3.8 Noise and Vibration

This section includes background information on noise and vibration and a summary of noise and vibration impacts identified, as well as potential mitigation measures.

3.8.1 Introduction to Resources and Regulatory Requirements

3.8.1.1 Noise

What we hear as sound is a series of continuous air pressure fluctuations superimposed on the atmospheric pressure that surrounds us. The amplitude of fluctuation is related to the energy carried in a sound wave; the greater the amplitude, the greater the energy and the louder the sound. Sound pressure levels are quantified by the fundamental descriptor used in acoustics, the sound pressure level, in decibels (dB). When sounds are unpleasant, unwanted, or disturbingly loud, we tend to classify them as noise.

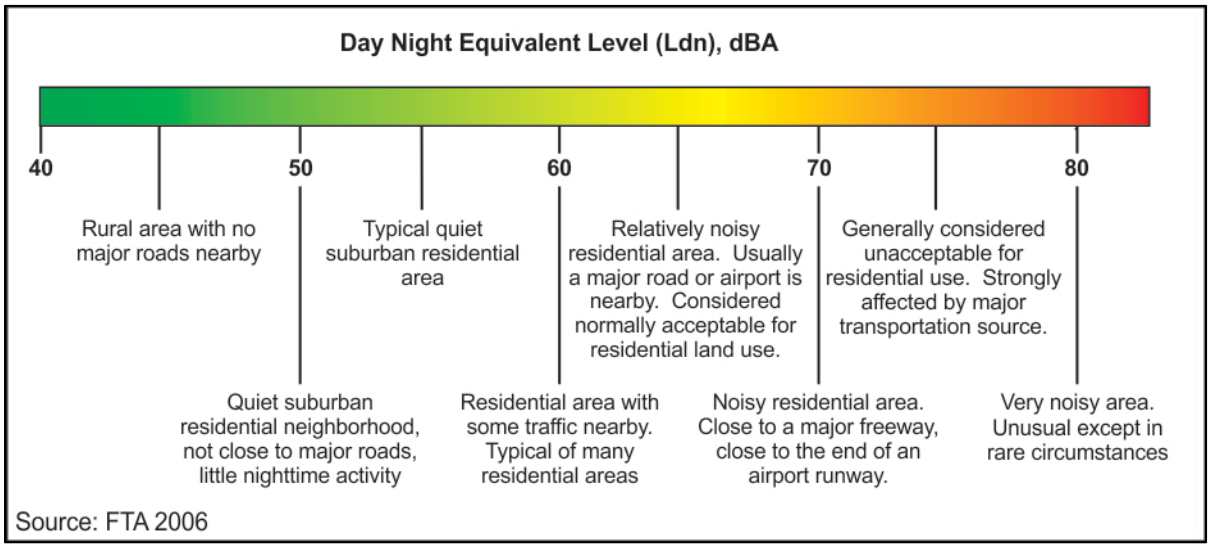
The number of fluctuation cycles or pressure waves per second of a particular sound is the frequency of the sound. The human ear is less sensitive to higher and lower frequencies than to mid-range frequencies. Therefore, sound level meters used to measure environmental noise generally incorporate a weighting system that filters out higher and lower frequencies in a manner similar to the human ear. This system produces noise measurements that approximate the normal human perception of noise. Measurements made with this weighting system are termed A-weighted and are specified as A-weighted decibel (dBA) readings. Community noise is usually characterized in terms of the A-weighted sound level.

When sounds exceed 110 dBA, there is a potential for hearing damage, even with relatively short exposures. In quiet suburban areas far from major freeways, the noise levels during the late night hours will drop to about 30 dBA. Outdoor noise levels lower than this only occur in isolated areas where there is a minimum of natural noises such as leaves blowing in the wind, crickets, or flowing water.

Several noise descriptors are used that take into account the variability of noise over time. The equivalent sound level (Leq) is the level of a constant sound for a specified period of time that has the same sound energy as an actual fluctuating noise over the same period of time. It is an energy average sound level. The day-night sound level (Ldn) is the equivalent sound level for a 24-hour period with an additional 10 dBA added to nighttime sound levels occurring between 10:00 p.m. and 7:00 a.m. Another descriptor, the statistical sound level, is the sound level that is equaled or exceeded for a specified percentage of a given measurement period. For example, L25 is the notation for the noise level within a measurement interval that is equaled or exceeded 25% of the time. The minimum noise level during a measurement period is denoted Lmin. The maximum noise levels that occur during an event, such as the passing of a heavy truck or the flyover of an airplane, is denoted Lmax.

Figure 3.8-1 defines typical community noise levels in terms of Ldn. Most urban and suburban neighborhoods will be in the range of Ldn 50 to 70 dBA. An Ldn of 70 dBA is a relatively noisy environment that might be found at buildings on a busy surface street, close to a freeway or near a busy airport. In recent times, many urban developments have combined retail, light commercial and other nonresidential uses with residential uses in a mixed-use environment. Because of these mixed-use developments, ambient noise levels in some urban environments may be slightly higher than the levels provided in Figure 3.8-1.

Figure 3.8-1. Typical Day-Night Sound Levels



The following list contains some general rules for community noise.

- A 3-dB change is the minimum most people will notice in most environments.
- Under free-field conditions, where there are no reflections or additional attenuations, a point sound source is known to decrease at a rate of 6 dB for each doubling of distance. For example, a sound level of 70 dB at a distance of 100 feet would decrease to 64 dB at 200 feet.
- Sounds such as sirens, bells, and horns are more noticeable than broadband noise sources, such as traffic.
- A 10-dB increase in sound level is perceived as an approximate doubling of the loudness of the sound and represents a substantial change in loudness.
- An important factor to recognize is that noise is measured on a decibel scale, and combining two noises is not achieved by simple addition. For example, combining two 60-dBA noises does not give 120 dBA (which is near the pain threshold), but yields 63 dBA which is lower than the volume at which most people listen to their televisions.

3.8.1.2 Regulatory Noise Requirements and Impact Criteria

Several different noise criteria were evaluated for applicability to the noise and vibration analysis for the proposed project. These include the *Transit Noise and Vibration Impact Assessment* (FTA guidance manual) (Federal Transit Administration 2006) along with the Washington Administrative Code (WAC) and local criteria from the Lynnwood Municipal Code (LMC) and Bellevue City Code (BCC). Applicable noise and vibration criteria and methods used for the noise studies are provided in the following sections.

3.8.1.3 FTA Noise Criteria

Transit noise impacts for this project are determined based on the criteria defined in the FTA guidance manual. The FTA noise impact criteria are based on documented research on community reaction to noise. The criteria are based on a sliding scale that uses the existing noise levels as a basis for setting actual impact levels. Although more transit noise is allowed in neighborhoods with high levels of existing noise, as the existing noise levels increase, a smaller increase in the total noise exposure is allowed when compared to areas with lower existing noise levels. The FTA noise impact criteria also group noise-sensitive land uses into three categories.

- **Category 1.** Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
- **Category 2.** Residences and buildings where people normally sleep. This category includes homes, hospitals and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
- **Category 3.** Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities are also considered to be in this category. Certain historical sites and parks are also included.

The criteria do not apply to most commercial or industrial uses because, in general, the activities within these buildings are compatible with higher noise levels. They do apply to business uses which depend on quiet as an important part of operations, such as sound and motion picture recording studios.

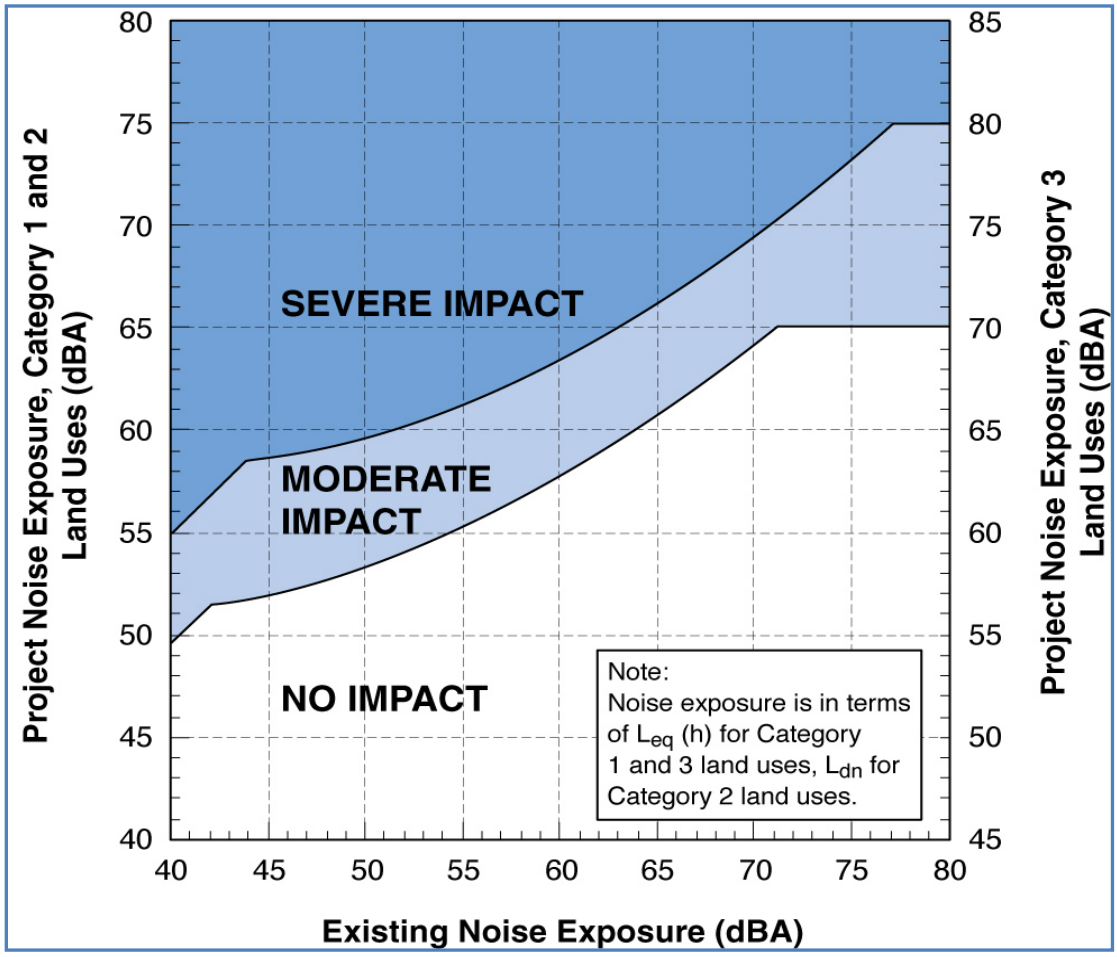
FTA assumes that parks are a special case, and how they are used and where they are located should be considered when considering whether or not a particular park, or an area within a park, is considered noise-sensitive. All parks along the project corridor were evaluated for consideration under the FTA criteria. Based on park location, uses, and existing noise levels, Scriber Creek Park was evaluated under FTA Category 3 criteria. The park's hours of operation are considered when performing the noise analysis per FTA criteria.

The Ldn is used to characterize noise exposure for residential areas (Category 2). For other noise-sensitive land uses, such as outdoor amphitheaters, parks, and school buildings (Categories 1 and 3), the maximum 1-hour Leq during the facility's operating period is used. There are no noise impact criteria for most commercial and industrial land uses. There are two levels of impact included in the FTA criteria: severe and moderate, interpreted as follows.

- **Severe Impact.** Project-generated noise in the severe impact range can be expected to cause a large percentage of people to be highly annoyed by the new noise and represents the most compelling need for mitigation. Noise mitigation will normally be specified for severe impact areas unless there are truly extenuating circumstances that prevent it.
- **Moderate Impact.** In this range of noise impact, the change in the cumulative noise level is noticeable to most people but may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These factors include the existing level, the projected level of increase over existing noise levels, the types and numbers of noise-sensitive land uses affected, the noise sensitivity of the properties, the effectiveness of the mitigation measures, community views, and the cost of mitigating noise to more acceptable levels.

The FTA noise impact criteria are summarized in graphical form in Figure 3.8-2, which shows the existing noise exposure and the additional noise exposure from the transit project that would cause either moderate or severe impact. The future noise exposure would be the combination of the existing noise exposure and the additional noise exposure caused by the transit project.

Figure 3.8-2. FTA Noise Impact Criteria



3.8.1.4 Local Noise Ordinances

Under FTA regulations, local (state, county, and city) noise ordinances must be considered for ancillary facilities and construction. The local regulations for the noise analysis of the proposed project are taken from WAC 173-60, Maximum Environmental Noise Levels. These are the same criteria used by the City of Lynnwood in its noise control ordinance found in LMC 10.12. They are also the same City of Bellevue noise limits as found in BCC 9.18.

This noise control ordinance contains property-line noise limits based on land use (Environmental Designation for Noise Abatement [EDNA]). More details on the EDNA classifications are provided in Appendix E.2, *Noise and Vibration Technical Report*. In general, EDNA Class A is residential property, buildings where human beings reside and sleep. Class B is for commercial uses such as restaurants; retail services; banks; office buildings; community services; educational, religious and governmental facilities; and other miscellaneous commercial services. Class C includes those uses not described above and is primarily for farming, storage, warehouse, distribution and industrial properties. The WAC provides maximum allowable noise levels between any two uses as shown in Table 3.8-1. The

property-line noise limits in Table 3.8-1 are reduced by 10 dBA from 10:00 p.m. to 7:00 a.m. to reflect nighttime sensitivity to noise.

Table 3.8-1. Washington State Noise Ordinance

Property Producing Noise (EDNA)	Maximum Allowable Sound Level (dBA) Property Receiving Noise EDNA		
	Class A (Residential)	Class B (Commercial)	Class C (Industrial)
Class A	55	57	60
Class B	57	60	65
Class C	60	65	70
Note: A reduction of 10 dBA is applicable to the values listed in the table from 10:00 p.m. to 7:00 a.m.			

For construction activities, the noise limits in Table 3.8-1 would be applicable during evening and nighttime hours and on weekends and holidays, as defined under the city codes. In the City of Lynnwood, sounds created by construction are exempt between the hours of 7:00 a.m. and 6:00 p.m. on weekdays. Construction between 6:00 p.m. and 7:00 a.m. on weekdays, and construction on weekends must meet the city code in Table 3.8-1 with the allowable exceedance criteria or obtain a noise variance from the city. In the City of Bellevue, sounds created by construction and emanating from construction sites are exempt between the hours of 7:00 a.m. and 6:00 p.m. on weekdays, and 9:00 a.m. and 6:00 p.m. on Saturdays that are not legal holidays. Construction during nighttime hours (between 6:00 p.m. and 7:00 a.m. on weekdays, and between 6:00 p.m. and 9:00 a.m. on Saturdays) or on Sundays or legal holidays is required to meet the noise regulations provided in Table 3.8-1 with the allowable exceedance unless a noise variance is received from the city.

3.8.1.5 Vibration

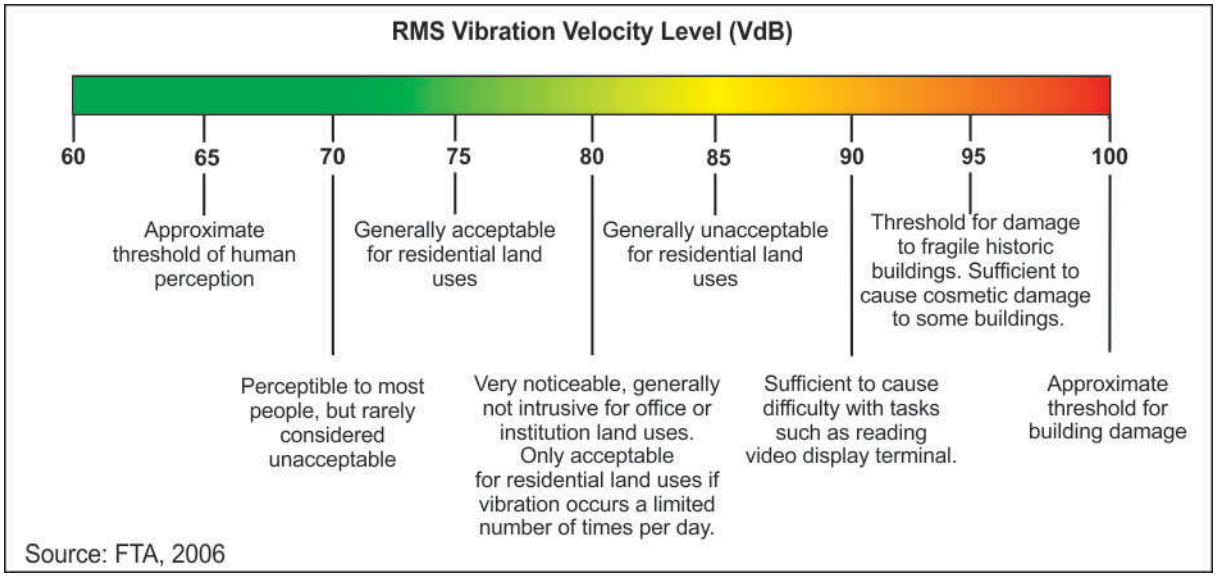
Groundborne vibration consists of oscillatory waves that propagate from the source through the ground to adjacent buildings. On steel-wheel/steel-rail train systems, groundborne vibration is created by the interaction of the steel wheels rolling on the steel rails. Although the vibration is sometimes noticeable outdoors, it is almost exclusively an indoor problem. Trains operating in the OMSF yard would not produce sufficient vibration to cause even minor cosmetic damage to nearby buildings. The primary concern is that the vibration and radiated noise can be intrusive and annoying to building occupants. The building vibration caused by groundborne vibration may be perceived as motion of building surfaces; rattling of windows, items on shelves, or pictures hanging on walls; or as a low-frequency rumbling noise, which is referred to as groundborne noise. Factors that influence the amplitudes of groundborne vibration include vehicle suspension parameters, condition of the wheels and rails, type of track, track support system, type of building foundation, and the properties of the soil and rock layers through which the vibration propagates.

Train vibration is virtually always characterized in terms of the root-mean-square (RMS) amplitude. RMS is a widely used but sometimes confusing method of characterizing vibration and other oscillating phenomena. It represents the average energy over a short time interval; typically, a one

second interval is used to evaluate human response to vibration. RMS vibration velocity is considered the best available measure of potential human annoyance from groundborne vibration.

Figure 3.8-3 gives a general idea of human and building response to different levels of vibration. Existing background building vibration is usually in the range of 40 to 50 velocity decibels (VdB), which is well below the range of human perception. Although the perceptibility threshold is about 65 VdB, human response to vibration is usually not bothersome unless the RMS vibration velocity level exceeds 70 to 75 VdB. This is a typical level 50 feet from a rapid transit or light rail system. Buses and trucks rarely create vibration that exceeds 70 VdB unless there are large bumps or potholes in the road.

Figure 3.8-3. Typical RMS Vibration Levels



Vibration Criteria

FTA has developed impact criteria for acceptable levels of groundborne noise and vibration. Groundborne noise is associated with subterranean transit projects and is therefore not a concern for the proposed project. Experience with groundborne vibration from rail systems and other common vibration sources suggest the following.

- Groundborne vibration from transit trains should be characterized in terms of the RMS vibration velocity amplitude.
- The threshold of vibration perception for most humans is around 65 VdB. Levels in the 70 to 75 VdB range are often noticeable but acceptable, and levels greater than 80 VdB are often considered unacceptable.

For an operations and maintenance facility, which has train movement throughout the day, evening and nighttime hours, the FTA limit for acceptable levels of residential groundborne vibration is 72 VdB. FTA assigns sensitive land uses to the following three categories.

- **Vibration Category 1: High Sensitivity**. This category includes buildings where low ambient vibration is essential for the interior operations in the building. Vibration levels may be below the level of human perception. Typical land uses covered by Category 1 are vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. The degree of sensitivity to vibration will depend on the specific equipment that will be affected by the vibration. Equipment such as electron microscopes and high-resolution lithographic equipment can be very sensitive to vibration, and even normal optical microscopes will sometimes be difficult to use when vibration is well below the human annoyance level. Manufacturing of computer chips is an example of a vibration-sensitive process.
- **Vibration Category 2: Residential.** This category includes residences and buildings where people normally sleep, including private dwellings, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance. It is common practice to also use this category as a standard for some special uses such as auditoriums or theaters.
- **Vibration Category 3: Institutional.** This category includes land uses with primarily daytime use including schools, churches, and other institutions and quiet offices that do not have vibration-sensitive equipment. Offices in buildings primarily for industrial use are not included in this category.

