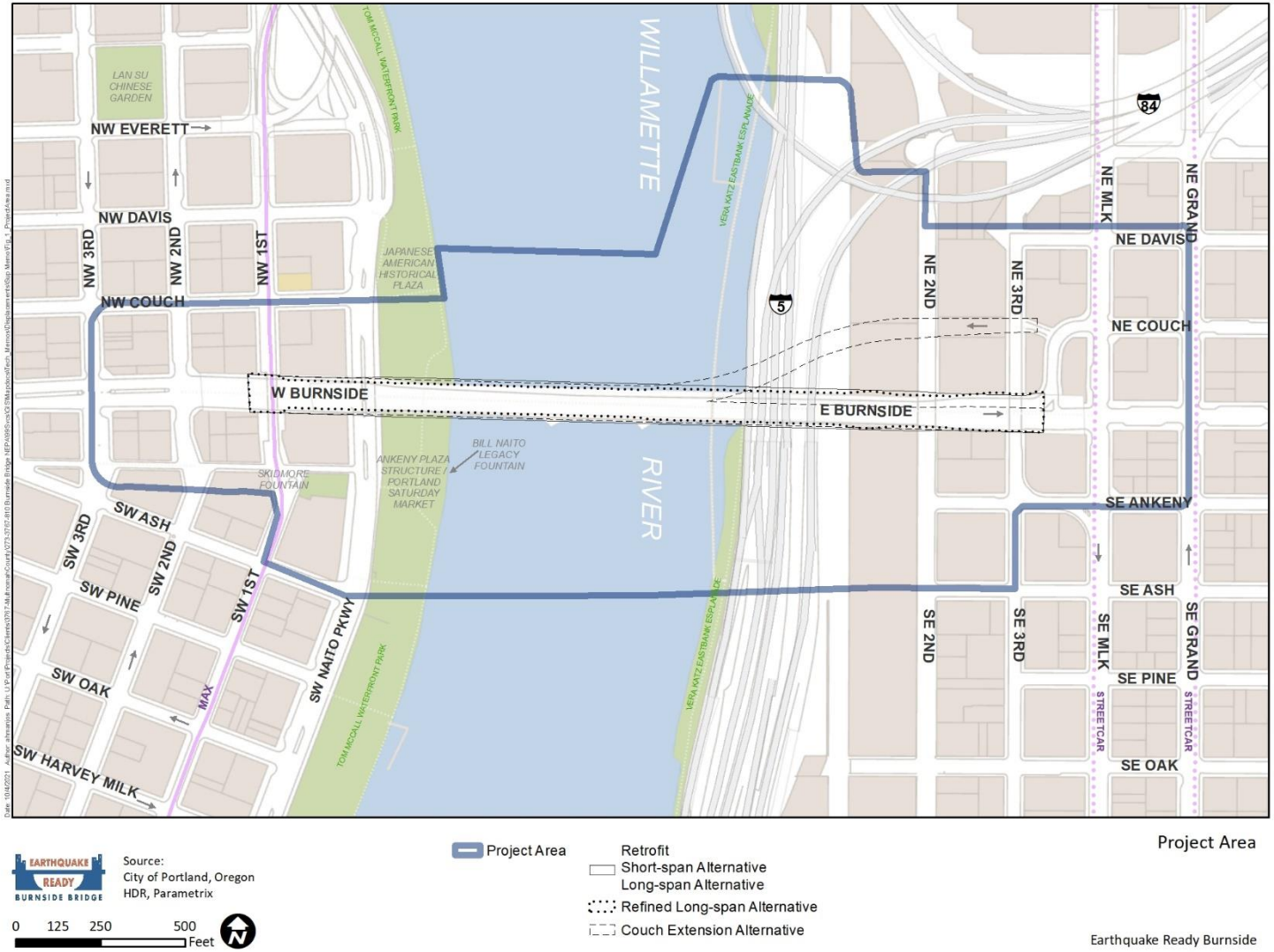
1.1 Project Location

The Project Area is located within the central city of Portland. The Burnside Bridge crosses the Willamette River connecting the west and east sides of the city. The Project Area encompasses a one-block radius around the existing Burnside Bridge and W/E Burnside Street, from NW/SW 3rd Avenue on the west side of the river and NE/SE Grand Avenue on the east side. Several neighborhoods surround the area including Old Town/Chinatown, Downtown, Kerns, and Buckman. Figure 1 shows the Project Area.

1.2 Project Purpose

The primary purpose of the Project is to build a seismically resilient Burnside Street lifeline crossing over the Willamette River that will remain fully operational and accessible for vehicles and other modes of transportation following a major Cascadia Subduction Zone (CSZ) earthquake. The Burnside Bridge will provide a reliable crossing for emergency response, evacuation, and economic recovery after an earthquake. Additionally, the bridge will provide a long-term safe crossing with low-maintenance needs.

Figure 1. Project Area



2 Project Alternatives

This technical memorandum evaluates potential design refinements to the Draft EIS Preferred Alternative. All of the Project Alternatives evaluated in the Draft EIS are summarized in Chapter 2 of the Draft EIS and described in detail in the EQRB *Description of Alternatives Report* (Multnomah County 2021a). Briefly, the Draft EIS evaluated a No-Build Alternative and four Build Alternatives. One of the Build Alternatives, the Long-span Alternative, was identified as the Preferred Alternative. The potential refinements evaluated in this technical memorandum are collectively referred to as the "Refined Long-span Alternative (Four-lane Version)" or the "Refined Long-span." The Refined Long-span includes Project elements that were studied in the Draft EIS but have been modified as well as new options that were not studied in the Draft EIS. These refinements and new options are intended to provide lower cost and, in some cases, lower impact designs and ideas that could be adopted to reduce the cost of the Draft EIS Preferred Alternative while still achieving seismic resiliency. The potential design refinements, and how they differ from the Draft EIS Long-span Alternative, are described below.

- Bridge width – The total width of the bridge over the river would be approximately 82 to 93 feet (the range varies depending on the bridge type and segment). For comparison, the Draft EIS Replacement Alternatives were approximately 110 to 120 feet wide over the river. The refined bridge width would accommodate approximately 78 feet for vehicle lanes, bike lanes, and pedestrians, which is comparable to the existing bridge.
    - The refined bridge design would accommodate four vehicle lanes (rather than five as evaluated in the Draft EIS). The following lane configuration options are being evaluated:
        - Lane Option 1 (Balanced) – Two westbound lanes (general-purpose) plus two eastbound lanes (one general-purpose and one bus-only lane)
        - Lane Option 2 (Eastbound Focus) – One westbound lane (general-purpose) plus three eastbound lanes (two general purpose and one bus only)
        - Lane Option 3 (Reversible Lane) – One westbound lane (general-purpose) plus two eastbound lanes (one general-purpose and one bus-only) plus one reversible lane (westbound AM peak and eastbound PM peak)
        - Lane Option 4 (General Purpose with Bus Priority) – Two westbound general-purpose lanes plus two eastbound general-purpose lanes, plus bus priority access (e.g., queue bypass) at each end of the bridge.
    - The width of the vehicle lanes would be, at minimum, 10 feet and could vary depending on how the total bridge width is allocated between the different modes.
    - The total width of the bicycle lanes and pedestrian sidewalks would be approximately 28 to 34 feet. This is wider than the existing bridge but 9 feet narrower than what was proposed in the Draft EIS for the replacement

alternatives. Physical barriers between vehicle lanes and the bicycle lanes are proposed and are in addition to the above dimensions.

  - The refined bridge would allow narrower in-water piers, due to less weight needing to be transferred to the in-water supports.

- Other design refinements being evaluated:
  - West approach – This memorandum evaluates a refined girder bridge type for the approach over the west channel of the river, Tom McCall Waterfront Park, and Naito Parkway. Compared to the cable-stayed and tied-arch options evaluated in the Draft EIS, this option would not only reduce costs but also avoid an adverse effect to the Skidmore/Old Town National Historic Landmark District. It would have two sets of columns in Tom McCall Waterfront Park compared to just one with the Draft EIS tied-arch option and five with the existing bridge.

