

Attachment E2
Noise Technical Memorandum–SR 520



Prepared for: Jodi Ketelsen
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Date: November 4, 2012
Subject: Noise Modeling Results: NE 51st Street to NE 65th Street
Project: East Link Project

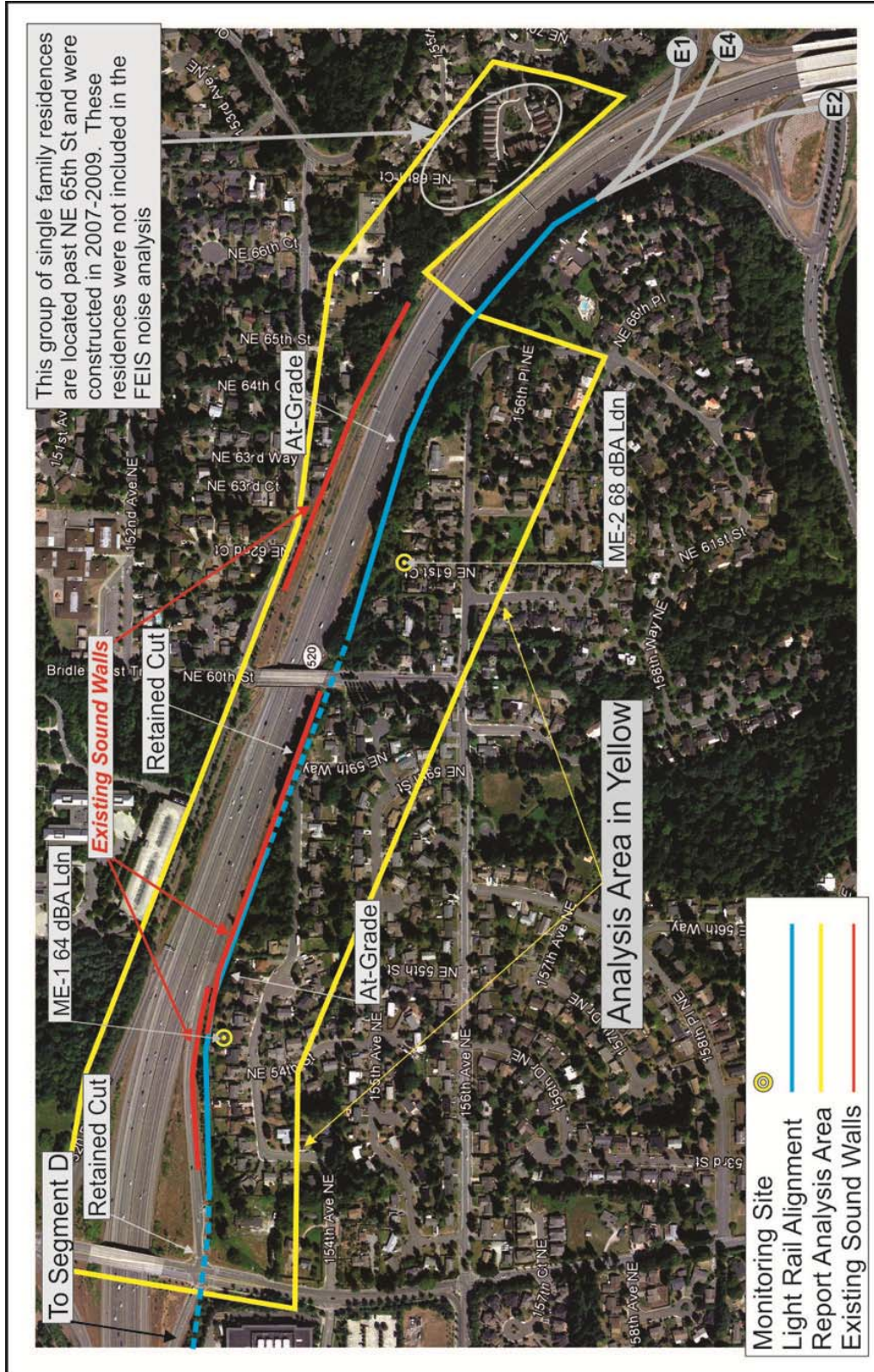
This memorandum summarizes the results of the noise analysis for the residential area the is approximately between NE 51st Street and NE 65th Street, adjacent to SR 520, for the East Link Project, Segment E. The results from this analysis are valid for all Segment E Alternatives between NE 51st Street and NE 65th Street. North of NE 65th Street the noise analysis results are provided in the *Noise and Vibration Technical Report*, Sound Transit East Link Project, July 2011. Figure 1 is an aerial view showing the analysis area along with the two noise monitoring locations used in this analysis, ME-1 and ME-2. Table 1 provides a summary of the findings of this study. As shown, the number of impacts varies by alternative for residences on the west side of SR 520. The slight variation in noise impacts is because each of the alignments transitions to an elevated profile at different locations, and an elevated alignment is slightly louder than an at-grade alignment.

Alternative	East Side of SR 520		West Side of SR 520		Total Impacts	
	Moderate	Severe	Moderate	Severe	Moderate	Severe
<i>Preferred E2</i>	21	7	6	0	27	7
E1	21	7	10	0	31	7
E4	21	7	13	0	34	7

This study addresses the following areas:

- This study is primarily concerned with homes between NE 51st Street and NE 65th Street on the east side of SR 520. Many of the homes along the east side of SR 520 are behind existing sound walls and construction of the project would require the removal and replacement of some, or all, of the sound walls on the east side of SR 520.
- In addition to the homes on the east side of SR 520, the analysis also considered potential noise impacts at residences on the west side of SR 520. Many of the homes along the west side of SR 520 are also behind existing sound walls. However, the upper floors of some of these homes are visible over the top of the sound wall. For these sites, the upper floor sleeping areas were also analyzed for noise impacts assuming no additional noise reduction from the existing sound walls.
- There is a new residential development on the west side of SR 520, along 156th Place NE that is included in this study. These homes were constructed between 2007 and 2009 after the EIS was in progress. The existing Ldn for these sites was estimated using measured data from other nearby monitoring locations, and additional measurements should be taken to confirm impacts before applying any noise mitigation.