Table 3.8-2 summarizes the FTA impact criteria for groundborne vibration. As shown in Table 3.8-2, some land use activities are more sensitive to vibration than others. For example, certain research and fabrication facilities, television and recording studios, and concert halls are more vibration-sensitive than residences and buildings where people normally sleep, which are more sensitive than institutional land uses with primarily daytime use.

Table 3.8-2. FTA Vibration Impact Criteria for Frequent[a] Events

Land Use Category	Category Comment	Groundborne Vibration (VdB re 1 micro in/sec)
1	Low interior vibration is essential	65
2	Residential and sleep	72
3	Institutional and daytime	75
--[b]	Concert hall, TV/recording studio	65
--[b]	Auditorium	72
--[b]	Theatre	72
--[b]	Office use for detailed analysis	84

Source: Federal Transit Administration 2006.

[a] Frequent is defined as greater than or equal to 70 events per day.

[b] Special buildings and office spaces do not fall into any specific FTA land use categories.

Vdb = velocity decibels; in/sec = inch per second

3.8.2 Methods

The noise and vibration study area includes all structures within 225 feet for areas with intervening buildings, extending out to 350 feet in areas with an unobstructed line-of-sight to the OMSF (Federal Transit Administration 2006).

Under FTA criteria, noise impacts are based on the existing noise levels; therefore, ambient noise monitoring was required. The monitoring was used to establish the noise environment at residential land uses near the site. Impacts under the local regulations from the Cities of Bellevue and Lynnwood are property line noise limits that are based on the zoning designations and associated EDNA classifications established by city code.

3.8.2.1 Construction Noise and Vibration

The noise and vibration analysis for project construction follows the FTA guidance manual. The analysis reviews the types of equipment normally used for this type of project and the expected noise levels at nearby noise sensitive properties.

3.8.2.2 Operational Noise

The methods of analysis and the assumptions used are summarized below. Complete details on the noise sources and analysis methodology are provided in Appendix E.2, *Noise and Vibration Technical Report*.

Noise and vibration from OMSF operations were modeled using the methods described in the FTA guidance manual. The operational noise impact assessment includes the analysis of noise from general maintenance operations, train cleaning, the arrival and departure of trains at the OMSF, vehicle movement in the yard, and ancillary equipment including a power substation.

A light rail vehicle (LRV) wash system would be enclosed with openings on each end for LRV access. Blowers, which strip water off the vehicles, would be located inside one end of the LRV wash structure, and automatic doors would be used to allow LRVs to exit the wash facility after the blowers were shut down. The LRV wash system would typically be used for 50 to 60 minutes per-day. Based on measurements of similar wash facilities, and information from wash blower manufacturers, the sound level at a distance of 50 feet from the end of the wash bays, with the doors closed, is assumed to be 59 dBA.

Noise from general maintenance activities inside the shop building would include use of hand tools, continuous operation of compressors and other mechanical equipment, and intermittent operation of equipment such as overhead cranes, vehicle lifts, and the wheel trues. For this analysis, it was assumed that bay doors would be left open for ventilation, making this a worst-case analysis, and the typical sound level would be 65 dBA at 50 feet outside of the work bays.

Once the LRVs arrive at the OMSF, vehicle circulation on site is limited to the speed limit of 8 miles per hour (mph), which produces a noise level of 68 dBA at 25 feet. The noise analysis also includes two chimes of the low bell, producing 72 dBA at 50 feet, whenever a train begins to move. Other

noise-producing sources would include switches, a traction power substation and OMSF personnel and suppliers accessing the site. The analysis uses reference noise levels for operation of a maintenance base taken from the FTA guidance manual and that the OMSF would operate 24 hours per day.

Due to the low speed of 8 mph for LRV operations in the OMSF, wheel squeal noise would not be noticeable. Any wheel squeal on the curves into and out of the storage tracks would be resolved with lubrication or other means. Therefore, wheel squeal was not included in the noise model for the OMSF.

3.8.2.3 Operational Vibration

Light rail vibration was predicted using information from the vibration sections of the *East Link Project Final EIS* (Sound Transit 2011) and the Draft Vibration Technical Report of the *Lynnwood Link Extension Draft EIS* (Sound Transit 2013). Based on these documents and including track type adjustments for ballast and tie, direct fixation and aerial guideway alignment types, vibration impacts could only occur at FTA Category 2 structures located within 70 feet of the Lynnwood Alternative site tracks, and within 100 feet of the BNSF Alternative, BNSF Modified Alternative, and SR 520 Alternative site tracks, as well as the BNSF Storage Tracks component of the Lynnwood Alternative. The larger impact distance for these build alternatives would be due to the different vibration propagation characteristics of the soils at the different sites.

3.8.3 Affected Environment

This section provides a summary of the existing land use and noise environment near the build alternative sites.

3.8.3.1 Lynnwood Alternative

Parcels comprising the Lynnwood Alternative site are zoned as Business/Technical Park (BTP) and Light Industrial (LI); these are categorized as Class C EDNA per LMC 10.12.400.Land use near the Lynnwood Alternative site is residential along the west side of 52nd Avenue W. East of 52nd Avenue W, adjacent to Interstate 5 (I-5), there is one single-family residence and then land uses transition to commercial and industrial. East of 52nd Avenue W are several vacant parcels, state and private office buildings, and Scriber Creek Park. Based on the park location, uses and existing noise levels, Scriber Creek Park was evaluated under the FTA Category 3 criteria.

Existing noise levels near the Lynnwood Alternative site range from 72 dBA Ldn near I-5 reducing to 57 to 65 dBA Ldn toward the north end of the alternative site. Existing noise levels near Scriber Creek Park, the Park Five Apartments, and the Cedar Creek Condominiums range from 58 to 62 dBA Leq during peak hours, with Ldn noise levels ranging from 57 to 62 dBA. Figure 3.8-4 provides an overview of the Lynnwood Alternative site, access tracks, monitoring locations, measured noise levels, and area land use near the site.

Source: Michael Minor & Associates 2014.

Graphics ... 0032912 (3-28-2014)

Figure 3.8-4: Lynnwood Alternative—Land Use and Monitoring Locations
Sound Transit Link Light Rail OMSF Draft EIS

3.8.3.3 BNSF Alternative, BNSF Modified Alternative, and BNSF Storage Tracks

Parcels comprising the BNSF Alternative site are zoned as Bel-Red Office-Residential Node 2(BR-OR-2) and Bel-Red Residential (BR-R); these are categorized as Class B EDNA per BMC 9.18.025. Areas west of the Eastside Rail Corridor within the BNSF Modified Alternative site are designated Bel-Red Medical Office (BR-MO), also categorized as Class B EDNA per BMC 9.18.025. The single parcel comprising the BNSF Storage Tracks is zoned BR-OR-2, a Class B EDNA per BMC 9.18.025. Land use north and east of the BNSF Alternative and BNSF Modified Alternative sites is commercial and industrial. West of the sites, along 116th Avenue NE, land use includes the Seattle Children's Hospital: Bellevue Clinic and Surgery Center, several commercial and office spaces, and several single-family residences. The Seattle Children's Hospital has a planned expansion to the east of the existing building, which will include new medical facilities and additional parking.

Within the Bel-Red subarea, the Spring District is a mixed-use transit-oriented development project that has an approved 15-year Master Development Plan. The Spring District is located north of NE 12th Street, between NE 20th and NE 24th Avenues. It will include office space, retail, housing, hotels, parks, and a new road system with the necessary infrastructure. Construction of the hotel is planned for 2022–2024 (Phase 4). Construction of residential structures nearest to 120th Avenue NE and 124th Avenue NE is planned for 2024–2026 (Phase 5) and 2026–2028 (Phase 6).

The two Spring District residential structures and hotel nearest to the BNSF Alternative and BNSF Modified Alternative sites are shown in Figures 3.8-5 and 3.8-6.

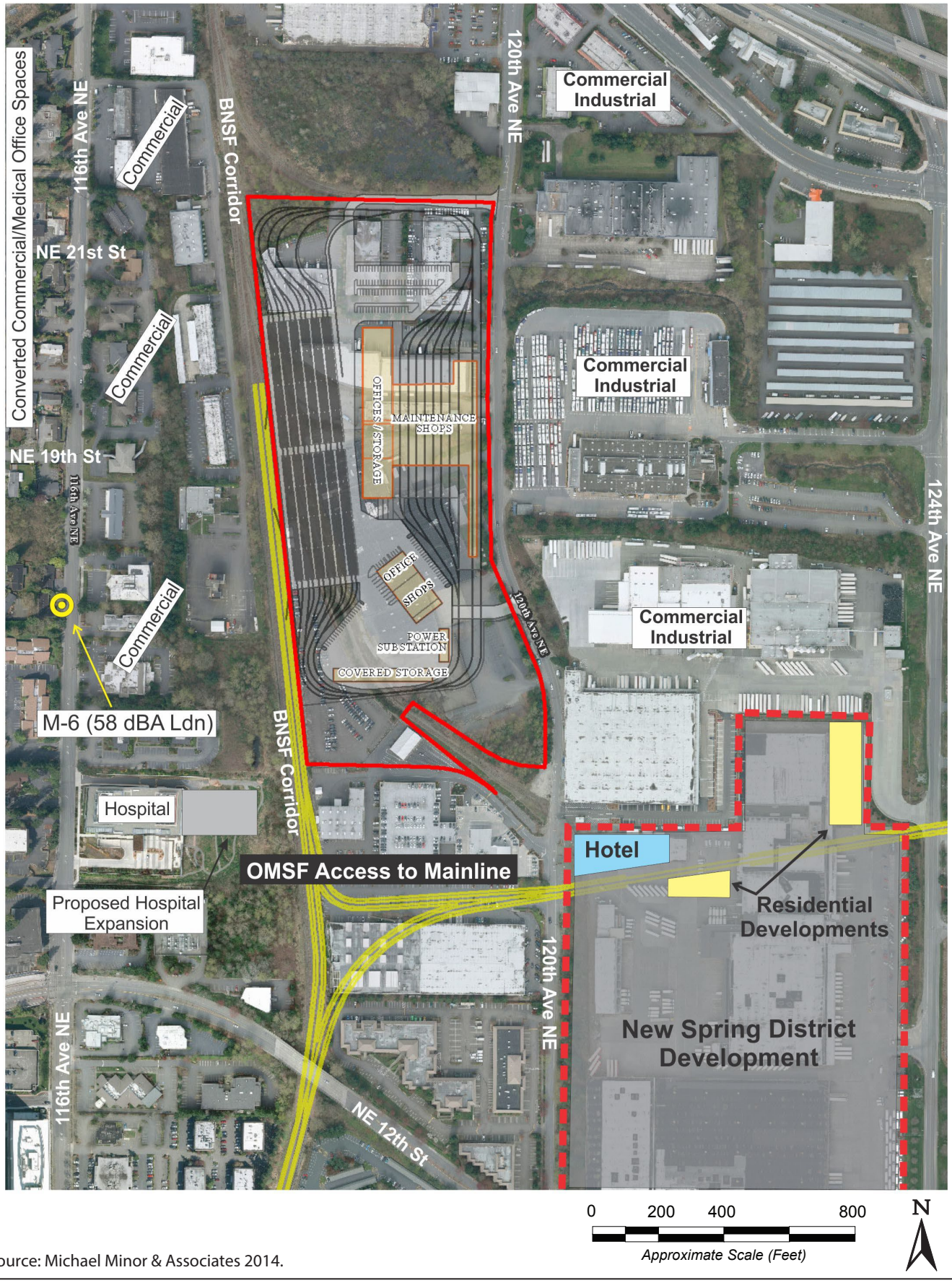
There are no proposed parks or recreational resources near the BNSF Alternative site, BNSF Modified Alternative site, or BNSF Storage Tracks.

Existing noise levels near the alternative sites are dominated by traffic noise from I-405, NE 12th Street, 116th Avenue NE and other arterial roadways in addition to the commercial and industrial activities. Noise levels range from high of 70 dBA Ldn near State Route (SR) 520, reducing to 58 dBA Ldn at single-family residences west of 116th Avenue NE. Figures 3.8-5 and 3.8-6 provide an overview of the BNSF Alternative and BNSF Modified Alternative sites, along with the access tracks, monitoring locations, measured noise levels, and area land use.

3.8.3.4 SR 520 Alternative

Parcels comprising the SR 520 Alternative site are zoned Bel-Red General Commercial (BR-GC) and categorized as Class C EDNA per BMC 9.18.025.

There are no residences within 700 feet of the SR 520 Alternative site boundaries. Noise levels near the site are dominated by traffic on SR 520, NE 20th Street, 130th Avenue NE, along with noise from existing commercial and light industrial activities. Noise levels in this area varied from 71 dBA Leq during peak hours to 60 dBA Leq during nighttime hours, for a 24-hour Ldn of 70 to 72 dBA. Figure 3.8-7 provides an outline of the SR 520 Alternative site, access tracks, monitoring locations, measured noise levels, and area land use.



Source: Michael Minor & Associates 2014.

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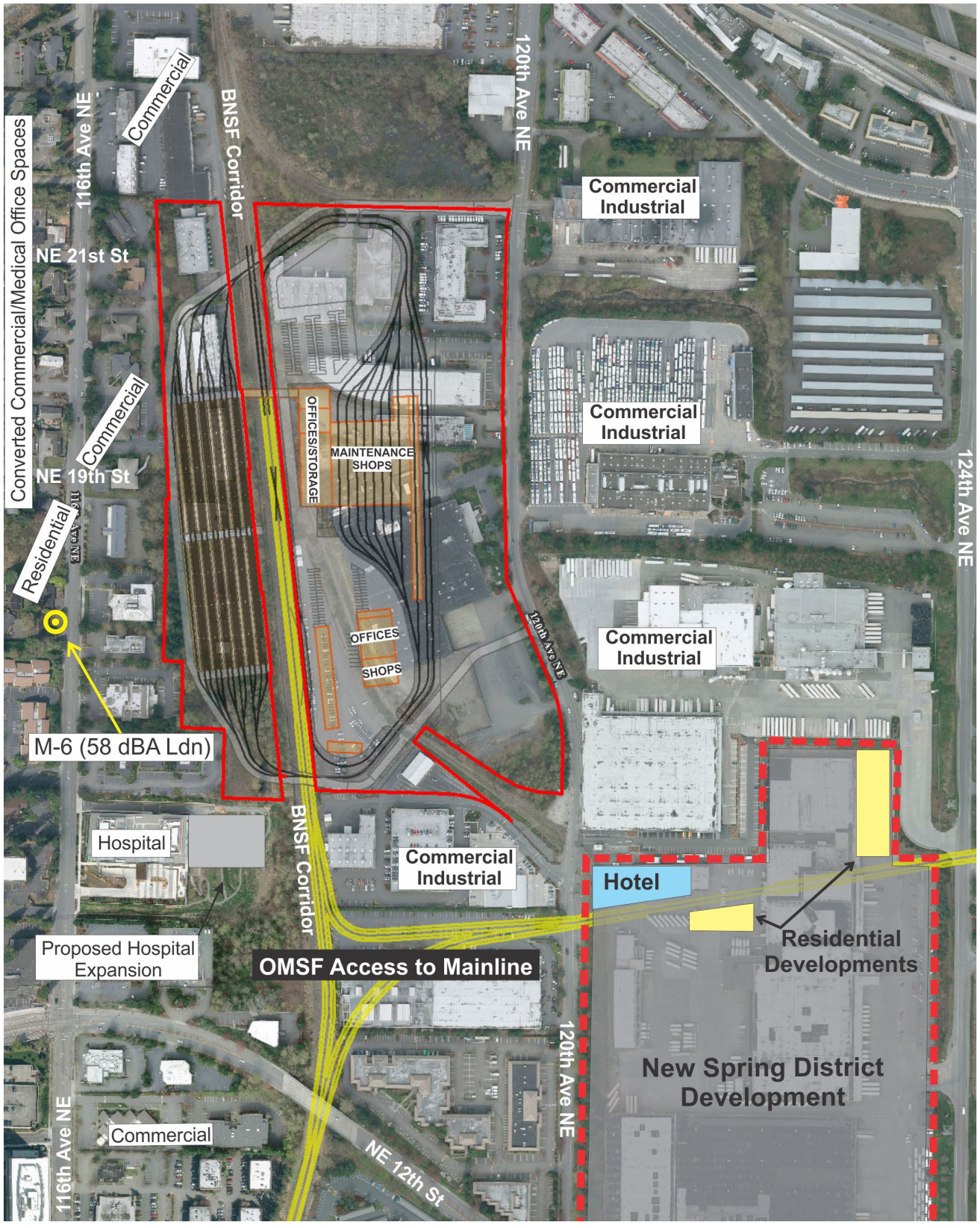
Figure 3.8-5: BNSF Alternative—Land Use and Monitoring Locations
Sound Transit Link Light Rail OMSF Draft EIS



Source: Michael Minor & Associates 2014.

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Figure 3.8-6: BNSF Modified Alternative—Land Use and Monitoring Locations
Sound Transit Link Light Rail OMSF Draft EIS

Source: Michael Minor & Associates 2014.

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Figure 3.8-7: SR 520 Alternative—Land Use and Monitoring Locations
Sound Transit Link Light Rail OMSF Draft EIS

3.8.4 Environmental Impacts

This section provides a summary of the noise and vibration impacts expected during construction and operation of the OMSF. Complete details are provided in Appendix E.2.

3.8.4.1 No Build Alternative

Under the No Build Alternative, noise and vibration levels would continue to be dominated by traffic on nearby major highways, commercial and industrial activities and local traffic on nearby arterial roadways.

3.8.4.2 Impacts Common to All Build Alternatives

Construction Noise and Vibration

Noise related to construction activities would be generated by heavy equipment used during construction of the proposed project. Typical construction equipment for this type of project would include air compressors, backhoes, concrete pump, cranes, bulldozers, excavators, flatbed trucks, fork lifts, generators, haul trucks, jack hammers, loaders, paver, pumps, pneumatic tools, service trucks, tractor trailers, utility trucks, vibratory equipment and soil compactors, and welders. Construction activities would occur approximately 100 to 200 feet from the nearest residences under the Lynnwood Alternative (Lynnwood site only). Construction activities would occur within approximately 300 to 400 feet from noise-sensitive properties under the BNSF Alternative and BNSF Modified Alternative, as well as for the BNSF Storage Tracks. Under the SR 520 Alternative, the nearest residences are over 700 feet away, north of SR 520. Table 3.8-3 provides a summary of the equipment used for the two major phases of construction.

Table 3.8-3. Typical Construction Activities and Maximum Noise Levels at 100 Feet

Construction Phase	Typical Equipment	Noise Levels (Lmax) at 100 feet in dBA
Clearing, grubbing earthwork and preparation	Air compressor, back hoe, generator, concrete saws, concrete breakers, jack hammers, haul trucks, loaders and utility trucks	85–89
Building Construction, track installation and Paving	Paver, crane, concrete pumps, haul trucks, concrete mixer, air compressor, back hoe, generator, tractor trailer, jack hammer, pneumatic tools, utility trucks and welders	81–86

Source: U.S. Department of Transportation 1977.

As noted previously, for the City of Lynnwood, sounds created by construction are exempt between the hours of 7:00 a.m. and 6:00 p.m. on weekdays. Sounds created by construction and emanating from construction sites in the City of Bellevue are exempt between the hours of 7:00 a.m. and 6:00 p.m. on weekdays, and 9:00 a.m. and 6:00 p.m. on Saturdays that are not legal holidays. Because most construction activities are exempt during daytime hours, noise and vibration related to project construction—while a potential issue for nearby residences and businesses—is not expected to result in substantial impacts because the majority of construction activity would be

contained on site and would be temporary in nature. Any construction activities outside of these hours are required to meet the state's noise regulations as given in Table 3.8-1, with the allowable exceedance unless a noise variance is received from the City.

There is a potential for pile driving at all of the build alternative sites. Under the Lynnwood Alternatives, pile foundations or drilled piers would likely be required in the northern and eastern parts of the site. At the BNSF Storage Tracks, BNSF Alternative, and BNSF Modified Alternative sites, pile foundations or drilled piers may be necessary to support elevated structures and bridges or where substantial depth of fill placement would occur. At the SR 520 Alternative site, pile foundations may be necessary to support structures where substantial deep fill placement would occur or where the light rail access lines would cross over underground oil pipelines. Average maximum noise levels from pile driving typically ranges from 98 to 105 dBA Lmax at 50 feet. Due to the high noise levels, pile driving is typically limited to daytime hours, and any pile driving would be required to meet the applicable construction noise regulations.

3.8.4.3 Lynnwood Alternative

Construction Impacts

Construction impacts for the Lynnwood Alternative would be the same as those discussed in Section 3.8.4.4, Impacts Common to All Build Alternatives.