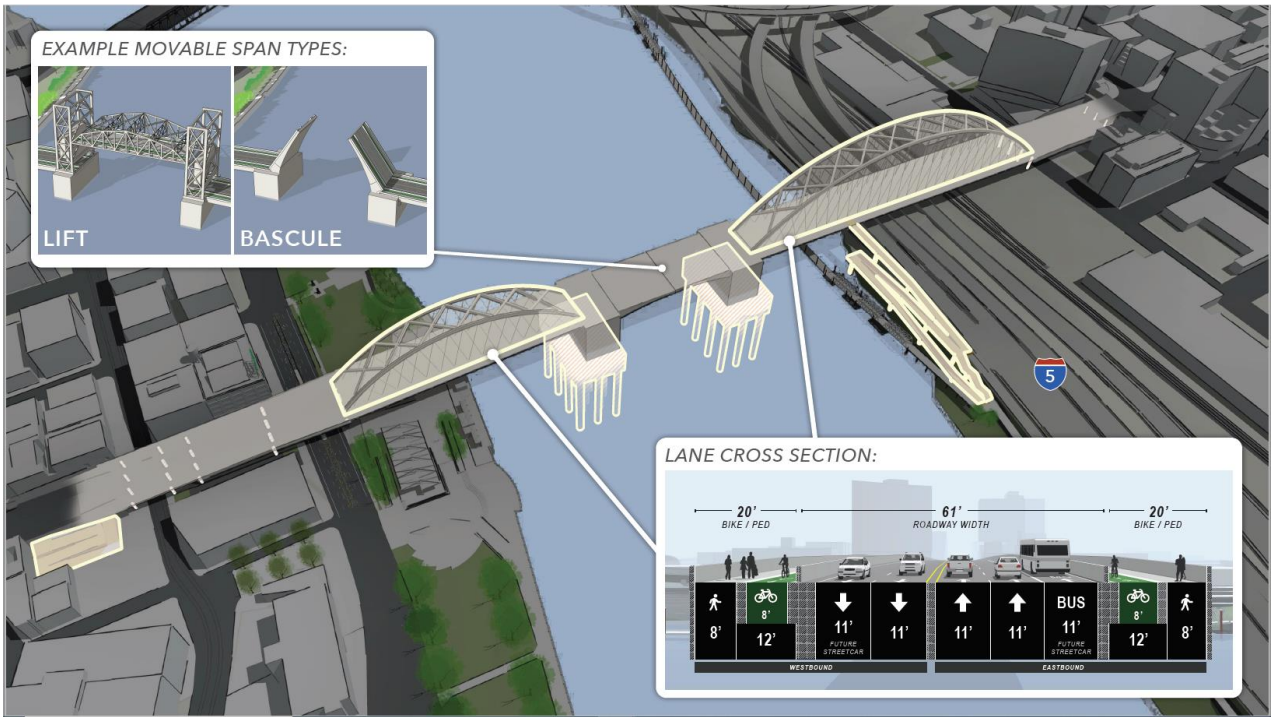
  - East approach – This memorandum evaluates a potential span length change for the east approach tied-arch option that would minimize the risks and reduce costs associated with placing a pier and foundation in the geologic hazard zone that extends from the river to about E 2nd Avenue. The refined tied-arch option would be about 720 to 820 feet long and approximately 150 feet tall (the Draft EIS Long-span Alternative was the same height and 740 feet long). The refined alternative would place the eastern pier of the tied-arch span either on the east side of 2nd Avenue (Option 1) or just west of 2nd Avenue (Option 2). Increasing the length of the tied-arch span would also reduce the length and depth of the subsequent girder span to the east.

  - Americans with Disabilities Act (ADA) access – This memorandum evaluates a refined approach for providing direct ADA access between the bridge and the Eastbank Esplanade, as well as between the bridge and W 1st Avenue and the Skidmore Fountain MAX station. The Draft EIS evaluated multiple ramp, stair, and elevator options for these locations. This Supplemental Draft EIS memorandum evaluates a refined option that would provide enhanced ADA access at both locations using both elevators and stairs. These facilities would also provide pedestrian and potentially bicycle access. For the west end, there is also the potential for replacing the existing stairs with improved sidewalk access from the west end of the bridge to 1st Avenue.

Figure 3 highlights the elements of the Draft EIS Long-span Alternative that have been modified to create the Refined Long-span Alternative, as described above. Figure 2 shows the Draft EIS Long-span Alternative and Figure 3 shows the Refined Long-span Alternative. Both figures include the tied-arch option for the east approach and the bascule option for the center movable span, but the east span could also be a cable-stayed bridge and the movable span could be a vertical lift bridge. For the west approach, the Draft EIS Long-span Alternative shows the tied-arch option while the Refined Long-span shows the refined girder bridge. The Refined Long-span Alternative image shows just one of the four possible lane configuration options being studied. All four configuration options, as well as many more graphics of the Refined Long-span Alternative, and how it compares to the Draft EIS Long-span Alternative, can be found in Chapter 2 of the *EQRB Supplemental Draft Environmental Impact Statement*

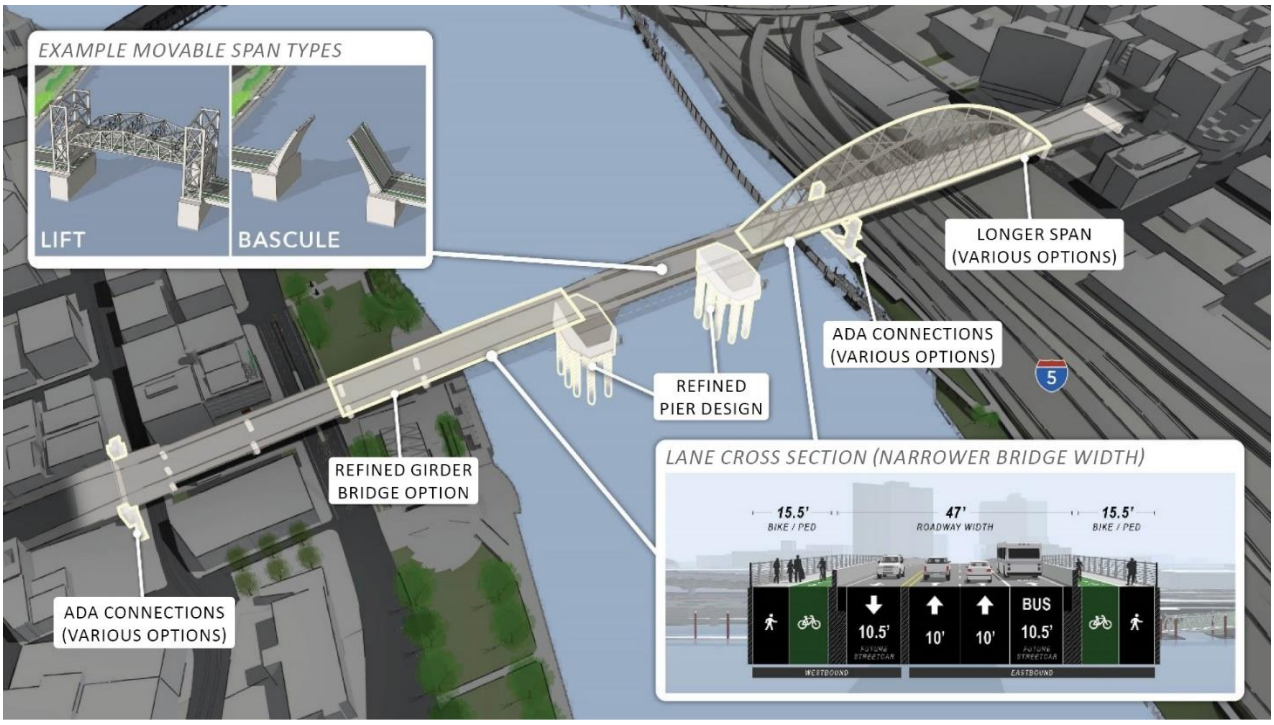
(Multnomah County 2022a). Figure 3 also shows just one of the possible ways to allocate the bridge width between vehicle lanes, bicycle lanes and sidewalks; the total width of the bicycle and pedestrian facilities could range from approximately 28 to 34 feet.

