Appendix B: Location of Sensitive Noise Receptors

Maps showing the locations of sensitive noise receptors for each option are provided for reference after this introduction. The Supplemental Draft Environmental Impact Statement (EIS) and Final EIS will include more information about potential mitigation measures, including the location of noise walls. A combination of noise walls, residential sound insulation, track lubrication, and special trackwork at crossovers would effectively mitigate transit noise impacts for all options. In the case of residential sound insulation, only interior noise impacts would be mitigated, and some residual outdoor noise impacts may remain.

Noise Basics

Human response to noise is subjective and can vary greatly from person to person. Factors that can influence individual response to noise include the loudness, frequency, the amount of background noise present before an intruding noise occurs and the nature of the work or activity (e.g., sleeping) that the noise affects. The unit used to measure the loudness of noise is the decibel (dB). To better approximate the sensitivity of the human ear to sounds of different frequencies, the A-weighted decibel (dBA) scale was developed, known as the A-scale. The A-scale is used in most noise ordinances and standards, including the applicable standards for the East Link Project.

The most basic sound level measurement is the maximum sound level, denoted Lmax. To account for the variance in loudness over time, a common noise measurement, the equivalent sound pressure level (Leq), was developed. The Leq is defined as the energy average noise level, in dBA, for a specific time period (for example, 1 hour). Another useful descriptor is the day-night equivalent sound level, abbreviated Ldn, which is defined as the 24-hour Leq, but with a 10-dBA penalty assessed to noise events occurring at night (defined as 10 p.m. to 7 a.m.). The effect of this penalty is that any event during nighttime hours is equivalent to 10 events during the daytime hours. For example, each train pass-by between 10 pm and 7 am is considered to have the same acoustical energy as 10 daytime trains. This strongly weights Ldn toward nighttime noise to reflect the supposition that most people are more easily annoyed by noise during nighttime hours when background noise is lower and when most people are sleeping.

The smallest change in broadband noise, such as traffic noise, that a human ear can perceive is about 3 dBA. For pure tones, the smallest perceptible change is close to 1 dBA. Most people also perceive an increase of 5 dBA or more as clearly noticeable, while a 10-dBA increase (or decrease) in noise levels is judged by most people as a doubling (or halving when levels decrease) of sound level.

Normal conversation ranges between 44 and 65 dBA when speakers are 3 to 6 feet apart. Quiet urban nighttime noise levels range from 40 to 50 dBA, while nighttime noise levels in an urban area near major roadways typically range from 50 to 60 dBA. Finally, noise levels during the day in a noisy urban area are frequently as high as 70 to 80 dBA.