Operational Impacts

The Lynnwood Alternative includes three design options (C1, C2, and C3), each connecting to one of the three build alternatives being evaluated in the *Lynnwood Link Extension Draft EIS* (Sound Transit 2013). Noise analysis for the site was evaluated using both FTA criteria and the local noise control ordinance from the City of Lynnwood. The City of Lynnwood ordinance classifies EDNAs based on zoning designations (LMC 10.12.400). The Lynnwood Alternative site is an EDNA Class C (industrial) property. Properties adjacent to the Lynnwood Alternative site are classified as EDNA Class A (residential and park/public) and Class B (commercial).

LRVs being stored at the BNSF Storage Tracks would be restricted to the speed for auxiliary tracks of 8 mph. In addition, the LRV operator would also be required to sound the low bell during initial movement back to service. The combination of noise from the slow-moving LRVs and bells was not predicted to result in any noise impacts due to the distance between the receivers and the storage tracks, which is greater than 300 feet.

Under Design Options C1 and C2, there would be no noise or vibration impacts as identified for the FTA criteria. There would be two residential EDNA noise impacts under the City of Lynnwood noise control ordinance (LMC 10.12). The noise impacts would occur at two residences along 52nd Avenue W that are located next to a crossover and the LRV wash system. The impacts would be related to the added noise from the new crossovers, with contribution from the wash system and maintenance bays. The locations of the two impacts are shown in Figure 3.8-8 and Table 3.8-4, providing the noise levels at these locations with and without noise mitigation.

For Design Option C3, there would be no noise impacts under the FTA criteria or under the City of Lynnwood noise control ordinance (LMC 10.12). Design Option C3 would not result in any impacts because the mainline track access crossovers would be located near I-5, away from the residences. Conversely, under Design Options C1 and C2, the crossovers would be located along 52nd Avenue W near the residential area.

Noise levels within Scriber Creek Park would only be of concern during daytime hours because the park closes at dusk (9:30 p.m. during summer months), and opens at sunrise. Additionally, the park is located on the north side of the Lynnwood Alternative site, and would be shielded from the maintenance bays and the LRV wash system by intervening structures, such as offices and shop buildings. There is an access track proposed along the southern side of the park and a shop facility that would be approximately 500 feet from the park trails.

Operations of the Lynnwood Alternative, including trains accessing the main line tracks during peak hours, would produce noise levels of 58 dBA Leq at the nearest edge of the park. These levels are below the FTA criteria of 62 dBA for a moderate noise impact at a Category 3 use with an existing Leq of 58 dBA.

Furthermore, the 58 dBA Leq is also below the City of Lynnwood daytime criteria of 60 dBA. Therefore, no noise impacts were identified at the Scriber Creek Park under Design Option C1 or C2. Under Design Option C3, noise levels at Scriber Creek Park would be even lower than under Design Options C1 or C2, by 3 to 5 dB, due to the location of the access tracks being closer to I-5. Therefore, there would be no noise impacts at the park under Design Option C3.

The BNSF Storage Tracks component of the Lynnwood Alternative is not predicted to result in a notable increase in the noise environment. LRVs accessing the storage tracks would be limited to the auxiliary track speed of 10 mph and are not predicted to cause an increase in existing ambient noise levels.

The distance from the OMSF tracks on the Lynnwood Alternative site to the nearest residences would be over 130 feet. Because it is projected that vibration impacts could only occur within 70 feet of the Lynnwood Alternative site, no vibration impacts are expected to occur under this alternative.

3.8.4.4 BNSF Alternative and BNSF Modified Alternative

Construction Impacts

Construction impacts for the BNSF Alternative and BNSF Modified Alternative would be the same as those discussed in Section 3.8.4.4, Impacts Common to All Build Alternatives.

Operational Impacts

Noise analysis for the BNSF Alternative and BNSF Modified Alternative sites was evaluated using both FTA criteria and the local noise control ordinance from the City of Bellevue. The City of Bellevue ordinance classifies EDNAs based on zoning designations (BMC 9.18.025). The alternative

sites are EDNA Class B (commercial) properties. Properties directly adjacent to the alternative sites are EDNA Class B (commercial) and Class C (industrial) properties.

No noise impacts would occur under the BNSF Alternative as identified under FTA or City of Bellevue noise criteria. The Seattle Children's Hospital: Bellevue Clinic and Surgery Center—which has planned improvements to expand east toward the BNSF Alternative site—is the nearest noise-sensitive use to the BNSF Alternative site. The new building would be approximately 410 feet southwest of the BNSF Alternative site, and 250 feet west of the access tracks. This property was evaluated using FTA Category 2 and the Bellevue City Code EDNA Class B. The analysis concluded that there would be no noise impacts under either FTA or City of Bellevue noise criteria at the Seattle Children's Hospital: Bellevue Clinic and Surgery Center.

Proposed residential buildings in the Spring District would be 850 to 1,100 feet from the BNSF Alternative site, and the nearest proposed hotel would be approximately 550 feet from the site. No noise impacts would occur at any structures in this new development under FTA or City of Bellevue noise criteria.

The distance from the BNSF Alternative site and access tracks to the Seattle Children's Hospital: Bellevue Clinic and Surgery Center, which is the closest vibration-sensitive use, would be approximately 250 feet. This distance is well beyond the 100-foot limit calculated for potential vibration impacts under the BNSF Alternative. Therefore, no vibration impacts are projected for this alternative at any nearby properties under FTA criteria.

No noise impacts would occur under the BNSF Modified Alternative as identified by either the FTA or the City of Bellevue noise control ordinance criteria. As with the BNSF Alternative, the properties surrounding the BNSF Modified Alternative site are classified EDNA B (commercial) and EDNA C (industrial). The proposed new building that is part of the Seattle Children's Hospital: Bellevue Clinic and Surgery Center would be approximately 200 feet southwest of the BNSF Modified Alternative site, and 250 feet west of the access tracks. Proposed residences at the Spring District would be 700 to 925 feet from the BNSF Modified Alternative site, with the hotel 700 feet from the site. No noise impacts were identified at any of these structures under FTA or City of Bellevue noise criteria.

The distance from the OMSF tracks to the Seattle Children's Hospital: Bellevue Clinic and Surgery Center, the closest vibration-sensitive use, would be approximately 250 feet, which is well beyond the 100-foot distance for potential vibration impacts under this alternative. Therefore, no vibration impacts are projected for the BNSF Modified Alternative at any use under FTA criteria.

3.8.4.5 SR 520 Alternative

Construction Impacts

Construction impacts for the SR 520 Alternative would be the same as those discussed in Section 3.8.4.4, Impacts Common to All Build Alternatives.

Operational Impacts

Noise analysis for the SR 520 Alternative site was evaluated using both FTA criteria and the City of Bellevue noise control ordinance criteria. The City of Bellevue ordinance classifies EDNAs based on zoning designations (BMC 9.18.025). The SR 520 Alternative site is an EDNA Class C (industrial) property. Properties adjacent to the site are classified as EDNA Class B (commercial) and Class C (industrial).

Under the SR 520 Alternative, there would be no residences or other FTA Category 2 or Category 3 uses within 700 feet of the SR 520 Alternative site; therefore, there would be no noise impacts under FTA noise criteria. Under the City of Bellevue noise criteria, no noise impacts were identified at adjacent properties.

No vibration impacts are predicted under this alternative due to the distance from the tracks to the nearest structures.

3.8.5 Indirect and Cumulative Impacts

No indirect noise and vibration impacts would occur as a result of the proposed project.

Provided below is a summary of the cumulative noise levels expected once the East Link, Lynnwood Link Extension, and the proposed OMSF projects are completed. The cumulative impacts analysis assumes that noise mitigation measures proposed for the East Link and Lynnwood Link Extension would be implemented.

3.8.5.1 Lynnwood Alternative

Under the Lynnwood Alternative (Design Options C1 and C2), cumulative noise levels at residences along 52nd Avenue W, between 208th Street and 204th Street, are predicted to range from 58 to 70 dBA Ldn prior to noise mitigation. There are 19 moderate and 19 severe noise impacts predicted in this area from the Lynnwood Link Extension, and the two noise impacts under the Lynnwood Alternative are included with those noise impacts.

The combined noise mitigation measures proposed for each project would reduce noise levels at all residences along 52nd Avenue W to below both FTA and City of Lynnwood noise control ordinance criteria, with future cumulative noise levels ranging from 46 to 59 dBA Ldn. Therefore all cumulative noise impacts would be fully mitigated.

Under the Lynnwood Alternative (Design Option C3), cumulative noise levels would be the same as given for the OMSF alone for properties near the alternative site along 52nd Avenue W, and noise levels along the Lynnwood Link Extension alignment would be the same as those provided in the *Lynnwood Link Extension Draft EIS* (Sound Transit 2013). Because of the location of the Lynnwood Link Extension under Design Option C3, noise from the light rail would not add to the projected noise from the OMSF for residences along 52nd Avenue W. There would also be no increases in noise levels at residences affected by the Lynnwood Link Extension Alternative that would experience a change with the addition of the OMSF Lynnwood Alternative. Under all of the

Lynnwood Alternative design options, cumulative construction noise generated at the properties near the alternative sites would be expected to be the same as the standalone OMSF project. There is a potential for some other local construction projects to overlap with the construction of this project. This would only happen if other unrelated construction projects occur simultaneously with this project. However, because the project's construction noise analysis assumes the worst-case noise levels, the overall maximum noise levels at any one property would remain the same.

3.8.5.2 BNSF Alternative, BNSF Modified Alternative, and SR 520 Alternative

Under the BNSF Alternative, BNSF Modified Alternative, and SR 520 Alternative, cumulative noise levels would be the same for properties near these alternative sites, as noise levels given for the proposed OMSF project alone. In addition, operational noise levels along the selected East Link alignment would be the same as those provided in the *East Link Project Final EIS* (Sound Transit 2011). Because the location of the East Link project is several hundred feet from all of the OMSF build alternative sites, noise from the light rail would not add to the projected noise from the OMSF. Therefore, no cumulative noise impacts are projected under these alternatives.

Under the BNSF Alternative, BNSF Modified Alternative, and SR 520 Alternative, cumulative construction noise generated at properties near these alternative sites is expected to be the same as the standalone OMSF project. There is a potential for other local construction projects to overlap with the construction of the OMSF project; however, worst-case construction noise levels predicted would also account for any other nearby construction project. In most cases, however, because construction noise would be localized, it would not contribute to a cumulative noise impact.

3.8.6 Potential Mitigation Measures

This section describes noise and vibration measures that could be used to mitigate impacts of the proposed project. Mitigation is provided for the impacts related to the short-term project construction and long-term operational impacts.

3.8.6.1 Construction Noise

Under its *Link Noise Mitigation Policy* (Sound Transit 2004), Sound Transit would seek to limit construction noise levels and impacts and meet applicable noise regulations and ordinances. Typical mitigation measures that could be applied are discussed below. Contractors would be required to meet the criteria of City of Lynnwood and City of Bellevue noise ordinances.

Several noise-mitigation measures could be implemented to reduce construction noise levels to within the required limits. Sound Transit would, as practical, limit construction activities that produce the highest noise levels during daytime hours, or when disturbance to sensitive receivers would be minimized. For operation of construction equipment that could exceed allowable noise limits during nighttime hours (between 10:00 p.m. and 7:00 a.m.) or on Sundays or legal holidays, Sound Transit would obtain the appropriate noise variance from the City of Lynnwood or the City of Bellevue.

Noise-control mitigation could include the following measures, as necessary, to meet required noise limits.

- Use low-noise emission equipment.
- Implement noise-deadening measures for truck loading and operations.
- Conduct monitoring and maintenance of equipment to meet noise limits.
- Use acoustic enclosures, shields, or shrouds for equipment and facilities.
- Install high-grade engine exhaust silencers and engine-casing sound insulation.
- Minimize the use of generators.
- Use movable noise barriers at the source of the construction activity.

3.8.6.2 Construction Vibration

In general, building damage from construction vibration is not anticipated for this project due to the type of project and distance between the site and any nearby properties. In any locations of concern, preconstruction surveys would be conducted to document the existing condition of buildings, in case there was an issue during or after construction. During final design, a review of construction methods would be performed to determine the potential for construction related vibration impacts and methods to control vibration, which would be included in the contract specifications.

3.8.6.3 Operational Noise and Vibration

This section presents noise and vibration mitigation measures for each of the Build Alternatives. Mitigation measures presented are based on Sound Transit's *Link Noise Mitigation Policy* (Sound Transit 2004). Under this policy, mitigation measures are considered for all noise impacts, both moderate and severe. During final design if additional noise and vibration analysis demonstrates that the relevant noise criterion could be achieved by a less-costly means, or that the noise or vibration impact at that location would not occur even without mitigation, then the mitigation measure could be eliminated or modified as needed. Conversely, if any additional noise impacts are identified during final design, then Sound Transit would provide mitigation that is consistent with the *Link Noise Mitigation Policy* (Sound Transit 2004).

Lynnwood Alternative

Mitigation for the noise impacts under the Lynnwood Alternative (Design Options C1 and C2) could include special track work to reduce noise from the crossover. The potential location of the modified crossover is shown in Figure 3.8-8. With a modified crossover, all noise impacts would be mitigated. Table 3.8-4 provides the noise levels for the sites with impacts with and without the proposed noise mitigation measures.

Source: Michael Minor & Associates 2014.

Graphics ... 0032912 (3-28-14)

Figure 3.8-8: Lynnwood Alternative, All Design Options—Noise Impacts and Mitigation
Sound Transit Link Light Rail OMSF Draft EIS

Table 3.8-4. Noise Impacts and Mitigation for Lynnwood Alternative, Design Options C1 and C2

Address[a]	Project Noise (Leq in dBA)[b]	Noise Impacts[c]	Project w/Mitigation (Leq in dBA)[d]	Impacts w/Mitigation[e]	Mitigation Methods[f]
20504 52nd Ave W	**50**	1	42	0	Special trackwork for new crossover
20430 52nd Ave W	**50**	1	42	0	Special trackwork for new crossover

a. Sites shown in Figure 3.8-8.

a. Lynnwood criteria for EDNA Class A (residential) noise levels is 60 dBA Leq (daytime) and 50 dBA Leq (nighttime).

b. Number of homes with noise levels above the criteria.

c. Project noise levels with proposed noise mitigation measures.

d. Number of homes with noise levels above the criteria with noise mitigation measures.

e. Type of mitigation proposed for the impact.

For Design Option C3, no noise impacts would occur and no mitigation is proposed. There are no vibration impacts predicted under the Lynnwood Alternative (Design Options C1, C2 and C3); therefore, no mitigation would be required.

BNSF Alternative

There are no noise or vibration impacts predicted under the BNSF Alternative; therefore, no mitigation would be required.

BNSF Modified Alternative

There are no noise or vibration impacts predicted under the BNSF Modified Alternative; therefore, no mitigation would be required.

SR 520 Alternative

There are no noise or vibration impacts predicted under the SR 520 Alternative and; therefore, no mitigation would be required.

3.9 Ecosystems

This section addresses the ecosystem components—aquatic resources, vegetation and wildlife, and wetlands—in the vicinity of the build alternatives. Appendix E.3, *Ecosystems Technical Report*, of this Draft EIS provides information about the methods, affected environment, species, habitats, impacts, and mitigation discussed in this section. Appendix E.3 also provides detailed graphics illustrating the extent of aquatic resources, vegetation and wildlife habitats, and wetlands in the affected environment, as well as detailed graphics illustrating the environmental impacts of the build alternatives.

3.9.1 Introduction to Resources and Regulatory Requirements

An *ecosystem* is the interaction between plants, animals, microorganisms, and the physical environment in which they live. Ecosystems are made up of living organisms, including humans, and the environment they inhabit.

Components of ecosystems are protected by federal, state, and local regulations. Such regulations govern planning, land use, and management activities that have the potential to affect ecosystem resources in the study area. The following federal, state, and local laws, regulations, and agency jurisdiction and management guidance documents pertain to aquatic resources; vegetation and wildlife habitat; priority, threatened, and endangered species; and wetlands.

- Critical areas ordinances (CAOs) for the Cities of Lynnwood and Bellevue pursuant to the Washington Growth Management Act (Revised Code of Washington [RCW] 36.70A)
- Endangered Species Act (ESA)
- Executive Orders 89-10, 90-40, and 11990
- Migratory Bird Treaty Act (MBTA)
- Bald and Golden Eagle Protection Act
- Local Agency Shoreline Master Programs (SMPs)
- Magnuson-Stevens Fishery Conservation and Management Act (MSA)
- National Environmental Policy Act (NEPA)
- Sections 404, 402, and 401 of the Clean Water Act (CWA)
- Washington State Water Pollution Control Act
- Shoreline Management Act (SMA)
- State Environmental Policy Act (SEPA)
- Washington Administrative Code (WAC) 222-110
- Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) Management Recommendations

Sound Transit would comply with the requirements of all related laws and regulations related to ecosystem resources through the permit application and approval process once a preferred alternative is selected, including preparation of a biological assessment to meet ESA requirements.

3.9.2 Methods

The study areas for ecosystems include all aquatic resources, vegetation and wildlife, and wetlands according to the following criteria and within the following boundaries. Wetlands are considered separate ecosystem resources from aquatic resources and vegetation because they perform different ecological functions from aquatic systems (i.e., streams) and are typically described not only based on their type of vegetation, but also on their hydrologic and water-quality functions. Wetlands are also regulated as distinct entities by federal, state, and local governments.

- **Aquatic Resources.** The aquatic resources study area was defined as any stream, river, pond, ditch or associated stream buffer/riparian habitat occurring in and within 200 feet of the build alternative sites and extending 100 feet upstream to 300 feet downstream from where the sites cross a stream or other water course. There is no commercial fishing in the aquatic resources study area, either by tribal or nontribal fishers. None of the stream reaches in the aquatic resources study area are regularly accessible to anadromous salmonids, although occasional use has been documented and is possible depending on stream flow conditions.

  Streams in the aquatic resources study area are classified according to existing conditions using the State of Washington Interim Water Typing Criteria (WAC 222-16-031), and the King County, City of Lynnwood, and City of Bellevue classification systems, as detailed in Appendix E.3. All of these stream reaches have limited fish use and poor or fair fish habitat conditions, typically due to urban development.

- **Vegetation and Wildlife**. Sound Transit identified six vegetation categories or cover types appropriate for the nature of the build alternative sites, including three forested categories based on dominant tree type (coniferous, deciduous, or mixed) and one category for developed portions of each site containing little to no vegetation (developed).

  Sound Transit searched WDFW's PHS database (2012) for priority species and DNR's Natural Heritage Inventory (NHI) database of rare plants and native communities (2012) within 0.5 mile of the four build alternative sites. No priority plant species have been recorded in the study area. No federal or state threatened or endangered species are known to exist in the study area based on recorded observations listed in these databases, reconnaissance site observations, and observed habitat conditions. The particular suitability of each alternative site for priority wildlife species is addressed in Appendix E.3.

  The study area was defined as all vegetation and wildlife habitat in the build alternative sites and additional adjacent vegetation or habitat as appropriate to the species or habitat type (e.g., forested areas occurring partially within and partially outside the build alternative sites was treated as a single patch of habitat that could be affected). Habitat for individual wildlife species was assessed as biologically appropriate for that species to meet regulatory requirements specific to the species (e.g., bald eagle nesting or breeding locations within 1 mile). Vegetation areas were classified and mapped regardless of subsequent upland/wetland designation. As a result, vegetation classifications may include areas of wetland vegetation and, therefore, may

overlap with areas also categorized as wetlands. Any such overlap is described and each wetland was specifically differentiated.

- **Wetlands**. Wetlands and potential wetlands were identified during a field reconnaissance effort and from data collected in the wetland study area during delineation work completed as part of the *Lynnwood Link Extension Draft EIS* (Sound Transit 2013) and *East Link Project Final EIS* (Sound Transit 2011). Potential wetlands are areas identified as part of the *Lynnwood Link Extension Draft EIS* (Sound Transit 2013), but were not readily observable and could not be accessed in the field to verify site conditions. Wetlands are classified in terms of the level of wildlife/biological habitat, hydrologic, and water quality function they provide. The degree to which functions are performed by a wetland (e.g., enhancing water quality, reducing floods, and providing fish and wildlife habitat) result in a higher category assignment (Hruby 2006), with Category 1 (I) offering the highest function and Category 4 (IV) offering the lowest. A detailed summary of each wetland's characteristics and level of function based on the rating forms is presented in Appendix E.3. All wetlands identified are expected to be jurisdictional waters of the United States.

  The study area included all wetlands occurring in the build alternative sites and within 200 feet of either side of the sites. Also included are wetlands that are partly within or that cross through the sites and wetland study area. Portions of wetlands that extend beyond the wetland study area and potential wetland areas outside of the field reconnaissance survey area were identified and described based on visual observation from public areas during the field reconnaissance; current local, state, and federal wetland maps; critical area reports; and aerial photograph examination.