Figure 2. Draft EIS Long-Span Alternative



Note: The Draft EIS Long-span Alternative included multiple bridge types for both the east and west approach. This figure shows only the tied arch option.

Figure 3. Refined Long-Span Alternative



Notes: The Refined Long-span Alternative evaluated in this SDEIS includes both cable-stayed and tied arch options for the east span. This figure shows only the tied arch option. The Draft EIS studied, and SDEIS further studies, a bascule option and vertical lift option for the center movable span. The inset shows both options but the main figure shows the bascule option. This figure also shows just one of the lane configuration options considered in the SDEIS.

- Construction assumptions:
  - Construction duration – The expected duration of project construction is 4.5 to 5.5 years, dependent upon the design option. See Table 1 for more information regarding construction impact extent and closure timeframes.
  - Construction area – Compared to the Draft EIS Long-span Alternative, the main refinement is that the construction area would be smaller for the west approach south of the bridge, including a smaller area within Tom McCall Waterfront Park south of the bridge.
  - Construction access and staging – The construction access and staging is expected to be the same as that described in the Draft EIS.
  - Vegetation – the Refined Long-span Alternative would remove slightly fewer trees and vegetation impacts than the Draft EIS Long-span Alternative, primarily within Tom McCall Waterfront Park south of the bridge.
  - In-water work activity – The in-water work would be similar to that described in the Draft EIS, except that the replacement bridge in-water foundations would consist of a perched footing cap and a group of drilled shafts. Whereas the Draft EIS discussed the use of cofferdams to isolate in-water work, the Refined Long-span Alternative proposes to use a temporary caisson lowered to an elevation about mid-height of the water column to construct footing caps, avoiding additional disturbance of the riverbed that would be needed for a cofferdam.

Additionally, the existing Pier 4 would be fully removed, Pier 1 would be partially removed below the mudline and Piers 2 and 3 removed to below the mudline. Existing in-water piles would be removed, subject to the design option advanced.

- Temporary freeway, rail, street, and trail closures – Temporary closures are expected to be the same as those described in the Draft EIS.
- Access for pedestrians and vehicles to businesses, residences, and public services – Access is expected to be the same as that described in the Draft EIS.
- On-street parking impacts – On-street parking impacts are expected to be the same as those described in the Draft EIS.
- Property acquisitions and relocations – Property acquisitions and relocations are similar to those listed in the Draft EIS, except that they have been modified to reflect a narrower set of bridge design options.
- Temporary use of Governor Tom McCall Waterfront Park – The park area that would be temporarily closed for construction has changed since the Draft EIS. On the north side of the bridge, the closure area has been reduced to avoid removing ten cherry trees and a berm that are part of the Japanese American Historical Plaza; this change would apply to all of the build alternatives. On the south side of the bridge, the park closure area has also been reduced to include only the area north of the Tom McCall Waterfront Park trellis; this revision applies only to the Refined Long-span Alternative.

Table 1. Construction Impacts, Closure Extents, and Timeframes by Build Alternative

Facility Impacted	Draft EIS Long-Span Alternative	Refined Long-Span Alternative
Tom McCall Waterfront Park	4.5-year closure within boundary of potential construction impacts	Same; Smaller closure area south of the bridge
Willamette River Greenway Trail	Portion of trail within Tom McCall Waterfront Park closed for same duration as park; detours in place for construction duration	Same
Japanese American Historical Plaza	Southern portion of plaza would be closed for same duration as Tom McCall Waterfront Park	Same
Ankeny Plaza Structure	Closure for duration of construction but no impacts to Ankeny Plaza structure	Plaza Structure would not be closed during construction or impacted
Bill Naito Legacy Fountain	No closure of fountain and associated hardscape	Same
Vera Katz Eastbank Esplanade	18 months (this could extend to 3.5 to 4.5 years if project builds ramps rather than elevators and stairs for the ADA/bicycle/pedestrian connection); detours in place for construction duration	Same
Burnside Skatepark	4 months full closure	Same
River Crossing on Burnside Street	4- to 5-year closure	Same
Saturday Market Location	4.5-year closure or use of alternative location	Same
Skidmore Fountain MAX Station	Approximately 5 weeks	Same
Navigation Channel/Willamette River Water Trail	Intermittent closures; 2 to 10 closures; each closure up to 3 weeks	Same
Overall Construction Duration	**4.5 to 5.5 years**	**Same**

3 Definitions

The following terminology is used when discussing geographic areas in the EIS:

- **Project Area** – The area within which improvements associated with the Project Alternatives would occur and the area needed to construct these improvements. The Project Area includes the area needed to construct all permanent infrastructure, including adjacent parcels where modifications are required for associated work such as utility realignments or upgrades. For the EQRB Project, the Project Area includes approximately a one-block radius around the existing Burnside Bridge and W/E Burnside Street, from NW/SW 3rd Avenue on the west side of the river and NE/SE Grand Avenue on the east side.
- **Area of Potential Impact (API)** – This is the geographic boundary within which physical impacts to the environment could occur with the Project Alternatives. The API is resource-specific and differs depending on the environmental topic being

addressed. For all topics, the API will encompass the Project Area, and for some topics, the geographic extent of the API will be the same as that for the Project Area; for other topics (such as for transportation effects) the API will be substantially larger to account for impacts that could occur outside of the Project Area. The same API was used in the *EQRB Vegetation, Wildlife, and Aquatic Species Technical Report* (Multnomah County 2021e).

- **Project vicinity** – The environs surrounding the Project Area. The project vicinity does not have a distinct geographic boundary but is used in general discussion to denote the larger area, inclusive of the Old Town/Chinatown, Downtown, Kerns, and Buckman neighborhoods.

4 Relevant Regulations

There are no differences in regulations with the Refined Long-span Alternative.

5 Analysis Methodology

The analysis methodology is the same as was used in the *EQRB Vegetation, Wildlife, and Aquatic Species Technical Report* (Multnomah County 2021e).

6 Affected Environment

The affected environment for the Refined Long-span Alternative is the same as what was evaluated in the *EQRB Vegetation, Wildlife, and Aquatic Species Technical Report* (Multnomah County 2021e).

7 Impacts from the Design Modifications and Comparison to Draft EIS Alternatives

The impacts to vegetation, wildlife, and aquatic species are the same with the Refined Long-span Alternative as were evaluated in the Draft EIS, but the magnitude of impacts differs. Changes in the design result in different locations and amounts of affected resources. For a more detailed evaluation of impacts that did not change, refer to the *EQRB Vegetation, Wildlife, and Aquatic Species Technical Report* (Multnomah County 2021e). See Figure 4 for the temporary construction impacts with Draft EIS Long-span Alternative and Figure 5 for the permanent impacts from the Draft EIS Long-span Alternative.

