3.10 NOISE

3.10.1 INTRODUCTION

This section examines current noise levels in the Study Area. A desktop survey using aerial photography, Google Earth, ArcGIS, and the City of Bellevue Comprehensive Plan and zoning was used to determine locations of noise sensitive land uses in the Study Area. Information is provided on how noise is defined and the noise levels when impacts occur.

Significant impacts would occur based on the following:

- Future traffic noise levels of 10 dBA or more above existing noise levels
- Peak-hour traffic noise levels exceed the NAC after mitigation

After describing existing noise levels and the methods used for the impact analysis, each alternative was analyzed to determine the effects on noise sensitive land uses within the Study Area. This includes construction, stationary commercial activities, and the resulting increased noise levels associated with increases in traffic.

To reduce the effects of the potentially elevated noise levels, mitigation measures are identified. There are no performance measures related to Noise.

3.10.2 AFFECTED ENVIRONMENT

BACKGROUND

Noise is defined as sound that is loud or unpleasant or that causes disturbance. There are several different ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. Some statistical noise levels are stated in this report in A-weighted decibels (dBA). Noise levels stated in terms of dBA reflect the response of the human ear by filtering out some noise in the low- and high-frequency ranges that the ear does not detect well. Exhibit 3.10–1 lists technical noise terms used in this report.

Exhibit 3.10–1 Definitions of Acoustical Terms

TERM	DEFINITIONS
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the sound pressure to the reference pressure.
A-Weighted Sound Level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter deemphasizes very low- and very high-frequency components of sound, in a manner similar to the frequency response of the human ear, and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Equivalent Noise Level (L_{eq})	The average A-weighted noise level during a given period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	Noise that intrudes over and above the ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: WSDOT (2012)

The effects of noise on people can be listed in three general categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as startling and hearing loss

In most cases, environmental noise produces effects in the first two categories only. Workers in industrial plants, however, may experience noise effects in the last category, physiological effects. No completely satisfactory way exists to measure the subjective effects

of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a standard is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person's subjective reaction to a new noise is to compare it to the existing or "ambient" environment to which that person has adapted. In general, the more a new noise exceeds the previously ambient noise level, the less acceptable the new noise will be judged by listeners.

REGULATORY CRITERIA

City of Bellevue

The Washington State Department of Ecology (WAC 173-60) has classified three areas or zones based on land use and established maximum permissible noise levels, titled Environmental Designation for Noise Abatement (EDNA), and are as follows:

- Residential areas: Class A EDNA
- Commercial areas: Class B EDNA
- Industrial areas: Class C EDNA

Jurisdictions may designate EDNAs or their own classifications. The City of Bellevue has adopted maximum permissible environmental noise levels in Bellevue City Code (BCC) Section 9.18.030. See Exhibit 3.10–2.

Exhibit 3.10–2 Bellevue Maximum Permissible Environmental Noise Levels

	EDNA OF RECEIVING PROPERTY (dBA)		
EDNA OF NOISE SOURCE	Class A	Class B	Class C
Class A Residential	55	57	60
Class B Commercial	57	60	65
Class C Industrial	60	65	70

Source: Bellevue City Code

The code sets allowable outdoor noise levels in residential areas near proposed future commercial and industrial facilities; it is based on noise that may emanate from operations within buildings and does not address general traffic noise. The allowable noise limits apply to all hours, with lower allowable limits at night.

The City has sorted zones into the EDNA classes:

- Residential land use district (Class A EDNA): R-1, R-1.8, R-2.5, R-3.5, R-4, R-5, R-7.5, R-10, R-15, R-20, R-30.
- Commercial land use district (Class B EDNA): PO, O, OLB, OLB-OS, NB, CB, DNTN-O-1, DNTN-O-2, DNTN-MU, DNTN-R, DNTN-OB, DNTN-OLB, F1, F2, F3, MI, BR-R, BR-MO, BR-MO-1, BR-OR, BR-OR-1, BR-OR-2, BR-RC-1, BR-RC-2, BR-RC-3, BR-CR, BR-ORT.
- Industrial land use district (Class C EDNA): LI, GC, BR-GC.