  Once the wetland category was determined, the appropriate wetland buffer was added to the mapped configuration of each wetland. In many cases, existing buildings, parking lots, railroad tracks and ballast, and roads are located within the wetland buffer as ascribed based on its regulatory classification. The presence of these developed features reduces buffer functions under existing conditions. Thus, only the functional (i.e., nondeveloped) buffer of each wetland is depicted and was considered during the assessment of potential impacts. In instances where stream and wetland buffers overlap (e.g., along Scriber Creek and the West Tributary of Kelsey Creek), only the widest buffer is shown and was considered during the assessment of potential impacts.

The ecosystems impact analysis relies on literature research; communication with federal, state, and local regulatory agencies; a preliminary field assessment of resources (as allowed from public rights of way); and GIS mapping of resources on aerial photographs. Vegetation in the study areas was classified following the system used by Sound Transit for the environmental review of both the East Link and Central Link projects, which was based on the King County (1987) Wildlife Habitat Profile (Sound Transit 1999, 2011). Under this system, vegetation is given a wildlife habitat value rating of high, moderate, or low. These ratings should only be viewed relative to one another in the study areas, relative to this Draft EIS, and not across the landscape as a whole.

Impacts were determined through geographic information system (GIS) analysis of the configuration of the build alternatives relative to the extent of vegetation and its associated wildlife habitat value, and relative to the delineated or reconnaissance boundary of the wetlands and streams, and their associated functional buffers.

Direct wetland and *direct wetland buffer impacts* reflect direct removal/fill of the wetland's area and the consequent loss of specific functions (e.g., water quality improvement, stormwater detention and erosion reduction, and wildlife habitat), including loss of buffer functions such as screening from disturbance, wildlife habitat, and erosion or sedimentation protection. *Indirect wetland impacts* reflect the effect of direct impacts on a large portion—but not all—of a wetland, on the remaining area of wetland. Such indirect wetland impacts could result from consequent impacts on a wetland's hydrologic characteristics (e.g., the depth and duration of seasonally ponded surface water), or to the portion of the wetland able to support tree and shrub vegetation (such as could occur beneath an elevated section of track), or as a result of isolation of the wetland from other wetlands or areas of valuable upland habitat that contribute to its wildlife habitat functions (such as could occur in areas with a concentration of multiple sections of tracks or other facilities).

3.9.3 Affected Environment

3.9.3.1 Lynnwood Alternative

Aquatic Resources

The Lynnwood Alternative site occurs in the Scriber Creek drainage of the Swamp Creek subbasin, which discharges into the Sammamish River and then into the north end of Lake Washington. Only cutthroat trout, coho salmon, and non-salmonid resident fish have the potential to occur in the portion of Scriber Creek in the aquatic resources study area. River lamprey could also occur throughout Scriber Creek, but there is no available information documenting their occurrence.

The BNSF Storage Tracks site lies primarily in the West Tributary of Kelsey Creek drainage in Bellevue, with a small portion of the southern end of the site in the Sturtevant Creek drainage. No streams occur in the aquatic resources study area for the BNSF Storage Tracks. No salmonids are known to occur within at least 0.4 mile of the aquatic resources study area. However, other resident fish species may be present.

Vegetation and Wildlife

Less than half of the Lynnwood Alternative site is developed (45% under Design Option C1, 38% under Design Option C2, and 47.5% under Design Option C3). The remainder provides vegetation types associated with the wetlands along Scriber Creek, primarily along the northern and eastern portions of the site. The northern portion of the Lynnwood Alternative site includes 6 acres of forest vegetation (11 acres under Design Option C2).

Wetland N1-1, the Scriber Creek wetland (described below) is approximately 17 acres (Sound Transit 2013), and is designated as critical habitat by the City of Lynnwood (Lynnwood Municipal Code [LMC] 17.10) and as a priority habitat by WDFW (2012). Habitat features include snags with pileated woodpecker (*Dryocopus pileatus*) activity, willow with signs of beaver (*Castor canadensis*) activity, and multistoried vegetation comprised largely of native species. Several trees on site most likely qualify as "significant trees" under LMC 17.15, and occur within the patches of forest vegetation. The main significant tree species is Douglas-fir (*Pseudotsuga menziesii*).

Approximately 80% of the BNSF Storage Tracks site is developed. This area supports small, generally isolated areas of vegetation which includes wetland habitats. Existing conditions for wildlife are the same as for the BNSF Alternative and BNSF Modified Alternative sites (as described below). No federal or state threatened or endangered species are known to exist in the Lynnwood Alternative study area.

Wetlands

Two wetlands (N1-1 and N1-3) and two potential wetlands were identified in the Lynnwood Alternative site. Additionally, two wetlands (N1-2 and WLY6) and one potential wetland were identified within 200 feet of the site. All of the wetlands and potential wetlands are small, confined wetlands rated as Category III wetlands with limited functions, except for Wetland N1-1, the approximate 17-acre, Category II wetland located in the northern and eastern portion of the Lynnwood Alternative site associated with Scriber Creek. It is locally referred to as the Scriber Creek Wetland in the city's comprehensive plan and considered one of the "major" wetlands in the City of Lynnwood (City of Lynnwood 2011). This wetland is also described in the *Lynnwood Link Extension Draft EIS* and *Ecosystems Technical Report* (Sound Transit 2013) as Wetland WLY4. The wetland contains three vegetation classes and occupies a broad depression associated with Scriber Creek and the diffuse flow of the creek through the wetland. The buffers of the two western arms of the wetland appear to have been planted with native trees and shrubs, and are signed with Native Growth Protection Area (NGPA) signs. Wetland N1-1 is designated as critical habitat by the City of Lynnwood (City of Lynnwood 2011) and priority habitat by WDFW (2012). Wetland buffers are generally vegetated, but narrow, with extensive development limiting buffer widths and vegetation density around the perimeter of the wetland.

Six wetlands were identified in the BNSF Storage Tracks site. These are described under the BNSF Alternative and BNSF Modified Alternative.

3.9.3.2 BNSF Alternative

Aquatic Resources

The BNSF Alternative site lies primarily in the West Tributary of Kelsey Creek drainage, with a small portion of the southern end of the site in the Sturtevant Creek drainage. No salmonid species are known to occur within at least 0.4 mile of the aquatic resources study area; however, other resident fish species may be present.

Vegetation and Wildlife

The BNSF Alternative site is commercially developed (81%), with small patches of forest (less than 2 acres total) distributed throughout the site. The site is expected to be used by common urban wildlife species. The main habitat features in the vegetation and wildlife study area are two palustrine forested wetlands, both of which are Category III wetlands located at the headwaters of the West Tributary of Kelsey Creek as it flows east between commercially developed areas. Snags in these wetlands may support foraging by pileated woodpeckers. No federal or state threatened or endangered species are known to exist in the BNSF Alternative study area. The BNSF Alternative site lies within 0.8 mile of a known peregrine falcon eyrie (nest) that is periodically used in downtown Bellevue and may be part of the foraging territory used by the falcons. The BNSF Alternative site also lies within approximately 0.3 mile (although on the other side of Interstate 405 [I-405]) of an osprey nest in Hidden Valley Sports Park, but does not support aquatic foraging habitat for ospreys.

Wetlands

Four small, depressional Category III wetlands were identified in the BNSF Alternative site, all located east of the Eastside Rail Corridor. The area east of the Eastside Rail Corridor is also the eastern portion of the BNSF Modified Alternative site, as described below. The wetlands are all located in confined depressions, separated from each other by railroad tracks, and support small areas of either forested or emergent vegetation. In addition, five wetlands and two ditches were identified within 200-feet of the BNSF Alternative site.

3.9.3.3 BSNF Modified Alternative

Aquatic Resources

Aquatic resources for the BNSF Modified Alternative are the same as those for the BNSF Alternative.

Vegetation and Wildlife

The BNSF Modified Alternative site includes most of the area encompassed within the BNSF Alternative site and contains 5 acres of mostly deciduous forest. About 1 acre of this forest also falls within the BNSF Alternative site; the additional 4 acres are situated along the slope west of the railroad tracks. The forested slope west of the railroad tracks provides habitat value for species such as gray squirrel and other small mammals (e.g., mice, rats, and voles), songbirds, raptors, and possibly the Pacific chorus frog (*Pseudacris regilla*) due to its interspersion of vegetation types and ponded areas alongside the railroad tracks. Existing conditions for wildlife are otherwise the same as for the BNSF Alternative. In total, the BNSF Modified Alternative is 77% developed. No federal or state threatened or endangered species are known to exist in the BNSF Modified Alternative study area.

Wetlands

Six wetlands and two ditches were identified in the BNSF Modified Alternative site and three wetlands were identified within 200 feet of the site. Four of the wetlands (E2-1, E2-2, E2-6, and E2-7) in the BNSF Modified Alternative site and three of the wetlands adjacent to the site (E2-3, E2-4, and E2-5) are the same as those identified to be in or adjacent to the BNSF Alternative site. Two wetlands (E2-1a and E2-1b) identified as adjacent to the BNSF Alternative site are within the BNSF Modified Alternative site. Both are long, generally narrow Category III wetlands located along the eastern edge of the western portion of the site, adjacent to the Eastside Rail Corridor. These wetlands total approximate 1.27 acres and support depressional palustrine forested, scrub-shrub, and emergent wetland vegetation. Portions of these wetlands are also within the Lynnwood Alternative BNSF Storage Tracks site.

Three ditches are present in or adjacent to the BNSF Modified Alternative site, all are associated with Wetland E1-1a and E1-1b and convey water outside the wetland study area through linear, channelized swales. The southern portion of Wetland E1-1a appears to drain south via Ditch #1 to the Sturtevant Creek subbasin. Ditch #2 connects the wetlands. Ditch #3 conveys water north out of Wetland E1-1b to the West Tributary of the Kelsey Creek subbasin. These features may be considered Waters of the United States (i.e., not wetlands or streams, but drainage features that convey water to a wetland or stream) because of their characteristics and their connection between the wetlands, the stormwater system, and downstream waterbodies.

3.9.3.4 SR 520 Alternative

Aquatic Resources

The SR 520 Alternative site is bisected by Goff Creek, which varies between a piped channel and a surface channel through the site. No natural riparian habitat is present along the creek in the study area; the stream buffer is pavement, retaining wall, or mowed grass/the emergent vegetation of Wetland E3-2 (described below). Salmonids occur in the lower reaches of Goff Creek downstream of the site below a blocking culvert under Bel-Red Road, about 0.4 miles downstream of the aquatic resources study area. Only cutthroat trout are known to occur upstream of this culvert. The channel segment within the site is not considered suitable habitat for resident fish species because it is separated from other suitable habitats by numerous passage barriers, and because of the lack of aquatic habitat complexity. Despite the already degraded condition of the stream channel and its buffer, it would be expected to provide rearing habitat for some resident fish and potentially anadromous fish, should downstream fish passage barriers be removed in the future.

Vegetation and Wildlife

The SR 520 Alternative site is 92% developed, providing habitat in small, scattered patches for highly adaptable urban wildlife species. The mixed and deciduous forest habitat that exists in the site totals approximately 0.5 acres. Although some of this habitat is small portions of forested wetland, the understory is dominated by nonnative Himalayan blackberry (*Rubus armeniacus*), a species that limits habitat value for native wildlife. There is a large patch of undeveloped, forested habitat to the

immediate north of the site, but it is separated from the site by SR 520, which forms a wildlife movement barrier. The SR 520 site lies within 1.6 miles of a known peregrine falcon eyrie (nest) that is periodically used in downtown Bellevue and may be part of the foraging territory used by the falcons. No federal or state threatened or endangered species are known to exist in the study area for the SR 520 Alternative.

Wetlands

Three wetlands and two ditches were identified in the 520 Alternative site and two wetlands were identified within 200 feet of the site. Three of the wetlands (E3-1, E3-4, and E3-5) are small, forested, Category III or IV wetlands located along the northern edge of the site. Water from these wetlands flows through the riprap retaining wall along the southern toe of the slope and onto the paved parking area and into storm drains; the western end of Wetland E3-1 also flows directly into Goff Creek. Wetland E3-2 is a small Category IV wetland associated with the channel of Goff Creek as it flows adjacent to NE 20th Street, and is bounded by paved sidewalks and road prisms. Wetland E3-3 is a small Category III wetland confined within a stormwater ditch located at the toe of the northern edge of NE 20th Street, and is bounded by vertical concrete walls. The buffer and edges of this wetland appear to have been planted with native trees and shrubs, and are marked with NGPA signs indicating that this wetland may be mitigation constructed to compensate for wetland and/or buffer impacts. The wetland flows into a storm drain and appears to connect with Goff Creek. Wetlands E3-2 and E3-3 are illustrated as "wetland/stream buffer" on figures within the *East Link Project Final EIS* (Sound Transit 2011). Wetland E3-5 continues east outside of the wetland study area and flows to the Valley Creek drainage; it was identified as "Wetland WR11 West of 140th Avenue NE" in the *East Link Project Final EIS* (Sound Transit 2011).

Two ditches are present in the SR 520 Alternative site. These ditches convey water through linear, channelized swales into the stormwater system. They may be considered Waters of the United States (i.e., not wetlands or streams, but drainage features that convey water to a wetland or stream) because of their characteristics and the connection between the stormwater system and Goff Creek.

3.9.4 Environmental Impacts

A summary of impacts of the build alternatives on ecosystems are presented in Tables 3.9-1 through 3.9-3.

Table 3.9-1. Impacts on Aquatic Resources

Alternative	Aquatic Resource	Stream Impacts (linear ft)	Stream Buffer Impacts (acres)	Impacts within 100-Year Floodplain (acres)
Lynnwood Alternative				
Design Option C1	Scriber Creek	0	<0.1	<0.1
Design Option C2	Scriber Creek	0	0.1	0.1
Design Option C3	Scriber Creek	0	0	<0.1
BNSF Storage Tracks	West Tributary of Kelsey Creek	0	0	0
BNSF Alternative	West Tributary of Kelsey Creek	0	0	0
BNSF Modified Alternative	West Tributary of Kelsey Creek	0	0	0
SR 520 Alternative	Goff Creek	700	0.64	0

Table 3.9-2. Impacts on Vegetation and Wildlife

Alternative	Acres within Project Limits[a]	Permanent Operational Impacts (acres)					
		Vegetation Removed by Class					Removed Vegetation
		UMVC	UMVD	UMVM	UMV	USV	
Lynnwood Alternative							
Design Option C1	38	3	3	<1	3	2	11
Design Option C2	42	3	3	<1	3	2	11
Design Option C3	40	3	3	<1	3	2	11
BNSF Storage Tracks	15	0	<1	<1	<1	<1	<1
BNSF Alternative	27	0	1	<1	<1	2	3
BNSF Modified Alternative	39	0	4	<1	<1	2	6
SR 520 Alternative	26	0	<1	<1	0	2	2

[a] Acres within project limits include all parcels plus any construction footprint that may fall outside of these parcels in the ROW which could impact vegetation in these areas. Thus, acres within project limits may be larger than affected parcel acres described in Chapter 2, Alternatives Considered.

UMVC = urban mostly vegetated – coniferous forest; UMVD = Urban mostly vegetated – deciduous forest; UMVM = Urban mostly vegetated – mixed forest; UMV = Urban moderately vegetated; USV = Urban sparsely vegetated.

Table 3.9-3. Impacts on Wetlands and Wetland Buffers

Alternative	Direct Wetland Impacts (acres)	Wetland Buffer Impacts (acres)
Lynnwood Alternative		
Design Option C1	1.9	1.6
Design Option C2	2.1	1.6
Design Option C3	1.9	1.6
BNSF Storage Tracks	0.08	0.19
Subtotal	1.98–2.18	1.79
BNSF Alternative	0.07	0.25
BNSF Modified Alternative	0.6	1.33
SR 520 Alternative	0.39	0.29

3.9.4.1 No Build Alternative

The No Build Alternative would not result in impacts on aquatic resources, vegetation, wildlife, threatened or endangered or priority species, or wetlands. However, ongoing development may affect these resources. The Lynnwood Alternative site is partially developed and the Edmonds School District plans to build a district support center at this location. If constructed, the district support center would increase impervious area on the site, affecting approximately 7,000 square feet of wetland and affecting stream buffers and vegetation. Proposed replanting and construction best management practices (BMPs) would likely avoid, minimize, and mitigate for these potential impacts (Shockey/Brent, Inc. 2007). Urbanized land use is likely to continue on the currently developed western portion of the site for the foreseeable future.

Local improvements related to stormwater treatment and management could result if new development is constructed in the build alternative sites. Such new development would be subject to stormwater permitting and would be required to implement stormwater treatment and management to standards similar to those anticipated for the proposed project.

3.9.4.2 Impacts Common to All Build Alternatives

Figures 3.9-1 through 3.9-5 depict impacts from each of the build alternatives.

Construction Impacts

All upland or wetland/riparian vegetation that is temporarily disturbed outside of the build alternative sites (i.e., within the construction access areas and related rights-of-way) would be restored after construction is completed. Site restoration would include replanting disturbed areas, with appropriate native vegetation, immediately following construction. However, the length of time required for restoration areas to effectively replace preproject functions would vary depending on the type, age, and diversity of the plant community in such areas.

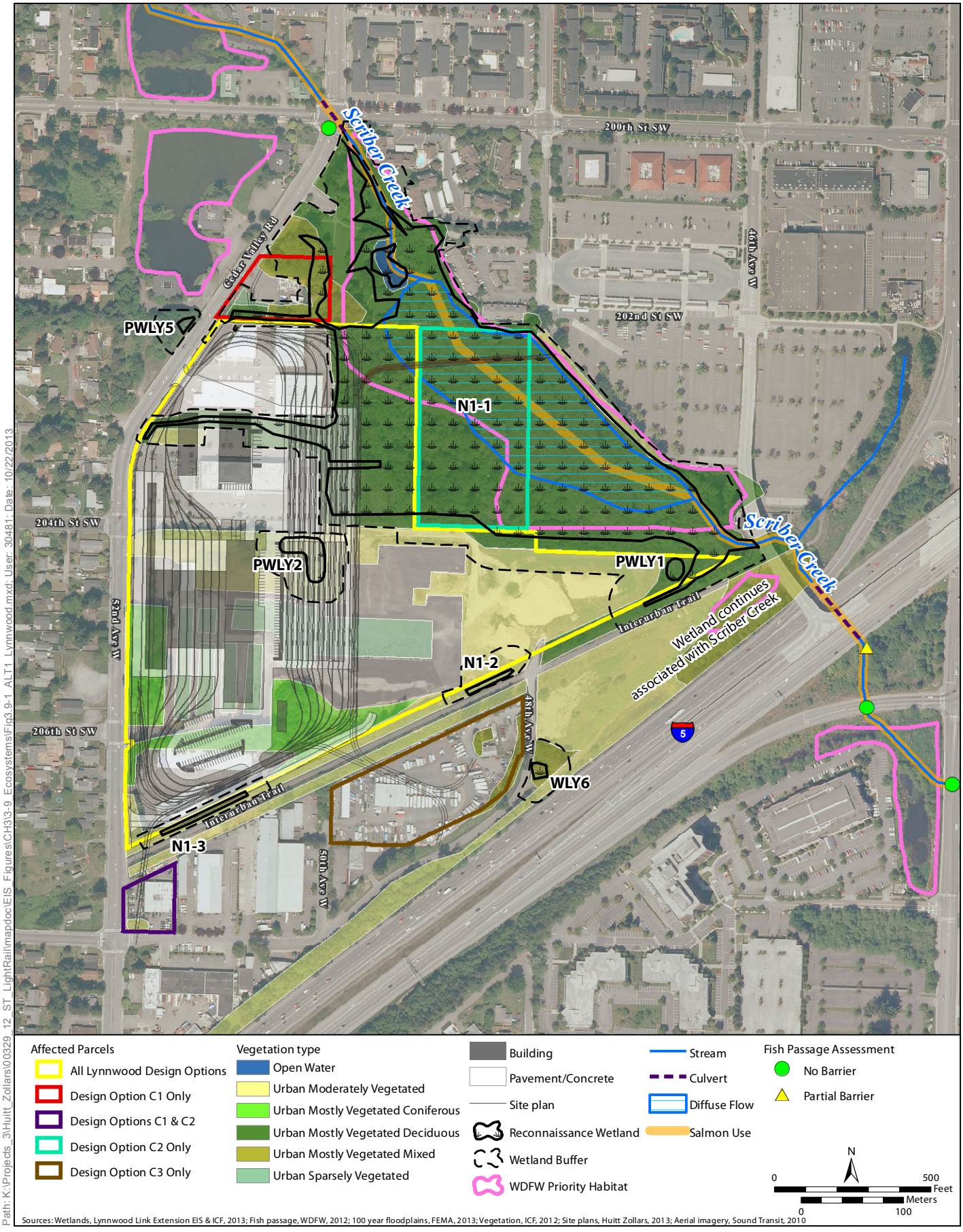

Figure 3.9-1: Lynnwood Alternative—Impacts (Lynnwood Component)
Sound Transit Link Light Rail OMSF Draft EIS

