Downtown Redmond Link Extension
SEPA Addendum

Appendix E
Water Resources Supporting Materials
Technical Memorandum

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Prepared for

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INTRODUCTION

This technical memorandum provides conceptual calculations and mappings to evaluate potential impacts on water resources for the Downtown Redmond Link Extension Project. Sound Transit is considering design refinements to the Preferred Alternative in Segment E of the adopted East Link Project, the Marymoor Alternative E2 (referred to hereafter as the 2011 Project) in the 2011 East Link Light Rail Transit Project Final Environmental Impact Statement (EIS; Sound Transit 2011). The project modifications proposed for the Downtown Redmond Link Extension are referred to herein as the Proposed Design Refinements.

Proposed Design Refinements

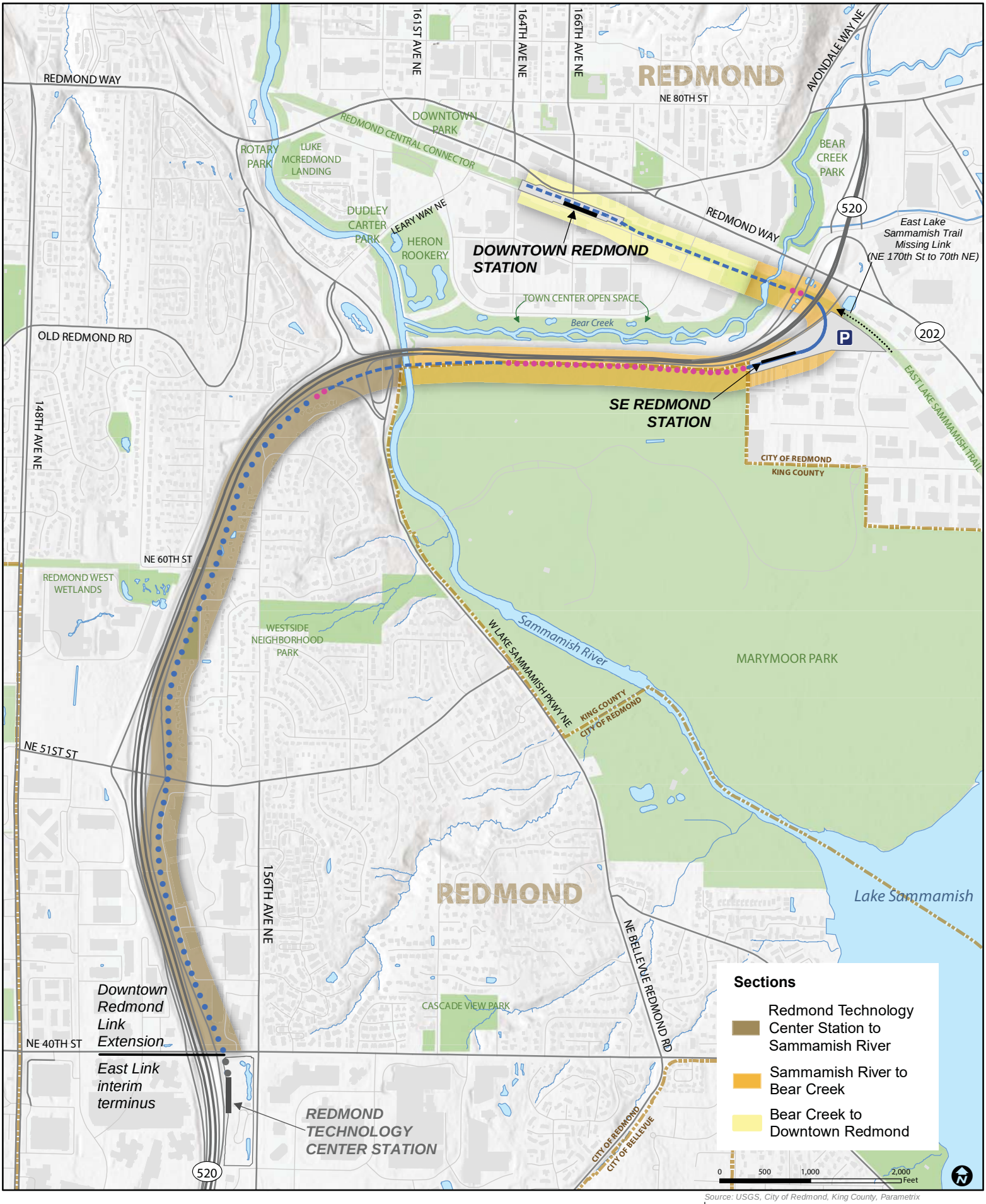
The Proposed Design Refinements start at the East Link interim terminus at NE 40th Street, just past the Redmond Technology Center Station (formerly called Overlake Transit Center Station), and terminate just east of 164th Avenue NE. The corridor was designated into three geographic sections: Redmond Technology Center Station to Sammamish River, Sammamish River to Bear Creek, and Bear Creek to Downtown Redmond. The alignment is shown in Figure 1 and sections are described below. Because the East Link maintenance facility has been located in Bellevue, the Proposed Design Refinements do not include a maintenance facility location.