Figure 1. Area Overview, Monitoring Locations and New Development



- There are also three lots on the east side of SR 520, along 156th Avenue NE (parcel numbers 1451, 1453, and 1471), which were not included in the FEIS analysis. A single family home has been constructed on each of these lots since the FEIS analysis and, therefore, they are included in this study. These homes account for one new moderate impact (at parcel number 1453).

Introduction to Noise

Noise is defined as unwanted sound; it is measured in terms of sound pressure level and is usually expressed in decibels (dB). The human ear is less sensitive to higher and lower frequencies than it is to midrange frequencies. The A-weighting system was developed to provide a measurement meaningful to humans, which reduces the sound level of higher and lower frequency sounds. This filtering system is used in virtually all noise ordinances. Measurements taken with this “A weighted” filter are referred to as “dBA” readings.

There are two primary noise measurement descriptors that are used to assess noise impacts from traffic and transit projects, the Leq and the Ldn, described below:

- **Leq:** The equivalent sound level (Leq) is the level of a constant sound for a specified time period that has the same sound energy as an actual fluctuating noise over the same period of time. The peak-hour Leq is used for all traffic and light rail noise analyses at locations with daytime use, such as schools and libraries.
- **Ldn:** The day-night sound level (Ldn) is a Leq over a 24-hour period, with 10 dBA added to nighttime sound levels (between 10 p.m. and 7 a.m.) as a penalty to account for the greater sensitivity and lower background sound levels during this time.

Noise Criteria

Noise impacts for the East Link Project are based on the criteria defined in the FTA guidance manual Transit Noise and Vibration Impact Assessment (2006). The FTA noise impact criteria are founded on well-documented research of community reaction to noise and are based on changes in noise levels using a sliding scale. Although more transit noise is allowed in neighborhoods with high levels of existing noise, as existing noise levels increase, smaller increases in total noise exposure are allowed than in areas with lower existing noise levels.

FTA’s noise impact criteria are grouped into the following noise-sensitive land use categories:

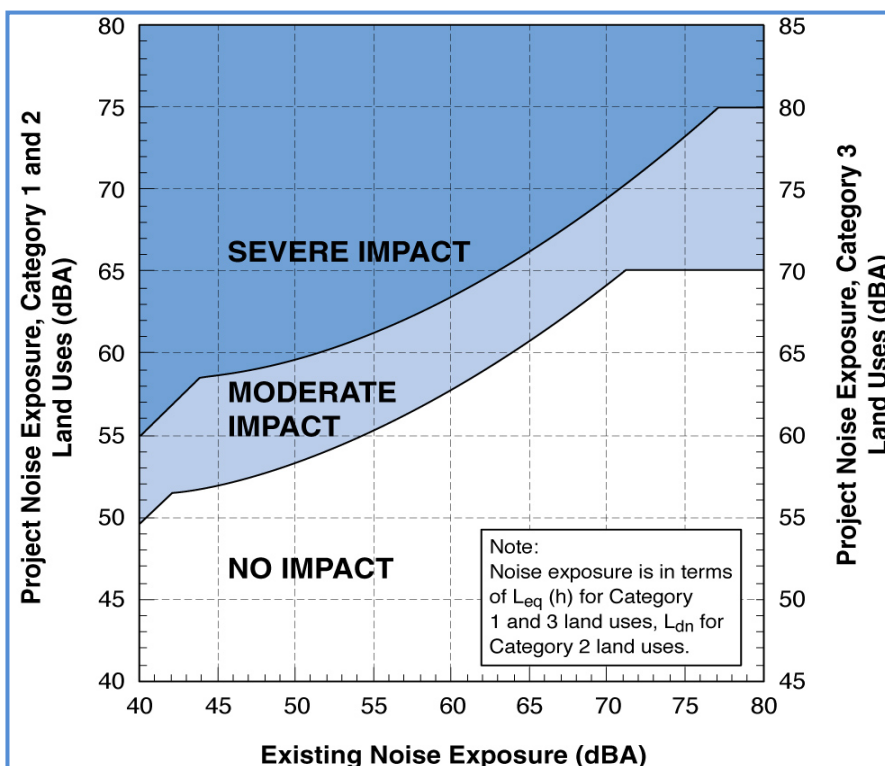
- **Category 1:** Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included 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 can also be considered to be in this category. Certain historical sites and parks are also included.

The Ldn is used to characterize noise exposure for residential areas (Category 2). For other noise-sensitive land uses, such as churches school buildings (Categories 1 and 3), the maximum 1 hour Leq during the facility's operating period is used. There are two levels of impact included in the FTA criteria; the interpretation of these two levels of impact is summarized below:

- **Severe impact:** Project-generated noise in the severe impact range can be expected to cause a substantial 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 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 might 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 noise level, the predicted 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.

Figure 2 depicts the FTA noise impact criteria, as well as the existing noise exposure and the additional noise exposure from a transit project that would cause either moderate or severe impacts. The future noise exposure is determined by combining the existing noise exposure and the additional noise exposure caused by a transit project.