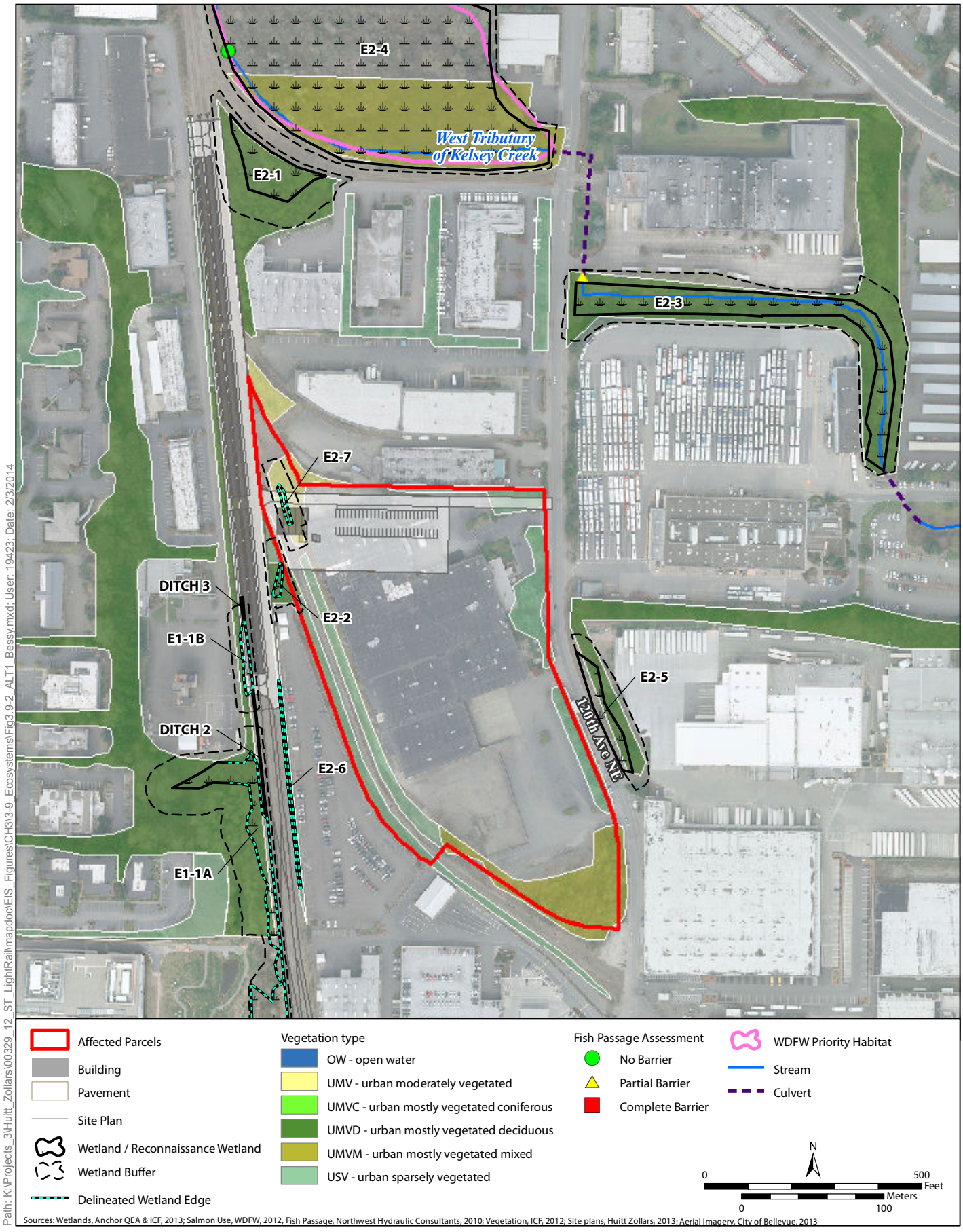

Figure 3.9-2: Lynnwood Alternative—Impacts (BNSF Storage Tracks Component)
Sound Transit Link Light Rail OMSF Draft EIS

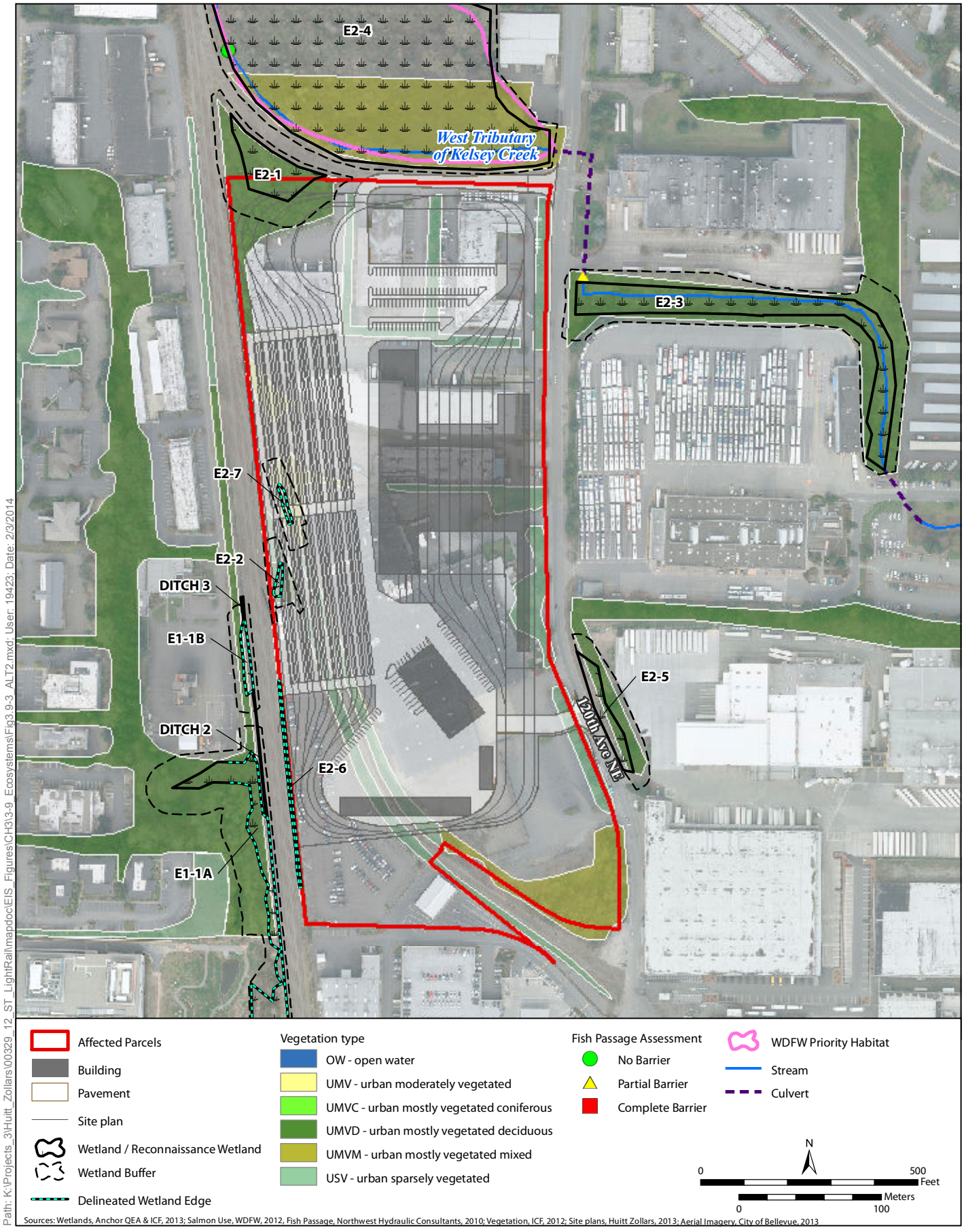

Figure 3.9-3: BNSF Alternative—Impacts
Sound Transit Link Light Rail OMSF Draft EIS

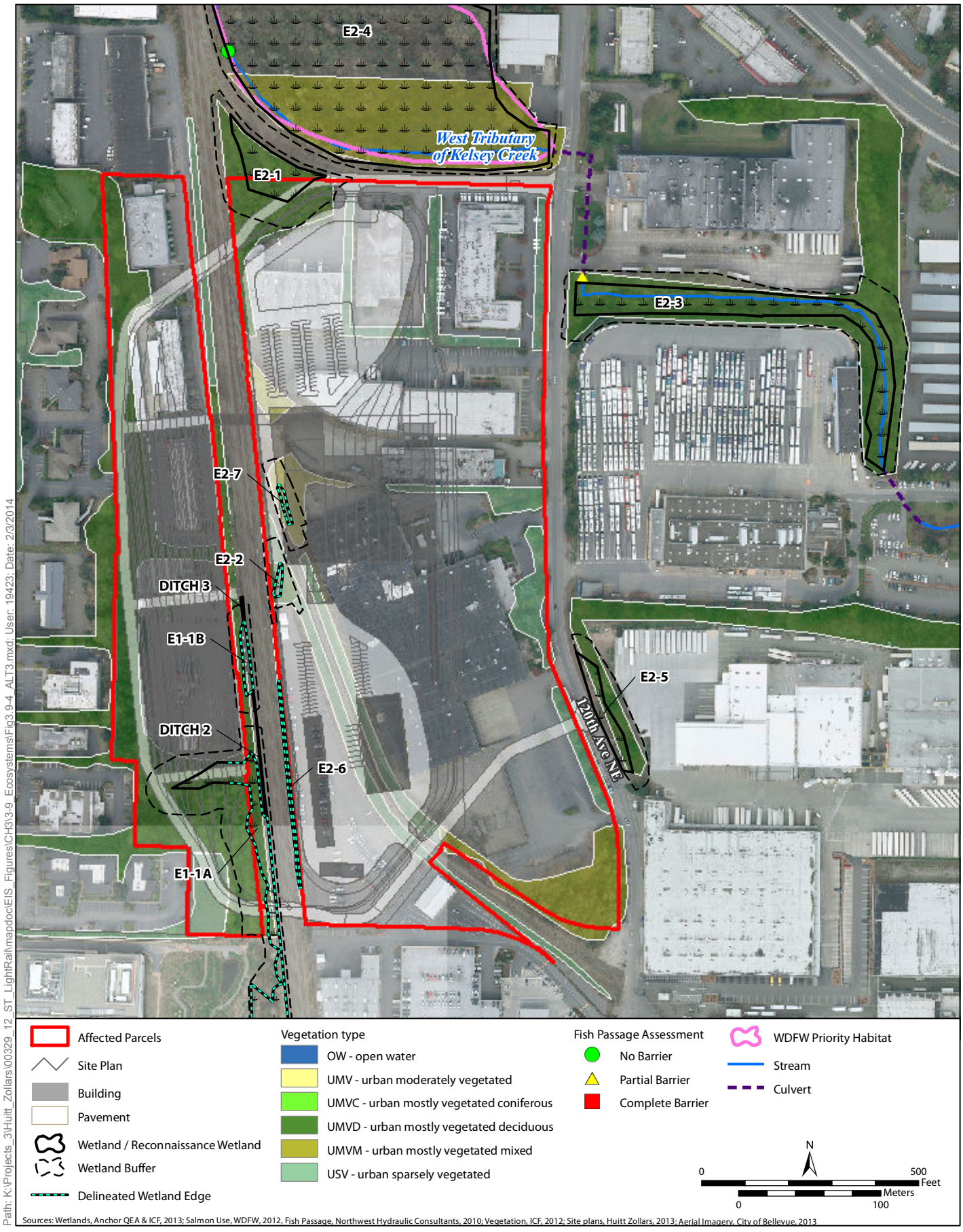

Figure 3.9-4: BNSF Modified Alternative—Impacts
Sound Transit Link Light Rail OMSF Draft EIS

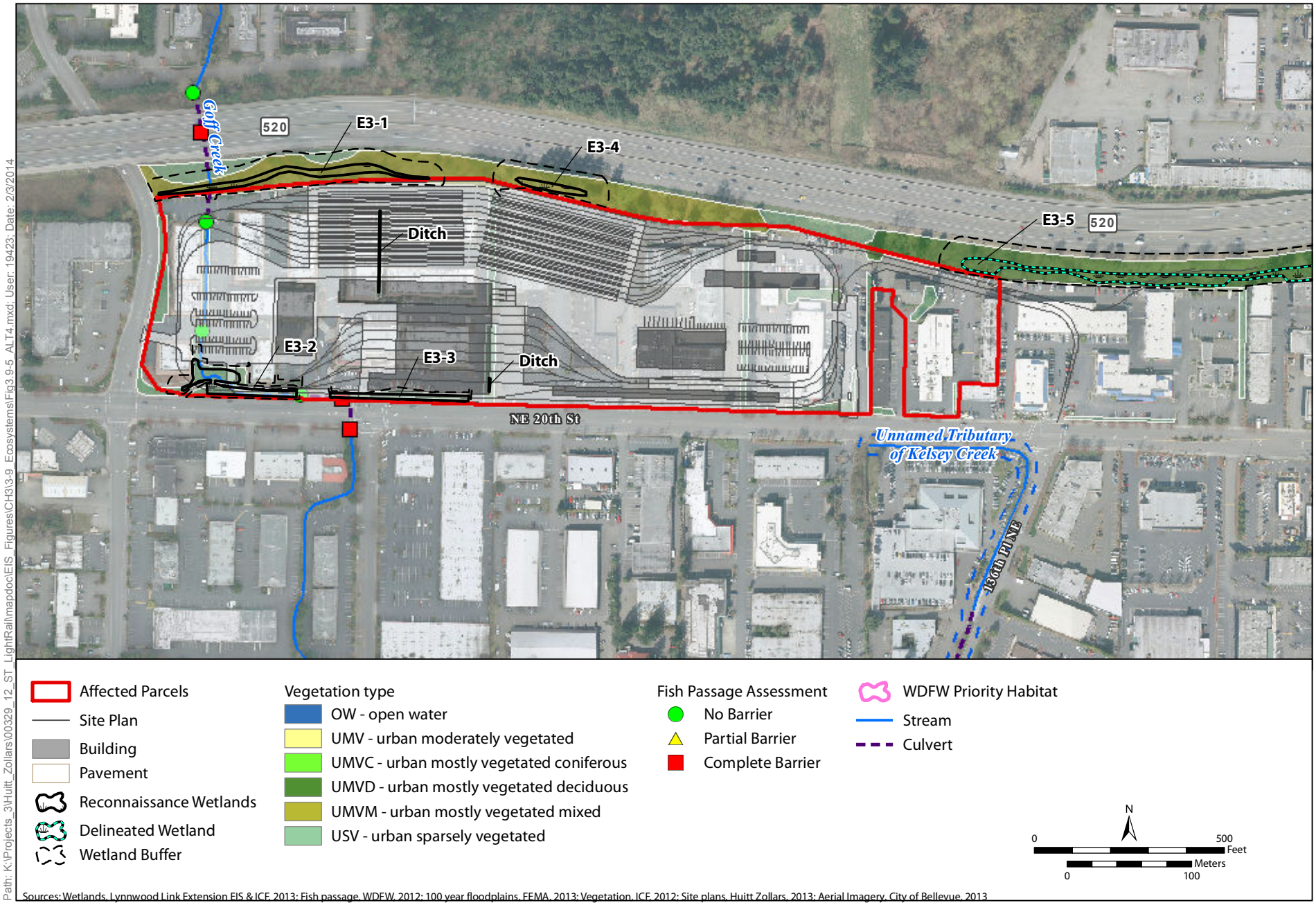

Figure 3.9-5: SR 520 Alternative—Impacts
Sound Transit Link Light Rail OMSF Draft EIS

Land necessary for construction of the elevated guideways, which would provide access between the proposed project and Lynnwood Link Extension or East Link would be temporarily disturbed during construction, and such areas similarly restored following construction. All uplands and wetlands in the construction areas would be disturbed during construction and all vegetation would be temporarily removed. Short-term turbidity impacts may also occur from sedimentation in streams and wetlands resulting from vegetation removal. The duration of the temporary construction impacts would vary with the nature of the activity and the types of BMPs implemented. Recovery time would also vary depending on the affected habitat type.

Construction-related impacts would occur where the build alternative sites cross streams or encroach into stream buffers. Construction impacts would be temporary and limited to the period during and immediately following construction. In addition to the potential impacts of erosion and sediment loading, the use of heavy construction equipment could increase the potential for leakage of fuel, oil, or hydraulic fluids. These impacts may include temporary loss of habitat, temporary reduction of wetland functions, and temporary contamination of surface waters. A spill prevention, control, and countermeasures (SPCC) plan would be developed and implemented, as part of a Stormwater Pollution Prevention Plan (SWPPP), to avoid or minimize construction-related pollutants from entering streams. Construction activities would have temporary impacts on wildlife from vegetation clearing, which could disrupt wildlife breeding, feeding, and travel functions. Increased noise levels during construction could displace wildlife into potentially less-suitable habitats.

Some wildlife species would eventually return to areas that are revegetated after construction; however, reestablishing native vegetation would require 2 to 4 years for herbaceous areas and more years for multilayered vegetation types. Individual animals would be displaced (mobile species such as birds) or destroyed (small, slower-moving species such as amphibians, reptiles, and small mammals) as construction activity occurs. No federal or state threatened or endangered species would be affected during construction because none are known to exist at any of the build alternative sites. Wetland functions could be temporarily reduced by construction activities from reductions in habitat quality, as well as vegetation clearing which can reduce the ability of the wetland to slow down water and remove sediment and contaminants.

Potential temporary construction impacts would be controlled by the types of construction activities and by the implementation of BMPs during construction. These BMPs would be designed to accommodate site-specific characteristics such as widths of wetland and stream buffers and effectively avoid or minimize temporary construction impacts (as well as permanent operational impacts) on all ecosystem resources. These practices are described in detail in Appendix E.3.

Potential BMPs include the following items.

- Delineation of construction limits for vegetated and habitat areas that may be disturbed during construction.
- Development of a Temporary Erosion and Sediment Control (TESC) plan, including BMPs such as silt fences; protective ground covers such as straw, plastic sheeting, or jute mats; and straw bales in drainage features.
- Development of a Construction Stormwater Pollution Prevention Plan, including a TESC; SPCC Plan; Concrete Containment and Disposal Plan; Dewatering Plan; and a Fugitive Dust Plan.
- Use of tracked equipment rather than tire-based equipment in areas that are sensitive to adverse effects from soil compaction. Temporary work bridges could be used in extremely sensitive areas, such as in wetlands or near streams.
- Restoration of areas temporarily affected by construction to pre-construction conditions or better through replanting or reseeding and implementation of a revegetation plan that emphasizes the use of native species as appropriate.
- Any temporary dewatering of the in-water work zone would be preceded by work area isolation and fish removal/relocation (as necessary). Fish handling would be conducted by a trained and qualified biologist.
- Turbid water produced during the course of in-water work would be prevented from discharging to fish-bearing waters or wetlands. Turbid wastewater may be routed to temporary or permanent detention facilities, or to upland areas that provide adequate rates of infiltration.
- Conducting vegetation clearing outside of general migratory bird breeding season, which is typically from March 15 through August 31.

Operational Impacts

All vegetation (and thus, wildlife habitat and wetland functions related to that vegetation) in each of the build alternative sites would be permanently affected and all vegetation, wetlands, and aquatic resources would be removed from the area containing OMSF infrastructure. Consequently, any habitat value of these areas for fish and wildlife would be eliminated and all wetland functions eliminated. However, all direct and indirect wetland and buffer impacts would be mitigated according to local, state, and federal regulations, as described in Section 3.9.6.2, Compensatory Mitigation.

Adverse long-term impacts may include loss of vegetation and wildlife habitat, filling of wetlands, increased stormwater runoff, and degraded surface water quality. However, the proposed project would be developed consistent with current stormwater management regulations. This may provide a beneficial effect in areas that are already built out and were developed prior to modern stormwater treatment requirements. The proposed project would result in overall improvements in streamflows, through the requirement to meet predevelopment conditions for streamflows. Stormwater would be treated to enhanced treatment levels to remove heavy metals. Substantial

permanent impacts on water quality, and therefore aquatic species, would not be expected. While wildlife habitat would be permanently eliminated and habitat value of adjacent areas of vegetation could decline due to the noise and activity inherent in the operation of the OMSF, no adverse effect on essential fish habitat protected by the Magnuson-Stevens Act is expected. No federal or state threatened or endangered species would be affected because none are known to exist at any of the build alternative sites.

