Stormwater Supplemental Memorandum

Multnomah County | Earthquake Ready Burnside Bridge Project

Portland, OR

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Earthquake Ready Burnside Bridge Stormwater Supplemental Memorandum

Prepared for

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Acronyms, Initialisms, and Abbreviations

ADA	Americans with Disabilities Act
API	Area of Potential Impact
CIA	contributing impervious area
CSO	combined sewer overflow
CSZ	Cascadia Subduction Zone
EIS	environmental impact statement
EQRB	Earthquake Ready Burnside Bridge
SDEIS	Supplemental Draft Environmental Impact Statement

Executive Summary

As part of the Supplemental Draft Environmental Impact Statement for the Earthquake Ready Burnside Bridge Project, this supplemental technical memorandum has been prepared to evaluate the impacts of potential design refinements to the Preferred Alternative on stormwater management within the project's Area of Potential Impact. This memorandum compares the No-build Alternative and the Preferred Alternative from the Draft EIS to the Refined Long-span Alternative.

The Refined Long-span Alternative would have a narrower deck width than both the No-build and the Preferred Alternative from the Draft EIS. Subsequently the Refined Long-span Alternative would result in the lowest total stormwater runoff from the Project and would provide treatment to current standards for all the disturbed impervious areas.

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1 Introduction

In support of the Supplemental Draft Environmental Impact Statement (SDEIS) for the Earthquake Ready Burnside Bridge Project (EQRB), this supplemental technical memorandum has been prepared to evaluate the impacts of potential design refinements to the Preferred Alternative on stormwater management 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.