Figure 2. FTA Noise Impact Criteria



Analysis Assumptions

Noise from East Link operations was modeled using the methods described in FTA's Transit Noise and Vibration Assessment Manual (2006). Input to the model included the following assumptions:

- Measured reference noise levels for a single light rail vehicle equipped with wheel skirts range from 78 to 79 dBA at 50 feet at 40 mph.
- Operations assume three-car trains with 7-minute headways during peak hours, 10-minute headways during midday and early evening, and 15-minute headways during late evening, nighttime, and early morning hours
- Speed through this area was modeled at 50 MPH.
- Elevations of sensitive properties and any shielding or other topographical features that could affect noise transmission.
- Plan, profile, and track type for this area includes retained cut and at-grade profiles, transitioning to an elevated profile north of NE 65th Street. Ballast and tie track was assumed until the alignment transitions to an elevated profile.
- Because there is no station or at-grade crossing, the train-mounted bells would not be used except in an emergency and therefore were not included in the study
- Wheel squeal can occur on curves with a radius of less than 600 feet, and under Alternatives E1 and E4 lubrication could be used to reduce any squeal that may occur on the curves towards West Lake Sammamish Parkway NE. *Preferred Alternative E2* has no curves with radius of less than 1,200 feet in this area, and therefore no wheel squeal would be predicted.

The procedure used to evaluate the impacts of the project alternatives is based upon the change in the noise level that would be caused by each alternative and the number of dwelling units potentially affected by project noise. For this analysis, attenuation from the noise-reducing effects of ground coverage was not included, and all front-line receivers were assumed to have a line-of-sight view of the light rail trackway unless the trackway was in a retained cut or was located on the far side of an existing noise wall from the receivers, directly shielding the receptor from the tracks. This conservative methodology ensures that all potential noise impacts would be identified. This method is consistent with the FTA Transit Noise and Vibration Manual.

Noise Impacts

For the purpose of discussing potential noise impacts, the study area was divided into east and west sides of SR 520. All noise sensitive land uses in the study area are single family residential. There are two residences displaced with the project, both of which are near the intersection of 154th Avenue NE and NE 59th Way. One home is displaced due to the roadway realignment, and the second is simply too close to the alignment near the retained cut under NE 60th Street. Complete detailed tables with noise projections are provided in Attachment 1 and a discussion of the impacts along with figures are provided below.

Light Rail Noise Impacts: East Side of SR 520

Along the east side of SR 520 noise levels were projected for 60 single family residences. While the existing sound wall along SR 520 between receiver 1146 and NE 60th Street

would be removed for project construction, it was assumed for purposes of this study that the removed wall would be replaced with a new wall that is at least as effective at reducing SR 520 traffic noise. The noise reducing effects of this new sound wall on light rail noise is included in this analysis. The existing short sound wall along the NE 51st Street on-ramp to SR 520 would be unaffected by construction and would remain in place. Under this assumption, the study identified 21 moderate impacts and 7 severe impacts to single family residences on the east side of SR 520. All of the severe impacts are at receivers that are located in the area where the alignment is between the residences and the existing short sound wall along the NE 51st Street on-ramp to SR 520. It is also important to note that receiver 1098 is only one dB below the severe impact criteria because the house is slightly farther from the tracks than other homes in this area.

The impacts are shown on Figures 3 through 5. Also shown on these figures are the existing sound walls and the sites where the project would result in the existing sound wall being removed and replaced.

Light Rail Noise Impacts: West Side of SR 520

On the west side of SR 520 there are two distinct groups of homes analyzed, the first group includes eight homes along 154th Avenue NE, south of a power substation, that have a sound wall protecting them from traffic noise on SR 520. Although most of the homes are single story, and fully shielded from SR 520 and the light rail by the sound wall, there are three two-story homes where the upper floor windows are clearly visible from the highway, and therefore also from the light rail alignment. These three homes, 1433, 1446 and 1501 were identified with moderate noise impacts, but only at the upper floors (see Figure 4).

Because these homes just meet the moderate impact criteria, prior to providing any noise mitigation, it is recommended that existing noise levels for these homes be measured. If the noise levels at these upper floors are higher than the 64 dBA Ldn used in the analysis, impacts may not occur. These impacts are shown on Figure 4.

The second group of homes on the west side of SR 520 were constructed between 2007 and 2009, and were not included in the FEIS. Furthermore, these homes are not protected from existing SR 520 traffic noise by any sound wall or berm. The ambient noise levels for these homes were also taken from measured levels on the east side of SR 520, using site ME-2 (see Figure 1). Finally, because these homes are located near the transition to an elevated profile, the number of impacts varies with alternative. *Preferred Alternative E2*, which transitions to an elevated profile the farthest north of the three Segment E alternatives, only had three moderate noise impacts. Alternative E1, which transitions to an elevated profile directly across from the last home in this area, identified seven moderate noise impacts. Finally, Alternative E4, which transitions to an elevated profile the farthest south of the three Segment E alternatives, has ten moderate noise impacts. Again, ambient noise monitoring in this area is recommended prior to application of any noise mitigation measures. Noise impacts for this area by alternative, along with the location of the transition to an elevated profile, are shown on Figure 5.

Noise Mitigation

Noise Mitigation for the East Side of SR 520

All noise impacts identified could be mitigated with sound walls, or a combination of sound walls and building sound insulation. Noise impacts for the receivers between NE 51st Street and NE 60th Street could be mitigated with a sound wall along the east side of the trackbed,

beginning at the retained cut under NE 51st Street, and ending at the retained cut at NE 60th Street. This wall would also be designed to mitigate the traffic noise from SR 520, as it would be the replacement for the removal of the existing sound wall. The wall would be approximately 2,050 feet long, with the height determined by modeling the traffic noise on SR 520. The minimum wall height would be around 6 feet, with maximum heights estimated at 12 to 18 feet.