Permanent wetland and buffer impacts could result from direct removal/fill. All wetlands identified, as well as the majority of the ditches, are expected to be jurisdictional, and thus, regulated by the local jurisdictions, the Washington State Department of Ecology, and the U.S. Army Corps of Engineers (Corps). Thus, Sound Transit would seek Clean Water Act Section 404 and 401 permits from these jurisdictions (as applicable) for wetland impacts.

3.9.4.3 Lynnwood Alternative

Construction Impacts

- **Aquatic Resources.** Construction activities under this alternative would have a low risk of affecting aquatic resources because no direct temporary impacts on Scriber Creek are expected. Construction impacts on the Scriber Creek floodplain are addressed in Chapter 3.10, Water Resources. Implementation of appropriate BMPs would avoid or minimize impacts during construction, such as turbidity, on any portions of the stream buffer that are not permanently affected by the project footprint.
- **Vegetation and Wildlife.** Design Option C2 would have a greater temporary impact on wildlife than Design Option C1 or C3. Under Design Option C2, the lead track running east from the site would be constructed near the middle of Wetland N1-1 (Figure 3.9-1). Lead tracks for Design Options C1 and C3 follow I-5 and 52nd Avenue W along the edges of the wetland, where noise and human disturbance from traffic are already high. Thus, construction of Design Option C2 has a greater potential to bring noise and disturbance through the middle of the wetland, affecting interior habitats and temporarily displacing wildlife species to the edges of the wetland or other areas of adjacent habitat.
- **Wetlands.** Portions of Wetland N1-1 would be temporarily disturbed during construction. Implementation of appropriate BMPs would avoid or minimize temporary impacts on any portions of the wetlands that are not permanently affected by the project footprint. All temporarily disturbed wetland and wetland buffer vegetation would be revegetated with native vegetation following construction. The short-term impact would be a change in the wetland vegetation type where trees or large shrubs were removed during construction. Temporarily disturbed areas would regain function, although it would be decades before these areas would provide mature forested or scrub-shrub functions.

Design Option C2 would have a greater temporary impact on wetlands than Design Option C1 or C3. Under Design Option C1, three guideway support footings would be constructed in the narrow northwestern arm of Wetland N1-1. Under Design Option C2, the lead track running east from the site and multiple guideway support footings would be constructed across the middle of Wetland N1-1 (Figure 3.9-1). Construction of Design Option C2 has a greater potential for temporary impacts through the middle of the wetland, affecting interior wildlife habitat functions and temporarily reducing the density, diversity, and size of trees and shrubs in the disturbed areas. In contrast, lead tracks for Design Option C1 and Design Option C3 would follow currently developed routes along the edges of the wetland (rather than through its center). Design Option C3 would not include any guideway support footings in wetlands or wetland buffers.

In the BNSF Storage Tracks site, temporary impacts on portions of Wetland E1-1a could occur along the base of the western hillslope and the western side of the tracks. Construction noise could temporarily displace pileated woodpeckers transiting over the site to forage in Wetlands E2-3 or E2-4. Implementation of appropriate BMPs would avoid or minimize temporary impacts during construction activities on any portions of the wetlands that are not permanently affected by the project footprint.

Operational Impacts

- **Aquatic Resources.** The Lynnwood Alternative is not expected to measurably affect aquatic species or aquatic habitat conditions in the site, or in downstream reaches, because of the limited extent and location of potential impacts on Scriber Creek (Figure 3.9-1). Permanent impacts of this alternative on aquatic habitat would likely vary from minimal impacts on fish habitat, to minor adverse impacts requiring mitigation. Permanent impacts would include the placement of approximately 1,000 cubic yards of fill in the Scriber Creek floodplain (under Design Options C1 and C3) or the placement of approximately 1,100 cubic yards of fill in the floodplain under Design Option C2 (due to track footings being placed in the floodplain/Scriber Creek wetland). Impacts associated with the placement of fill in the Scriber Creek floodplain are detailed in Section 3.10, Water Resources. The Lynnwood Alternative would increase impervious surface by 35% but the proportion of the site characterized as pollution generating impervious surface (PGIS) would decrease by 25% (see Section 3.10, Water Quality, Tables 3.10-2 and 3.10-3). To minimize the potential impacts of increased impervious surface area, stormwater detention and treatment facilities would be constructed. These facilities would include stormwater ponds and underground vaults, sized to provide sufficient detention and treatment to offset any increase in impervious surface area. Approximately 0.1 acre of stream buffer would be permanently lost or altered under Design Option C2. This would preclude the development of mature forested vegetation, thereby limiting the future recruitment of large woody debris into this portion of Scriber Creek. No streams or stream buffers would be affected by the BNSF Storage Tracks.
- **Vegetation and Wildlife.** Approximately 6 acres of forested habitat would be permanently removed from the Lynnwood Alternative site, 1.6 to 1.8 acres of which would be forested

wetland habitat (Figure 3.9.1). Impacts would include a decrease in upland forest and wetland habitat patch size, a possible decrease in snags, and decreased snag-recruitment potential (i.e., fewer live trees that can eventually become snags). Loss of snags could affect foraging suitability of Wetland N1-1 for pileated woodpeckers. This alternative would result in the complete loss of Wetland PWLY2 (0.3-acre impact) and Wetland N1-3 (0.1-acre impact), which provide limited wildlife habitat functions due to their small size. For the same reasons as described under the Construction Impacts section, Design Option C2 would have a greater impact on wildlife and result in greater habitat fragmentation and human disturbance of wildlife habitat in Wetland N1-1 than Design Option C1 or C3. Operation of the BNSF Storage Tracks would affect approximately 0.2 acre of forested habitat, some of which is forested wetland habitat along the railroad tracks (Figure 3.9-2). Given the highly (80%) developed character of the BNSF Storage Tracks site and the small amount of high-quality habitat currently present, impacts from operation of the proposed project are expected to be minimal.

- **Wetlands.** The Lynnwood Alternative would result in 1.6 to 1.8 acres of permanent impact on the western side of Wetland N1-1 (reducing the wetland size by 8%) and would place elevated guideways across the center of the wetland including across the area of Scriber Creek's diffuse flow into the wetland (Figure 3.9.1). Impacts would affect the wetland's ability to perform water quality and hydrologic functions, and would reduce the amount of habitat provided for wildlife. All design options of this alternative would affect the areas that appear to be previous mitigation, which could complicate a determination of mitigation for impacts. The NGPA recording certificate for the southernmost portion of the wetland's two western arms specifically prohibits future development and requires any boundary adjustments to the NGPA be approved by the City of Lynnwood through a formal platting process. All design options of this alternative would affect this NGPA and trigger such a process for approval of any modification to the NGPA boundary to allow impacts on this portion of Wetland N1-1.

  Design Option C2 would have a greater impact (0.2 acre) on wetlands than Design Option C1 or C3, based on both area and wetland function, for the reasons stated in the Construction Impacts section. This alternative would also result in the loss of Wetland PWLY2 (0.3-acre impact) and Wetland N1-3 (0.1-acre impact). Approximately 1.6 acres of wetland buffer would also be affected by the Lynnwood Alternative: 1.4 acres of Wetland N1-1 buffer and 0.2 acre of Wetland N1-3 buffer. Impacts would result in the reduction of forested and shrub wetland habitats, as well as potentially surface-flow paths and the ability to store floodwaters associated the with the Scriber Creek floodplain. Wetlands and wetland buffers under the elevated guideway would also be affected through the conversion of forest-dominated wetlands to shrub-dominated wetlands and buffers under and along each side of the elevated guideways to prevent trees and branches from interfering with operation of the light rail.

Operation of the BNSF Storage Tracks would affect approximately 0.08 acre of wetlands (Wetlands E1-1b, E2-2, E2-6, and E2-7) including the complete loss of Wetland E2-7 (Figure 3.9-2). Approximately 0.2 acre of functional wetland buffer would also be affected. Operation of this alternative would also affect approximately 63 linear feet (less than 0.01 acre) of ditches. Wetlands associated with the BNSF Storage Tracks have a limited ability to provide wildlife habitat, water quality, and hydrologic functions due to the surrounding development, which has reduced their size and fragmented their connections. Impacts would affect primarily the wetland's ability to perform water quality and hydrologic functions, while further reducing the habitat that these wetlands currently provide for wildlife. This alternative would not affect snag recruitment or foraging habitat for pileated woodpeckers in Wetlands E2-3 or E2-4.

3.9.4.4 BNSF Alternative

Construction Impacts

- **Aquatic Resources**. No construction impacts would occur on the functional stream buffer of the West Tributary of Kelsey Creek (as it emanates from and flows through Wetland E2-4) as a result of the BNSF Alternative (Figure 3.9-3). Given the anticipated effectiveness of construction BMPs, construction activities under this alternative would have a low risk of adverse impacts on aquatic species, including resident fish. There is no anadromous salmonid spawning or rearing habitat within about 0.4 mile of the construction site; therefore, there would be no adverse impacts on these habitats.
- **Vegetation and Wildlife.** Little, if any, vegetation would need to be removed from outside the BNSF Alternative site for construction purposes. Construction would increase noise levels and human activity temporarily, but the impact is expected to be minimal and no species are expected to be affected. In accordance with the MBTA, Sound Transit would consult with the U.S. Fish and Wildlife Service (USFWS) on methods to implement during construction to avoid impacts on migratory birds. There would be no impacts on the peregrine falcon eyrie at Bellevue Tower, should it become active again, or on the osprey nest at Hidden Valley Sports Park. Construction noise could temporarily displace pileated woodpeckers transiting over the site to forage in Wetlands E2-3 or E2-4.
- **Wetlands.** Project construction activities are expected to include some temporary clearing of wetland vegetation during construction, which could result in the temporary loss of wetland or wetland buffer habitat. Implementation of appropriate BMPs would limit temporary construction impacts. All temporarily disturbed wetland and wetland buffer vegetation would be revegetated with native vegetation following construction. The short-term impact would be a change in the wetland vegetation type where trees or large shrubs are removed during construction, which would have temporary impacts on wildlife habitat functions in these wetlands. Temporarily disturbed areas would slowly regain function, although it would be decades before these areas would provide mature forested or scrub-shrub functions.

Operational Impacts

- **Aquatic Resources.** No operational impacts on the functional stream buffer of the West Tributary of Kelsey Creek would occur as a result of this alternative (Figure 3.9-3). The BNSF Alternative would result in a 3% increase in the impervious area and PGIS would decrease by 21% (see Section 3.10, Water Resources, Tables 3.10-2 and 3.10-3). Retrofitting the stormwater treatment and control measures on the site to meet current regulations is expected to result in measurable improvements in downstream water quality and streamflow characteristics compared to existing conditions.
- **Vegetation and Wildlife**. Less than 2 acres of mostly upland coniferous and deciduous forest habitat would be removed permanently for construction of the BNSF Alternative (Figure 3.9-3). The proposed project would increase the percent of the site that is developed from 81% to 93%. This habitat is currently used by songbirds, small mammals, and other species, and would be lost. Permanent impacts on wildlife are expected to be minimal and there would be no impacts on the peregrine falcon eyrie at Bellevue Tower, should it become active again, or on the osprey nest at Hidden Valley Sports Park.
- **Wetlands.** Impacts on Wetlands E2-1, E2-2, E2-6, and E2-7 would occur under the BNSF Alternative, totaling approximately 0.07 acre of direct wetland impact and approximately 0.25 acre of wetland buffer impact (Figure 3.9-3). This includes the complete fill of Wetlands E2-2 and E2-7, and the partial fill of Wetlands E2-1 and E2-6 and consequent loss of the limited wildlife habitat functions provided by these wetlands. This alternative would not affect snag recruitment or foraging habitat for pileated woodpeckers in Wetlands E2-3 or E2-4. The BNSF Alternative would not affect the ditches along the western side of the BNSF tracks. The character of these wetland impacts would be the same as described under the BNSF Storage Tracks component of the Lynnwood Alternative.

3.9.4.5 BNSF Modified Alternative

Construction Impacts

- **Aquatic Resources.** The potential construction impacts on aquatic resources under this alternative would be similar to those discussed for the BNSF Alternative.
- **Vegetation and Wildlife.** The potential construction impacts on vegetation and wildlife resources under this alternative would be similar to those discussed for the BNSF Alternative.
- **Wetlands.** The potential construction impacts on wetlands under this alternative would be similar to those discussed for the BNSF Alternative, with additional temporary impacts on Wetland E1-1a. Implementation of BMPs described in Appendix E.3 would avoid or minimize temporary construction impacts on any portion of the wetlands not permanently affected.

Operational Impacts

- **Aquatic Resources.** Potential operational impacts of the BNSF Modified Alternative on aquatic resources would be similar to those described above for the BNSF Alternative. The BNSF Modified Alternative would result in a 12% increase in the impervious area and the proportion of the site characterized as PGIS would decrease by 9% (see Section 3.10, Water Resources, Tables 3.10-2 and 3.10-3). Retrofitting the stormwater treatment and control measures on the site, to meet current regulations, is expected to result in measurable improvements in downstream water quality and streamflow characteristics compared to existing conditions.
- **Vegetation and Wildlife.** Approximately 4 acres of mostly deciduous upland forest habitat would be removed permanently under the BNSF Modified Alternative (Figure 3.9-4). These 4 acres are currently used by songbirds, small mammals, and other species, and this habitat would be lost. As described under the BNSF Storage Tracks component of the Lynnwood Alternative and the BNSF Alternative, permanent impacts on wildlife are expected to be minimal, and there would be no impacts on the peregrine falcon eyrie at Bellevue Tower, should it become active again, or on the osprey nest at Hidden Valley Sports Park. This alternative would not affect snag recruitment or foraging habitat for pileated woodpeckers in Wetlands E2-3 or E2-4.
- **Wetlands.** The BNSF Modified Alternative would directly affect approximately 0.6 acre of wetland and approximately 1.3 acres of wetland buffer (Figure 3.9-4). Wetlands that would be affected include E1-1a, E1-1b, E2-1, E2-2, E2-6, and E2-7. Impacts would include 0.4 acre of direct impact on Wetland E1-1a and 1.05 acres of its functional buffer, 0.04 acre of direct impact on Wetland E2-1, and 0.28 acre of its functional buffer, and the complete loss of Wetlands E1-1b, E2-2, E2-6, and E2-7 and consequent loss of the limited wildlife habitat functions provided by these wetlands. The BNSF Modified Alternative would also affect approximately 349 linear feet (0.02 acre) of ditches. The character of these wetland and ditch impacts and the ability to mitigate them would be the same as described under the BNSF Storage Tracks component of the Lynnwood Alternative and the BNSF Alternative.

3.9.4.6 SR 520 Alternative

Construction Impacts

- **Aquatic Resources.** The SR 520 Alternative would require in-water construction activities during relocation of the stream channel or conversion of the surface channel of Goff Creek to a piped reach. Construction activities would be conducted outside of the stream ordinary high water mark (OHWM), until the relocated stream channels or pipes are completed. The streamflows would then be diverted into the new conveyance structures, and the existing channel would be eliminated to grade the site to level condition. This process is expected to avoid or substantially minimize potential temporary degradation of downstream water-quality conditions during the construction phase. Although the existing stream buffer consists primarily of impervious surface areas, there is some limited vegetation immediately adjacent to the channel of Goff Creek at this alternative site. Upland ground disturbances, and activities associated with placing the existing stream channel in an underground pipe, are expected to increase the potential for

temporary sediment delivery to Goff Creek. However, construction BMPs would minimize or eliminate these potential risks.

- **Vegetation and Wildlife**. Short-term vegetation disturbance outside the project footprint is expected to be minimal to none. Temporarily disturbed vegetation would be replanted, with an opportunity to increase native vegetation cover and decrease invasive species cover. Construction noise associated with this alternative would have the least impact on wildlife compared to the other build alternatives, given the current level of noise and development already on site.
- **Wetlands.** Project construction activities are expected to include some temporary clearing of wetland vegetation, which could result in the temporary loss of wetland or wetland buffer habitat. It is expected that the implementation of appropriate BMPs would minimize temporary impacts on wetland resources during construction activities at the site. . Implementation of appropriate BMPs would limit temporary construction impacts, and all temporarily disturbed wetland and wetland buffer vegetation would be revegetated with native vegetation following construction.

Operational Impacts

- **Aquatic Resources.** The SR 520 Alternative would permanently replace approximately 693 feet of open stream channel of Goff Creek, with a similar length of underground pipe, which would permanently degrade aquatic habitat functions provided by this segment of Goff Creek, and would affect approximately 0.64 acre of stream buffer habitat, 0.21 acre of which is also wetland buffer (Figure 3.9-5). This section of stream is highly modified, surrounded by commercial development, and isolated from upstream and downstream habitats. Fish use is expected to be limited and temporary due to the generally poor stream and riparian habitat conditions and isolation from other habitats by numerous passage barriers.

  The resulting direct impacts on fish and other living aquatic resources would be limited because this habitat is degraded, provides limited habitat suitability for native fish species, and is fragmented and isolated from more accessible and productive habitat areas farther downstream in the Goff Creek and Kelsey Creek watersheds. However, the existing open channel provides other important stream functions, including groundwater inputs that support base flows and moderate water temperatures in downstream reaches, and the transportation of nutrients and organic material from upstream to downstream habitats, supporting the aquatic food chain.

  The SR 520 Alternative would improve water quality conditions by reducing the amount of PGIS that drains to surface waters, and by increasing stormwater detention and treatment capacity. While the SR 520 Alternative would result in a 33% increase in the impervious area, the proportion of the site characterized as PGIS would decrease by 18% (see Section 3.10, Water Resources, Tables 3.10-2 and 3.10-3). The SR 520 Alternative would also improve stormwater detention and treatment site-wide relative to current conditions. The SR 520 Alternative would retrofit the entire site with modern stormwater detention and treatment consistent with current regulatory standards. On this basis, this alternative would likely result in an incremental

improvement in water quality conditions in downstream receiving waters relative to current conditions.

The 693 feet of open channel in the SR 520 Alternative site represents about 36% of the total length of open channel habitat available between SR 520 and the accessible anadromous fish habitat in Goff Creek downstream of Bel-Red Road. Anadromous fish access to reaches upstream of Bel-Red Road could be restored in the future. The City of Bellevue has plans to daylight large sections of Goff Creek (City of Bellevue 2012) downstream of the SR 520 Alternative site. The loss of the open channel habitat in the SR 520 Alternative site footprint would likely be considered an adverse impact on aquatic resources in Goff Creek by WDFW. BMPs are expected to prevent any impacts on Valley Creek, which is about 150 feet east of the SR 520 Alternative site.

- **Vegetation and Wildlife.** Due to the limited amount of high-quality habitat and the highly developed nature of the SR 520 Alternative site, this alternative would have the least impact on vegetation and wildlife habitat of the four build alternatives. Approximately 0.5 acre of deciduous and mixed forest (mostly forested wetland) and 2 acres of landscaping would be permanently removed (Figure 3.9-5). The majority of this habitat exists in a linear corridor between SR 520 and commercial development and the understory is thick with Himalayan blackberry. Although this area is mapped as high-value as forested habitat, the habitat value is diminished by small patch size, lack of corridors, noise, and human disturbance. There is no connectivity to larger habitat patches and the highway and other roads make dispersal of amphibians and most small mammals to and from this site unlikely. Birds and larger mammals face the hazard of having to cross roads to reach this habitat. A couple of snags that provide foraging habitat for woodpeckers would be lost. Some large trees that may provide perching and roosting habitat for raptors would be lost.
- **Wetlands.** Wetland impacts associated with the SR 520 Alternative would occur on three of the five wetlands in this alternative site (Figure 3.9-5). This alternative would also substantially modify two ditches in the site, totaling approximately 246 linear feet. This alternative would result in 0.4 acre of direct wetland impact and 0.3 acre of wetland buffer impact. This would include the filling of Wetland E3-2 (0.2 acre) which currently provides a limited floodplain for Goff Creek, and Wetland E3-3 (0.1 acre), which drains through pipes to Goff Creek and impacts on the western end of Wetland E3-5, which continues east outside of the wetland study area. Each of the three affected wetlands provide small patches of wildlife habitat, as well as water quality and hydrologic functions.

3.9.5 Indirect and Cumulative Impacts

As explained in Section 3.9.2, Methods, indirect wetland impacts may occur on the remaining portion of a wetland due to the effect of direct impacts occurring on a large portion of the wetland. Permanent wetland and buffer impacts could result indirectly from grading or placing fill into large portions of wetlands, as well as from grading and placing fill into large portions of a wetland's buffer. Indirect impacts can affect a wetland's hydrologic characteristics (e.g., its capacity to hold

water and ability to slow water flow) as well as its wildlife habitat functions. Both the Lynnwood Alternative and BNSF Alternative would result in such indirect impacts on wetlands and wetland buffers. The BNSF Modified Alternative would indirectly affect much of Wetland E1-1a (Figure 3.9-4).