Figure 4. Draft EIS Long-span Temporary Construction Impacts

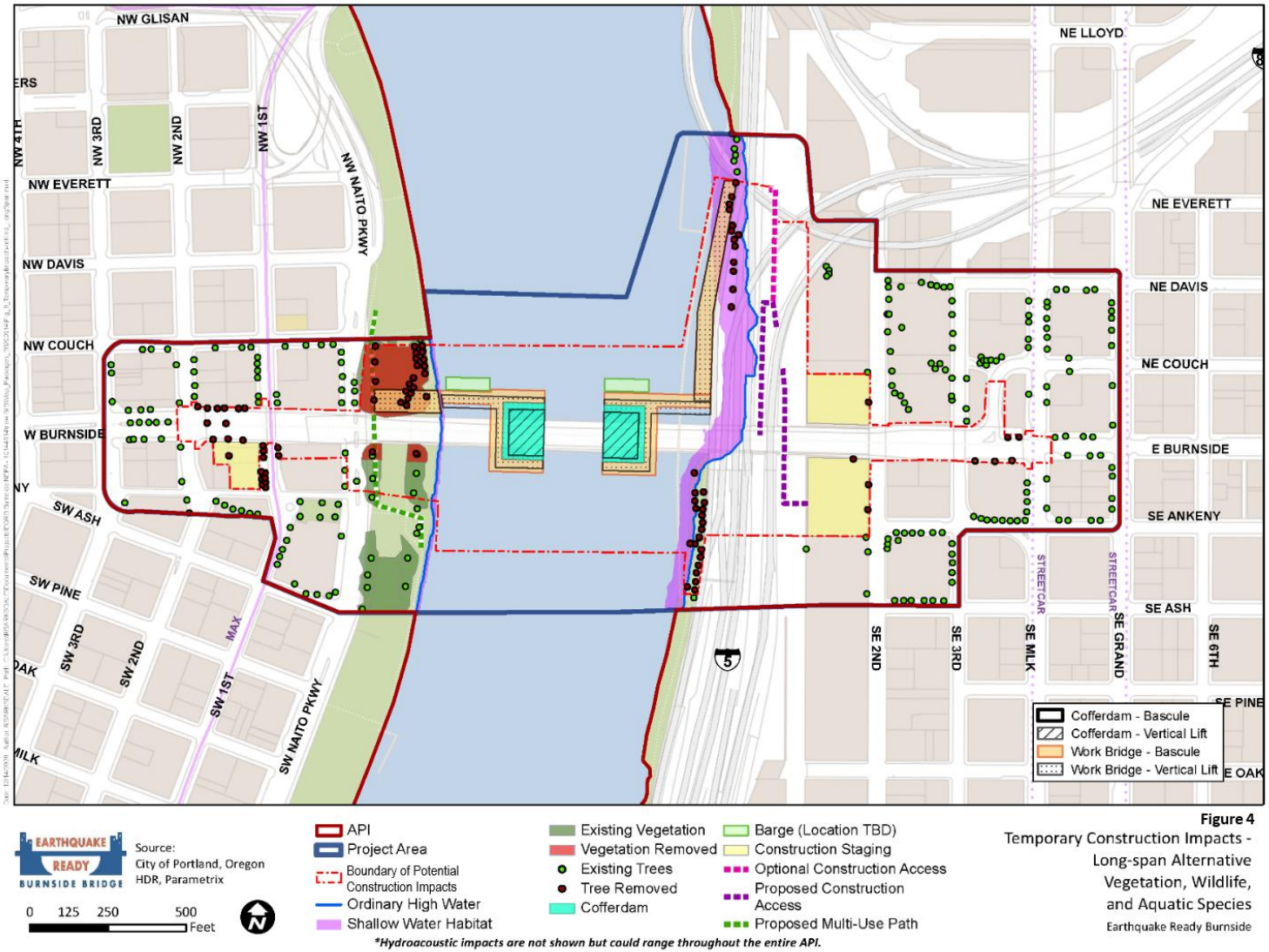


Figure 5. Draft EIS Long-span Permanent Impacts

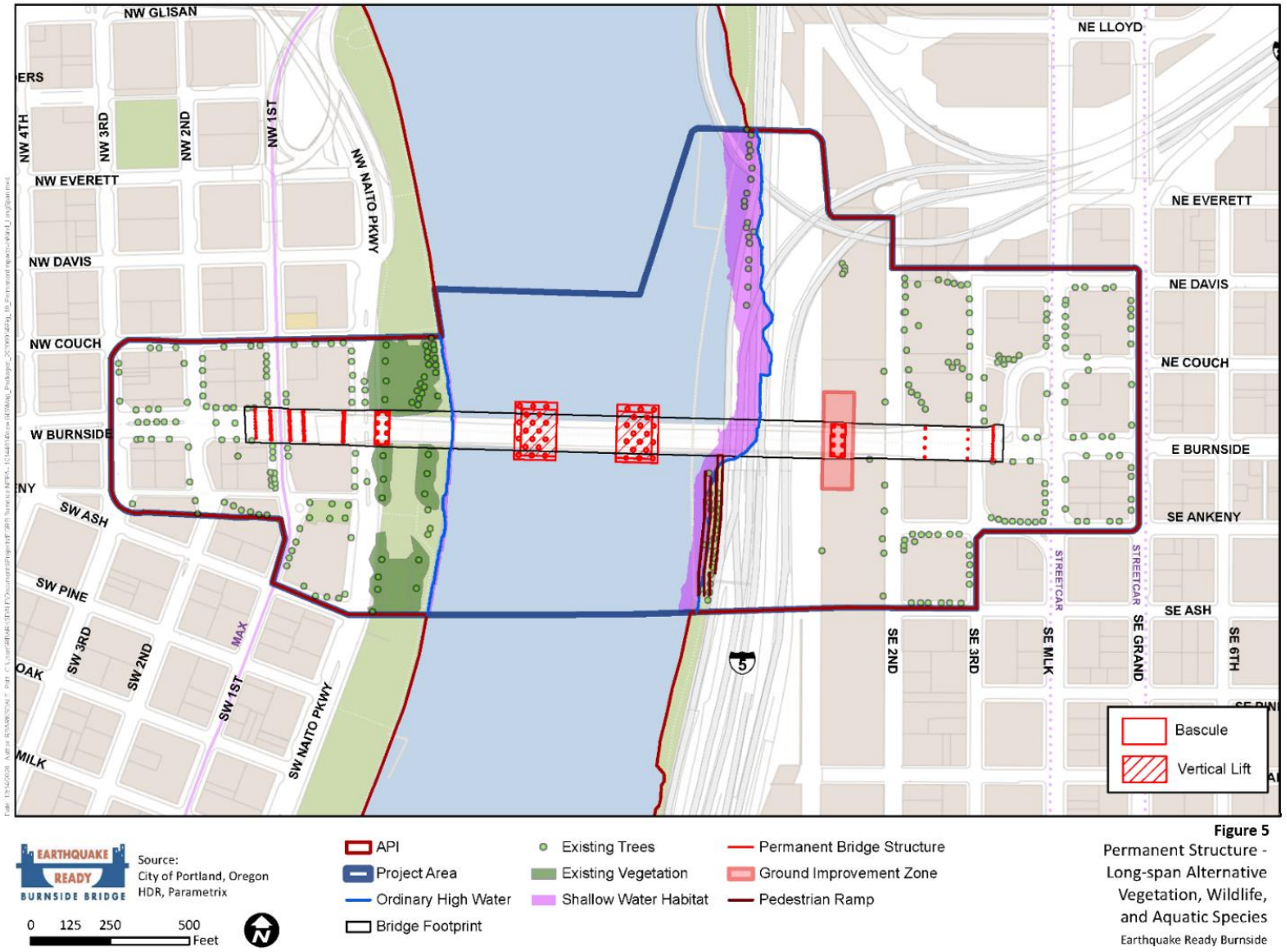


Figure 5
Permanent Structure - Long-span Alternative
Vegetation, Wildlife, and Aquatic Species
Earthquake Ready Burnside

7.1 Direct Impacts

Temporary Construction Impacts

Construction of the Refined Long-span Alternative would directly impact vegetation, wildlife, and aquatic species in the same way as the Draft EIS Long-span Alternative. However, the magnitude of impacts differs with the refinements. The estimated construction period is the same as the Draft EIS Long-span Alternative, at 4.5 years, but the anticipated area of temporary construction impacts has changed due to additional sidewalk and roadway improvements, different construction staging areas, and the change from a pedestrian ramp to stairs and elevators. The anticipated area of construction impacts is approximately 32.7 acres, compared to 30.7 acres with the Draft EIS Long-span Alternative.