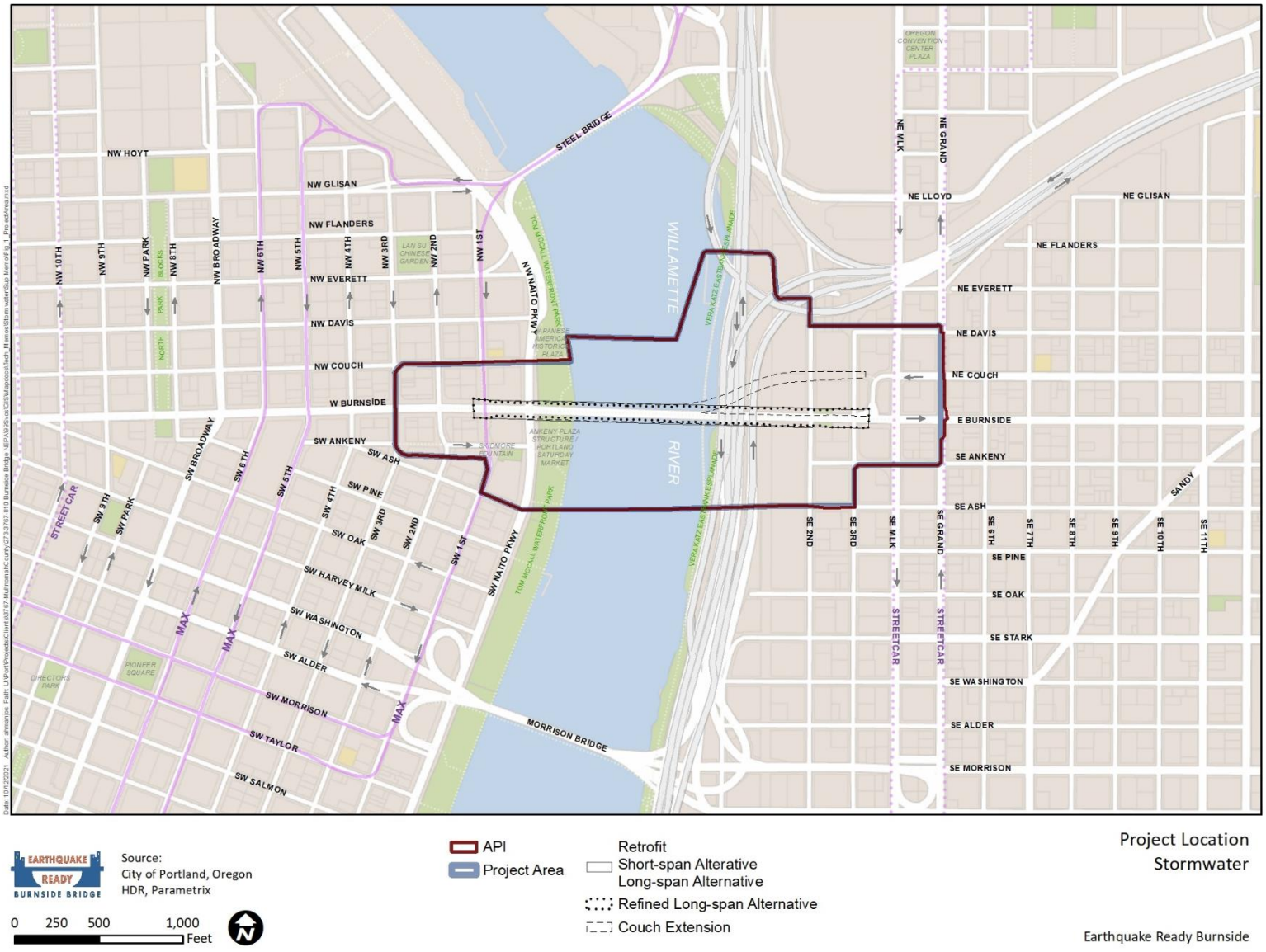
1.1 Project Location

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 and Area of Potential Impact



2 Project Alternatives

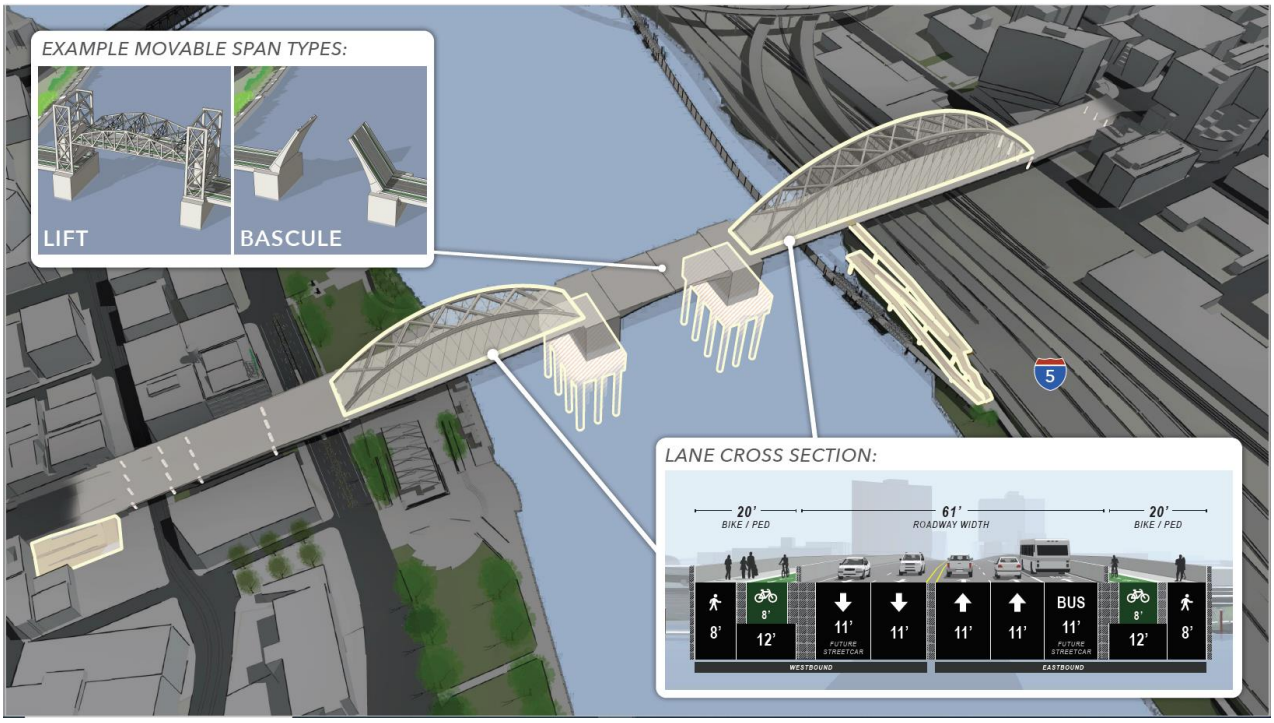
This technical memorandum evaluates potential design refinements to the Draft EIS Preferred Alternative. All of the Project Alternatives evaluated in the Draft EIS are summarized in Chapter 2 of the Draft EIS and described in detail in the *EQRB Description of Alternatives Report* (Multnomah County 2021a). 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 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 SDEIS memo 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.