FTA Noise Impact Criteria

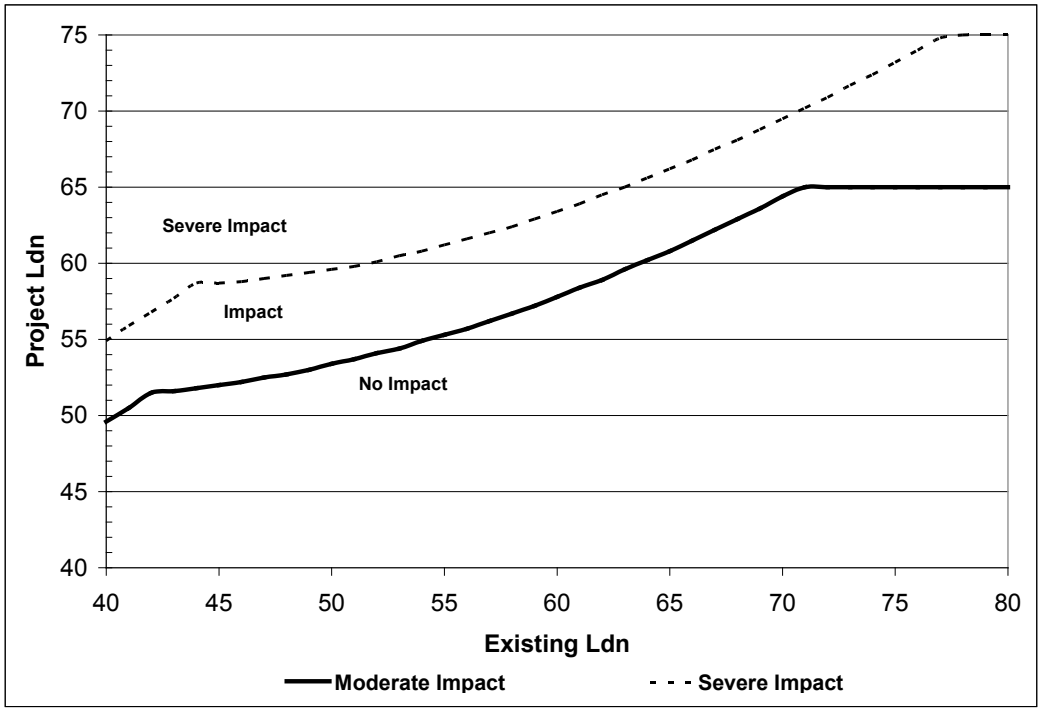
The noise criteria in the Federal Transit Administration (FTA) guidance manual for Transit Noise and Vibration Impact Assessment are founded on well-documented research on community reaction to noise and are based on changes in noise exposure using a sliding scale. The amount that the transit project is allowed to change the overall noise environment is reduced with increasing levels of existing noise.