VEGETATION

An increase in the area of anticipated construction is proposed with the Refined Long-span but would result in less vegetation removal. The increase in area is due to the addition of sidewalk and roadway improvements west of 1st Street where there is little to no existing vegetation besides street trees. The majority of the trees in this new area would be protected during construction, although seven trees would need to be removed with the Refined Long-span Alternative that were proposed to remain with the Draft EIS Long-span Alternative. Impacts to 10 flowering cherry trees associated with the Japanese American Historical Plaza were proposed for removal with the Draft EIS Long-span Alternative. The design refinements reduced the anticipated area of construction impacts within Tom McCall Waterfront Park, avoiding removal of these 10 trees. The reduction in construction area would apply to all Build Alternatives, decreasing the number of trees removed for all Build Alternatives. On the east side, the anticipated area of construction would be reduced south of the bridge where a pedestrian ramp was initially proposed, but now is proposed to be an elevator, allowing the 21 riparian trees south of the bridge to remain in place. Approximately 77 trees and 1.0 acre of vegetation total would be removed with the Refined Long-span Alternative (Figure 6 and Figure 7), which is less than the Draft EIS Long-span Alternative. Once construction is completed, restoration would be implemented as part of the Project's mitigation, which would restore the areas where vegetation loss occurred. Restoration would include removal of invasive species and revegetation with native species that would likely result in a net benefit in species diversity in the riparian area.

Figure 6. Refined Long-span Temporary Construction Impacts (with Bascule Lift)

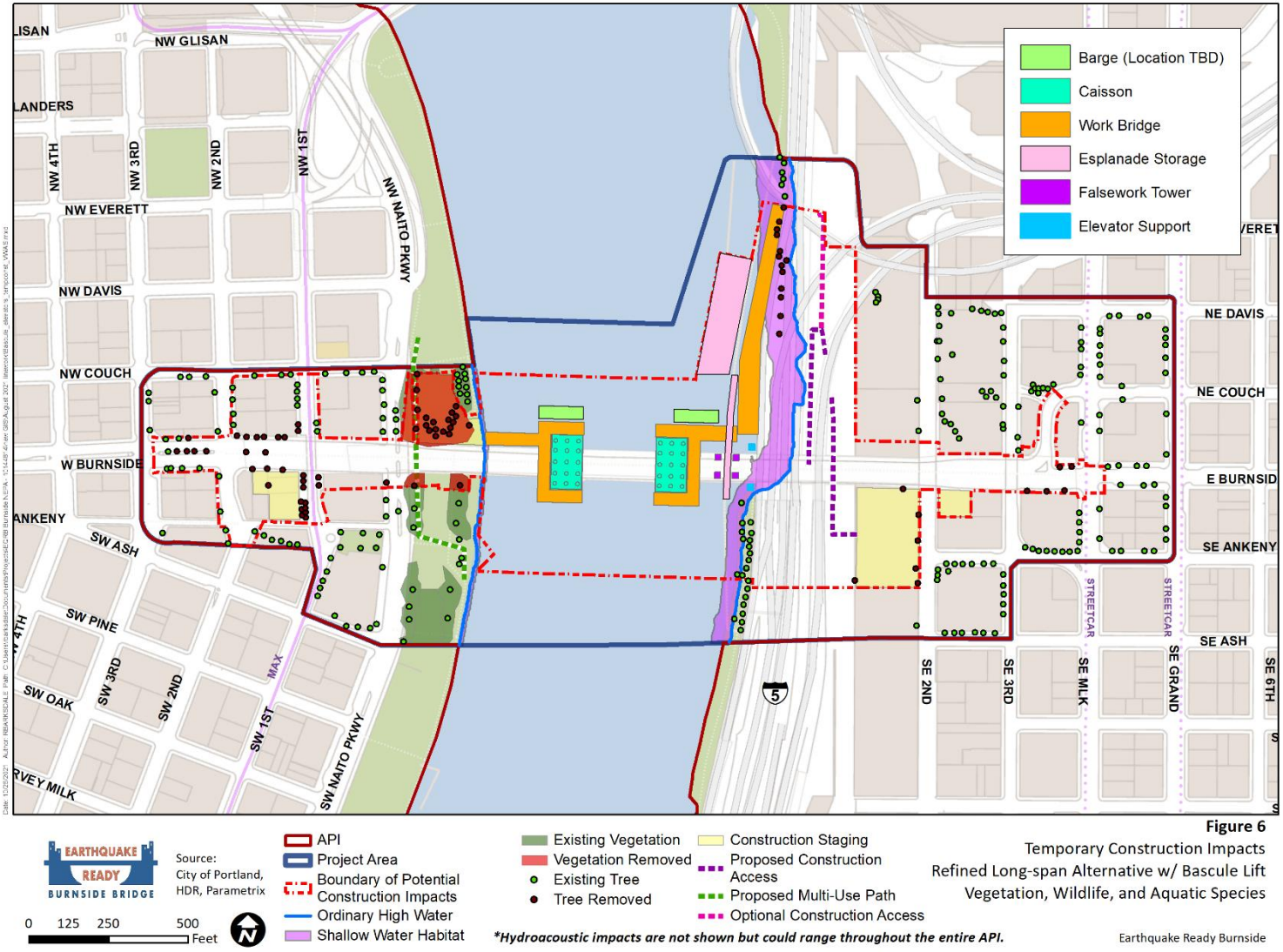


Figure 7. Refined Long-span Temporary Construction Impacts (with Vertical Lift)