North of NE 60th Street, a second wall could be installed to mitigate the impacts in this area. The wall length would vary depending on alternative, and would likely be integrated with the sound wall on the elevated guideway described in the FEIS. The wall would begin near NE 60th Street, and continue on top of any retaining walls, ending at the transition to the elevated structure, where it would overlap with the sound wall on the elevated guideway. Under *Preferred Alternative E2* the wall would be approximately 2,280 feet long, under Alternative E1 the wall would be approximately 2,180 feet long, and Alternative E4 the wall would be approximately 2,030 feet long. The wall heights would be determined during final design, but heights of 4 to 8 feet are expected, as the light rail noise comes from the wheel rail interface, which near ground level.

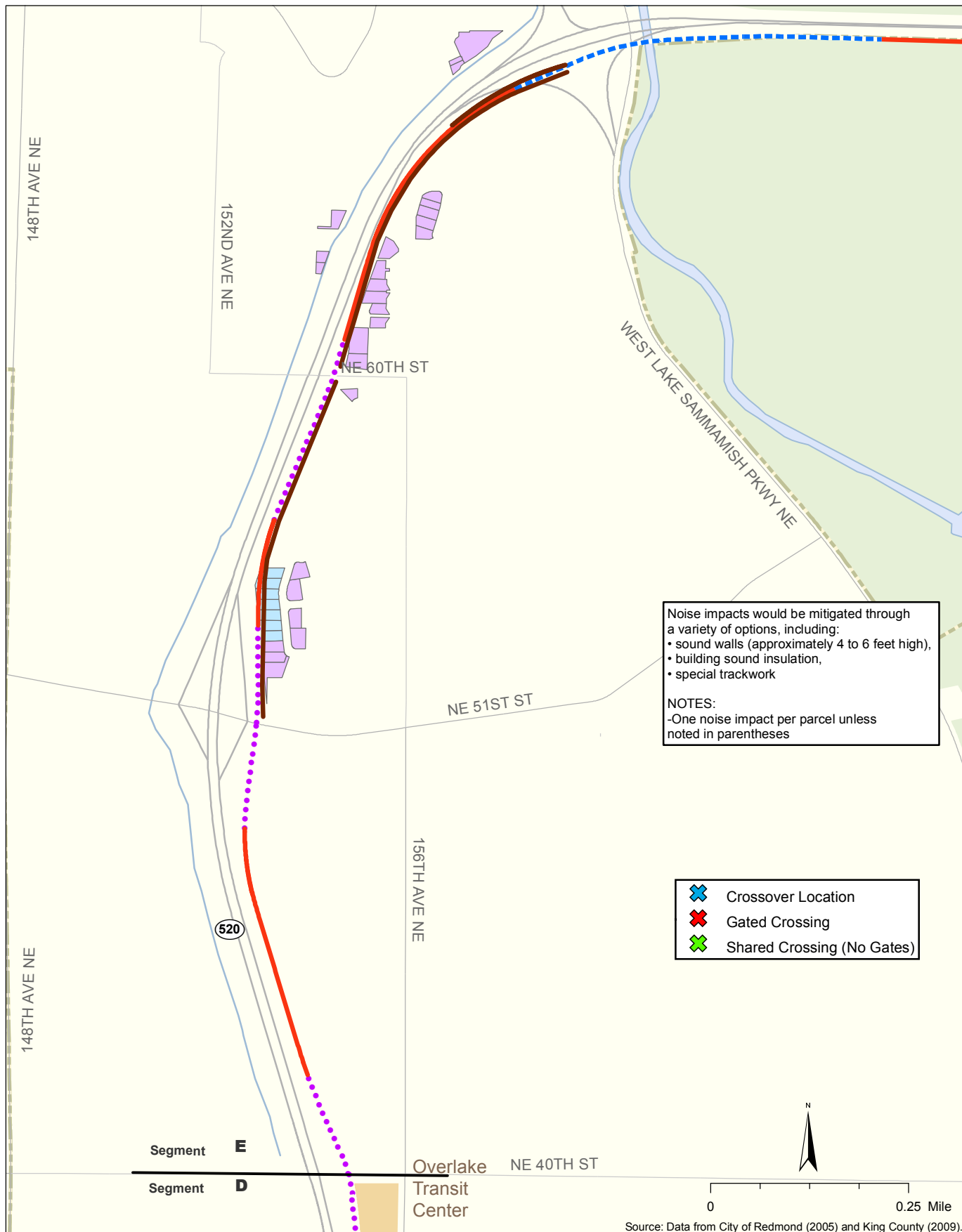
Noise Mitigation for the West Side of SR 520

Noise impacts at the three upper floors at receivers 1433, 1446 and 1501 could be mitigated with building sound insulation. A second option would be to install a 6 to 8 foot tall sound wall along the west side of the tracks for approximately 1,200 to 1,300 feet. One item to consider with the sound wall option would be residents complaining about reflected traffic noise, so it may be necessary to make the west side of the wall sound absorptive.

For receivers located in the new development shown on Figure 5, sound walls along the west side of the tracks, a sound wall near the residences, or building sound insulation are all options to consider in this area. Extending the sound wall described above for receivers 1433, 1446 and 1501 to also provide mitigation for these residences would mean increasing the wall length to approximately 2,400 feet, including continuing the wall along the elevated guideway. This would also provide noise mitigation for this area.

Summary

The number of noise impacts would vary by alternative. There would be 27 moderate and 7 severe impacts under *Preferred Alternative E2*, 31 moderate and 7 severe impacts under Alternative E1, and 34 moderate and 7 severe impacts under Alternative E4. All impacts could be mitigated with sound walls, or a combination of sound walls and building sound insulation. Prior to finalizing the impacts and mitigation, ambient noise level readings should be taken at 2 to 4 sites on the west side of SR 520. Also, because some or all of an existing sound wall would be removed to accommodate the project, a traffic noise study may also be required.