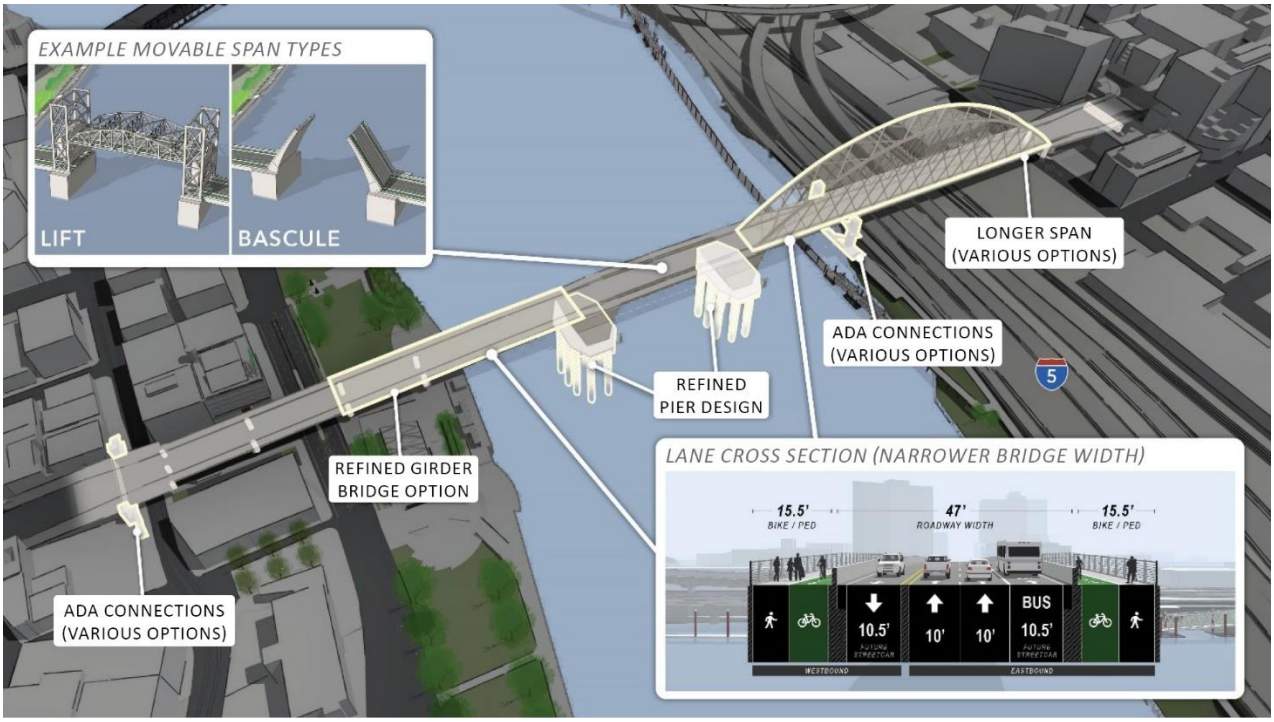
Figure 3 highlights the elements of the Draft EIS Long-span Alternative that have been modified to create the Refined Long-span Alternative, as described above. Figure 2 shows the Draft EIS Long-span Alternative and Figure 3 shows the Refined Long-span Alternative. Both figures include the tied-arch 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 Alternative 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 2022b). 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 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 that 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 narrow 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 SDEIS as was used in the *EQRB Stormwater Technical Report* (Multnomah County 2021c).

- **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.
- **Contributing Impervious Area (CIA) –** The impervious surfaces within the strict project limits, plus impervious surface owned or operated by Multnomah County, the City of Portland, or the Oregon Department of Transportation outside the project limits that drain to the project via direct flow or discrete conveyance.

4 Relevant Regulations

The same Laws, Plans, Policies, and Regulations from the *EQRB Stormwater Technical Report* (Multnomah County 2021c) were followed to guide or inform the stormwater assessment.