Most zones in the Study Area are considered Commercial, and GC is considered Industrial. There are two residential zones, R-20 and R-30.

Temporary construction activity that complies with the allowable hour limitations set by BCC 9.18.020 is exempt from the numerical noise limits. Vehicles traveling on public roads are also exempt from the numerical limits, assuming that the vehicles meet state standards (when regulated by Chapter 173-62 WAC).

Federal Guidelines

This analysis addresses noise standards associated with highways consistent with Washington State Department of Transportation and Federal Highway Administration guidelines.[1]

A major source of noise in urban environments is from vehicles traveling on roads; as growth leads to additional traffic, there may be an increase in noise. Federal aid projects—transportation facilities receiving federal funding—would be subject to federal noise guidelines. Washington State Department of Transportation (WSDOT) 2011 Traffic Noise Policy and Procedures (WSDOT 2012) are consistent with those of the Federal Highway Administration (FHWA) (23 Code of Federal Regulations 72) and have been approved by FHWA for use on federal-aid projects in Washington. FHWA guidelines state that noise abatement must be considered when a noise impact affects a particular land use or Activity Category. The FHWA Activity Categories B and C noise abatement criteria (NAC) of 67 A-weighted sound level decibels (dBA) apply to residences, churches, schools, recreation areas, and similar land use activities. Exhibit 3.10–3 describes WSDOT's NAC by land use

1 *A Final EIS and Record of Decision in 2011 addressed East Link light rail, including stations serving Mercer Island, south Bellevue, downtown Bellevue, BelRed, and Redmond's Overlake area. Bellevue stations included the Wilburton station. The East Link Light Rail was analyzed with regard to Federal Transit Authority noise guidelines and is not repeated here.*

Exhibit 3.10-3 WSDOT Noise Abatement Criteria by Land Use Category

ACTIVITY CATEGORY	L_{EQ} (DECIBELS)	DESCRIPTION
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Residential (single and multifamily units)
C	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails and trail crossings.
D	52 (Interior)	Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72 (Exterior)	Hotels, motels, offices, restaurants, bars, and other developed lands, properties, or activities not included in Categories A through D or F. Includes undeveloped land permitted for these activities.
F	–	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	–	Undeveloped lands that are not permitted.

L_{eq} = equivalent noise level
Source: WSDOT, 2012

category. Other developed lands (e.g., hotels/motels or other business areas) are included in Activity Category E, with a NAC of 72 dBA. FHWA determines a noise impact to occur when predicted future traffic noise levels "approach" or exceed the established FHWA NAC for a given Activity Category. WSDOT defines "approach" as within 1 dBA of the FHWA NAC (66 dBA for Activity Categories B and C or 71 dBA for Category E).

CRITERIA FOR INCREASES IN NOISE LEVELS

The following general relationships exist between noise levels and human perception:

- A 1- or 2-decibel increase is not perceptible to the average person.
- A 3-decibel increase is just barely perceptible to the human ear.
- A 5-decibel increase is readily perceptible to the human ear.
- A 10-decibel increase is perceived as a doubling in loudness to the average person.

In addition to the criterion sound levels described above, FHWA and WSDOT consider a traffic noise impact to occur if future predicted noise levels substantially exceed the existing noise levels. While FHWA guidance does not specifically define what constitutes a substantial increase, FHWA provides state highway agencies the flexibility in establishing their own definition of what constitutes a substantial increase. The WSDOT guidance states that a predicted future traffic noise level of 10 dBA or more above existing noise levels constitutes a substantial increase.

METHODOLOGY

Traffic noise levels were evaluated using FHWA's Traffic Noise Model (TNM) 2.5. The model is based upon reference energy emission levels for automobiles, medium trucks (two axles), and heavy trucks (three or more axles) with consideration given to vehicle volume, speed, roadway configuration, distance to the receptor, terrain features, atmospheric conditions, and the acoustical characteristics of the site.