Noise impacts would be mitigated through a variety of options, including:

- sound walls (approximately 4 to 6 feet high),
- building sound insulation,
- special trackwork

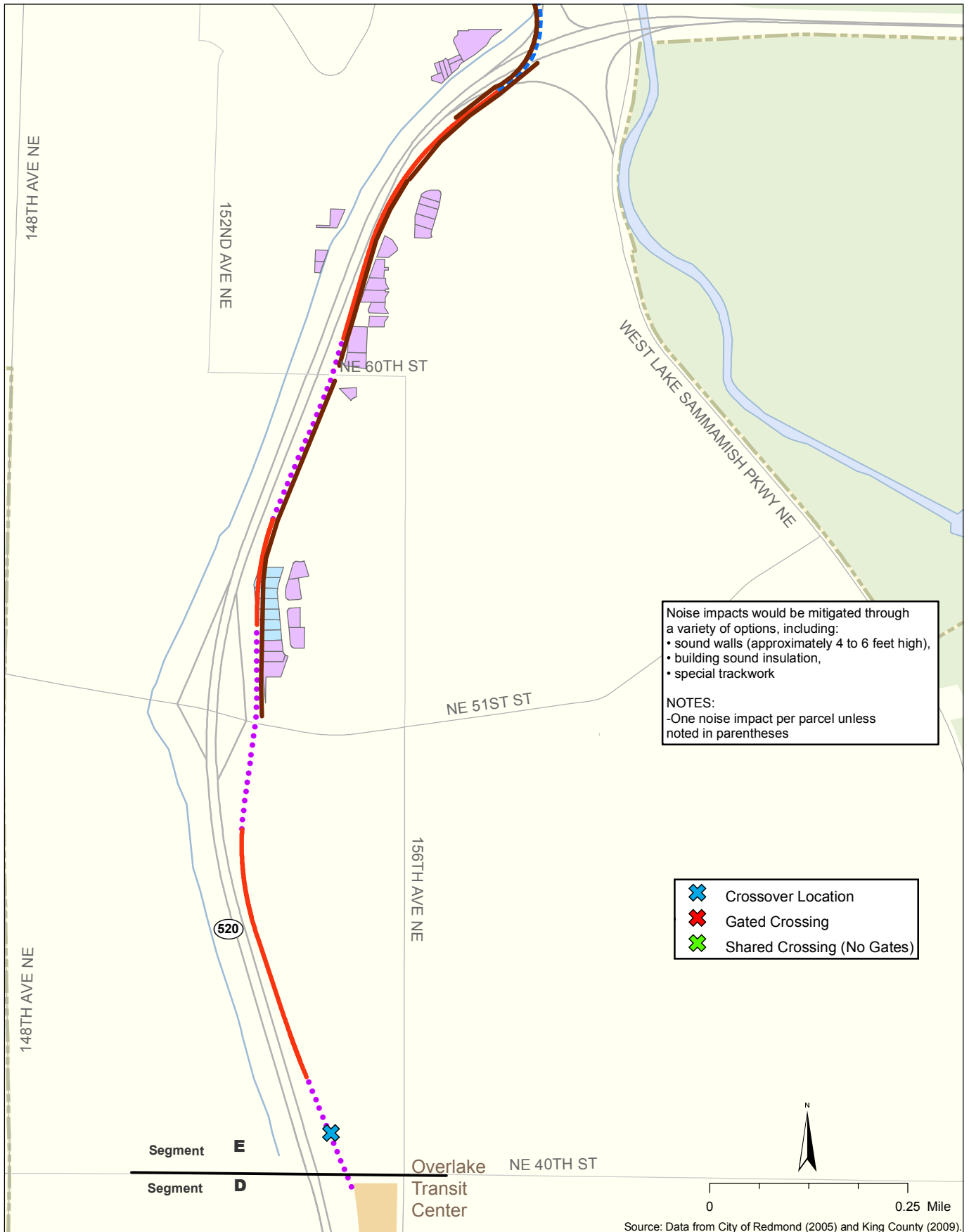
NOTES:
 -One noise impact per parcel unless noted in parentheses

- Crossover Location
- Gated Crossing
- Shared Crossing (No Gates)

- | | | |
|---------------------|---------------------------------------|------------------------------|
| At-Grade Route | Proposed Station | Moderate |
| Elevated Route | Maintenance Facility and Access Track | Severe |
| Retained-Cut Route | New and/or Expanded Park-and-Ride Lot | Proposed Sound Wall Location |
| Retained-Fill Route | | |
| Tunnel Route | | |