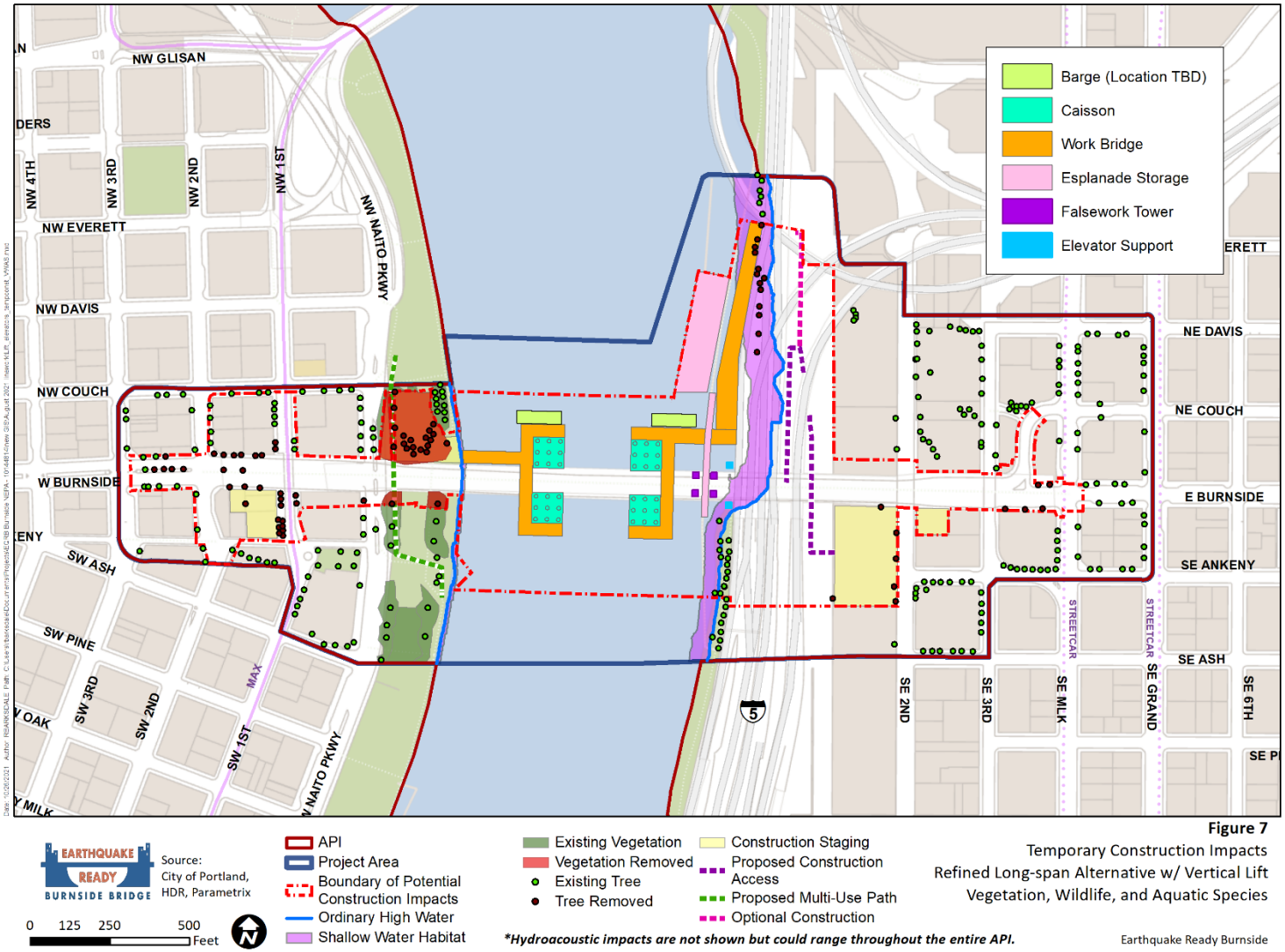


Figure 7
Temporary Construction Impacts
Refined Long-span Alternative w/ Vertical Lift
Vegetation, Wildlife, and Aquatic Species

Earthquake Ready Burnside

WILDLIFE

Impacts from construction affecting wildlife include noise disturbance and a reduction in habitat and food sources, which are the same impacts discussed in the Draft EIS. The construction schedule of the Refined Long-span Alternative is the same as the Draft EIS Long-span Alternative, so there are no differences in impacts to wildlife on a temporal scale. Construction activities that cause noise including pile driving would temporarily create unfavorable conditions. After construction is complete and the noise returns to ambient levels, birds and wildlife affected by noise would likely return to the API. The same amount and duration of pile driving is proposed with the Refined Long-span Alternative as the Draft EIS Long-span Alternative. Because there is less vegetation removal, this leads to a smaller amount of habitat and food source loss. After construction, wildlife habitat would be restored as part of the Project's mitigation. The proposed restoration would likely create a higher quality habitat than currently exists in the API as invasive vegetation would be removed and replaced with native vegetation at a ratio of 1.5:1 or greater.

AQUATIC SPECIES

The use of caissons during construction is one of the design refinements proposed. Whereas the Draft EIS evaluated impacts from cofferdams for in-water work on the piers, caissons are now proposed for possible use. Caissons would reduce impacts to aquatic species and their habitat when compared with cofferdams. With cofferdams, sheet pile is driven into the riverbed around the existing structure. Caissons are constructed above the river and then lowered down into the water column while staying above the riverbed. Only the shafts that support the caisson box are placed within the riverbed. The caisson that is located in the water column would temporarily reduce available habitat for fish and other aquatic species, but on a smaller scale than a cofferdam. For the Refined Long-span Alternative with the Bascule Lift, the total area that caissons would occupy during construction is approximately 2,096 square feet below OHWM. With the Vertical Lift, a caisson would occupy approximately 3,008 square feet (Table 2).

Table 2. Refined Long-Span Alternative Approximate Temporary Construction Activities Causing Impacts to Vegetation, Wildlife, and Aquatic Species

Movable Span	Temporary Impacts								
	Number of Piles below OHWM	Area of Piles below OHWM (square feet)	Number of Piles in SWH	Area of Piles in SWH (square feet)	Caisson Area (square feet)	Loss of Vegetation / Wildlife Habitat (acres)	Tree Removal (# of trees)	Duration of Construction (years)	Duration of Pile Driving (days)
Bascule Lift	566	1790	51	170	2096	1.0	77	4.5	135-145
Vertical Lift	677	1860	51	170	3008	1.0	77	4.5	135-145

OHWM: ordinary high water mark
SWH: shallow water habitat

Work bridges would be required to access the existing piers and the Eastbank Esplanade pedestrian improvements. Temporary piling would be installed to support the work bridges and for storage of the Eastbank Esplanade dock. Sections of the floating dock would be intermittently moved and stored on-site throughout a period of 18 months (Figure 6 and Figure 7). The sections would be moored to up to 30 temporary steel piles, which would remain in place throughout the entire construction period. These piles would result in 100 square feet of temporary impacts below OHWM. The work bridge configurations are different with the Refined Long-span Alternative as compared to the Draft EIS Long-span Alternative to account for the change in layout for the Movable Span Options. Approximately 566 to 678 temporary piles would be required, which would occupy between 1,790 square feet to 1,860 square feet below OHWM (depending on the movable span), and 170 square feet of shallow water habitat (SWH). The Draft EIS was written at an earlier stage of design in which fewer piles were estimated. The piling needed to support the oscillator and drilled shafts, the work bridge needed within the footprint of the footing cap, and the work bridge for the Eastbank Esplanade elevators have now been refined. Therefore, the number of piles below OHWM is greater than what was included in the Draft EIS, (but this is not due specifically to the Refined Long-span Alternative design). Table 3 below shows updated impacts that take into consideration the additional elements associated with temporary piles for the Refined Long-span Alternative, the Draft EIS Long-span Alternative, and the No-Build Alternative.

Table 3. Estimated Temporary Construction Physical Impacts and Duration for All Alternatives

Alternative	Temporary Construction Area (acres)	Loss of Vegetation/ Wildlife Habitat (acres)	Loss of Trees (quantity)	Number of Piles below OHWM*	Pile Driving Duration (total days)	Years of Construction
No-Build	0	0	0	0	0	0
Draft EIS Long-span	30.7	1.3	87**	650-730	135-145	4.5
Refined Long-span	32.7	1.0	77	566-677	135-145	4.5

*Number of piles includes all piles needed for bridge work and pedestrian improvements. The Draft EIS Long-span includes pile counts for ramps, while the Refined Long-span includes pile counts for elevators and stairs.
**Tree inventory has been updated since the Draft EIS was published, which results in an additional 6 trees within Tom McCall Waterfront Park that would be removed under both the Draft EIS Long-span and the Refined Long-span.

SWH is critical for migrating and rearing salmonids and has been drastically degraded and reduced in the Willamette River due to past development. SWH is the preferred habitat type for juvenile Coho Salmon (Friesen 2005). Pile driving creates underwater noise (known as hydroacoustic impacts), which can result in fish injury, behavior modification, and death. Hydroacoustic impacts can also affect marine mammals, although construction activities are not expected to cause disturbance or injury due to the animals' seasonal presence and tolerance to human activities. As discussed in the *EQRB Vegetation, Wildlife, and Aquatic Species Technical Report* (Multnomah County 2021e), hydroacoustic impacts can travel beyond the immediate vicinity where pile

driving takes place. For the EQRB Project, hydroacoustic impacts are anticipated to range from approximately 12,000 feet upstream to 15,000 downstream of the bridge.

In addition to disturbance and reduction of aquatic habitat, other potential impacts to aquatic species from temporary construction activities include sedimentation and scouring issues from temporary fill and removal below OHWM. These issues can affect fish, including salmonids listed as threatened or endangered on the ESA, physiologically, behaviorally, and through changes in habitat (Bash et al. 2001). Because partial demolition of the existing in-water piers is anticipated, work barges would be required, similar to the other alternatives. Use of barges can affect aquatic species through increased sedimentation during spud installation, physical reduction of habitat, and increased risk of predation by piscivorous fish.