Cumulative impacts for ecosystem resources were considered within a broader study area to capture how the impacts of reasonably foreseeable future projects—when coupled with the proposed project and past projects—may interact to affect the function of ecosystems at a larger scale than site-specific alternatives. The existence and extent of areas dominated by native plants that could provide wildlife habitat and support wildlife corridors for mobile species, foraging areas for avian and mammal species, and breeding habitats were qualitatively considered at the scale of the Scriber Creek and West Tributary of Kelsey Creek subbasin scale. Stream habitat accessibility and quality were similarly considered at the subbasin scale for qualitative impacts on aquatic resources and fish species. Landscape connectivity within these subbasins was considered for impacts on wetlands based on the degree to which they provide water quality, hydrologic, and habitat functions to their watersheds.

Segment C-Mountlake Terrace to Lynnwood of the Lynnwood Link Extension would result in impacts on ecosystems resources in the Scriber Creek subbasin. Potential stream and wetland impacts from Segment C–Mountlake Terrace to Lynnwood would include impacts on Scriber Creek, the tributary to Scriber Creek, and approximately 0.1 acre to 1.0 acres of wetland impact including impacts on the Scriber Creek Wetland (WLY4 in the Lynnwood Link documents, Wetland N1-1 herein). Impacts on Scriber Creek as it flows and disperses through the wetland are considered wetland impacts in the *Lynnwood Link Extension Draft EIS* (Sound Transit 2013). Lynnwood Link Extension would also result in an estimated 0.06 acre of impact on the North Branch of Thornton Creek and 1.0 acre of impact on McAleer Creek, both of which are tributary streams to Lake Washington (as is Scriber Creek, via Swamp Creek). Vegetation impacts and consequent loss of wildlife habitat as a result of the Lynnwood Link Extension would range from 1 to 2 acres in the Thornton Creek subbasin, 3 to 11 acres in the McAleer Creek subbasin, and 1 to 2 acres in the Scriber Creek subbasin.

The OMSF Lynnwood Alternative's approximate 6 acres of vegetation and wildlife habitat impact, 1.6 to 1.8 acres of wetland impact, and 0.1 acre of aquatic impacts would add to these reasonably foreseeable project impacts from the Lynnwood Link Extension and, thus, contribute to cumulative impacts on the Scriber Creek subbasin, as well as to the greater Lake Washington watershed. These impacts would contribute cumulatively to the loss of area and function currently found in the remaining undeveloped portions of the Scriber Creek subbasins. They would further reduce the area of native vegetation, wetlands, and fish and wildlife habitat and further limit the connectivity of the habitat corridor formed by Scriber Creek and its wetlands and riparian zone through the City of Lynnwood.

Based on the *East Link Project Final EIS* (Sound Transit 2011), the East Link project would result in impacts on ecosystems resources in the same watersheds as the build alternatives, with impacts varying depending on segment and alternative within each segment. The potential stream and wetland impacts from Segment D – Bel-Red/Overlake would include impacts on the unnamed

tributary to Kelsey Creek, a crossing of the West Tributary of Kelsey Creek and Wetland WR-6 (herein referred to Wetland E1-1a). This segment of East Link would also result in vegetation impacts and consequent loss of wildlife habitat in the watershed of 0.9 acre, which would add to the approximate .05 acre to 4 acres of vegetation and wildlife habitat impacts of the BNSF Alternative, BNSF Modified Alternative, and SR 520 Alternative in the watershed.

In conjunction with the 2 to 4 acres of vegetation and wildlife habitat impact, the approximately 0.07 to 0.6 acre of wetland impact, 0.33 to 1.96 acres of wetland buffer, and 693 feet of Goff Creek that would be piped under the BNSF Alternative, BNSF Modified Alternative, and SR 520 Alternative, these reasonably foreseeable project impacts on the stream, wetland, wetland buffers, and vegetation and wildlife habitat would contribute to the cumulative impacts in the Kelsey Creek subbasin of the Lake Washington watershed.

These impacts would cumulatively contribute to the loss of area and function currently found in the remaining undeveloped portions of the Kelsey Creek subbasin. Due to the highly dispersed and disconnected nature or most of the areas of vegetation and wetlands affected by these projects, the cumulative loss of habitat connectivity and corridors through the city would be less than the cumulative impact of the OMSF's Lynnwood Alternative and the Lynnwood Link Extension on the Scriber Creek subbasin.

3.9.5.1 Beneficial Impacts

Both the Lynnwood Link Extension and East Link would provide mobility options and would help achieve higher-density, transit-oriented development, thereby reducing the area of land development in ways that are consistent with regional and local plans and policies. These projects would support high-density, mixed-use redevelopment, which would be a beneficial cumulative impact by potentially reducing the tendency for urban sprawl through a concentration of development into already developed areas.

New impervious surfaces added by the proposed project and other reasonably foreseeable projects would include appropriate stormwater control and quality treatment in accordance with Ecology regulations. This would improve conditions relative to stormwater detention and treatment in the highly developed portions of the BNSF Alternative, BNSF Modified Alternative, and SR 520 Alternative sites. Thus, the proposed project could provide an overall cumulative benefit in terms of stormwater quality.

Positive cumulative impacts could also result from efforts to enhance streams and wetlands in the Scriber Creek and Kelsey Creek subbasins through comprehensive planning and subbasin plans. The proposed project and other reasonably foreseeable development projects would be subject to regulatory review and/or permitting under federal, state, and local regulations and would be required to mitigate impacts on streams, wetlands, and high-value habitats in accordance with federal, state, and local regulations. Project review and permitting processes would trigger the implementation of conservation measures to avoid and minimize impacts on ecosystem resources,

and would require compensatory mitigation for unavoidable impacts. Coordination between project proponents, and across projects proposed by the same proponent, could also help reduce impacts.

3.9.6 Potential Mitigation Measures

Sound Transit's policy (Executive Order No. 1, Establishing a Sustainability Initiative for Sound Transit [2007]) on ecosystem mitigation is to avoid impacts on environmentally sensitive resources and provide adequate mitigation and no net loss of ecosystem function and acreage as a result of agency projects. The proposed project would mitigate impacts to ecosystem resources in accordance with the mitigation sequencing requirements established by NEPA, the CWA, and local CAOs. According to NEPA (40 CFR 1508.20), mitigation for ecosystem impacts is based on a hierarchy of first avoiding the impact, then minimizing the impact by limiting the degree or magnitude of the action, rectifying the impact by restoring, repairing, or rehabilitating the affected environment, reducing or eliminating the impact over time, and finally compensating for any remaining unavoidable adverse impacts by providing substitute resources or environments.

As described below, the build alternatives for the proposed project would avoid or minimize potential impacts on ecosystems resources whenever practicable, and Sound Transit is committed to providing compensatory mitigation when avoidance is not practicable.

3.9.6.1 Avoidance and Minimization

Sound Transit would comply with standard specifications, BMPs, and applicable federal, state, and local mitigation requirements during design, construction, and post construction activities. BMPs typically required for avoidance and minimization of impacts on ecosystem resources are outlined in Appendix E.3. Sound Transit would meet all regulatory requirements and continue to implement proactive avoidance and minimization measures related to these BMPs in adherence with federal, state, and local regulations.

3.9.6.2 Compensatory Mitigation

To the extent that impacts could not be avoided or minimized through BMPs, or rectified after construction, Sound Transit would implement additional measures to reduce impacts and provide compensatory mitigation measures where impacts are unavoidable.

Compensatory wetland mitigation would be conducted in accordance with applicable federal, state, and local requirements and guidelines. These include the federal *Final Compensatory Mitigation Rule* (40 CFR 230); interagency guidance prepared by Ecology, the Corps, and EPA in *Wetland Mitigation in Washington State* (Washington State Department of Ecology et al. 2006); and local CAOs for the Cities of Lynnwood and Bellevue.

Mitigation for unavoidable impacts on other resources (e.g., streams, stream buffers, and fish and wildlife habitat/habitat for species of local importance) that are protected under local CAOs would also be conducted in accordance with the requirements of those ordinances (i.e., Bellevue Municipal Code [BMC] 20.25H.080 and 20.25H.085 for streams and 20.25H.160 for habitat associated with species of local importance; LMC 17.10.064 for streams and 17.10.081 for wildlife). Sound Transit

would also adhere to local ordinances regarding tree replacement ratios (e.g., replacement of significant trees per the LMC).

Sound Transit would work with the Cities of Lynnwood and Bellevue to define appropriate mitigation that is consistent with, and complementary to, local plans for ecosystem restoration. Mitigation could be accomplished through a combination of site-specific actions, and more basin-wide or programmatic actions such as creating wider stream or riparian buffers, restoring native riparian areas, removing nonnative and invasive vegetation, supporting environmental education, and improving stormwater management.

Approved Mitigation Bank

Currently, there are no approved mitigation banks with service areas that include the subbasins in which wetland impacts would occur under the build alternatives. Although it is possible that a bank could become certified with service in the build alternative sites in the future, mitigation banking projects would take considerable lead time for planning and approval.

King County In-Lieu Fee Program (Mitigation Reserves Program)

King County has developed an in-lieu fee program called the Mitigation Reserves Program (MRP), which was approved by the Corps in March 2012 (King County 2013a). As of February 2012, the program is available throughout unincorporated King County. The program may be available to project proponents (such as Sound Transit) working within incorporated cities if the city codes allow it and if the city and King County have an agreement in place. However, as of February 2012, there are no such agreements in place (King County 2013b). The program includes service areas within the King County watersheds affected by the proposed project (i.e., Cedar River/Lake Washington and Sammamish River). Sound Transit would discuss this program with the Cities of Lynnwood and Bellevue to determine whether mitigation through the MRP would be appropriate for the proposed project.

Project-Specific Mitigation Developed by Sound Transit

Lacking an approved mitigation bank, and if agreements to use the King County Mitigation Reserves Program cannot be reached, Sound Transit would mitigate for unavoidable impacts through permittee-responsible, project-specific mitigation in accordance with the mitigation ratios specified in the Lynnwood and Bellevue CAOs and in accordance with the procedures outlined by Ecology and the Corps for selecting mitigation sites using a watershed approach (Hruby et al. 2009). Sound Transit would use the guidance from Ecology, the Corps, and EPA, in conjunction with each jurisdiction's critical areas mitigation ratio requirements, to determine the appropriate amount and types of compensatory mitigation to appropriately compensate for the specific functions and degree of functions provided by the types of wetland impacts (Hruby 2012).

Mitigation for Impacts Resulting from the Lynnwood Alternative

Specific compensatory mitigation sites for unavoidable impacts on wetlands (and other ecosystem resources) would be determined during final design and project permitting. Mitigation would be designed to compensate for impacts on wetland area and functions. The urbanized nature of the Scriber Creek basin limits the size and connectivity of potential mitigation sites to the Scriber Creek corridor. Currently identified opportunities include wetland and stream mitigation opportunities present in the Scriber Creek vicinity near the Lynnwood Transit Center. Mitigation opportunities exist on parcels that are under both public and private ownership, including parcels that could be acquired by Sound Transit because they intersect with areas needed for the Lynnwood Link Extension right-of-way. These mitigation opportunities may include wetland creation, restoration, or enhancement.

Mitigation for Impacts Resulting from the BNSF Alternative, BNSF Modified Alternative, and SR 520 Alternative

Specific compensatory mitigation sites for unavoidable impacts on wetlands (and other ecosystem resources) would be determined during final design and project permitting. Currently identified opportunities include the potential for improving fish passage within the Unnamed Tributary of Kelsey Creek and for completing wetland and stream mitigation in conjunction with the City's plans for daylighting and restoring portions of Goff Creek downstream of the SR 520 Alternative site and upstream of Bel-Red Road, and to remove fish passage as part of the city's vision for the Bel-Red corridor (City of Bellevue 2012). NGPA signage and native tree and shrub plantings around Wetland E3-3 indicate this area has potentially been the subject of compensatory stream or wetland mitigation in the past, which could complicate a determination of mitigation for impacts. However, Sound Transit would work with the City of Bellevue during final design and permitting to clarify this issue and determine appropriate mitigation. Mitigation for the SR 520 Alternative could also potentially include rerouting Goff Creek to a partially daylighted channel along the western and southern edges of the SR 520 Alternative site.

3.10 Water Resources

This section analyzes how the proposed project could affect water resources. The discussion addresses surface waters, stormwater, floodplains, and groundwater.

3.10.1 Introduction to Resources and Regulatory Requirements

The following laws, statutes, local ordinances, and guidelines address hydrology, water quality, drainage and flooding issues.

- National Pollutant Discharge Elimination System (NPDES) Permit Regulations and Permits
- Presidential Executive Orders 11988 and 11990
- Washington State Water Quality Standards
- The Washington State Department of Ecology (Ecology)'s *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology 2012)
- Washington State Department of Transportation (WSDOT) *Highway Runoff Manual* (Washington State Department of Transportation 2011)
- Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (HPA) requirements
- National Flood Insurance Protection Act
- Flood Disaster Protection Act
- Sections 401, 402, and 404 of the Clean Water Act (CWA)
- Section 10 of the Rivers and Harbors Act
- City and County floodplain, stormwater, and drainage regulations
- City and County critical areas ordinances
- City Shoreline Master Programs
- King County Industrial Waste Discharge Permit for discharge of operational process wastewater to the sanitary sewer

3.10.2 Methods

The study area for water resources consists of the stream and groundwater basins within which the build alternative sites are located. As part of the conceptual engineering prepared for the proposed project, a conceptual design was developed for the major stormwater detention and treatment facilities required for the build alternatives. In general, a conservative approach was taken when developing drainage concepts. Sound Transit applied the Western Washington Hydrology Model, developed by Ecology, to develop project hydrology and estimate facility sizing. Flow-control facilities were designed to achieve post-project stormwater flows equivalent to forested conditions,

as required by Ecology and the jurisdictions' municipal stormwater discharge permits. The potential for reduced flow control and treatment due to the presence of regional facilities was not accounted for at this stage of design. The potential for use of onsite low-impact development (LID) stormwater management techniques was not thoroughly investigated at this stage of design, because it requires detailed knowledge of site soil conditions which are not yet available. Preliminary observations and the preliminary geotechnical report suggest that opportunities for LID techniques may be limited due to soil and/or high groundwater conditions.

3.10.3 Affected Environment

All build alternative sites for the proposed project are located in Water Resources Inventory Area (WRIA) 8, the Cedar-Sammamish Watershed, as designated by Washington State Department of Natural Resources. Most of the basin areas occupied by the alternative sites are urbanized, with impervious surface cover ranging from approximately 50% to a high of approximately 77%. Notable features in the study area include the heavily developed corridors of Interstate 5 (I-5), Interstate 405 (I-405), and State Route 520 (SR 520) and surrounding suburban development.

The affected environment addresses the surface waters, stormwater, floodplains, and groundwater.

- **Surface Waters**. All four build alternative sites are located in WRIA 8, the Cedar-Sammamish Watershed. All of the surface streams identified here are part of stream systems that ultimately discharge to Lake Washington. Only those streams in the immediate vicinity of the build alternative sites are discussed here. Table 3.10-1 summarizes the surface water bodies in the study area that could be affected by the proposed project, including information related to designated uses, water quality impairments and flooding/drainage issues.

Table 3.10-1. Potentially Affected Surface Water Bodies in the Study Area

Surface Water Body	Relevant Alternative	Water Quality Impairments[a]	Flood Mapping
Scriber Creek	Lynnwood Alternative	None	Zone X, adjacent to Zone AE floodway
West Tributary of Kelsey Creek	Lynnwood Alternative (BNSF Storage Tracks), BNSF Alternative, BNSF Modified Alternative	None (impairments exist downstream in Kelsey Creek mainstem)	Zone X
Goff Creek	SR 520 Alternative	None	Zone X
Kelsey Creek	SR 520 Alternative	Dissolved oxygen, temperature, fecal coliform	Zone X
Valley Creek	SR 520 Alternative	None	Zone X

[a] Source: 2008 303d List, Category 5.

Designated uses for surface waters are established by Ecology and are used to define the applicable water quality standards for the surface water bodies. Each of the water bodies in the study area is designated by Ecology for the following uses: salmonid spawning, rearing, and migration; primary contact recreation; domestic, industrial, and agricultural water supply; stock watering; wildlife habitat; harvesting; commerce and navigation; boating; and aesthetic values (Washington Administrative Code [WAC] 173-201A-600).

Water-quality impaired surface water bodies are identified in the State's CWA Section 303(d) list, based on measurements of water quality in excess of or outside the range of the established water quality standards for a given parameter. Category 5 surface water bodies are those for which Ecology has determined that a Total Maximum Daily Load (TMDL) allocation must be developed. Under a TMDL, discharge limits for pollutants of concern would typically be applied in a discharger's permit, based on studies that determine the pollutant loading that a water body can sustain without causing violations of the water quality standards.

- **Stormwater.** Both the Cities of Lynnwood and Bellevue have active stormwater management regulations and programs. Ecology provides guidelines for stormwater management in its *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology 2005). Stormwater management design guidelines for Lynnwood and Bellevue are generally consistent with the manual, as required by the Phase II Municipal NPDES Storm Water Discharge Permit to which both cities are subject.
- **Floodplains.** Flood mapping information is compiled from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps adopted by the local jurisdictions, and available in digital data formats. The Zone X designation is for areas outside the 500-year floodplain; within the 500-year floodplain with average flooding depths less than 1 foot; or within the 100-year floodplain with average flooding depths less than 1 foot. The Zone AE designation means an area within the 100-year floodplain and for which the base flood elevation, or 100-year flood, has been established based on hydrologic/hydraulic studies.
- **Groundwater.** Groundwater levels are generally shallow, typical of a site adjacent to a stream/wetland complex. Glacial till underlies much of the area at shallow depth, and water infiltrates slowly through this material. It is not uncommon during the rainy season for groundwater to pond at the surface. During the drier summer months, groundwater plays a critical role in providing base flow to the streams in the area. Infiltration of stormwater runoff is an important source of groundwater recharge to shallow aquifers that sustain base flows in streams.

3.10.3.1 Lynnwood Alternative

Surface Waters

There are no surface water features in the Lynnwood Alternative site, with the exception of some wetlands. Nearby surface water features include Hall Lake to the southwest, Hall Creek which connects Hall Lake to Lake Ballinger farther south, and Scriber Creek to the northeast of the site,

which flows southeast out of Scriber Lake past the site. Both of these drainages discharge into Lake Washington: the outlet from Lake Ballinger continues as McAleer Creek and enters Lake Washington in Lake Forest Park. Scriber Creek flows to the southeast past the site before joining Swamp Creek, which continues south entering the Sammamish River in Kenmore a short distance from the Sammamish River mouth at Lake Washington. The Lynnwood Alternative site is located completely within the Scriber Creek basin, per the Snohomish County Swamp Creek Basin Plan (Snohomish County 2002).

The BNSF Storage Tracks is located in the same area as the BNSF Alternative and BNSF Modified Alternative, described in Section 3.10.3.2 (see Appendix E.3, *Ecosystems Technical Report*, for figures depicting the surface water bodies in the vicinity of the Lynnwood Alternative site).

Stormwater

All of the build alternative sites have existing storm drain infrastructure. Preliminary grading plans call for levels of cut and/or fill that may render use of existing stormwater infrastructure infeasible.

The Cities of Lynnwood and Bellevue operate stormwater systems that only collect and convey stormwater, not sanitary sewage. These stormwater systems discharge to the local streams. Urbanization in Lynnwood and Bellevue has changed many of the historical land uses, from forested areas to urban development. Higher peak-runoff flows and volumes and lower infiltration caused by impervious surfaces has resulted in stream channel and habitat alteration and degradation. To reduce the high flows that would otherwise occur in the streams, both cities operate systems of regional detention ponds and implement development regulations designed to protect the receiving waters. Runoff from developments constructed in the last 15 to 20 years generally receives treatment and detention prior to discharging into the cities' stormwater systems or into receiving waters. Regional systems may have the advantage of allowing new development to discharge stormwater to them with reduced independent stormwater detention and/or treatment requirements.

Floodplains

A portion of the Lynnwood Alternative site, north of 204th Street SW, is mapped as Zone X on the preliminary digital Flood Insurance Rate Map for Snohomish County (Map Number 53061C71310E, effective date November 8, 1999). This designation is for areas within the 500-year floodplain or the 100-year floodplain with average flooding depths less than 1 foot. The eastern part of the Lynnwood Alternative site is adjacent to the mapped floodway for Scriber Creek (Zone AE). The base flood elevation in the vicinity of the Lynnwood Alternative site is approximately 336 feet (NAVD 88).