Both existing and future noise receivers were modeled. Documenting noise levels at future developments is helpful to local agencies and the public to aid in future land use planning. To capture locations where sensitive noise receivers could be located in the future, noise receivers were modeled throughout the Study Area in locations where future development is proposed.

NOISE-SENSITIVE RECEIVERS WITHIN THE STUDY AREA

The study area is bound by NE 12th Street to the north, I-405 to the west, and the furthest eastern limit is 124th Ave NE (Exhibit 3.10–4). This area consists of medical facilities with outdoor uses, residential and commercial uses, and hotels. The main source of traffic noise is produced from I-405, 116th Avenue NE, NE 12th Street, NE 8th Street, and ramps between NE 8th Street and I-405.

Exhibit 3.10–4 illustrates the locations of the noise sensitive receivers used in the analysis. Sensitive receivers include parks, schools, and residences. There are few noise sensitive receivers currently in the Study Area, with residential uses limited to development around Lake Bellevue to the north. The four locations illustrated on Exhibit 3.10–4 were selected because they are

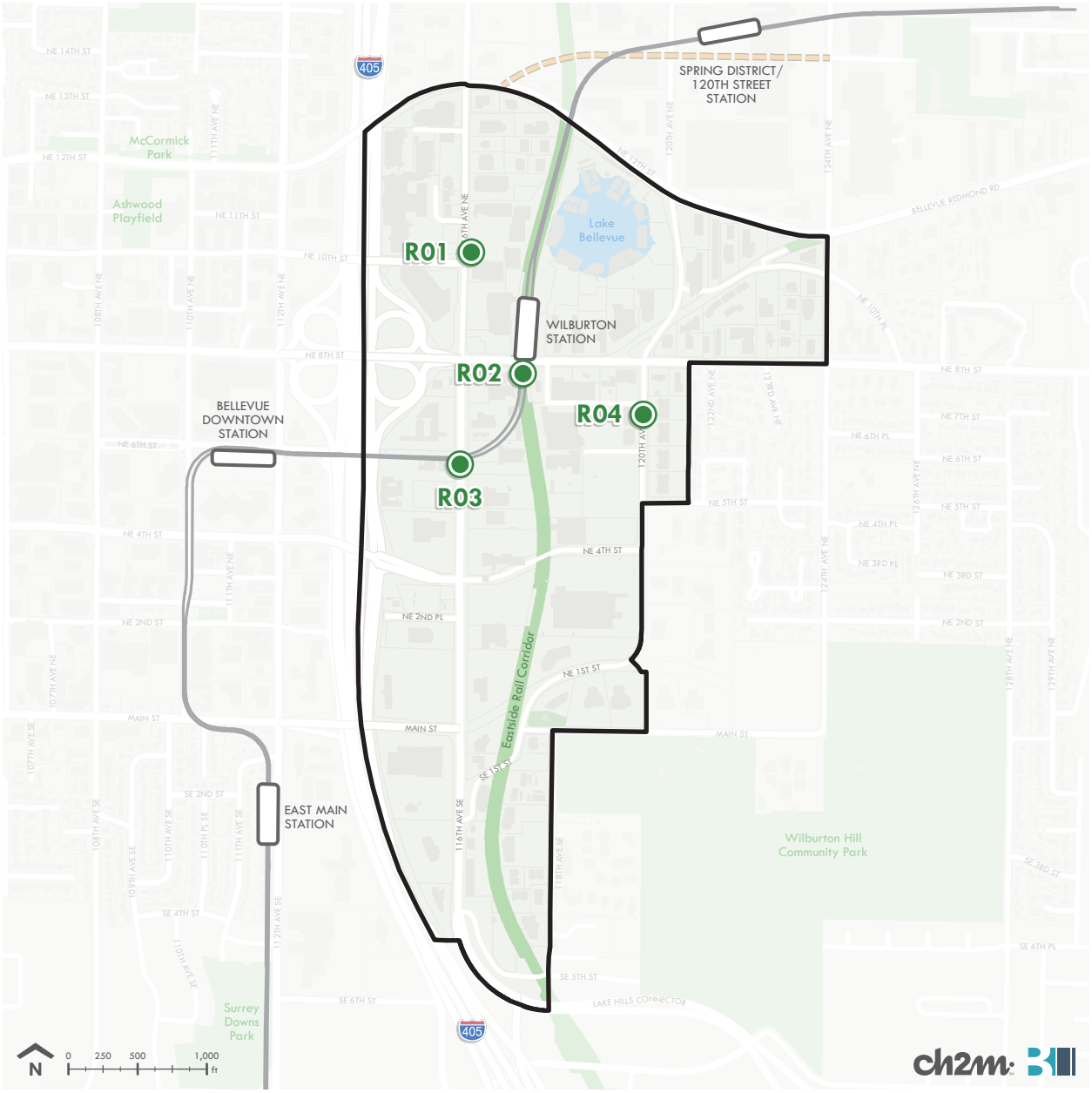

Exhibit 3.10-4 Modeled Noise-Sensitive Locations

Source: CH2M, 2017

- Wilburton Study Area Boundary
- East Link Light Rail Stations
- East Link Light Rail Route
- Spring Blvd–Under Construction
- Parks & Open Space
- Buildings
- Modeled Noise-Sensitive Locations

associated with areas of noise sensitive receivers as part of future land uses and would include residential and open space areas.

- R01—Located at the intersection of 116th Avenue NE and NE 10th Street. Existing land uses include medical facilities and Hotel 116 to the west and commercial to the east.
- R02—Located at the intersection of NE 8th Street and the Eastside Rail Corridor. Existing land uses include commercial development. Planned land uses for this project, in this area, include the light rail.
- R03—Located on116th Avenue NE, mid-block between NE 4th Street and NE 8th Street. Existing land uses include commercial development. Planned land uses for this project, in this area, include the Grand Connection, residential uses, and light rail.
- R04—Located on 120th Avenue NE, mid-block between NE 6th Street and NE 8th Street. Existing land uses include commercial and office related uses. Planned future land uses for this project, in this area, include residential to the west.