There are two levels of impact included in the FTA criteria: moderate impact and severe impact. The impact threshold for a moderate impact varies according to the level of the existing ambient noise. The severe impact threshold also varies according to the existing ambient noise but is set at levels where a higher percentage of people would be highly annoyed by the project noise.

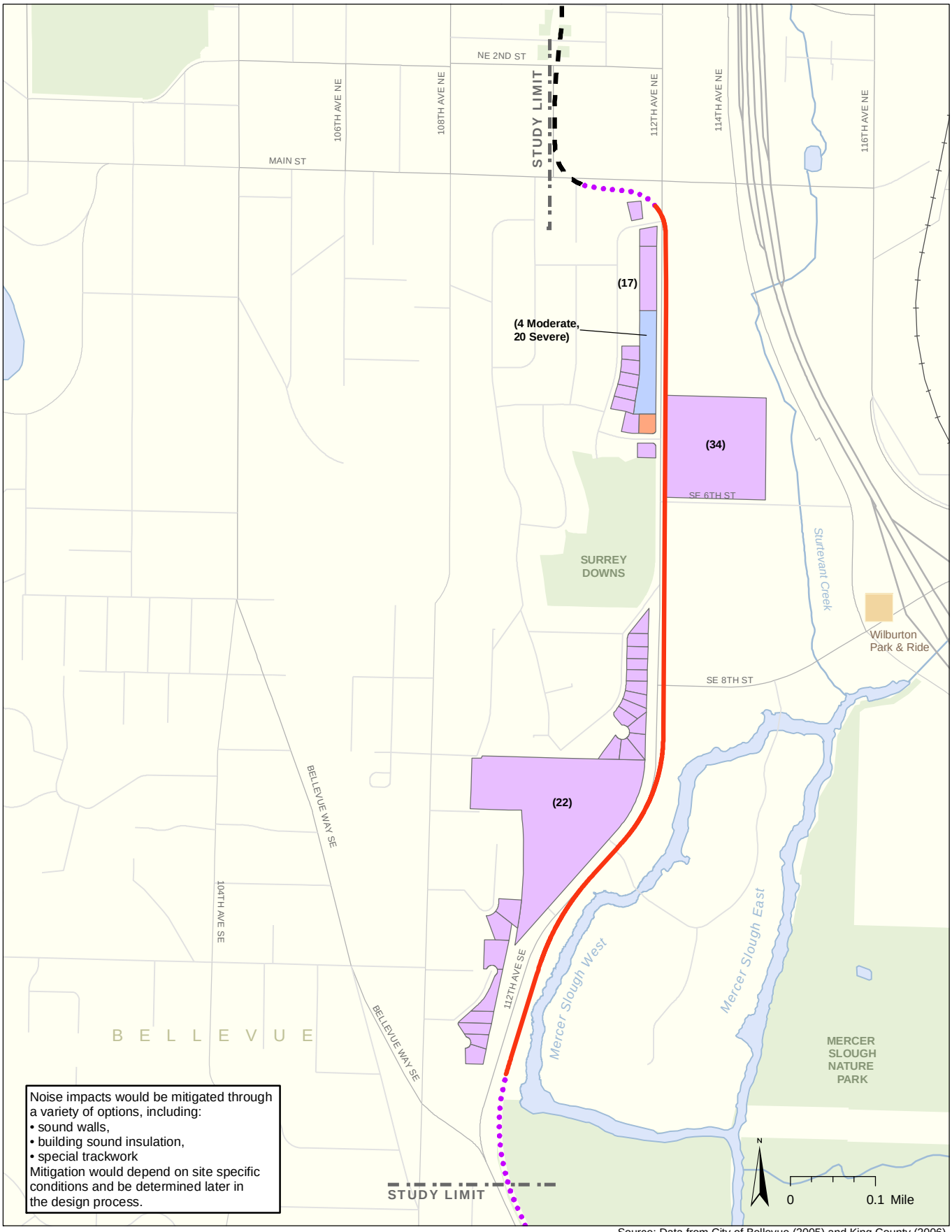
Project noise in the no-impact range is not likely to be annoying to most people. The FTA sliding scale noise impact criteria are illustrated in Figure A-1.

