Appendix E

NERTS Noise Assessment (revised)

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Northeast Recycling and Transfer Station Project

Noise Assessment

Revised Final

February 2025

King County Department of Natural Resources and Parks,
Solid Waste Division

Northeast Recycling and Transfer Station Project E00633E19

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Acronyms and Abbreviations

ANSI	American National Standards Institute
dB	decibel(s)
dBA	A-weighted decibel(s)
County	King County
EDNA	environmental designation for noise abatement
EIS	Environmental Impact Statement
FTA	Federal Transit Administration
ISO	International Organization for Standardization
L_{eq}	equivalent noise level
L_n	statistical noise level
MRW	moderate risk waste
NERTS	Northeast Recycling and Transfer Station
PPV	peak particle velocity
RTS	recycling and transfer station
SWD	Solid Waste Division
WAC	Washington Administrative Code
WMC	Woodinville Municipal Code

EXECUTIVE SUMMARY

PURPOSE AND NEED

The King County Department of Natural Resources and Parks, Solid Waste Division, operates a system of eight transfer stations, two drop box facilities, one facility and one Wastemobile that accept moderate risk waste[1] from residents and small businesses, and one regional landfill in King County, Washington. The *King County Comprehensive Solid Waste Management Plan* (King County 2019), which was adopted by cities in accordance with the adoption process described in the interlocal agreements between King County and incorporated cities in King County (Section 1.2.1 in the Final Environmental Impact Statement [King County 2025]) and approved by the Washington State Department of Ecology, identified the need for a new transfer station to replace the aging Houghton Recycling and Transfer Station (RTS) in the northeastern Lake Washington area of King County. The nearly 60-year-old Houghton RTS is one of the busiest in terms of tonnage and transactions, yet it has outlived its useful life and lacks capacity for the type of recycling and collection services that are increasingly in demand. The new RTS, which will be called the Northeast Recycling and Transfer Station (NERTS), is proposed to be located in the northeastern part of King County, an area illustrated on Figure 5-4 of the *King County Comprehensive Solid Waste Management Plan* (King County 2019).

This document analyzes the potential noise impacts of a new NERTS for the alternatives under consideration.

ALTERNATIVES

The County is considering two action alternatives (Alternatives 1 and 2) in addition to the No Action Alternative for the NERTS, as follows:

- No Action Alternative – A new RTS would not be sited in northeastern King County. The existing Houghton RTS at 11724 NE 60th Street in Kirkland would continue to be operated.
- Alternative 1: The existing Houghton RTS and adjacent area at 11724 NE 60th Street in Kirkland. Two options:
  - 1A – a facility constructed after the existing transfer station building is closed and deconstructed or demolished
  - 1B – a facility constructed while the existing transfer station building is open and operating, and then the existing transfer station building would be closed and repurposed, or deconstructed or demolished and replaced after the new station is open
- Alternative 2: A site consisting of six tax parcels in the 15000 block of Woodinville-Redmond Road NE in Woodinville.

SUMMARY OF FINDINGS

Under the No Action Alternative, it is assumed that the current Houghton RTS would continue under its current operations and would have minimal direct impacts on noise receptors.

Alternatives 1A, 1B, and 2 may be constructed and operated consistent with the applicable requirements. Final engineering and design of the selected alternative will incorporate necessary and appropriate design features, which would reduce sound levels to ensure compliance with regulatory limits. Because Alternatives 1A, 1B, and 2 include construction of a new building, they are expected to contain sound substantially more so than the existing Houghton RTS canopy.

[1] Moderate risk waste: relatively small quantities of hazardous waste generated by households and small businesses. Moderate risk waste includes household hazardous waste.

1. Introduction and Project Description

King County Department of Natural Resources and Parks, Solid Waste Division (SWD), is proposing to site, design, and build a modern transfer station in northeast King County (the County) to meet the region's growing demand for environmentally responsible waste management services. The new station would replace the existing aging Houghton RTS in Kirkland, which has been in service since the mid--1960s and does not have the capacity to offer the recycling and collection services customers increasingly need and want. The Noise Assessment, prepared in support of an environmental impact statement (EIS) prepared by the County as required by the Washington State Environmental Policy Act (SEPA), addresses potential impacts from noise associated with the No Action Alternative and the proposed action alternatives.

The construction and operation of the proposed action alternatives and the ongoing operations associated with the No Action Alternative will use equipment that emits sound. This assessment describes the noise in the area of the proposed alternatives for the new Northeast Recycling and Transfer Station (NERTS) and evaluates potential impacts that may result from the No Action Alternative and from the construction and operation of two potential action alternatives for a new recycling and transfer station (Alternative 1 in Kirkland and Alternative 2 in Woodinville, Washington) (see **Figure 1-1**). This assessment has been assembled to aid in EIS decision-making. It also will aid the design and construction teams by providing

1.1. Project Description

The new NERTS facility will include an enclosed solid waste transfer and processing area, enclosed solid waste compactor units, a recycling collection and sorting area, employee facility, scale house and weigh station, space for on-site customer queuing, a possible fueling station, and possible moderate risk waste disposal for products from homes and small qualifying businesses (Alternative 2 only).

The new facility would be designed and constructed to meet today's building and environmental standards and standards for service, operational efficiency, and customer and employee safety. The facility would provide improved recycling services to meet the County's environmental goals, and waste would be cost-effectively compacted for efficient transport. The facility would also have space for waste storage in the event of a major regional disaster and sufficient off--street queuing space for private and commercial vehicles.