Redmond Technology Center Station to Sammamish River

In the section between the Redmond Technology Center Station and the Sammamish River, the light rail route runs parallel to the east side of State Route (SR) 520. The alignment would generally be at-grade with SR 520 and use retained-cut sections to cut into the hillside and pass under existing overpasses at NE 40th Street, NE 51st Street, and NE 60th Street. As the alignment follows SR 520 and curves east, it transitions to an elevated structure crossing over the West Lake Sammamish Parkway NE interchange and the Sammamish River.

This alignment with the Proposed Design Refinements is similar to the 2011 Project, but has been modified in several locations to minimize impacts on adjacent roadways and to accommodate the Washington State Department of Transportation (WSDOT) planned improvements (WSDOT 2013). Between NE 40th Street and NE 51st Street, the alignment has been shifted up to 20 feet away from SR 520 to maximize available WSDOT right-of-way and limit impacts on the adjacent property. The refined alignment has also been shifted up to 25 feet away from SR 520 south of NE 60th Street and up to 30 feet near the West Lake Sammamish Parkway NE eastbound off-ramp.

With the Proposed Design Refinements, a traction power substation (TPSS) would be located in the vicinity of SR 520 and NE 65th Street, whereas the TPSS in this area for the 2011 Project would be located under the elevated guideway near the West Lake Sammamish Parkway/SR 520 interchange.



Source: USGS, City of Redmond, King County, Parametrix

Figure 1
Alignment with Proposed Design Refinements
Downtown Redmond Link Extension

Sammamish River to Bear Creek

Between the Sammamish River and the SE Redmond Station, the Proposed Design Refinements are similar to the 2011 Project. The elevated guideway would be about 50 to 60 feet above the Sammamish River with the Proposed Design Refinements, which is approximately 15 to 20 feet lower than anticipated for the 2011 Project. The elevated guideway for the Proposed Design Refinements would match the height of the SR 520 bridge and would not have any columns within the ordinary high water mark of the river. The Proposed Design Refinements would transition from elevated to a retained-fill section as it crosses Marymoor Park, whereas the 2011 Project would transition from elevated to at-grade across the park. In the Proposed Design Refinements, the retained-fill section would be between 5 and 14 feet higher than the current ground level and would provide grade separation from Marymoor Park facilities. Similar to the 2011 Project, the Proposed Design Refinements alignment would then transition to ground level as it enters the SE Redmond Station. The elevated section of the alignment would utilize columns that penetrate deeply into the ground in the western portion of Marymoor Park, after which construction impacts would not extend deeper than approximately 4 feet below the current ground surface along the eastern portion of Marymoor Park to the SE Redmond Station area.

The major changes in this section are related to the City of Redmond's plans allowing the Marymoor Subarea to develop around the SE Redmond Station as a transit-oriented neighborhood with mixed-use developments, including a revised street network and new trail connections. Station facilities for both the 2011 Project and the Proposed Design Refinements would include a 1,400-stall parking garage as well as circulation for transit, passenger pick-up and drop-off, and connections to trails in the area. The Proposed Design Refinements would rebuild NE 70th Street, currently a dead-end street, to serve the station and surrounding land uses and to connect to the SE Redmond street system consistent with City of Redmond plans. The second TPSS would be located at the SE Redmond Station, whereas the 2011 Project placed the second TPSS in the vicinity of 166th Avenue NE in the rail corridor.