Consider the following as an example of FTA's sliding scale impact criteria related to a residential land use: A location with an existing noise level of 55 dBA Ldn (bottom scale) would have an impact if the transit project noise level (side scale) were between 56 dBA and 61 dBA Ldn; in contrast, a location with an existing noise level of

Figure A-1. **FTA Impact Criteria**



65 dBA Ldn would have an impact if the project noise levels were between 61 dBA and 66 dBA Ldn. Those same environments would have a severe impact if the project levels were greater than 61 dBA Ldn and greater than 66 dBA Ldn, respectively.



Source: Data from City of Bellevue (2005) and King County (2006).

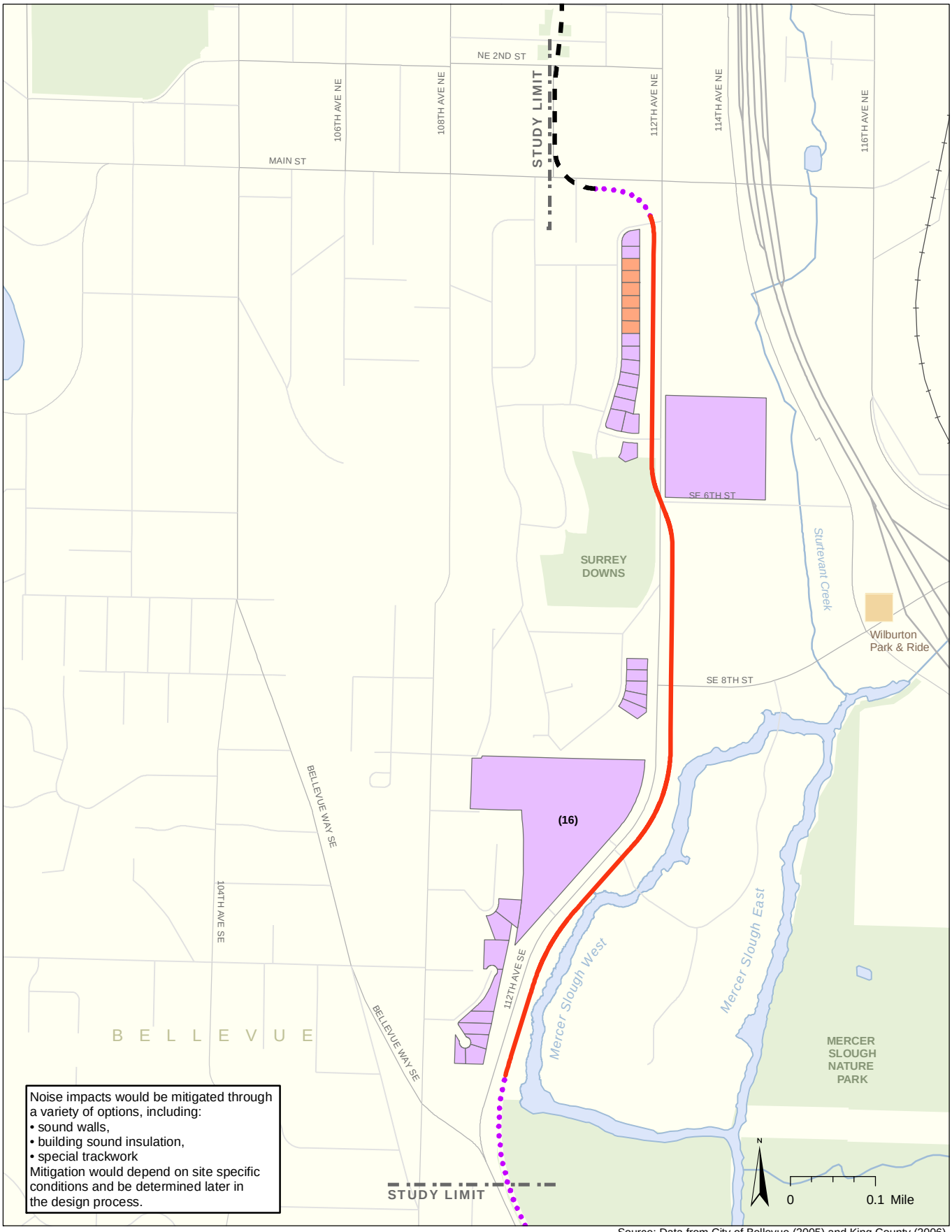
At-Grade Route
Elevated Route
Retained-Cut/Fill Route
Tunnel Route

Proposed Station
P New and/or Expanded Park-and-Ride Lot

Both Moderate and Severe Impacts
Severe Impact
Moderate Impact

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

Transit Noise Impacts
Option 1: Center Running to Main Street Tunnel
East Link Project



Noise impacts would be mitigated through a variety of options, including:
- sound walls,
- building sound insulation,
- special trackwork