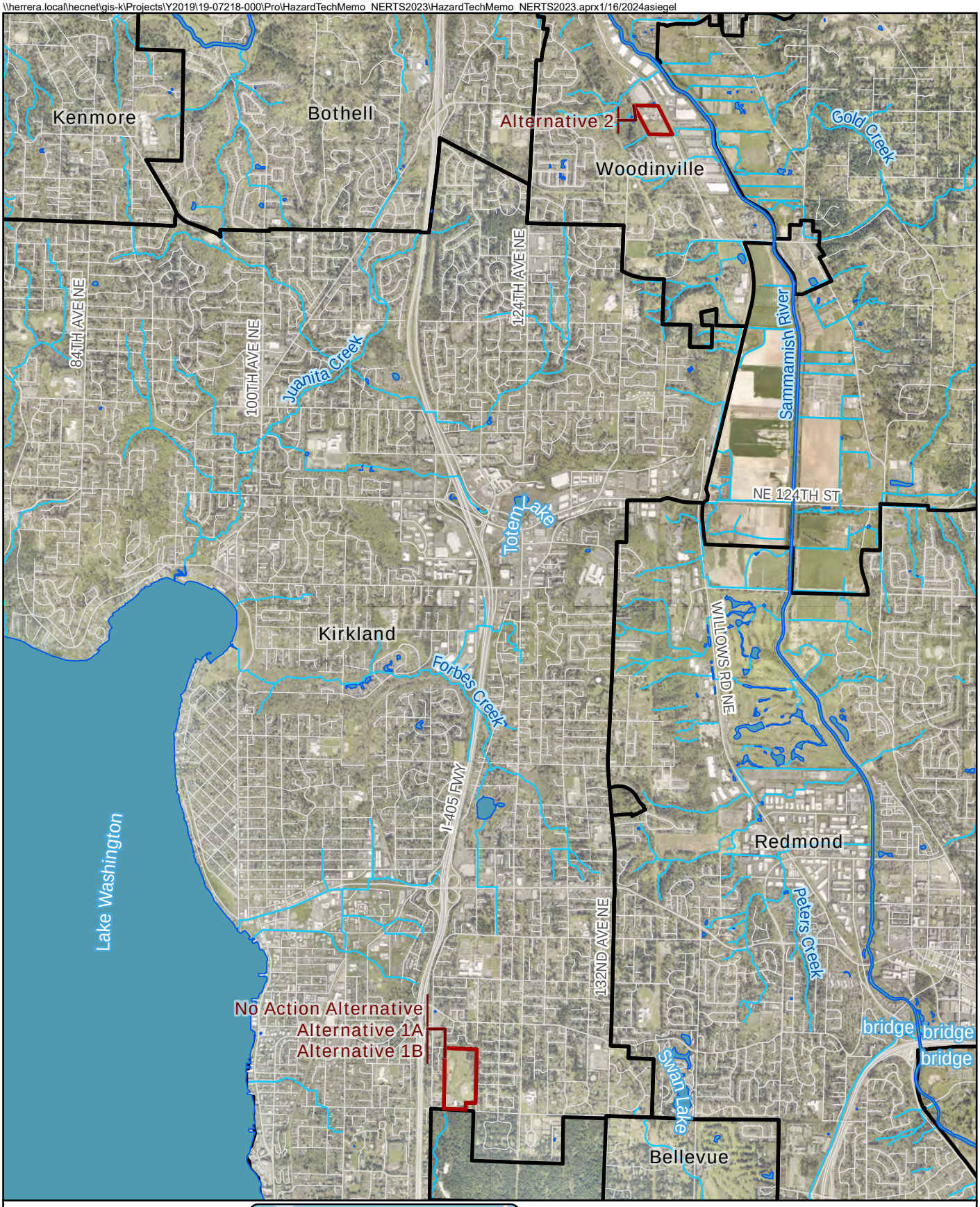
1.2. Project Alternatives

1.2.1. No Action Alternative

The existing Houghton Transfer Station is located at 11724 NE 60th Street in Kirkland on parcel 1759701890. The site is bordered to the east and west by single-family homes. Directly south of the site is NE 60th Street and directly south of NE 60th Street is Bridle Trails State Park. Under the No Action Alternative, no new NERTS facility would be developed at any location, and the existing Houghton RTS would continue to operate at its current location. If a new transfer station were not built, the existing transfer station would continue to offer limited recycling services for as long as it operates, and services would not be modernized or expanded to accommodate a growing population and solid waste industry changes. The facility would not be enclosed to control noise and odors. Waste would continue to not be compacted, which affects the number of transfer trucks and trailers that use the Houghton RTS, and there would not be space for waste storage in the event of a major regional disaster. The existing site is 8.4 acres. Access to the site is from NE 60th Street.

The existing facility is not enclosed, so it does not control noise nor odors. In 2022, the Houghton Transfer Station received two odor complaints on SWD's customer service line.

The Houghton RTS was built to codes before King County established sustainability goals for building development. The existing station does not include green building and sustainable design features that are part of the two action alternatives.



Legend
- Road
- Streams
- Alternative Locations
- Waterbody
- City Limit

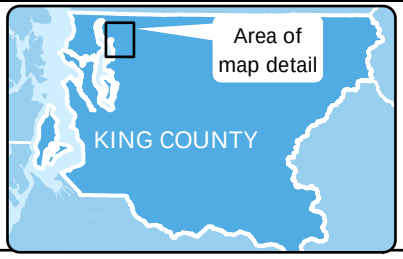


Figure 1-1. Vicinity Map of King County Solid Waste Division Northeast Recycling and Transfer Station Alternatives.