From the SE Redmond Station, the alignment is similar to the 2011 Project, turning to the northwest, crossing underneath SR 520, and entering the former BNSF rail corridor. The Proposed Design Refinements would cross under SR 520 at-grade and require reconstruction of the SR 520 eastbound off-ramp and westbound on-ramp. The Proposed Design Refinements would slightly raise SR 202 (Redmond Way) and a short section of NE 76th Street to align with the reconstructed westbound on-ramp and its intersection, which would be modified. The Proposed Design Refinements and the 2011 Project alignment would both rise to cross on a new bridge elevated about 3 to 6 feet over Bear Creek. The Proposed Design Refinements would also accommodate an at-grade trail connection between the East Lake Sammamish Trail and Redmond Central Connector Trail with a bridge over Bear Creek, which may be constructed by Sound Transit as part of the project with funding provided by King County, or funded and constructed by King County at a later time. This trail connection is a missing segment of King County's East Lake Sammamish Trail, and the Proposed Design Refinements' raising of the SR 520 ramps makes this at-grade connection possible.

The Bear Creek channel and its floodplain would be regraded and broadened to remove some past fill and constrictions in the floodplain from the existing railroad bridge, which is no longer in use and would be removed. These improvements to the Bear Creek channel would complement restoration efforts completed downstream since 2011. The improvements were not contemplated and therefore not analyzed for the 2011 Project.

To accommodate stormwater discharges, two new outfalls would be needed to convey stormwater from the guideway to the Sammamish River. One outfall would be located on each side of the river. Because of the early stage of design during preparation of the Final EIS, these outfalls were not previously anticipated; however, one or more outfalls would have been needed to discharge stormwater for the 2011 Project. In the SE Redmond Station vicinity, several new stormwater facilities would infiltrate runoff from the guideway. Some of the facilities may be open ponds, while others may be underground infiltration galleries (a type of drainage system) or other suitable methods.

Bear Creek to Downtown Redmond

In the section between Bear Creek and downtown Redmond, the Proposed Design Refinements have the same general alignment but with some different features than the 2011 Project. After crossing over Bear Creek, the refined alignment would continue on an elevated structure, whereas the 2011 Project would return to grade. The refined alignment in downtown Redmond would shift slightly south of the 2011 Project alignment, and it would be shorter. The elevated Downtown Redmond Station and tail tracks would shift approximately 1,600 feet east compared to the 2011 Project. The Downtown Redmond Station would span 166th Avenue NE and remain in the existing rail corridor easement on the north side of NE 76th Street. Approximately 460 feet of tail tracks for train layover and turnback operations would continue west of the station, terminating just east of 164th Avenue NE. Crossover tracks would be located just west of 170th Avenue NE in downtown Redmond, whereas the 2011 Project previously located the crossover tracks west of the SE Redmond Station.