There are other noise sensitive receivers just outside of the Study Area including Wilburton Hill Park, Bellevue Botanical Garden, the John Paxton House (Eastside Heritage Center) to the southeast, and residential developments including single-family and multifamily residences primarily to the east. There are also a number of hotels located along the western boundary of the Study Area.

The Grand Connection is planned as a signature, urban, connection between Meydenbauer Bay at Lake Washington and the Eastside Rail Corridor in the Wilburton Commercial Area that will improve the non-motorized network. The Grand Connection would cross I-405 and its relationship to the Eastside Rail Corridor and Wilburton Commercial Area. The Grand Connection, a non-motorized pedestrian, bicycle facility, and an outdoor recreation use, would be a new noise receiver.

3.10.3 IMPACTS

For the purposes of this EIS, significant impacts on noise would occur under the following:

- Future traffic noise levels of 10 dBA or more above existing noise levels
- Peak-hour traffic noise levels exceed the NAC after mitigation

IMPACTS COMMON TO ALL ALTERNATIVES

Short-term Impacts

Under all alternatives there would be temporary impacts in noise during construction. Construction activities would be temporary in nature and it is anticipated the majority of the activities would occur during daytime working hours. Typical construction equipment would include dump trucks, cement pumpers, backhoes, excavators, and other heavy equipment. Within Bellevue, construction activities 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 which are not legal holidays. Any construction outside of these hours or on Sundays would require expanded exempt hours and be subject to criteria noted in Bellevue City Code 9.18.020.C (Noise Exemptions), or would require a noise variance.

Long-term Impacts

Noise From Stationary Commercial Operations

Future commercial facilities could use stationary mechanical equipment that, unless properly designed or controlled, could cause community noise levels to exceed the allowable City noise ordinance limits. In addition, future facilities could use outdoor loading docks and outdoor material storage areas that, unless properly designed and controlled, could generate substantial amounts of noise in the surrounding community. Such uses would be subject to the noise limits of BCC 9.18.030. Mitigation measures to reduce these noise impacts to less than significant levels are described in Section 3.10.4 Mitigation Measures.