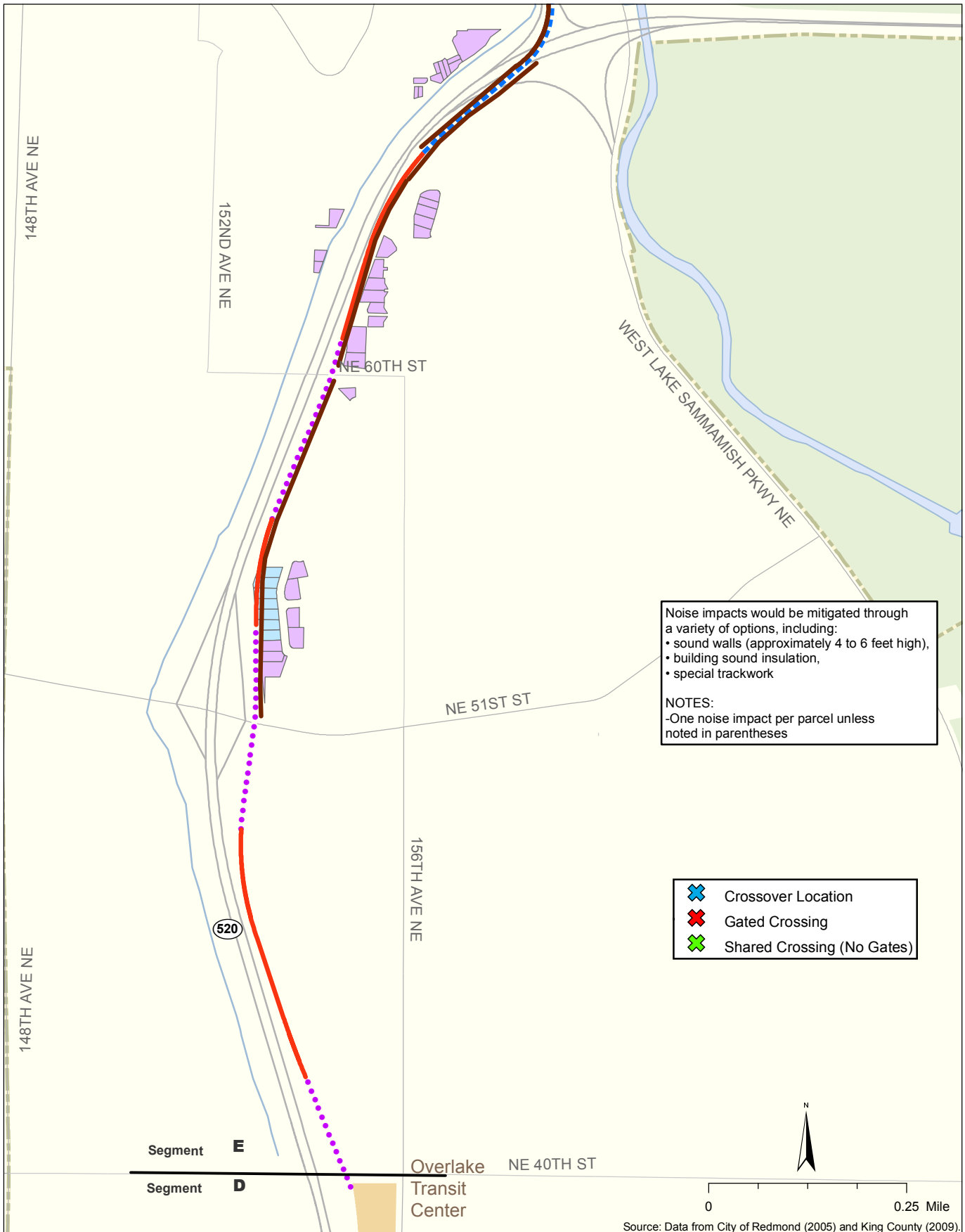
Figure 3
Noise Impacts
Segment E, Alternative E2
 Segment E Revised Noise Analysis
 East Link Project

Source: Data from City of Redmond (2005) and King County (2009).



- | | | |
|---------------------|---------------------------------------|------------------------------|
| At-Grade Route | Proposed Station | Moderate |
| Elevated Route | Maintenance Facility and Access Track | Severe |
| Retained-Cut Route | New and/or Expanded Park-and-Ride Lot | Proposed Sound Wall Location |
| Retained-Fill Route | | |
| Tunnel Route | | |

Figure 4
Noise Impacts
Segment E, Alternative E1
 Segment E Revised Noise Analysis
 East Link Project



Noise impacts would be mitigated through a variety of options, including:

- sound walls (approximately 4 to 6 feet high),
- building sound insulation,
- special trackwork

NOTES:
-One noise impact per parcel unless noted in parentheses

- Crossover Location
- Gated Crossing
- Shared Crossing (No Gates)

- | | | |
|---------------------|---------------------------------------|------------------------------|
| At-Grade Route | Proposed Station | Moderate |
| Elevated Route | Maintenance Facility and Access Track | Severe |
| Retained-Cut Route | New and/or Expanded Park-and-Ride Lot | Proposed Sound Wall Location |
| Retained-Fill Route | | |
| Tunnel Route | | |

Figure 5
Noise Impacts
Segment E, Alternative E4
 Segment E Revised Noise Analysis
 East Link Project

Source: Data from City of Redmond (2005) and King County (2009).