N
PLAN

SCALE: 1" = 4,000'-0"
0 2,000 4,000
Feet

King County

SCALE: 1"=120'-0"

0' 60' 120' 240' 480'

N
PLAN

LEGEND

SITE BOUNDARY

AREA BOUNDARY

Figure 1-2
No Action Alternative

King County Solid Waste Division
Northeast Recycling and Transfer Station

King County

1.2.2. Elements Common to the Action Alternatives

The new facility would be built to modern transfer station and green building standards. The addition of compactors to reduce the volume of garbage before it is hauled to the landfill or other disposal facility could reduce the total number of transfer hauling trips to and from the new station by nearly a third, reducing the cost of operations and traffic impacts (King County 2019). In addition, modern transfer stations are built as fully enclosed buildings, resulting in reduced external dust, noise, odor, and litter. New transfer stations offer sufficient queuing space for customers and storage space for waste, including expanded dedicated areas for recycling services. All action alternatives would include the following physical elements (except where noted):

- Scale house and scales
- Enclosed transfer building for waste handling, sorting, and processing, with separate areas for commercial and self-haul drop-off
- Waste compactors
- Recycling and material staging areas
- Administration and staff area, and possible public education/meeting area
- Station perimeter fence
- MRW collection building (Alternative 2 only)
- A fueling station (to be determined)
- A “To Be Determined” building to house additional private recycling or reuse operators or other service providers
- Roadways for customers and SWD vehicles
- Covered and uncovered parking for waste transfer trailers
- Staff and visitor parking
- Stormwater management
- Wastewater management
- Landscaping.

1.2.2.1. Building Features

The approximate footprint of the building area would be between 80,000 square feet and 125,000 square feet. This would provide space for solid waste, recycling, administration, MRW collection (Alternative 2 only), and disaster event waste storage. Buffers between the active area of the station and neighboring uses would be appropriately sized and designed to reduce or eliminate impacts.

The height of the new station would depend on site conditions, city zoning codes, and the duly adopted building code. The distance from the main tipping floor – where refuse is dumped by customers – down to the compactor(s) would be approximately 20 feet and may be partially below grade. The height from the main tipping floor to the highest point of the roof would be approximately 50 feet – which is the distance required for commercial garbage trucks to tip without hitting the overhead misting (or equivalent technology), fire sprinkler, ventilation, and other systems. The overall height of the new station would be approximately 70 feet above the lowest level (50 to 70 feet above ground level). Development of buildings, parking areas, and roadways at the new transfer station would result in up to seven to nine acres of impervious surfaces.

The new transfer station will target the highest green building standards possible at each site, under King County’s Green Building and Sustainable Development ordinance and King County Code Title 18 Environmental Sustainability Programs.

1.2.2.2. Elements of Operation

The following activities and services would be provided at the new station:

- Disposal and transfer of garbage from self-haul and commercial customers
- Acceptance of source-separated waste from self-haul customers
  - Co-mingled recyclables (curbside mix of paper, cardboard, tin, aluminum, plastic containers, glass bottles and jars)
  - Cardboard
  - Mixed yard and food waste
  - Clean wood
  - Plastic film
  - Expanded polystyrene (Styrofoam)
  - Scrap metal
  - Mercury lighting (fluorescent tubes and compact fluorescent bulbs)
  - Large appliances (refrigerant and non-refrigerant)
  - Small appliances (anything with a cord)
  - Additional recyclables, which may include bicycles and bicycle parts, CD/DVD/VCR players, rigid plastics, textiles, mattresses, carpet, gypsum wallboard, aggregates (bricks, pavers, porcelain sinks and toilets), asphalt shingles and other construction and demolition waste; and other materials targeted for diversion from disposal
- Potential removal of recyclables from mixed loads and/or construction and demolition waste loads
- Potential mixed waste sorting and processing
- Potential transfer of commercial yard waste and curbside recyclables
- Potential on-site organics sorting and processing
- Potential MRW service.

While providing recycling services remains an important element of the 2019 Solid Waste Comp Plan, specific policies and goals change over time. To this end, transfer stations, which are meant to last for approximately 50 years, must be designed to be flexible, with sufficient space to reconfigure operations as program requirements change over time.

The following measures are anticipated during operations for the health and safety of customers, employees, and neighbors:

- The transfer building will be fully enclosed except for the entry/exit points, reducing off-site dust, noise, odor, and litter.
- A mechanical exhaust ventilation system with filtration media will be incorporated into the transfer station building for odor and dust control within the building.
- A misting system or equivalent technology will be installed in the transfer building for odor and dust control within the building.
- The tipping floor will be cleared at the end of each day, with waste stored in the sealed compactor, if necessary.
- Fully loaded transfer trailers will be removed from the station in the order they are filled.
- Transfer trailers will be fully enclosed, and doors and door-seals will be maintained to reduce the potential for odor, spills and litter leaving the building.
- Efficient on-site traffic flows will minimize vehicle queuing, reducing emissions.

- The station will be cleaned weekly at a minimum.

1.2.2.3. Alternative 1

The site for Alternative 1 is located at 11724 NE 60th Street in Kirkland. Alternative 1 has two options:

- 1A – a facility constructed after the existing transfer station building is closed and deconstructed or demolished (**Figure 1-3**)
- 1B – a facility constructed while the existing transfer station building is open and operating, and then the existing transfer station building would be closed and repurposed, or deconstructed or demolished and replaced after the new station is open (**Figure 1-4**).