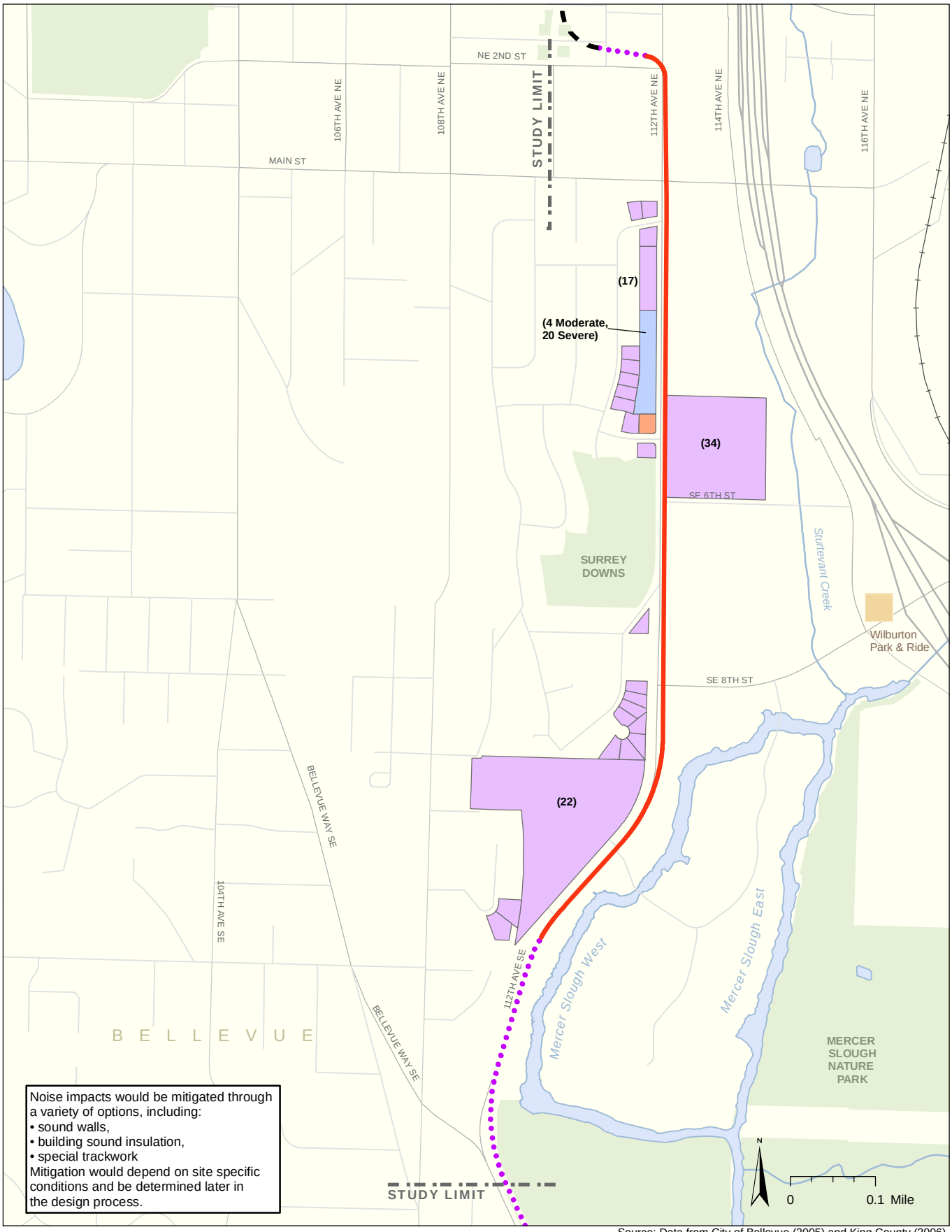
Mitigation would depend on site specific conditions and be determined later in the design process.

Source: Data from City of Bellevue (2005) and King County (2006).

- At-Grade Route
- Elevated Route
- Retained-Cut/Fill Route
- Tunnel Route
- Proposed Station
- P New and/or Expanded Park-and-Ride Lot
- Both Moderate and Severe Impacts
- Severe Impact
- Moderate Impact

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

Transit Noise Impacts
Option 2: Westside Running to Main Street Tunnel
East Link Project



Noise impacts would be mitigated through a variety of options, including:
- sound walls,
- building sound insulation,
- special trackwork