Noise Impact and Mitigation Details: East Link Light Rail																	
Receiver and Data Input Section						Impact Analysis						Project Mitigation					
Parcel #, Description, Existing Noise Levels and FTA Category						Project		Analysis		FTA Criteria		Number		Type of mitigation proposed			Mitigated
Area	Parcel	Description	Units	Ldn/Leq	FTA-CAT	Ldn/Leq	Type	Mod	Sev	Mod	Sev	Sound Wall	X-Over	Insulation	Ldn/Leq		
NE 51st Street to NE 59th Way																	
	1063	SF Residence on 51st	1	66	2	52	Ldn	62	68	--	--	No Wall	N/A	No	52		
	1064	SF Residence on 51st/SR520	1	66	2	60	Ldn	62	68	--	--	No Wall	N/A	No	60		
	1087	SF Residence on 154th Ave	1	60	2	50	Ldn	58	64	--	--	No Wall	N/A	No	50		
	1083	SF Residence on 154th Ave	1	62	2	54	Ldn	59	65	--	--	Potential Sound Wall	N/A	No	48		
	1077	SF Residence on 154th Ave	1	64	2	61	Ldn	61	66	1	--	Potential Sound Wall	N/A	No	55		
	1091	SF Residence on 154th Ave	1	64	2	63	Ldn	61	66	1	--	Potential Sound Wall	N/A	No	57		
	1098	SF Residence on 154th Ave	1	64	2	65	Ldn	61	66	1	--	Potential Sound Wall	N/A	No	59		
	1109	SF Residence on 154th Ave	1	64	2	66	Ldn	61	66	--	1	Potential Sound Wall	N/A	No	60		
	1115	SF Residence on 154th Ave	1	64	2	66	Ldn	61	66	--	1	Potential Sound Wall	N/A	No	59		
	1124	SF Residence on 154th Ave	1	64	2	66	Ldn	61	66	--	1	Potential Sound Wall	N/A	No	58		
	1131	SF Residence on 154th Ave	1	64	2	68	Ldn	61	66	--	1	Potential Sound Wall	N/A	No	59		
	1134	SF Residence on 154th Ave	1	64	2	68	Ldn	61	66	--	1	Potential Sound Wall	N/A	No	59		
	1142	SF Residence on 154th Ave	1	64	2	66	Ldn	61	66	--	1	Potential Sound Wall	N/A	No	57		
	1146	SF Residence on 154th Ave	1	64	2	66	Ldn	61	66	--	1	Potential Sound Wall	N/A	No	59		
	1152	SF Residence on 154th Ave	1	64	2	58	Ldn	61	66	--	--	Replacement Wall	N/A	No	58		
	1155	SF Residence on 154th Ave	1	64	2	66	Ldn	61	66	--	--	Replacement Wall	N/A	No	59		
	1163	SF Residence on 154th Ave	1	64	2	58	Ldn	61	66	--	--	Replacement Wall	N/A	No	58		
	1171	SF Residence on 154th Ave	1	64	2	57	Ldn	61	66	--	--	Replacement Wall	N/A	No	57		
NE 51st Street to NE 59th Way - east of 154th																	
	1104	SF Residence eastside of 154th Ave	1	60	2	58	Ldn	58	64	1	--	Potential Sound Wall	N/A	No	51		
	1119	SF Residence eastside of 154th Ave	1	60	2	58	Ldn	58	64	1	--	Potential Sound Wall	N/A	No	51		
	1139	SF Residence eastside of 154th Ave	1	60	2	59	Ldn	58	64	1	--	Potential Sound Wall	N/A	No	52		
	1150	SF Residence eastside of 154th Ave	1	60	2	58	Ldn	58	64	1	--	Potential Sound Wall	N/A	No	51		
	1153	SF Residence eastside of 154th Ave	1	60	2	57	Ldn	58	64	--	--	Potential Sound Wall	N/A	No	50		
	1162	SF Residence eastside of 154th Ave	1	61	2	57	Ldn	59	65	--	--	Potential Sound Wall	N/A	No	50		
	1174	SF Residence eastside of 154th Ave	1	61	2	57	Ldn	59	65	--	--	Potential Sound Wall	N/A	No	50		
	1183	SF Residence eastside of 154th Ave	1	61	2	54	Ldn	59	65	--	--	Replacement Wall	N/A	No	54		
	1194	SF Residence eastside of 154th Ave	1	61	2	54	Ldn	59	65	--	--	Replacement Wall	N/A	No	54		
	1201	SF Residence eastside of 154th Ave	1	62	2	55	Ldn	59	65	--	--	Replacement Wall	N/A	No	55		
	1211	SF Residence eastside of 154th Ave	1	62	2	56	Ldn	59	65	--	--	Replacement Wall	N/A	No	56		
	1219	SF Residence eastside of 154th Ave	1	62	2	57	Ldn	59	65	--	--	Replacement Wall	N/A	No	57		
	1233	SF Residence eastside of 154th Ave	1	64	2	58	Ldn	61	66	--	--	Replacement Wall	N/A	No	58		
	1240	SF Residence eastside of 154th Ave	1	64	2	58	Ldn	61	66	--	--	Replacement Wall	N/A	No	58		
NE 59th Way to NE 60th Overpass																	
	1267	SF Residence eastside of 154th Ave	1	64	2	60	Ldn	61	66	--	--	Replacement Wall	N/A	No	60		
	1271	SF Residence eastside of 154th Ave	1	62	2	53	Ldn	59	65	--	--	Replacement Wall	N/A	No	53		
	1279	SF Residence eastside of 154th Ave	1	62	2	52	Ldn	59	65	--	--	Replacement Wall	N/A	No	52		
	1286	SF Residence eastside of 154th Ave	1	62	2	59	Ldn	59	65	1	--	Potential Sound Wall	N/A	No	52		