Alternative 1A includes removal of the existing transfer station building prior to construction of the new station and inclusion of a "TBD" (to-be-determined) facility to house future private recycling or reuse operations or service providers; Alternative 1A does not provide for a MRW collection facility. The proposed potential site development area for Alternative 1A is about 10 acres. Full recycling services would be provided with Alternative 1A. Taylor Fields (the closed Houghton landfill property) is currently used as baseball fields and for active and passive recreation, with a network of trails traversing the property. The entire parcel is owned by King County SWD. Improvements to Taylor Fields are also planned.

Alternative 1B retains the existing transfer station building during construction of the new station, and then closes and repurposes it, or deconstructs or demolishes and replaces it after the new station is open. While a future use has not been determined, the repurposed or replaced facility could house future private recycling or reuse operations or service providers. Alternative 1B does not provide for a MRW collection facility. The proposed potential site development area for Alternative 1B is about 12.75 acres. Full recycling services would be provided with Alternative 1B. Improvements to Taylor Fields are also planned.

The site is bordered to the east and west by single-family homes. Directly south of the site is NE 60th Street and directly south of NE 60th Street is Bridle Trails State Park. The area immediately north of the existing transfer station, where much of the development would take place, is also zoned P – Park/Open Space. Both Alternative 1A and Alternative 1B may include removal of some existing waste in the development footprint to accommodate construction of new facilities.

1.2.2.4. Alternative 2

The site for Alternative 2 is located on six tax parcels in the 15000 block of Woodinville-Redmond Road NE in Woodinville on parcels 1526059086, 5711600010, 5711600020, 5711600030, 1526059094, and 1526059095. The proposed site is 12.9 acres, with an area available for development of at least seven acres with additional area potentially available dependent on compliance with federal, state, and local environmental regulations. (Figure 1-5). The site is bordered to the north and south by commercial and light industrial uses. To the east is Woodinville-Redmond Road NE and further east are commercial and light industrial uses. To the west is a sloped greenspace, an abandoned Burlington Northern-Santa Fe Railroad (BNSF) rail line, and residential properties. Access to the Woodinville site is from Woodinville-Redmond Road Northeast. The site is currently used for commercial uses including construction, portable toilet rental, manufacturing, and automotive businesses, which would be relocated. A portion of the site is vacant and undeveloped and contains a wetland. Full recycling services would be provided with Alternative 2.

Alternative 2 offers service for collection of MRW, which would be stored in specialized containers on site. MRW includes hazardous waste generated by households and small businesses. Where the SWD currently provides MRW service, the following materials are accepted: pesticides, glues and adhesives, antifreeze, aerosols, automotive products, fuels, rechargeable batteries, button batteries, pool and spa chemicals, oil-based paints, hobby chemicals, mercury devices, thinners and solvents, fluorescent bulbs, toxic cleaning products, fuel cylinders (under five gallons), lithium batteries, and alkaline batteries. Individual loads are limited to 50 gallons and containers greater than five gallons are generally not accepted.

SCALE: 1"=120'-0"

0' 60' 120' 240' 480'

N PLAN

LEGEND

- ALTERNATIVE LOCATION
- POTENTIAL SITE DEVELOPMENT AREA
- FUTURE DEVELOPMENT AREAS
- EXAMPLE ENTRANCE / EXIT

Figure 1-3
Action Alternative 1A

King County Solid Waste Division
Northeast Recycling and Transfer Station

King County

SCALE: 1"=120'-0"

0' 60' 120' 240' 480'

N
PLAN

LEGEND

- ALTERNATIVE LOCATION
- POTENTIAL SITE DEVELOPMENT AREA
- FUTURE DEVELOPMENT AREAS
- EXISTING BUILDINGS TO REMAIN DURING CONSTRUCTION
- EXAMPLE ENTRANCE / EXIT

Figure 1-4
Action Alternative 1B

King County Solid Waste Division
Northeast Recycling and Transfer Station

King County

SCALE: 1"=120'-0"

0' 60' 120' 240' 480'

N

LEGEND

- ALTERNATIVE BOUNDARY
- POTENTIAL SITE DEVELOPMENT AREA
- FUTURE DEVELOPMENT AREAS
- 79.8' WETLAND BUFFER
- 10'-0" BUILDING SETBACK
- EXISTING WETLAND AREA
- EXAMPLE ENTRANCE / EXIT

Figure 1-5
Alternative 2

King County Solid Waste Division
Northeast Recycling and Transfer Station

King County

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1.3. Construction Methods for the Action Alternatives

Design of the new NERTS facility has not been initiated at this time. However, it is anticipated that the action alternatives would require general earthwork and other activities to prepare the site for construction of facility buildings and associated functions. These activities may include, but not be limited to, soil excavation, soil filling, site grading, pile driving, utility trenching, waste excavation, modification or installation of environmental controls, installation of underground utilities, installation of drainage systems, material deliveries, building construction, and installation of equipment. Each of these activities would utilize appropriate construction equipment for the desired function. King County will require the design to minimize soil disturbance to the extent feasible.

2. Regulatory Context

Both action alternatives are located within King County, one in the city of Kirkland and one in the city of Woodinville.

2.1. Federal Regulations

There are no applicable federal regulations that limit offsite environmental sound levels.