Groundwater

The City of Lynnwood drinking water supply is provided from the City of Everett's Spada Lake Reservoir at the headwaters of the Sultan River. The Alderwood Water and Wastewater District pumps water, following treatment by the City of Everett, to the Lynnwood reservoirs for distribution. The Alderwood Water and Wastewater District also maintains a single artesian

well/spring located approximately 2.5 miles north of the Lynnwood Alternative site (Well #5, the 164th Street Artesian Well) as a service to residents who prefer to drink untreated water. The well is screened in the Intercity Aquifer over a depth range of 123 to 230 feet. The Lynnwood Alternative site is located outside of the city's Wellhead Protection Area and recharge area, as documented by the Washington State Department of Health.

3.10.3.2 BNSF Alternative and BNSF Modified Alternative

Surface Waters

The upper reaches of the West Tributary of Kelsey Creek flow north of the BNSF Alternative site and BNSF Modified Alternative site from west to east. The tributary, which has been channelized to follow street alignments, flows generally to the southeast into Kelsey Creek, which flows to the Mercer Slough and Lake Washington. (Refer to Appendix E.3 of this Draft EIS for figures depicting the surface water bodies in the vicinity of the BNSF Alternative and BNSF Modified Alternative sites.)

Stormwater

The affected environment regarding stormwater for the BNSF Alternative and BNSF Modified Alternative is the same as described for the Lynnwood Alternative.

Floodplains

FEMA 100-year floodplain maps are not available for the West Tributary of Kelsey Creek or Goff Creek in Bellevue, and there are no formally delineated floodplains in the vicinity of the build alternative sites. The BNSF Alternative and BNSF Modified Alternative sites are mapped in Zone X, outside of the 500-year floodplain of any surface water body (Map Number 53033C0368K).

Groundwater

The City of Bellevue does not use local groundwater resources as a drinking water supply source. Bellevue acquires its drinking water from the City of Seattle through the Cascade Water Alliance. Base flows in streams within Bellevue are supplied by relatively shallow groundwater resources, historically replenished by infiltration of rainfall. This process has been altered by development, which has resulted in increased runoff and reduced groundwater recharge. Stormwater/surface water management programs in Bellevue aim to promote rehabilitation of the local streams by, in part, reestablishing a more natural hydrologic regime.

Groundwater levels vary considerably throughout the build alternative sites. Glacial till underlies much of the area at shallow depth, and water infiltrates slowly through this material. It is not uncommon during the rainy season for groundwater to pond at the surface. During the drier summer months, groundwater plays a critical role in providing base flow to the streams in the area. For both cities, infiltration of stormwater runoff is an important source of groundwater recharge to shallow aquifers that sustain base flows in streams.

3.10.3.3 SR 520 Alternative

Surface Waters

The SR 520 Alternative site is located within three separate City of Bellevue drainage basins: Goff Creek, Kelsey Creek and Valley Creek. Refer to Appendix E.3 of this Draft EIS for figures depicting the surface water bodies in the vicinity of the SR 520 Alternative site.

Goff Creek traverses the SR 520 Alternative site from north to south east of 130th Avenue NE. Goff Creek is a salmonid-bearing tributary of Kelsey Creek, although a fish barrier downstream from the site, at Bel-Red Road, prevents access of anadromous salmonids to the alternative site reach. The 917-foot-long stream reach within the site varies in configuration between a piped channel (224 feet of the total length within the alternative site), a surface channel confined by 3- to 4-foot-high rock walls, and an unconfined channel flowing through landscaped lawn along NE 20th Street.

The central portion of the alternative site is part of the Kelsey Creek drainage basin that separates the Goff Creek basin from the Valley Creek basin. An unnamed, non-salmonid-bearing creek tributary to Kelsey Creek is present near the site, south of NE 20th Street. On the site itself, the stream is entirely conveyed in underground storm drain systems; there are no “daylight” segments of the stream onsite. The site storm drain system discharges to the municipal system, which conveys runoff to this unnamed tributary on the south side of NE 20th Street.

The eastern portion of the SR 520 Alternative site is located in the Valley Creek drainage basin. Surface water runoff from this parcel enters the municipal storm drain system along NE 20th Street, which discharges to Valley Creek.

Stormwater

The affected environment regarding stormwater for the SR 520 Alternative is the same as described for the Lynnwood Alternative.

Floodplains

FEMA 100-year floodplain maps are not available for the West Tributary of Kelsey Creek or Goff Creek in Bellevue, and there are no formally delineated floodplains in the vicinity of the build alternative site. As stated for the BNSF Alternative and BNSF Modified Alternative sites, the SR 520 Alternative site is mapped in Zone X, outside of the 500-year floodplain of any surface water body (Map Number 53033C0368K).

Groundwater

Groundwater for the SR 520 Alternative site is the same as described for the BNSF Alternative and BNSF Modified Alternative. In addition, there is evidence of a very shallow groundwater table (perhaps perched) near Goff Creek. During site visits, groundwater seepage was observed on the surface near the SR 520 embankment. This shallow groundwater may be a significant contributor of cool base flow to Goff Creek.

3.10.4 Environmental Impacts

3.10.4.1 No Build Alternative

Under the No Build Alternative, some redevelopment and new development in the study area would likely occur, according to current city planning. Such actions would have the similar potential to affect surface waters and groundwater as the build alternatives, depending on the actual redevelopment scenario. Stormwater detention and flow-control improvements would likely be delayed until future redevelopment occurred.

3.10.4.2 Impacts Common to All Build Alternatives

Construction Impacts

Potential construction impacts on water resources are similar for each of the build alternatives. The potential construction effects would be primarily on surface and groundwater quality.

Surface Water

Erosion of soil from areas disturbed during construction could adversely affect surface water quality through increases in turbidity, and could cause increased sedimentation in receiving streams. This latter effect could affect aquatic biota and change the geomorphology of a stream. The potential for erosion would be increased at the construction site because soils would be disturbed and directly exposed to the erosive effects of rainfall and surface water runoff.

Erosion and sedimentation could result from a variety of actions associated with construction, including, but not necessarily limited to, the following.

- Removing vegetation that exposes soil to erosion.
- Exposing soil by way of grading, filling, and excavating.
- Tracking soils onto roads and other impervious surface areas by vehicles.
- Constructing and clearing vegetation in or near wetlands, lakes, streams, or drainage courses.
- Grading that concentrates stormwater, increasing the erosive potential of runoff.
- Dewatering excavations such as pier foundations, trenches, and tunnels.

Aside from sediments, erosion could also result in the deposition of increased amounts of organic materials in surface water bodies. Such materials could cause decreases in dissolved oxygen in receiving waters, resulting in potential deleterious effects on aquatic life.

Typical chemical pollutants at the construction site could include fuels, oils, coolants, and other fluids associated with operating construction equipment. If these materials are spilled during handling or transfer, or released during line breaks or due to leaks, the potential effects would be impairments to surface water quality and increases in toxicity to aquatic life in the receiving water.

Runoff from concrete mixing, handling, pouring and newly poured concrete surfaces could pose an additional risk of chemical impacts. Runoff from such operations could have high pH levels, which could degrade water quality and be lethal to many forms of aquatic life including fish. In addition, concrete fines in runoff, could cause exceedance of turbidity standards.

For construction within and over streams or other water bodies, an HPA would be required from WDFW before work begins. The proposed project would comply with the HPA's stream-protection measures, including diverting streamflow around the construction area and limiting the construction period to the required work window, a period of the year identified in the HPA when fish would be minimally affected.

Stormwater

The total amount of ground disturbance during construction would be more than 1 acre for each build alternative; therefore, an NPDES general construction stormwater permit would be required for any of the build alternatives. One of the permit requirements is a project-specific construction stormwater pollution prevention plan (SWPPP). The SWPPP would be developed and implemented in accordance with the Sound Transit Environmental and Sustainability Management System and the permit requirements. This plan would include a temporary erosion and sediment control (TESC) plan, a spill control plan, and a hazardous materials management plan, and would also specify best management practices (BMPs) to be used during construction to minimize the potential for soil erosion and sedimentation and the release of pollutants to receiving surface waters or groundwater. Typical BMPs include the following.

- Minimizing the amount of cleared area at a construction site.
- Stabilizing construction entrances and haul roads using quarry spalls.
- Washing truck tires at construction entrances, as necessary.
- Constructing silt fences downslope from exposed soil.
- Protecting catch basins from sediment.
- Containing and controlling concrete and hazardous materials onsite.
- Installing temporary ditches to route runoff around or through construction sites, with periodic straw bales or rock check dams to slow runoff and settle suspended sediments.
- Providing temporary plastic, seeding or mulch to cover soil stockpiles and exposed soil.
- Using straw wattles to reduce the length of unbroken slopes and reduce concentration of runoff.
- Using temporary erosion control blankets or mulch on exposed steep slopes to reduce erosion before vegetation is established.
- Constructing temporary sedimentation ponds to remove solids from concentrated runoff and dewatering before being discharged.

- Conducting vehicle fueling and maintenance activities no closer than 100 feet from a water body or ditch.

The TESC plan also would include a water quality monitoring plan and a schedule for inspecting the erosion control measures for effectiveness. Water from dewatering activities would be treated to meet discharge requirements identified in the SWPPP or would be transported off site for proper disposal. Pavement slurry and residue from road cutting and grinding would be collected and properly disposed of offsite, and a concrete containment and disposal plan would be prepared. An Ecology-certified erosion and sediment control lead would be employed to conduct the inspections, and deficiencies would be promptly corrected. These measures would reduce the likelihood of causing excursions beyond water quality standards during construction.

Stormwater runoff would be tested, and if excessive levels of pH or turbidity are found, runoff would be treated before being released to storm sewers or a receiving water body. If discharge of treated construction or process water to a sanitary sewer is proposed, approval would be obtained from the King County Industrial Waste Division and the local jurisdiction.

During final design, opportunities for regional management of project stormwater and onsite control of stormwater runoff would be explored. The project design team would work with local jurisdictions to identify opportunities to incorporate LID features into the proposed project. Stormwater management and LID treatment principles would be favored over “traditional” stormwater treatment and applied wherever feasible, as required in the local jurisdiction’s NPDES permit.

Operational Impacts

All of the build alternatives present the potential for similar types of operational effects. All of the alternative sites have the potential to affect surface water quality and quantity, and by extension, stream habitat and groundwater quality and supply.

The scale of the potential impacts for comparison of the build alternatives can most easily be assessed by the increase in impervious surface area and the increase in pollutant-generating surfaces for each build alternative. Table 3.10-2 summarizes existing and proposed project impervious surface areas based on the current conceptual design. The proposed project limits would include the right-of-way for the OMSF lead track from the Eastside Rail Corridor, driveway access, the OMSF, and new parking lots.

Table 3.10-2. Existing and Proposed Impervious Surface Areas by Build Alternative

Alternative	Total Existing Impervious Area (acres)	Total Proposed Impervious Area (acres)	Total Change in Impervious Area (acres)	Total Impervious Area Increase (%)
Lynnwood Alternative[a]	30.3	40.9	10.6	35
BNSF Alternative	20.8	21.4	0.6	3
BNSF Modified Alternative	23.8	26.7	2.9	12
SR 520 Alternative	18.9	25.1	6.2	33

[a] Includes BNSF Storage Tracks in Bellevue.

Depending on the alternative, the proposed project would increase the amount of existing impervious surface area by approximately 1 to 11 acres. The alternative with the lowest absolute increase in impervious surface area is the BNSF Alternative. The Lynnwood Alternative would have the greatest increase in impervious surface area, based on the conceptual designs. The relatively large change in impervious area (an increase of 10.6 acres) for the Lynnwood Alternative compared to the other alternatives is mostly based on the conversion from pervious area to impervious track in the portion of the site south of the existing buildings.

Impervious surfaces can increase stormwater runoff rates, volumes, and pollutant loads. These, in turn, can cause higher flows and degraded water quality in receiving waters such as streams, lakes and wetlands. Impervious surfaces can also result in decreased infiltration and aquifer recharge, which can result in lower stream base flows essential to fish habitat and passage.

New impervious areas from the proposed project would include the OMSF building and tracks leading to the OMSF, roads, and parking areas. Ballasted (graveled) track sections were considered as impervious areas because of the high compaction and low permeability of the subsoils underlying the tracks, and as required by local drainage codes.

Existing impervious area measurements were obtained from reviewing recent aerial photography, as built design drawings, and Sound Transit survey data. The existing condition is important for comparison of impacts, but the flow-control standard requires matching historic (forested condition) flow parameters.

Project pollutant-generating impervious surface (PGIS) area would comprise primarily the OMSF, parking areas, and any roads that would need to be reconstructed following construction. PGIS would also include construction access roads, parking areas, equipment maintenance areas, and fuel and chemical transfer areas. Project trackways are typically considered non-PGIS, and only considered PGIS when combined with roadways, which carry pollutants from vehicular use. If collected and discharged separately from PGIS areas, runoff from the trackways would not require treatment. At this stage of conceptual design of the proposed project, the track runoff was assumed to be segregated from PGIS runoff and it, thus, would not require treatment. Treatment facility sizing is conservatively based on the co-mingling of all paved surfaces (not just PGIS paved surfaces). Stormwater runoff from PGIS would receive water quality treatment per the current treatment

standards. Table 3.10-3 summarizes condition PGIS based on the current conceptual design of the proposed project.

Table 3.10-3. Proposed Pollutant Generating Impervious Areas by Build Alternative

Alternative	Existing PGIS (acres)	Proposed PGIS (acres)	Change in PGIS (acres)	Change in PGIS (%)
Lynnwood Alternative	16.4	12.3	-4.1	-25
BNSF Alternative	11.1	8.8	-2.3	-21
BNSF Modified Alternative	13.6	12.4	-1.2	-9
SR 520 Alternative	13.3	10.9	-2.4	-18

The decrease in PGIS for all build alternatives reflects the conversion of existing PGIS pavement to non-PGIS trackway. By this conversion and by providing water quality treatment for the PGIS runoff, runoff water quality should be improved by the proposed project for each of the build alternatives.

Because all of the build alternatives are proposed at sites with existing commercial or industrial development, all of the build alternatives would present the opportunity to upgrade the sites to meet current stormwater quality and quantity management and groundwater protection standards.

3.10.4.3 Lynnwood Alternative

Construction Impacts

Construction activities in the Scriber Creek basin are expected to include some construction in the adjacent wetland and 100-year floodplain of Scriber Creek. Under Design Option C2 only, the lead track would span Scriber Creek near the junction with the elevated guideway. This overwater work would require an HPA from WDFW. However, the implementation of appropriate BMPs, as described in Appendix E.3, would prevent temporary impacts on surface-water resources during construction activities at the Lynnwood Alternative site.

Minimal temporary construction effects on water resources are expected from constructing the BNSF Storage Tracks in Bellevue (Kelsey Creek basin) due to the limited drainage features within the site, and the implementation of BMPs as previously described.

Overall, construction activities under this alternative would have a low risk of impacts on water resources because any temporary impact footprint would represent a minor portion of the overall drainage basins, and the implementation of construction BMPs.

Operational Impacts

In addition to the operational impacts stated in Section 3.10.4.2, Impacts Common to All Build Alternatives, all three design options of the Lynnwood Alternative would include potential operational impacts on floodplains due to placement of fill within the 100-year floodplain. In addition, under Design Option C2 only, support column footings would be placed within the 100-year floodplain. A floodplain analysis would be necessary to determine the necessity for and extent of mitigation methods, such as compensatory floodplain storage.

The current conceptual design for the Lynnwood Alternative shows an area of approximately 1 acre that would result in fill in Zone X. Zone X refers to areas within the 500-year floodplain, or within the 100-year floodplain with flood depths less than 1 foot. The quantity of fill in the 100-year floodplain in the conceptual design for the OMSF itself is approximately 1,000 cubic yards under all three design options. A detailed survey would be needed to both map the floodplain at the site and to determine precise floodplain fill quantities. Under Design Option C2 only, and as noted above, column footings for the lead track would be placed in the Zone AE floodway. The quantity of fill required would depend on footing and column design, but is conservatively estimated at 100 cubic yards. For Option C2 only, the total floodplain fill is estimated at 1,100 cubic yards. The OMSF facility itself is shown adjacent to Zone AE. No fill in Zone AE is likely per the conceptual design; however, this interpretation would need to be confirmed by a detailed survey.

3.10.4.4 BNSF Alternative and BNSF Modified Alternative

Construction Impacts

Construction impacts for the BNSF Alternative and BNSF Modified Alternative would be the same as those discussed in Section 3.10.4.2, Impacts Common to All Build Alternatives, and would not include in-water or over-water work. Thus, an HPA would not be required.

Operational Impacts

There would be no operational impacts on water resources, including floodplains, under the BNSF Alternative and BNSF Modified Alternative beyond those described in Section 3.10.4.2, Impacts Common to All Build Alternatives.

3.10.4.5 SR 520 Alternative

Construction Impacts

Constructing the SR 520 Alternative would require temporary rerouting and/or piping of Goff Creek to bypass the site, which would require an HPA. The temporary rerouting would likely be accomplished by collecting and pumping Goff Creek flow to a downstream discharge point. Disturbance in and work below the Ordinary High Water Mark (OHWM) of a stream would carry a higher risk of release of sediment downstream compared to work outside and above the OHWM.

Temporarily rerouting the creek would occur within the permitted work window during the summer when flows in the stream are extremely low. After construction of the piped stream conveyance shown in the conceptual design, the stream would be diverted to the new pipe from the temporary route.

Operational Impacts

Under the SR 520 Alternative, Goff Creek would be placed in a pipe beneath the site. Depending on final design grading of the site, the shallow groundwater observed at the site may need to be collected (via trench drains, for example) and drained directly to a stormwater conveyance or to Goff Creek. This could affect the shallow groundwater hydrology and change the timing of delivery

of groundwater to Goff Creek and the downstream stream system. If such a drainage system were installed, less groundwater may be available to provide baseflow during low streamflow periods. There would be no impacts on floodplains under this alternative.

3.10.5 Indirect and Cumulative Impacts

No indirect impacts related to water resources would result from construction and operation of the proposed project.

Historical development throughout Puget Sound has resulted in substantial changes to area drainage basins, including substantial changes in water quality and quantity in the Kelsey Creek and Scriber Creek basins. Logging and land clearing has resulted in sedimentation increases in area streams and lakes. Pesticides and fertilizers from previous farming practices and more recent landscape maintenance activities have contributed to the contamination of runoff entering area surface waters. In addition, substantial increases in impervious surface area, as well as PGIS, have increased overall runoff volumes and contaminant loading to area surface waters.

These past and ongoing actions have resulted in degraded water quality in many of the water bodies in the study area. A 25-year (1979–2004) trend analysis of the Kelsey Creek basin showed some changes in the water quality, including substantial increases in water temperatures and conductivity (King County 2013). Other water quality impacts include a decrease in dissolved oxygen and pH, and an increase in nitrate-nitrogen. Similar changes are likely to have also occurred in the Scriber Creek basin.

The Lynnwood Link Extension and East Link projects are anticipated to have similar impacts on water resources within the drainage basins of the OMSF build alternative sites. None of these potential impacts are anticipated to be adverse. The proposed project and other reasonably foreseeable future actions would be required to mitigate impacts on surface and groundwater in accordance with federal, state, and local regulations. This mitigation would include providing water quality treatment and flow control for impervious surfaces that currently receive no treatment and little or no flow control. Current regulations for runoff from new development or redevelopment projects aim to improve conditions to approach predevelopment conditions. Therefore, small improvements in water quality are expected to occur over time, with or without the proposed OMSF project.

3.10.6 Potential Mitigation Measures

A number of regulatory requirements for addressing water resource impacts would be part of the proposed project design. Where the alternatives would result in impacts after the application of design measures (i.e., stormwater management BMPs, flood hazard mitigation) included in the proposed project design, further mitigation would be necessary. Flood hazard mitigation would be required for the Lynnwood Alternative, due to placement of fill within the 100-year floodplain. The extent and nature of mitigation would be determined on the basis of a detailed floodplain delineation and flood study. Because FEMA floodplain maps are approximate, the detailed delineation would include a survey that maps the regulatory flood elevation on the project site. The flood study would evaluate the proposed project's impacts on flood elevations and mitigation

measures such as compensatory flood storage, to avoid increases in base flood elevation greater than 1 foot (Lynnwood Municipal Code [LMC] 16.46).

For all alternatives that include cut or fill walls, wall drainage systems would be provided to maintain the existing shallow groundwater flow patterns to the adjacent wetlands and streams, which would help sustain wetland hydrology and support base flows in streams.