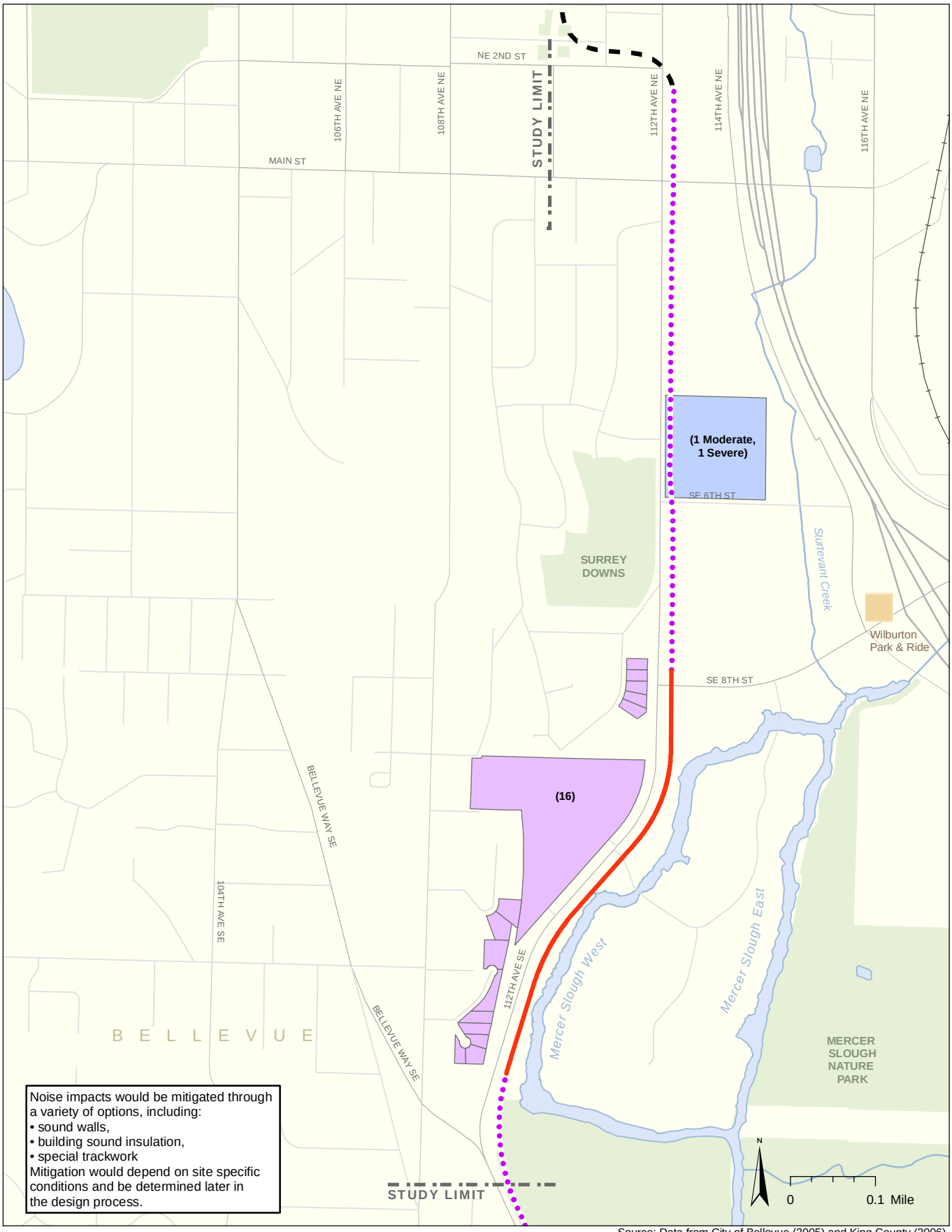
Mitigation would depend on site specific conditions and be determined later in the design process.

Source: Data from City of Bellevue (2005) and King County (2006).

- At-Grade Route
- Elevated Route
- Retained-Cut/Fill Route
- Tunnel Route
- Proposed Station
- P New and/or Expanded Park-and-Ride Lot
- Both Moderate and Severe Impacts
- Severe Impact
- Moderate Impact

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

Transit Noise Impacts
Option 3: Center Running to 2nd Street Tunnel
East Link Project



Noise impacts would be mitigated through a variety of options, including:
- sound walls,
- building sound insulation,
- special trackwork