The highest levels of vibration occur during short term construction activities and are assessed to evaluate the potential damage to nearby buildings. The Federal Transit Administration (FTA) manual establishes construction damage criteria in terms of peak particle velocity (PPV). These criteria are presented in Table 2-1 and range from a threshold of 0.12 inch per second for "buildings extremely susceptible to vibration damage" to 0.5 inch per second for "reinforced concrete, steel or timber (no plaster)" (FTA 2018).

Table 2-1. Federal Transit Administration Construction Vibration Damage Criteria

Building Category	PPV (inches per second)	Single Event PPV (inches per second)
1. Reinforced concrete, steel, or timber (no plaster) (buildings in steel or reinforced concrete, such as factories, retaining walls, bridges, steel towers, open channels, underground chambers, and tunnels with and without concrete alignment)	0.5	1.2
2. Engineered concrete and masonry (no plaster) (buildings with foundation walls and floors in concrete, walls in concrete or masonry, stone masonry retaining walls, underground chambers and tunnels with masonry alignments, and conduits in loose material)	0.3	0.7
3. Nonengineered timber and masonry buildings (buildings as mentioned previously but with wooden ceilings and walls in masonry)	0.2	0.5
4. Buildings extremely susceptible to vibration damage (construction very sensitive to vibration; objects of historic interest)	0.12	0.3

The Swiss criteria provide additional details regarding the building category and provide a single event limit.

2.2. Washington Administrative Code State Regulations

Washington Administrative Code (WAC) Title 173, Chapter 173-60, provides the applicable Maximum Environmental Noise Levels for Washington State. These levels are based on the environmental designation for noise abatement (EDNA), which is defined as "an area or zone (environment) within which maximum permissible levels are established" (WAC 173-60). There are three EDNA designations (WAC 173-60-030), which roughly correspond to residential, commercial/recreational, and industrial/ agricultural uses:

1) Class A: Lands where people reside and sleep (such as residential)

2) Class B: Lands requiring protection against noise interference with speech (such as commercial/recreational)

3) Class C: Lands where economic activities are of such a nature that higher noise levels are anticipated (such as industrial/agricultural)

Table 2-2 summarizes the maximum permissible levels applicable to sound received at noise-sensitive areas (Class A EDNA) and at industrial/agricultural areas (Class C EDNA) from an industrial facility (Class C EDNA).

Table 2-2. State of Washington Maximum Permissible Environmental Noise Levels

	Maximum Permissible Sound Levels (dBA) from a Class C EDNA Source		
	Class A EDNA Receiver		Class C EDNA Receiver
Statistical Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)	Anytime
L_{eq}	60	50	70
L_{25}	65	55	75
$L_{8.3}$	70	60	80
$L_{2.5}$	75	65	85

Source: WAC 173-60-040

L_{eq} = equivalent noise level
L_{25}: 15 minutes in any 1-hour period
$L_{8.3}$: 5 minutes in any 1-hour period
$L_{2.5}$: 1.5 minutes in any 1-hour period

dBA = A-weighted decibel(s)

The noise regulations do not specifically address residences (a Class A use) located on agricultural lands (a Class C use). While strict interpretation of sound from a Class C source on Class C lands would be 70 dBA, an alternative interpretation is 60 dBA during the daytime and 50 dBA during the nighttime at the residence itself.

The following are exempted from the limits presented in Table 2-1 (according to WAC 173-60-050):

1) Construction noise (including blasting) between the hours of 7 a.m. and 10 p.m.

2) Motor vehicles when regulated by WAC 173-62 (Motor Vehicle Noise Performance Standards for vehicles operated on public highways)

3) Motor vehicles operated off public highways, except when such noise affects residential receivers

WAC 173-60-050(6) states that “nothing in these exemptions is intended to preclude the [Washington State] Department [of Ecology] from requiring installation of the best available noise abatement technology consistent with economic feasibility.” WAC 173-62, Motor Vehicle Noise Performance Standards, regulates noise generated by vehicles traveling on public roads.

King County has promulgated independent state-approved noise standards pursuant to WAC 173-60 Section 110. The City of Kirkland and City of Woodinville also have separate noise regulations.

2.3. King County

The 2016 *King County Comprehensive Plan* (King County 2016) discusses goals specific to unincorporated areas of the County. While the project is not within the unincorporated area of King County, this information is provided for informational purposes. The following excerpts from the 2016 *King County Comprehensive Plan* provide examples of the value placed on minimizing noise impacts by the residents of King County and are applicable to this project:

12.86.110 Environmental sound levels – maximum permissible sound levels.

A. For purposes of this subsection, sound levels shall be measured by a Type 1 or Type 2 sound level meter. Sound level measurements shall be based on the L_{eq} during the measurement interval, using a minimum measurement interval of one minute for a constant sound source or a thirty-minute measurement for a noncontinuous sound source. For sound sources located within unincorporated King County, the maximum permissible sound levels are provided in Table 2-3.

Table 2-3. Maximum Permissible Sound Levels by Source and Receiving Property Districts

Sound Source District	Receiving Property District			
	Rural dBA	Residential dBA	Commercial dBA	Industrial dBA
Rural	49	52	55	57
Residential	52	55	57	60
Commercial	55	57	60	65
Industrial	57	60	65	70

B. During a measurement interval, Lmax may exceed the sound level limits of this section by no more than 15 dBA. For the purposes of this subsection, "Lmax" means the maximum sound over a measurement interval determined by using a sound level meter set to "fast" response time.