Traffic Noise

Exhibit 3.10–5 provides a high-level summary of Existing Conditions, No Action Alternative, Alternative 1, and Alternative 2 potential noise levels at the four noise receptor locations. Refer to Exhibit 3.10–4 for representative receptor locations. As shown in Exhibit 3.10–5, the existing noise levels range from 64 to 69 dbA, and the increases over existing conditions in the alternatives range from zero to 3 dBA, with most of the increase 1 dBA. As noted above under Criteria for Increases in Noise Levels, an increase of 1 dBA is not perceptible to the average person and a 3 dBA increase is barely perceptible.

Exhibit 3.10–5 Existing, No Action, and Future Potential Noise Levels

			NO ACTION ALT.		ALT. 1		ALT. 2	
RECEIVER	NAC (FUTURE CONDITIONS)	EXISTING CONDITIONS	Future Noise	Increase over Existing	Future Noise	Increase over Existing	Future Noise	Increase over Existing
R01	72	68	69	1	70	2	71	3
R02	67	64	64	0	65	1	65	1
R03	67	69	69	0	70	1	70	1
R04	67	65	67	2	66	1	68	3

Source: CH2M, 2017

The receivers in Exhibit 3.10–4 are currently in areas consisting of commercial and office-related uses that are not noise sensitive land uses. As noted above, these locations were selected based on potential future development. Changes in the land uses include mixed use (R01), parks and open space (Eastside Rail Corridor (R02)), the Grand Connection (R03), residential development (R04), and light rail (R02 and R03). Because most of the locations would include sensitive land uses, the future conditions are shown in Exhibit 3.10–5. A conservative NAC of 67 dBA was used in this analysis and with this assumption, R01, R03, and R04 have the potential to be impacted. For the residential areas east of R04, and outside of the Study Area, traffic noise impacts are not anticipated because of the distance between R04 and the residential developments. The traffic noise levels would decrease below the NAC. Depending on funding sources, a more detailed traffic noise analysis could be conducted, including field measurements to identify existing conditions and potential noise impacts and mitigation measures.

Because the Grand Connection would cross over I-405, there would be increases in noise by bringing the receiver closer to the interstate, but at the receiver near the Grand Connection (R03), the increase in noise over existing conditions would be above the NAC, but not perceptible to the average person. In addition, if new open space areas are constructed in close proximity to the interstate there is also the potential for noise to exceed the NAC.

PERFORMANCE MEASURES EVALUATION

There are no performance measures related to Noise.

Grand Connection Performance Measures

The Grand Connection options, if developed in tandem with other area redevelopment, could contribute to cumulative noise impacts and/or construction noise duration in association with Alternative 1 or Alternative 2. There may be more potential for cumulative impacts if development reached levels associated with Alternative 2 versus Alternative 1.

IMPACTS OF THE NO ACTION ALTERNATIVE

The No Action Alternative would not have as much development as Alternatives 1 and 2. Since this is the No Action Alternative, there will not be any change and therefore, no construction beyond that allowed by current zoning. Stationary commercial operations would be same and there are no other impacts beyond those discussed above, in Impacts Common to All.

The No Action Alternative results in smaller increases in traffic noise at all receivers except R04. As shown in Exbibit 3.10-5 the increases range between 0 and 2 dBA compared to existing. Only receiver R03 would exceed the NAC given the proximity to the future Grand Connection and R04 would also require mitigation consideration because the future noise levels are at the NAC.

IMPACTS OF ALTERNATIVE 1

Construction and stationary commercial operations impacts would be the same as discussed above, in Impacts Common to All Alternatives.

Future noise levels due to increase in traffic under Alternative 1 range from 65 to 70 dBA, with increases above existing levels up to 2 dBA. Similar to No Action, only R03 would exceed the NAC and R04 would need to consider mitigation since the future noise levels approach the NAC.

IMPACTS OF ALTERNATIVE 2

Future noise levels under Alternative 2 range from 65 to 71 dBA, with increases over existing conditions levels up to 3 dBA. The 3 dBA increases occur at receivers R01 and R04 and are due to the increase in traffic levels; however, R03 and R04 would exceed the NAC and require mitigation and R01 would approach the NAC and mitigation would need to be considered.