Permanent Impacts

Permanent impacts from the Refined Long-span Alternative are the same type as for the Draft EIS Long-span Alternative, which is a loss of habitat from the placement of structure below OHWM. Permanent structure includes pier footings, pier substructure, drilled shafts, navigation bollards, debris fender, and columns from the pedestrian access improvements. Additional permanent structure will be installed above OHWM, including bridge footings as well as footings for the East Approach (Tied Arch or Cable-stayed Option; see Figure 8 and Figure 9). Some of the permanent elements are only applicable with certain options (e.g., debris fender only with the Vertical Lift Option). In the Draft EIS, the Bascule Lift Option had a smaller permanent footprint than the Vertical Lift Option. With the Refined Long-span Alternative, the Vertical Lift Option has a different design, which has increased the overall footprint and is now larger in area than Bascule Lift Option. Although larger in area, the Vertical Lift Option is smaller than the Bascule Lift Option in volume due to the existing timber piling that will be left in place. Approximately 50 percent of the existing timber piling would be removed with the Bascule Lift Option, while none of the existing timber piling would be removed with the Vertical Lift Option.

Figure 8. Refined Long-span with Bascule Lift Permanent Structure

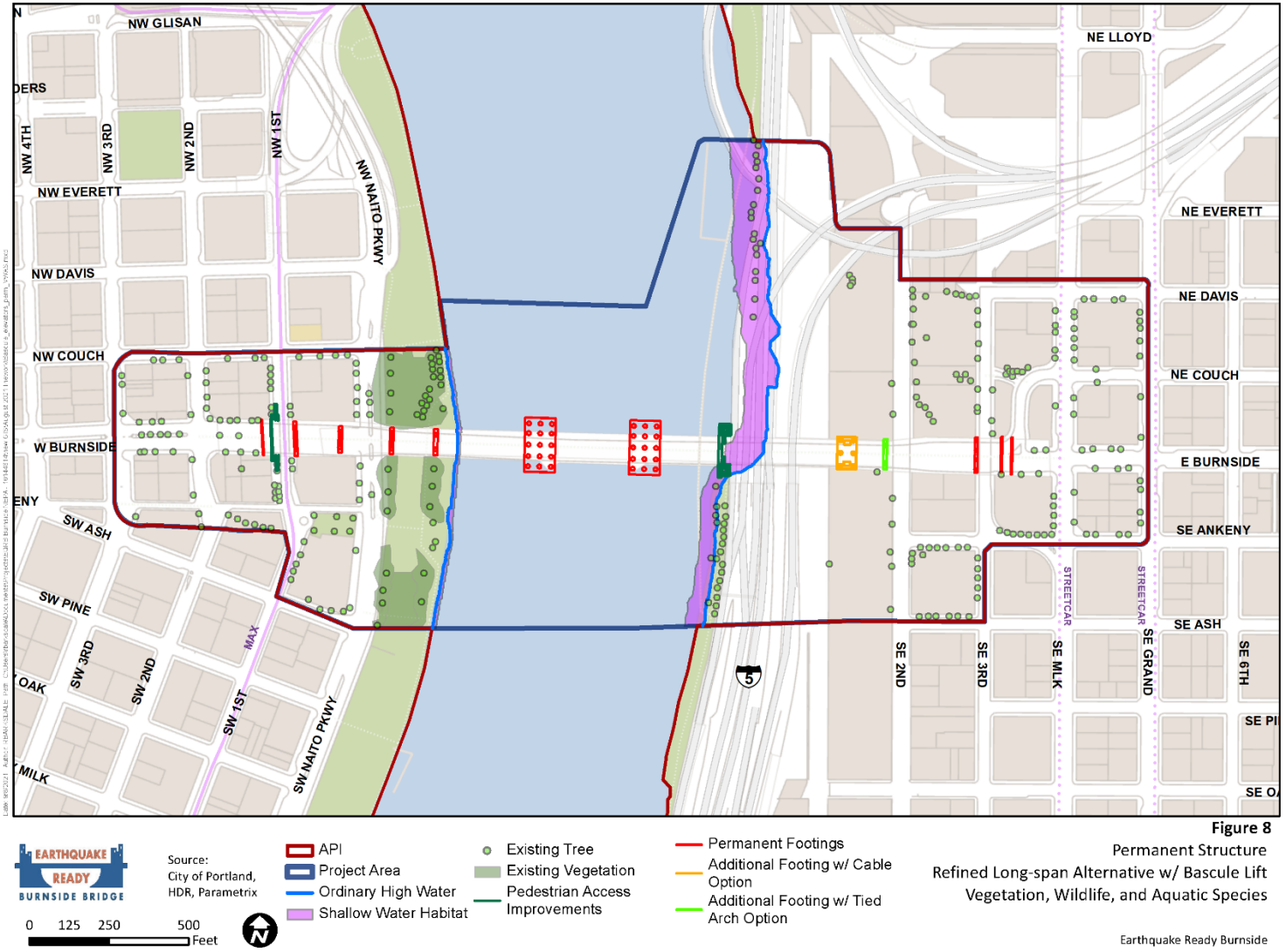


Figure 8
Permanent Structure
Refined Long-span Alternative w/ Bascule Lift
Vegetation, Wildlife, and Aquatic Species

Earthquake Ready Burnside

Figure 9. Refined Long-span with Vertical Lift Permanent Structure

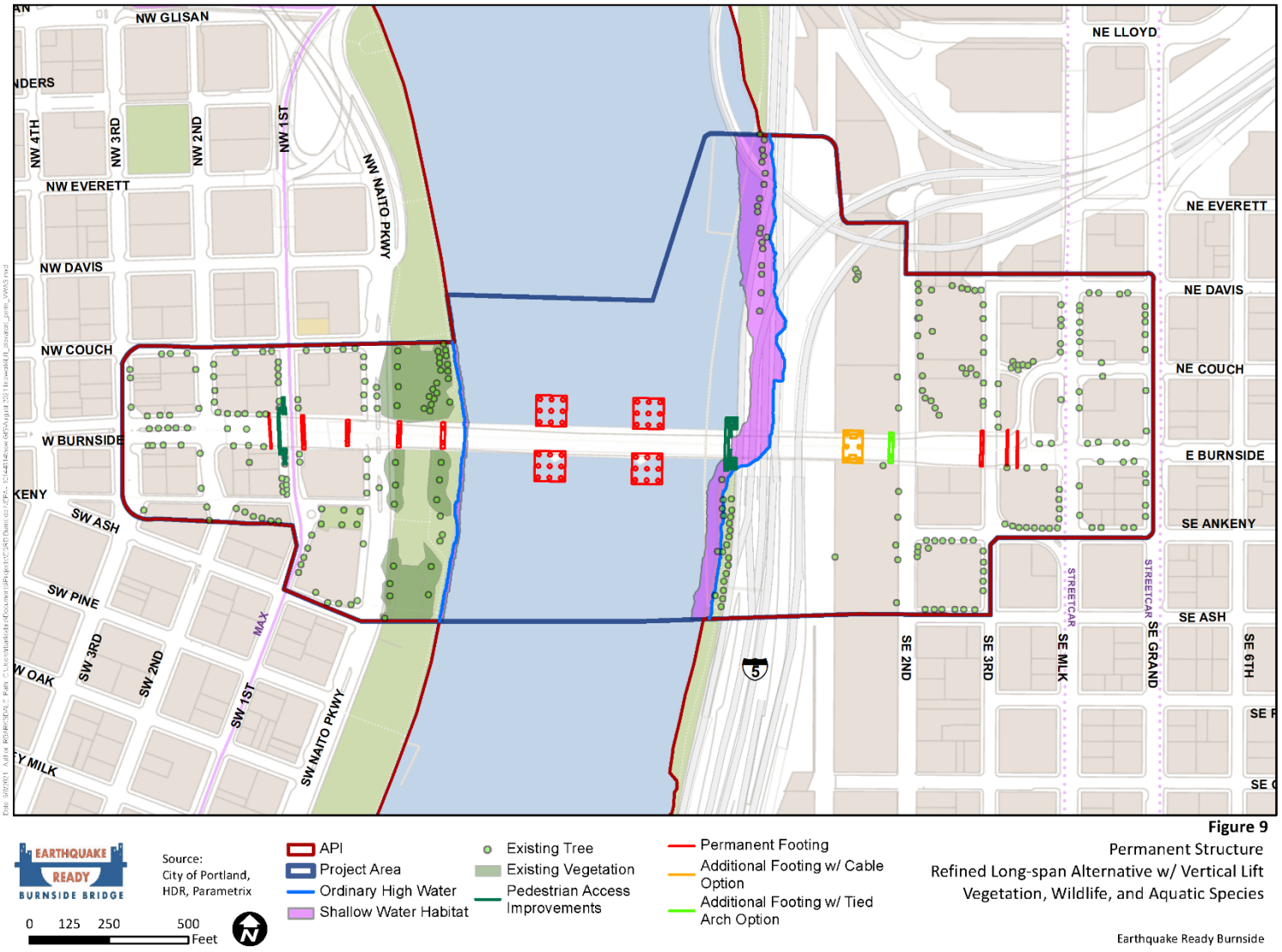


Figure 9
Permanent Structure
Refined Long-span Alternative w/ Vertical Lift
Vegetation, Wildlife, and Aquatic Species