12.86.120 Environmental sound levels – modifications to maximum permissible sound levels.

The maximum permissible sound levels established by this chapter shall be reduced or increased by the sum of the following:

A. Between 10:00 p.m. and 7:00 a.m. during weekdays, and between 10:00 p.m. and 9:00 a.m. on weekends, the levels established by K.C.C. 12.86.110 are reduced by 10 dBA where the receiving property lies within a rural or residential district of King County.

B. For any source of sound that has a pure tone component, the levels established by this chapter shall be reduced by 5 dBA, but this reduction shall not be imposed on any electrical substation. For the purposes of this subsection, “pure tone component means sound having the following qualities: a one-third octave band sound pressure level in the band with the tone that exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 decibels for center frequencies of 500 Hz and above, by 8 decibels for center frequencies between 160 and 400 Hz, and by 15 decibels for center frequencies less than or equal to 125 Hz]”; and

C. For any source of sound that is impulsive and not measured with an impulse sound level meter, the levels established by this chapter are reduced by 5 dBA.

12.86.510 Exemptions – sounds exempt during daylight hours.

The following sounds are exempt from this chapter between 7:00 a.m. and 10:00 p.m. on weekdays and between 9:00 a.m. and 10:00 p.m. on weekends, unless other hours are specified:

C. Sounds created by blasting that are governed by K.C.C. 21A.22.070;

12.86.520 Exemptions – construction sounds – exceptions.

A. Normal and usual sounds created by construction, including on or by watercraft, are restricted to the following hours unless otherwise specified by the director, and are exempt from this chapter except as provided in subsection C. of this section:

1. For heavy equipment used on construction sites, including crawlers, tractors, bulldozers, rotary drills and augers, loaders, power shovels, cranes, derricks, graders, off-highway trucks, ditchers, trenchers, compactors, compressors and other similar equipment, operating hours are between 7:00 a.m. and 7:00 p.m. weekdays and between 9:00 a.m. and 7:00 p.m. weekends;
2. For impact types of construction equipment, including pavement breakers, pile drivers, jackhammers, sandblasting tools or other types of equipment or devices that create impulse noise or impact noise, operating hours are between 8:00 a.m. and 5:00 p.m. on weekdays and between 9:00 a.m. and 5:00 p.m. on weekends; and
3. For all other construction activities, operating hours are between 7:00 a.m. and 10:00 p.m. on weekdays and between 9:00 a.m. and 8:00 p.m. on weekends.

B. This section does not apply to sound created by mineral extraction or materials processing operations, which are governed by K.C.C. chapter 21A.22.

C. Exterior construction sound levels heard from the interior of buildings within a commercial or industrial district, after efforts including closing windows and doors are taken to reduce the impact of the exterior construction noise, must not be unreasonable. Whether the construction sound levels are within the maximum permissible sound levels of this chapter may be a factor in determining reasonableness.

2.4. City of Kirkland

The City of Kirkland addresses noise in Chapter 115 (Miscellaneous Use Development and Performance Standards) of the Kirkland Zoning Code. In Section 115.95 of the code, the City of Kirkland adopted the Washington state standards for maximum environmental noise levels (WAC 173-60) described in Section 2.2. The code addresses public nuisance noise as follows:

> Any noise which injures; endangers the comfort, repose, health or safety of persons; or in any way renders persons insecure in life, or in the use of property, is a violation of this code. The operation of power equipment, including but not limited to leaf blowers, shall be deemed a public nuisance if such operation occurs during the following hours: before 8:00 a.m. or after 8:00 p.m. Monday through Friday, or before 9:00 a.m. or after 6:00 p.m. Saturday, Sunday, or the following holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

Section 115.25 of the Kirkland Zoning Code addresses requirements related to development activity – construction work that requires a permit. Limitations on construction noise are related to the timing of construction activity:

> It is a violation of this code to engage in any development activity before 7:00 a.m. or after 8:00 p.m., Monday through Friday, or before 9:00 a.m. or after 6:00 p.m. Saturday. No development activity may occur on Sundays or on the following holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

To work outside of the established hours, written permission must be granted by the Planning Official if the following conditions are met (Section 115.25(2)(a)):

1. The activity or operation will not impact any residential use; or
2. The permission will facilitate the construction of publicly funded improvements that will serve the general population of the City of Kirkland and such permission is necessary to avoid undue delay of project completion and/or long-term inconvenience or disruption to the general public.

Alternatively, the Planning Official may limit the established hours if the following conditions are met (Section 115.25(2)(b)):

1. The reduced hours will best serve the public's health, safety and welfare; or

2. There have been substantial verifiable complaints received by the Planning and Building Department that the development activity is interfering with the health and repose of residents of a residential use which is permitted in the zone in which the development activity is located.

If the Planning Official determines that the hours of operation on a site should be limited pursuant to subsections (2) (b)(1) or (2) of this section, he/she shall provide written notice to the owner of the property affected by this decision one (1) week prior to the imposition of the restriction. The Planning Official shall have the right to repeal this restriction at any time it can be shown that the development activity can and will be conducted so as not to be contrary to subsections (2)(b)(1) and (2) of this section.

Public disturbance noises are also addressed in the Kirkland Municipal Code in Chapter 11 Section 84A.070.

It is unlawful for any person to cause, or for any person in possession of property to allow to originate from the property, sound that is a public disturbance noise.