Analysis Methodology

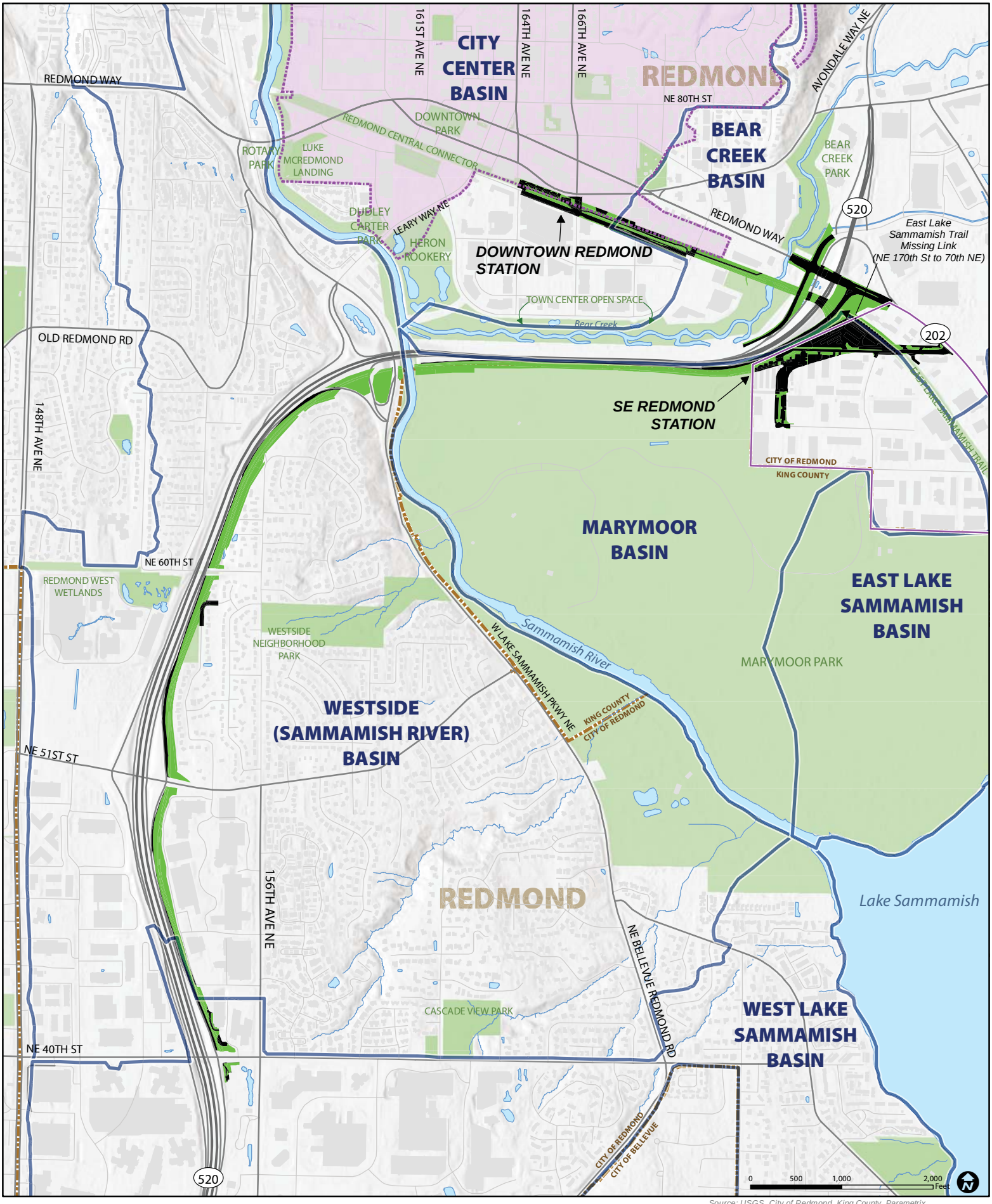
This section describes the methodologies for evaluating the Proposed Design Refinements potential impacts on water resources. These impacts are based on changes to impervious surfaces and water quality, as well as floodplain encroachment.

Impervious Surfaces. New impervious areas proposed by the Proposed Design Refinements were calculated using the geographic information system (GIS) based on preliminary design concepts for the Proposed Design Refinements (Figures 2 and 3). Similar to the analysis used for the 2011 Project, new impervious areas in the Proposed Design Refinements footprint were considered to include tracks and guideways, ballasted sections, stations, park-and-ride lots, and roads.

Water Quality. Changes to runoff water quality were qualitatively evaluated based on the following:

1. The proposed rail footprint on ballast is assumed to be non-pollution-generating impervious surface. If the rail tracks are located on other impervious surfaces with other activities, such as roadways, this would not change the pollution-generating characteristics of the underlying activity.
2. New roadway is assumed to be pollution-generating impervious surface.
3. Parking facilities, and other surfaces subject to vehicular use, are assumed to be pollution-generating impervious surface.