5 Analysis Methodology

The same analysis methodology was used in the SDEIS as was used in the *EQRB Stormwater Technical Report* (Multnomah County 2021c).

6 Affected Environment

The affected environment for stormwater management will be the same as the areas determined in the *EQRB Stormwater Technical Report* (Multnomah County 2021c).

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

The same types of impacts to stormwater management are anticipated with the Refined Long-span Alternative as the impacts that were analyzed in the *EQRB Stormwater Technical Report* (Multnomah County 2021c), such as the impervious areas that would receive water quality treatment, the volume of runoff needing to be detained, and the duration of any temporary stormwater measures required during construction. The only difference is the magnitude of impacts.

7.1 Direct Impacts

The impacts that would result from the Refined Long-span Alternative are the same types of impacts that were analyzed in the *EQRB Stormwater Technical Report* (Multnomah County 2021c) but at a different magnitude.

The Project would impact water quality treatment through the required stormwater treatment triggered by construction activities. The Refined Long-span Alternative would result in a net decrease of impervious area compared to the No-Build and the Draft EIS Long-span Alternatives. Table 2 compares the potential change in impervious areas. This decrease of impervious area is because the Refined Long-span Alternative results in fewer travel lanes across the bridge and therefore less total impervious surfaces.

Table 2. Net Increase/Decrease in Impervious Area

Alternative	Net Increase/Decrease in Impervious Area (acres)
No-Build	0.0
Draft EIS Long-span	0.9
Refined Long-span	-0.3

The Project would impact the volume of runoff being discharged to the Willamette River and to the City of Portland's combined sewer overflow (CSO) system. The Refined Long-span Alternative would decrease the total volume of runoff but would also change where runoff is discharged. Table 3 summarizes the areas being discharged to the different drainage systems located within the Project API.

Table 3. Impervious Areas within the API Discharge Location by Alternative

Alternative	West Bank CSO (acres)	West Bank Storm (acres)	East Bank CSO (acres)	East Bank Storm (acres)	Bridge Deck to River (acres)
No-Build	7.1	0.0	6.4	3.7	1.6
Draft EIS Long-span	6.6	1.6	6.4	5.0	0.0
Refined Long-span	6.4	1.2	6.3	4.5	0.0

As stated above, the total impervious area within the Project API would be decreased with the Refined Long-span Alternative. This is because the total area of the bridge deck has been decreased compared to the No-Build and Draft EIS Long-span Alternatives. Table 4 summarizes the amount of impervious area within the API that would be treated or not treated to the current water quality design standards for transportation projects within the Project Area. Due to the different bridge deck footprints, the impervious area totals differ between alternatives. The Refined Long-span Alternative proposes rebuilding

less of the existing impervious areas at either end of the bridge and therefore results in a smaller amount of total impervious area that requires treatment as part of the Project.

Table 4. Acres of Impervious Area within the API Treated and Untreated by Alternative

Alternative	Treated (acres)	Untreated (acres)
No-Build	0.5[a]	18.2
Draft EIS Long-span	7.5[a]	12.1[b]
Refined Long-span	6.0[a]	12.4[b]

[a] Is currently or would be treated to current regulatory standards for transportation projects
[b] Impervious area within the API that is not considered CIA and therefore does not require water quality treatment

7.2 Indirect Impacts

There are no expected indirect impacts to stormwater from the Refined Long-span Alternative.

8 Potential Mitigation

The potential type of mitigation will be the same as discussed in the *EQRB Stormwater Technical Report* (Multnomah County 2021c). The only change will be the amount of mitigation that is required. The Refined Long-span Alternative would result in a decrease in total impervious area within the API compared to both the No-build and the Draft EIS Long-Span Alternatives. See Table 2 for the comparison of impervious areas. Less impervious area results in less stormwater runoff volume that would require stormwater management.

9 Agency Coordination

No additional agency coordination took place during the preparation of the *EQRB Stormwater Supplemental Memorandum* (Multnomah County 2022a).

10 Preparers

Name	Professional Affiliation [firm or organization]	Education [degree or certification]	Years of Experience
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Christine Higgins	CASSO Consulting, Inc.	B.S., Civil Engineering	26

11 References

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

2022a EQRB Stormwater Supplemental Memorandum. https://www.multco.us/earthquake-ready-burnside-bridge/project-library.

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