3.10.4 MITIGATION MEASURES

INCORPORATED PLAN FEATURES

None.

REGULATIONS AND COMMITMENTS

- BCC 9.18.040 includes nuisance provisions.
- BCC 9.18.030 provides specific noise controls and allowable community noise limits (expressed as dBA levels) for commercial sources affecting residential receivers.
- BCC 9.18.020 limits hours of construction to daytime periods and on Sundays and holidays.
- BCC 9.18.045B includes the use of sound attenuation measures if exterior Ldn along proposed building lines of structure exceeds 65 dBA.
- The SEPA review process allows the City to consider potential noise impacts. A noise impact study may be required to forecast future noise levels for some developments and identify mitigation measures.
- WSDOT Traffic Noise Abatement Protocol sets requirements to evaluate and abate traffic noise impacts, for roadway improvement projects that use state or federal funding.

OTHER PROPOSED MITIGATION MEASURES

Construction

To reduce the potential for temporary, adverse noise impacts associated with construction, where the City has determined a noise control plan is required, the contractor will be required to comply with all federal, state, and local regulations relating to construction noise. Construction noise could be reduced by using enclosures or walls to surround noisy stationary equipment, installing mufflers on engines, substituting quieter equipment or construction methods, minimizing time of operation, and locating equipment as far as practical from sensitive receptors. To reduce construction noise at nearby receptors, the following mitigation measures will be incorporated into construction plans and contractor specifications:

- Locating stationary equipment away from receiving properties will decrease noise from that equipment.
- Erecting portable noise barriers around loud stationary equipment located near sensitive receivers will reduce noise.
- Limiting construction hours per City Code will avoid sensitive nighttime hours.
- Turning off idling construction equipment will eliminate unnecessary noise.
- Requiring contractors to rigorously maintain all equipment will potentially reduce noise effects.
- Recommending training construction crews to avoid unnecessarily loud actions (e.g., dropping bundles of rebar onto the ground or dragging steel plates across pavement) near noise-sensitive areas will reduce noise effects.

Noise Abatement

The noise analysis indicates that noise levels would reach abatement criteria at noise sensitive receivers under each alternative, using State guidelines which would only apply for transportation projects receiving federal funds and affecting sensitive receptors. The City could voluntarily include noise reduction measures in policies or codes applicable to the Study Area.

Where abatement criteria are required via federal or state rules, or voluntarily applied, a noise abatement analysis would be warranted.

Noise abatement measures, specifically noise barriers or noise reducing construction measures, should be considered as part of the future analysis. According to WSDOT's noise policy, for noise abatement to be implemented, it must be considered feasible and reasonable, and must meet the minimum criteria described below.

Feasibility is based on a minimum required sound-level reduction and constructability:

- Abatement must be physically constructible.
- The majority of first-row impacted receivers must obtain a minimum 5 dBA of noise reduction as a result of abatement (insertion loss); assuring that every reasonable effort will be made to assess outdoor use areas as appropriate.

Stationary Commercial Uses

The City could require each commercial facility proposed for construction within 500 feet of residentially-zoned parcels to conduct a project-specific community noise impact assessment to demonstrate compliance with the community noise limits set by the City's noise ordinance (BCC 9.18.030). The community noise assessment would apply to any stationary equipment that produces substantial amounts of noise, and would also apply to outdoor loading dock areas and outdoor material handling areas. If a proposed facility would require a substantial number of heavy-duty truck deliveries along a corridor where residentially-zoned parcels are within 500 feet of the roadway, then the noise study should also evaluate the potential impacts from increased traffic noise. The study would be submitted by applicants prior to the City issuing building permits for the proposed facility.

3.10.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

The potential increases in traffic noise is not expected to increase 10 dBA over existing conditions, and based upon the modeling would only increase up to 3 dBA. Considering the level of noise change as well as mitigation measures, no significant, unavoidable adverse impacts are anticipated.