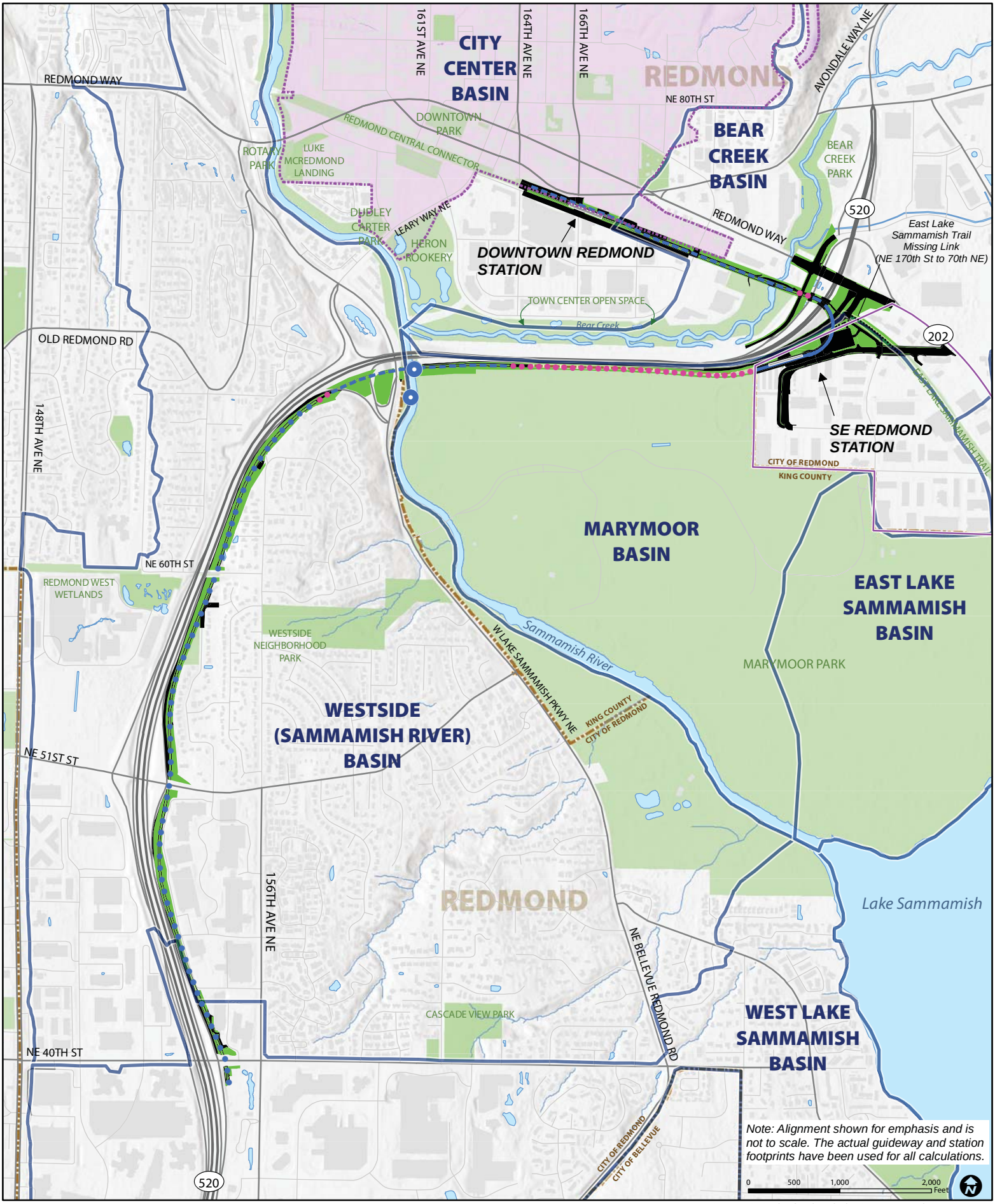
Floodplain Encroachment. Floodplain regulations within the Marymoor Park area are administered by King County through King County Code 21A.24. In all other areas of the Proposed Design Refinements, floodplain regulations are administered by the City of Redmond through Redmond Municipal Code 15.04.



Drainage Basins
Impervious
Pervious
Downtown Regional Facility Surcharge Area
Marymoor - 100% Infiltration Area
City Limits
Parks / Open Space

Source: USGS, City of Redmond, King County, Parametrix

Figure 2
Existing Land Cover
Downtown Redmond Link Extension



Source: USGS, City of Redmond, King County, Parametrix

Figure 3
Proposed Land Cover
Downtown Redmond Link Extension

Determining changes within existing floodplain boundaries is accomplished through the following steps:

1. Assessing Review Trigger: Separate floodplain reviews are triggered for the City of Redmond and King County. This is because the Proposed Design Refinements are within the boundaries of the effective flood insurance rate map (FIRM) and approved revisions provided by the Federal Emergency Management Agency (FEMA) (Figure 4; FEMA 1995, FEMA 1998, FEMA 2016) in both jurisdictions.
2. Determining Actual Floodplain Impacts: Identifying the extent of potential floodplain impacts is based on the available data that "most accurately classifies and delineates the flood hazard area" (King County Code 21A.24) or "any base flood elevation and floodway data available from a federal, state, or other source" (Redmond Municipal Code 15.04), as used and accepted by each jurisdiction. The applicable effective floodplain is typically based on the effective FIRM and the Flood Insurance Study. Flood control and floodplain protection measures may be clarified and refined based on additional data available, such as recent studies conducted by King County (Figure 5; King County 2013a, King County 2013b, King County 2013c).