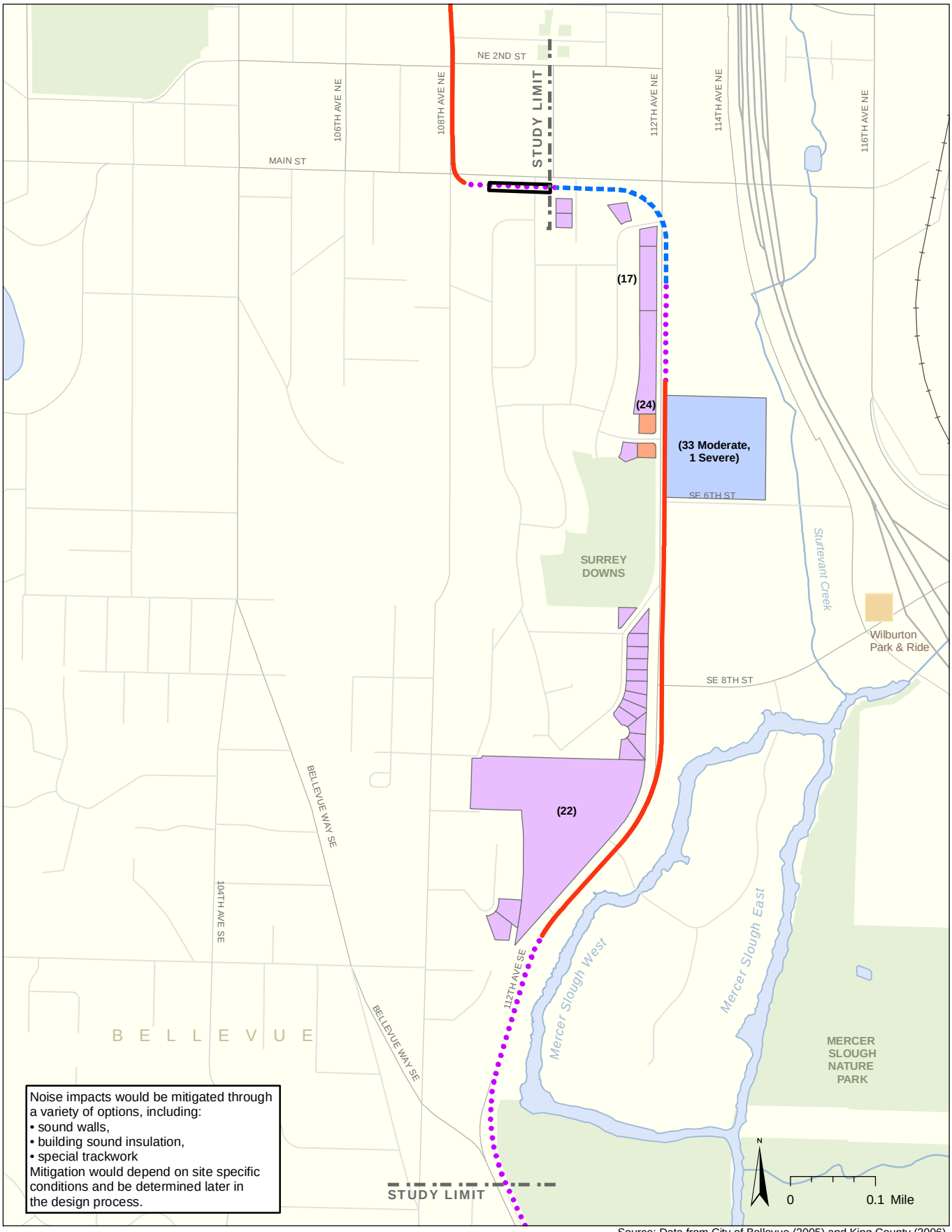
Mitigation would depend on site specific conditions and be determined later in the design process.

Source: Data from City of Bellevue (2005) and King County (2006).

- At-Grade Route
- Elevated Route
- Retained-Cut/Fill Route
- Tunnel Route
- Proposed Station
- P New and/or Expanded Park-and-Ride Lot
- Both Moderate and Severe Impacts
- Severe Impact
- Moderate Impact

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

Transit Noise Impacts
Option 4: Eastside Running to 2nd Street Tunnel
East Link Project



Source: Data from City of Bellevue (2005) and King County (2006).