Earthquake Ready Burnside

The total area of permanent structure below OHWM for the Refined Long-span Alternative ranges from 0.4 acre to 0.6 acre, depending on the Movable Span Option (Table 4). Approximately 113 square feet of permanent structure is proposed to be placed within SWH, which would further reduce available habitat used by ESA-listed salmonids. The amount of SWH loss is less with the Refined Long-span Alternative than with the Draft EIS Long-span Alternative by approximately 98 square feet. Ground improvements using jet grouting are anticipated with the Retrofit, Short-span, and Couch Extension alternatives below OHWM to reduce the effect of soil liquefaction during an earthquake. The Draft EIS Long-span Alternative and the Refined Long-span Alternative will require ground improvements but not below OHWM or within SWH. Therefore, no impacts to macroinvertebrate habitat are anticipated from ground improvements.

Table 4. Approximate In-water Permanent Direct Impacts for All Alternatives

Build Alternative and Movable Span Option	Permanent Impacts					
	Area of structure below OHWM* (acres)	Number of shafts below OHWM	Number of shafts in SWH	Area of structure in SWH (square feet)	GI Zone Area below OHWM (square feet)	GI Zone Area within SWH (square feet)
No-Build	0.4	-	-	-	-	-
Refined Long-span, Bascule Lift	0.4	28	1	113	0	0
Refined Long-span, Vertical Lift	0.6	22	1	113	0	0
DEIS Long-span, Bascule Lift	0.8	53	6	211	0	0
DEIS Long-span, Vertical Lift	0.5	45	6	211	0	0

*Area of structure below OHWM includes the pier footing, pier substructure, shafts, navigation bollards, debris fender (Vertical Lift only), and pedestrian connection columns.

The total removal and fill impacts below the OHWM is different than the area of permanent structure due to removal of materials from around the existing footings that will not be replaced. Portions of Piers 2 and 3 would be removed, Pier 4 would be entirely removed, as well as approximately 29,006 square feet of riprap and other non-native fill material. Pier 1 would be left in place. When adding the total proposed permanent removal below OHWM and subtracting that from the total proposed permanent fill, the result is a net removal of 10,714 square feet with the Bascule Lift Option, and a net removal of 1,292 square feet with the Vertical Lift Option (Table 5). The Draft EIS Long-span Alternative had a net fill of 3,029 square feet with the Bascule Lift, and a net removal of 11,781 square feet with the Vertical Lift. This results in a decrease in overall net impacts to waters with the design refinements for the Bascule Lift, and an increase with the Vertical Lift. The quantities shown in Table 5 affect aquatic species

through changes in the amount of available habitat. Because the Refined Long-span Alternative would result in a net removal of fill material, this would create more and better-quality habitat for aquatic species.

Table 5. Comparison of Permanent Net Fill and Removal Below the OHWM

Alternative and Movable Span Option	Permanent Net Fill/Removal (square feet)
No-Build	0
DEIS Long-span (Bascule)	+3029
DEIS Long-span (Vertical Lift)	-11781
Refined Long-span (Bascule)	-10714
Refined Long-span (Vertical)	-1292

7.2 Indirect Impacts

Vegetation

No indirect impacts to vegetation are anticipated.

Wildlife

No indirect impacts to wildlife are anticipated.

Aquatic Species

Similar to the direct impacts, the type of indirect impacts is the same as was evaluated in the Draft EIS, but the magnitude differs with the Refined Long-span Alternative. An anticipated indirect impact includes hydrological changes due to changes in impervious surfaces. The design refinements result in a difference of 1.2 acres of impervious surfaces. The proposed net increase in impervious surfaces was 0.9 acre with the Draft EIS Long-span Alternative. With the Refined Long-span Alternative, the net change in impervious surfaces would be a 0.3 acre decrease from the existing impervious surfaces because the proposed bridge is narrower than the existing bridge. Miniscule changes to flow could occur from runoff that would be discharged into the river. Changes in flow could affect scour and sedimentation, which can lower water quality and affect fish through changes in feeding behaviors and injury or death from gill abrasion (Kjelland et al. 2015). Impacts to flow from decreased runoff would be negligible due to the large size of the river and the requirement for detainment of runoff. No additional indirect impacts to aquatic species are anticipated. Refer to the *EQRB Stormwater Technical Report* (Multnomah County 2021d) and the *EQRB Hydraulic Impact Analysis Technical Report* (Multnomah County 2021c) for a more detailed discussions of stormwater and hydraulic impacts.

8 Potential Mitigation

Mitigation will be required, as discussed in the Draft EIS, but the magnitude differs due to the updated magnitude of impacts anticipated with the Refined Long-span Alternative. The avoidance and minimization measures are the same, which include limiting the in-water footprint as much as practicable, implementing construction BMPs, and providing stormwater treatment. Compensatory mitigation is also proposed with the Refined Long-span Alternative, as required by U.S. Army Corps of Engineers, Oregon Department of State Lands, and the City of Portland to compensate for unavoidable impacts to the Willamette River. A mitigation bank has been identified from which to potentially purchase mitigation credits. This mitigation would be off-site and at a ratio at or greater than 1.5:1, providing more area of restoration than area impacted. Some on-site riparian restoration is also proposed along the east bank of the river, which would include removal of invasive vegetation and revegetation with native trees and shrubs. Other on-site restoration includes revegetation in the API to replace the vegetation that was removed during construction. For a more detailed discussion of BMPs and mitigation strategies, refer to the *EQRB Vegetation, Wildlife, and Aquatic Species Technical Report* (Multnomah County 2021e).

9 Agency Coordination

No additional agency coordination occurred for this memorandum.

10 Preparers

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11 References

Bash, J., C. Berman, and S. Bolton

2001 Effects of Turbidity and Suspended Solids on Salmonids. Washington State Transportation Center, Washington State Department of Transportation.

Friesen, Thomas A.

2005 Biology, Behavior, and Resources of Resident and Anadromous Fish in the Lower Willamette River. Oregon Department of Fish and Wildlife, contracted by the City of Portland Bureau of Environmental Services. https://www.portlandoregon.gov/bes/article/79249

Multnomah County

2021a EQRB Description of Alternatives Report. https://www.multco.us/earthquake-ready-burnside-bridge/project-library

2021b EQRB Draft Environmental Impact Statement. https://www.multco.us/earthquake-ready-burnside-bridge/project-library.

2021c EQRB Hydraulic Impact Analysis Technical Report. https://www.multco.us/earthquake-ready-burnside-bridge/project-library.

2021d EQRB Stormwater Technical Report. https://www.multco.us/earthquake-ready-burnside-bridge/project-library.

2021e EQRB Vegetation, Wildlife, and Aquatic Species Technical Report. https://www.multco.us/earthquake-ready-burnside-bridge/project-library.

2022a EQRB Supplemental Draft Environmental Impact Statement. https://www.multco.us/earthquake-ready-burnside-bridge/project-library.