Where the alignment would pass through the Sammamish River floodplain in the Marymoor Park area and adjacent WSDOT right-of-way, the Proposed Design Refinements would provide required compensatory storage for fill or other mitigation measures to prevent impacts to the regulated floodplain elevation.

In the Bear Creek floodplain, the Proposed Design Refinements would change bridge and roadway configurations in the vicinity of SR 202 and the former BNSF Railway corridor; therefore, modifications to Bear Creek and its floodplain in the vicinity of the crossing are being considered (Figures 4 and 5). Any changes to the floodplain would be evaluated through a quantitative floodplain analysis conducted as part of permitting and agency approval. As a result, the Proposed Design Refinements could modify the Bear Creek floodplain elevation depending on the agency-approved changes to the floodplain configuration being implemented.

Analysis Results

Changes in impervious surface are summarized in Table 1 and shown in Figures 2 and 3. The Proposed Design Refinements would add 8.2 acres of impervious area, compared to an increase of 4.3 acres for the 2011 Project. Most of the 3.9 acre-difference in increased impervious area results from design updates to stations, parking areas, and roadways.

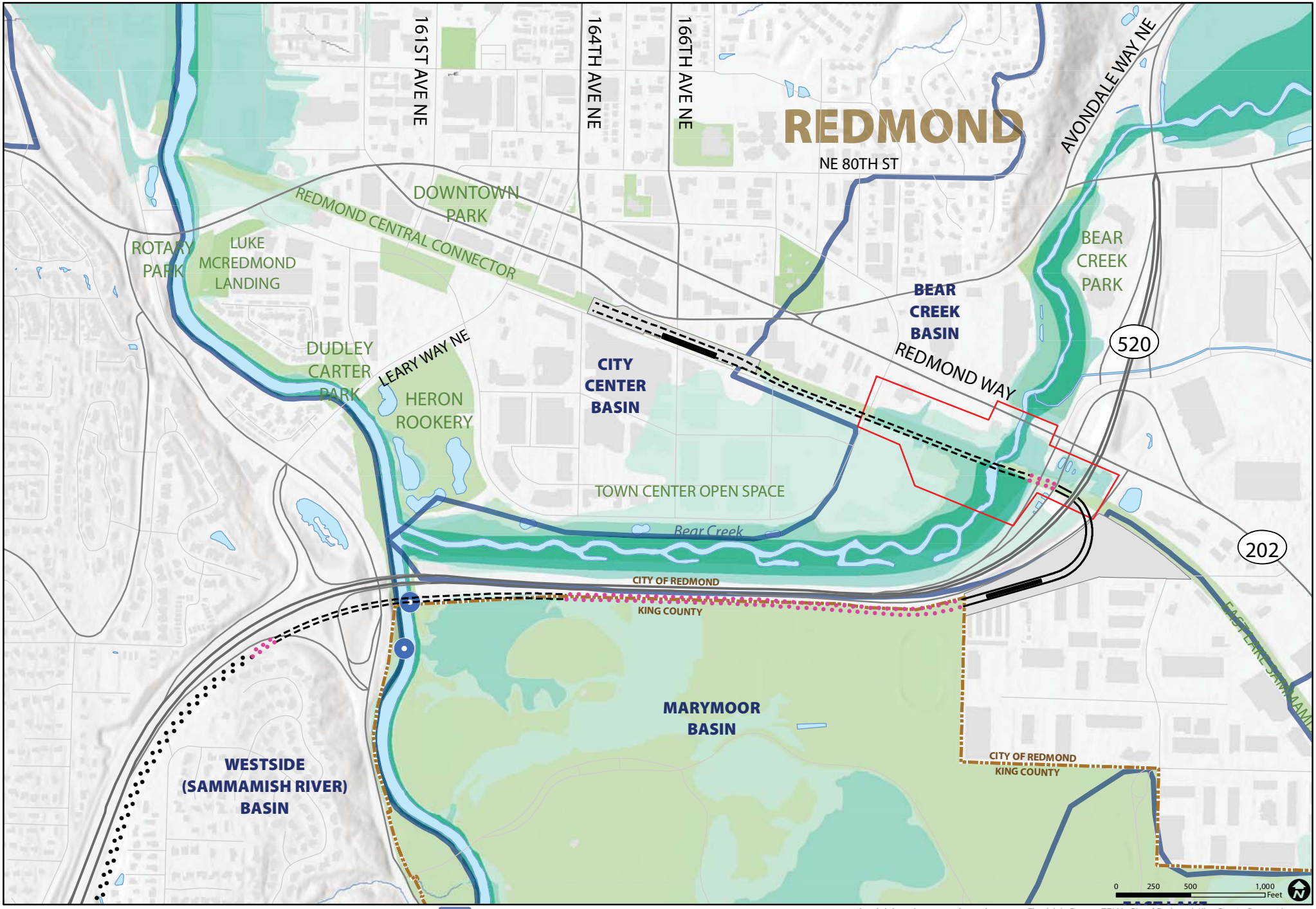
Table 1. Existing and Proposed Impervious Area