Noise Impact and Mitigation Details: East Link Light Rail																	
Receiver and Data Input Section						Impact Analysis						Project Mitigation					
Parcel #, Description, Existing Noise Levels and FTA Category						Project		Analysis		FTA Criteria		Number		Type of mitigation proposed			Mitigated
Area	Parcel	Description	Units	Ldn/Leq	FTA-CAT	Ldn/Leq	Type	Mod	Sev	Mod	Sev	Sound Wall	X-Over	Insulation	Ldn/Leq		
North of NE 60th St to NE 65th																	
	1319	SF residence on NE 60th	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	56		
	1345	SF Residence	1	68	2	67	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	60		
	1327	SF residence	1	66	2	58	Ldn	62	68	--	--	Potential Sound Wall	N/A	No	51		
	1341	SF Residence	1	66	2	59	Ldn	62	68	--	--	Potential Sound Wall	N/A	No	52		
	1358	SF Residence	1	66	2	59	Ldn	62	68	--	--	Potential Sound Wall	N/A	No	52		
	1375	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	56		
	1394	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57		
	1413	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57		
	1434	SF Residence	1	68	2	65	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58		
	1453	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58		
	1495	SF Residence	1	68	2	65	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58		
Second Line along 156th Ave SE																	
	1366	SF Residence	1	64	2	55	Ldn	61	66	--	--	Potential Sound Wall	N/A	No	49		
	1381	SF Residence	1	64	2	58	Ldn	61	66	--	--	Potential Sound Wall	N/A	No	52		
	1401	SF Residence	1	64	2	58	Ldn	61	66	--	--	Potential Sound Wall	N/A	No	52		
	1421	SF Residence	1	64	2	58	Ldn	61	66	--	--	Potential Sound Wall	N/A	No	53		
	1439	SF Residence	1	64	2	59	Ldn	61	66	--	--	Potential Sound Wall	N/A	No	53		
	1451	SF Residence	1	68	2	59	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	53		
	1471	SF Residence	1	68	2	62	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	56		
	1517	SF Residence	1	64	2	60	Ldn	61	66	--	--	Potential Sound Wall	N/A	No	54		
	1528	SF Residence	1	64	2	61	Ldn	61	66	1	--	Potential Sound Wall	N/A	No	55		
	1551	SF Residence	1	64	2	61	Ldn	61	66	1	--	Potential Sound Wall	N/A	No	55		
	1567	SF Residence	1	64	2	61	Ldn	61	66	1	--	Potential Sound Wall	N/A	No	55		
	1580	Duplex/ROW House	1	64	2	62	Ldn	61	66	1	--	Potential Sound Wall	N/A	No	56		
	1593	Duplex/ROW House	1	64	2	62	Ldn	61	66	1	--	Potential Sound Wall	N/A	No	56		

Noise Impact and Mitigation Details: East Link Light Rail																
Receiver and Data Input Section					Impact Analysis						Project Mitigation					
Parcel #, Description, Existing Noise Levels and FTA Category					Project		Analysis		FTA Criteria		Number		Type of mitigation proposed			Mitigated
Area	Parcel	Description	Units	Ldn/Leq	FTA-CAT	Ldn/Leq	Type	Mod	Sev	Mod	Sev	Sound Wall	X-Over	Insulation	Ldn/Leq	
Westside of SR 520; All Alternatives																
Westside of SR 520: South of Power Substation																
	1433	SF residence upper floor	1	64	2	61	Ldn	61	66	1	--	Sound Insulation	N/A	No	--	
	1446	SF residence upper floor	1	64	2	61	Ldn	61	66	1	--	Sound Insulation	N/A	No	--	
	1466	SF residence single floor	1	64	2	58	Ldn	61	66	--	--	Potential Sound Wall	N/A	No	52	
	1484	SF residence single floor	1	64	2	57	Ldn	61	66	--	--	Potential Sound Wall	N/A	No	52	
	1501	SF residence upper floor	1	64	2	61	Ldn	61	66	1	--	Sound Insulation	N/A	No	--	
	1520	SF residence single floor	1	64	2	57	Ldn	61	66	--	--	Potential Sound Wall	N/A	No	51	
	1540	SF residence single floor	1	64	2	60	Ldn	61	66	--	--	Potential Sound Wall	N/A	No	54	
	1584	SF residence single floor	1	68	2	60	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	54	
Alternative E1 Specific																
Westside of SR 520: North of Power Substation, South of Large Condo Complex																
	1646	SF Residence	1	68	2	61	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	55	
	1650	SF Residence	1	68	2	61	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	55	
	1662	SF Residence	1	68	2	62	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	56	
	1663	SF Residence	1	68	2	62	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	56	
	1665	SF Residence	1	68	2	62	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	56	
	1681	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57	
	1683	SF Residence	1	68	2	60	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	54	
	1692	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57	
	1698	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57	
	1706	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58	
	1710	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58	
	1711	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58	
	1739	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58	
	1713	SF Residence	1	68	2	60	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	55	
Alternative E2 Specific																
Westside of SR 520: North of Power Substation, South of Large Condo Complex																
	1646	SF Residence	1	68	2	60	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	54	
	1650	SF Residence	1	68	2	60	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	54	
	1662	SF Residence	1	68	2	61	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	55	
	1663	SF Residence	1	68	2	61	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	55	
	1665	SF Residence	1	68	2	61	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	55	
	1681	SF Residence	1	68	2	62	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	56	
	1683	SF Residence	1	68	2	59	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	53	
	1692	SF Residence	1	68	2	62	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	56	
	1698	SF Residence	1	68	2	62	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	56	
	1706	SF Residence	1	68	2	62	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	56	
	1710	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57	
	1711	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57	
	1739	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57	
	1713	SF Residence	1	68	2	60	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	54	

Noise Impact and Mitigation Details: East Link Light Rail																	
Receiver and Data Input Section						Impact Analysis						Project Mitigation					
Parcel #, Description, Existing Noise Levels and FTA Category						Project		Analysis		FTA Criteria		Number		Type of mitigation proposed			Mitigated
Area	Parcel	Description	Units	Ldn/Leq	FTA-CAT	Ldn/Leq	Type	Mod	Sev	Mod	Sev	Sound Wall	X-Over	Insulation	Ldn/Leq		
Alternative E4 Specific																	
Westside of SR 520: North of Power Substation, South of Large Condo Complex																	
	1646	SF Residence	1	68	2	62	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	56		
	1650	SF Residence	1	68	2	62	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	56		
	1662	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57		
	1663	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57		
	1665	SF Residence	1	68	2	63	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	57		
	1681	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58		
	1683	SF Residence	1	68	2	61	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	55		
	1692	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58		
	1698	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58		
	1706	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58		
	1710	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	59		
	1711	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58		
	1739	SF Residence	1	68	2	64	Ldn	63	69	1	--	Potential Sound Wall	N/A	No	58		
	1713	SF Residence	1	68	2	61	Ldn	63	69	--	--	Potential Sound Wall	N/A	No	55		