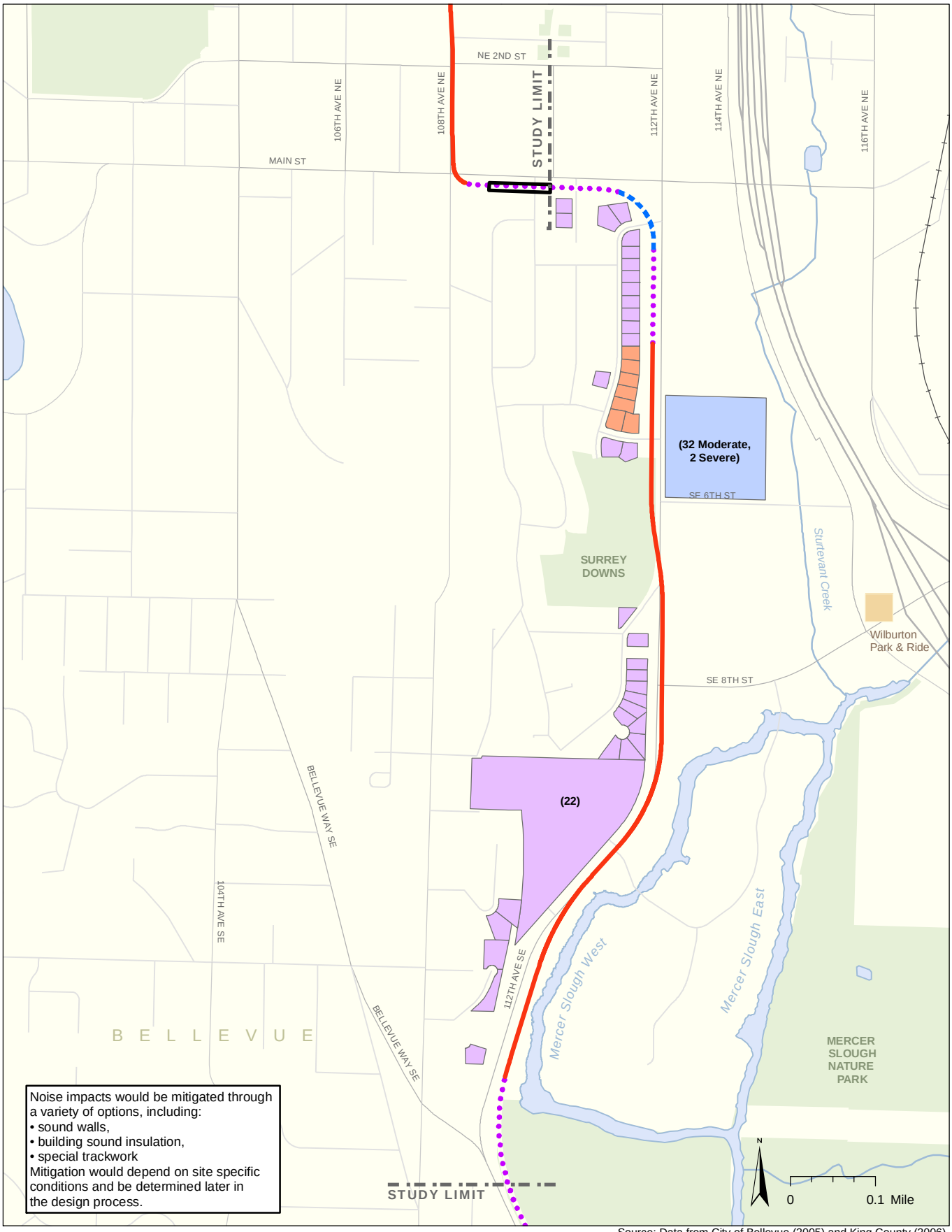
At-Grade Route
Elevated Route
Retained-Cut/Fill Route
Tunnel Route

Proposed Station
P New and/or Expanded Park-and-Ride Lot

Both Moderate and Severe Impacts
Severe Impact
Moderate Impact

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

Transit Noise Impacts
Option 5: Center Running to At-Grade
East Link Project



Noise impacts would be mitigated through a variety of options, including:
- sound walls,
- building sound insulation,
- special trackwork

Mitigation would depend on site specific conditions and be determined later in the design process.

Source: Data from City of Bellevue (2005) and King County (2006).

- At-Grade Route
- Elevated Route
- Retained-Cut/Fill Route
- Tunnel Route
- Proposed Station
- P New and/or Expanded Park-and-Ride Lot
- Both Moderate and Severe Impacts
- Severe Impact
- Moderate Impact

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

Transit Noise Impacts
Option 6: Westside Running to At-Grade
East Link Project