Major Downstream Waterbody	Drainage Basin	2011 Project		Proposed Design Refinements	
		Existing	Proposed	Existing	Proposed
Sammamish River	West Lake Sammamish	0.5	0.7	1.0	1.2
	East Lake Sammamish	0	0	0.0	0.0
	Westside	2.6	7.6	2.6	5.8
	Marymoor	8.8	7.9	10.2	11.9
	City Center	2.4	1.5	2.8	3.4
	Bear Creek	2.6	3.5	9.3	11.7
Total (acres)		16.9	21.2	25.8	34.1
Total Impervious Area Increase (acres)		4.3		8.2	
Total Impervious Area Increase (percent)		25%		32%	

Note: The FEMA floodplain base map is taken from the 1995 effective FIRM. The Bear Creek floodplain includes revisions approved by FEMA in 1998 and 2016.

Floodplain Source: FEMA, City of Redmond, King County, Parametrix

Figure 4
FEMA Floodplain
Downtown Redmond Link Extension



Note: Floodplains shown are based on a 2013 study conducted by King County. These floodplains are preliminary only and not yet approved by FEMA.

Floodplain Source: FEMA, City of Redmond, King County, Parametrix

Figure 5
King County Floodplain
Downtown Redmond Link Extension

Within the city of Redmond, stormwater management for the Proposed Design Refinements would be implemented based on the standards presented in the City of Redmond Stormwater Technical Notebook (Notebook) (City of Redmond 2017). The Notebook locally modifies and defines how the Washington State Department of Ecology's 2012 Stormwater Management Manual for Western Washington, as amended in 2014 (Ecology 2014), is applied in Redmond. Stormwater management within Marymoor Park would be implemented based on the King County Surface Water Design Manual (King County 2016). Both manuals have similar thresholds for water quality treatment and runoff volume flow control to prevent impacts on stream and groundwater quality. Because the modifications to the alignment would apply stormwater management to a larger area of roadway and parking that is currently untreated (City of Redmond 2013) compared to the 2011 Project, the Proposed Design Refinements are expected to result in a larger benefit to water resources than the 2011 Project.

A quantitative floodplain analysis would be conducted as part of permitting the Proposed Design Refinements. Where the alignment would pass through the Sammamish River floodplain in the Marymoor Park area and the adjacent WSDOT right-of-way, required compensatory storage provided by the Proposed Design Refinements for fill or other mitigation measures would prevent impacts to the floodplain elevations regulated by King County and the City of Redmond. In the vicinity of Bear Creek, the Proposed Design Refinements would conduct a flood study and gain approval from the City of Redmond for any proposed improvements to the stream channel and floodplain. The Bear Creek flood study would consider the Proposed Design Refinements proposed crossings when defining the new floodplain and floodway for the City of Redmond's approval. The improvements to the stream channel and floodplain implemented by the Proposed Design Refinements are expected to result in either no net impact or a benefit to the stream channel and floodway conveyance.

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