2.5. City of Woodinville

The City of Woodinville established noise regulations in Chapter 8.08 of the Woodinville Municipal Code (WMC). Section 8.08.040 of the code adopts the Washington state maximum permissible noise levels (WAC 173-60) presented in Section 2.2. Likewise, exemptions to the state maximum permissible noise levels from WAC 173-60-050 are adopted by reference. Section 8.08.060 prohibits public nuisance and disturbance noises, including the following:

- Any sound made by the construction, excavation, repair, demolition, destruction, or alteration of any building or property or upon any building site anytime on Sundays and holidays and outside the hours of 7:00 a.m. through 7:00 p.m., Monday through Friday and 9:00 a.m. through 5:00 p.m. on Saturday, or, from Memorial Day to Labor Day, anytime on Sundays and holidays and outside the hours of 7:00 a.m. through 9:00 p.m., Monday through Friday and 9:00 a.m. through 5:00 p.m. on Saturday, excepting:
- Nothing herein shall be construed to limit or prohibit different or more restrictive hours for any work authorized under a development permit issued under any chapter of this code as may be specified in any determining or decision issued under this code.

WMC Section 8.08.090 provides an option to obtain a variance to the maximum environmental noise levels:

1. Variances may be granted to any person from any requirement of WMC 8.08.040, if findings are made by the Planning Director or his/her designee that immediate compliance with such requirement cannot be achieved because of special circumstances rendering immediate compliance unreasonable in light of economic or physical factors, encroachment upon an existing noise source, or because of nonavailability of feasible technology or control methods. Variances shall not be granted for any requirement of WMC 8.08.060.
2. Any such variance, or renewal thereof, shall be granted only for the minimum time period found to be necessary under the facts and circumstances.

3. Methodology

This section describes the methodology followed to conduct the assessment and the corresponding results derived for construction and operations, respectively. Advanced design for the new NERTS facility has not been initiated at this time. However, it is anticipated that the action alternatives would require general earthwork and other activities to prepare the site for construction of facility buildings and associated functions. These activities may include, but not be limited to, soil excavation, soil filling, site grading, pile driving, utility trenching, waste excavation, modification or installation of environmental controls, installation of underground utilities, and installation of drainage systems. Each of these activities would utilize appropriate construction equipment for the desired function.

3.1. Data Sources and Collection

Operational measurements were collected at King County's Factoria transfer station to assess the level of sound emanating from a modern enclosed transfer station (construction of the Factoria Transfer station was completed in 2017). The primary sources of sound at Factoria are expected to be the same as the sources of sound for the NERTS Project: collection trucks, front-end loaders, compactors, transfer trucks, back-up alarms, material handling activities and building ventilation systems.

3.2. Selection of the Study Area

The study area extends approximately 2,500 feet beyond each project site boundary as compliance with applicable thresholds is reasonably expected within this distance.

3.3. General Construction Noise Evaluation

Sound levels from construction activities were estimated based on data from the FTA's *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). This manual represents the most recent and comprehensive tabulation of sound from common pieces of construction equipment that are typically used on a variety of construction projects. Representative sound levels from the FTA manual are presented in Table 3-1.

Table 3-1. Construction Equipment Noise Emissions Levels

Equipment	Typical Noise Level 50 feet from Source, dBA	Equipment	Typical Noise Level 50 feet from Source, dBA
Air Compressor	80	Paver	85
Backhoe	80	Pneumatic Tool	85
Compactor	82	Pump	77
Concrete Mixer	85	Roller	85
Concrete Pump	82	Saw	76
Concrete Vibrator	76	Scarifier	83
Crane, Derrick	88	Scraper	85
Crane, Mobile	83	Shovel	82
Dozer	85	Truck	84
Generator	82	Impact Wrench	85
Grader	85	Jack Hammer	88
Loader	80		

Source: Table 7-1, FTA 2018

As described by FTA, the average noise level from each piece of equipment is determined by the following formula for geometric spreading:

$$\textit{Typical Noise Level at 50 feet} + 10*\log(Adj_{usage}) - 20*\log(\textit{distance to receptor}/50) - 10*G*\log(\textit{distance to receptor}/50)$$

The following parameters have been used in this analysis:

- Usage factor (Adj_{usage}) is 1 (i.e., the equipment is operating continuously, which is a conservative assumption)
- Ground effect factor (G) is 0, representing hard ground (i.e., a ground condition that does not result in additional attenuation).

The total noise level is then solely a function of the equipment operating and distance. Using the total noise level results in a conservative assessment of propagation over long distances, which can be further attenuated by atmospheric absorption.

A review of the equipment noise levels presented in Table 3-1 indicates that the loudest equipment generally emits noise in the range of 80 to 90 dBA at 50 feet. Noise at any specific receptor is dominated by the closest and loudest equipment. The types, numbers, and duration of equipment anticipated to be used near any specific receptor location will vary over time. Therefore, a typical noise estimate was developed based on the general assumption of multiple pieces of loud equipment operating near each other with the exception of impact pile driving, which is addressed separately. Specifically, the scenario evaluated uses five pieces of general construction equipment working near each other, as follows:

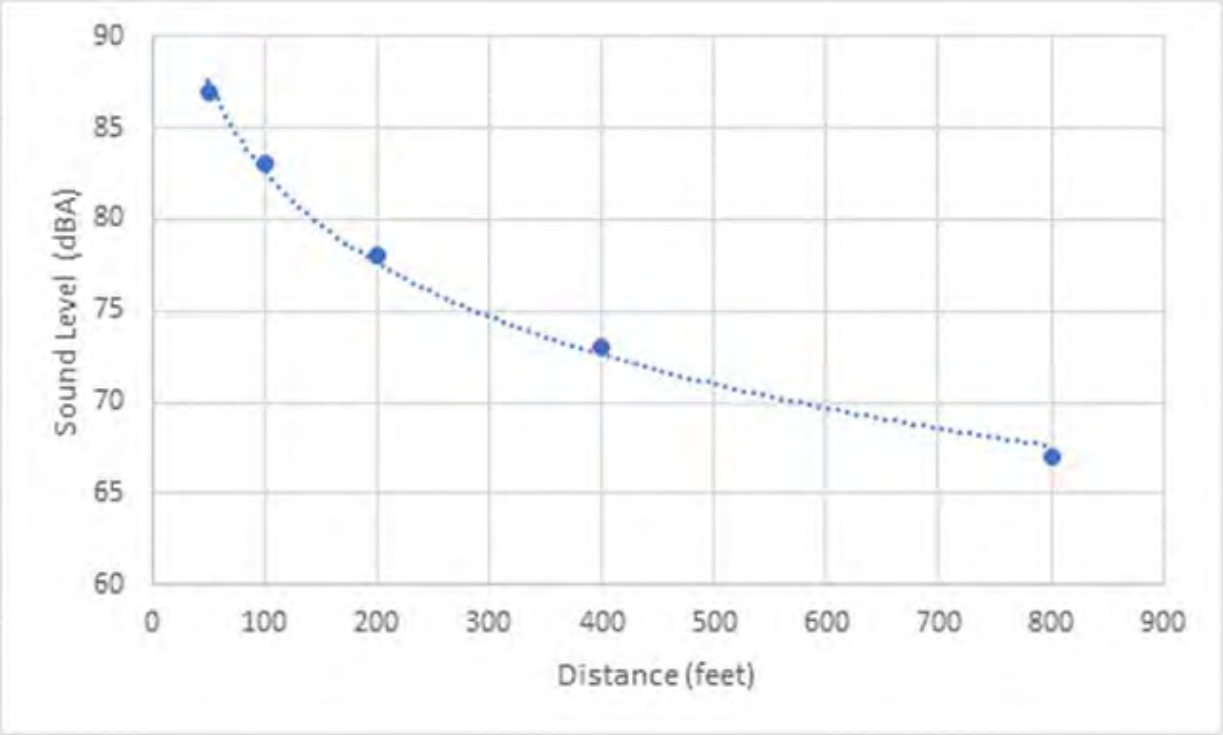
- One piece of equipment generating a reference noise level of 85 dBA at 50 feet at the edge of the construction or work area
- Two pieces of equipment generating 85 dBA reference noise levels located 50 feet farther away from the edge of construction or work area
- Two more pieces of equipment generating 85 dBA reference noise levels located 100 feet farther away from the edge of construction or work area

Table 3-2 summarizes the expected average equipment noise levels at various distances, based on this scenario. Figure 3-1 shows a plot of sound level versus distance.

Table 3-2. Average Equipment Noise Levels Versus Distance

Distance from Activity (feet)	Average Noise Level (dBA)
50	87
100	83
200	78
400	73
800	67
1600	62
3200	56

Figure 3-1. Sound Level Versus Distance



Driven piles may result in a noise level of 101 dBA at 50 feet with a usage factor of 20 percent while 95 dBA at 50 feet is identified as a more typical specified sound level. Pile-driving sound levels would be expected to decrease at a rate of 6 dBA per doubling of distance. Pile driving is a short-term activity and if required would be scheduled to occur during daytime hours. Table 3-3 presents the predicted sound level from impact pile driving at various distances.

Table 3-3. Predicted Pile-driving Sound Levels

Distance from Pile Driver (feet)	Pile Driver Sound Level of 101 dBA at 20% (dBA)	Pile Driver Sound Level of 95 dBA at 20% (dBA)
50	94	88
100	88	82
200	82	76
400	76	70
800	70	64

3.4. General Construction Vibration Evaluation

Construction activities have the potential to result in varying degrees of temporary ground-borne vibration, depending on the specific equipment used and operations involved. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. Table 3-4 summarizes vibration levels for typical construction equipment.

Table 3-4. Typical Construction Equipment Vibration Levels

Equipment	PPV at 25 feet (inches per second)
Pile driver (impact – upper range)	1.518
Pile driver (impact – typical)	0.644
Pile driver (sonic – upper range)	0.734
Pile driver (sonic – typical)	0.170
Large bulldozer	0.089
Caisson drilling	0.089
Trucks	0.076
Jackhammer	0.035
Small bulldozer	0.003

Source: FTA 2018

Bulldozers and other heavy civil construction equipment would be regularly used during the project's construction. In addition, heavy trucks would be used to deliver and remove material to and from the site. As referenced in Table 3-3, the largest vibration source is an impact pile driver. According to FTA, vibration levels associated with the upper range of an impact pile driver are 1.518 inches per second PPV at 25 feet. Trucks generate lower vibration levels of 0.076 inch per second PPV at 25 feet.

The risk of construction vibration damage from each piece of equipment can be assessed by adjusting the PPV from the reference PPV at 25 feet to the actual distance from the equipment to the receiver, using the following equation:

$$PPV_{equip} = PPV_{ref} \times \left(\frac{25}{D}\right)^{1.5}$$

Where:

PPV_{equip}= The peak particle velocity of the equipment adjusted for distance (inches per second)

PPV_{ref} = The source reference vibration level at 25 feet (inches per second)

D = The distance from the equipment to the receiver (feet)

To determine the closest distance each building type (by building category [Table 3-5]) can be to each type of equipment before sustaining damage, the equation was solved to find the distance at which the construction vibration damage criteria were met for each building criterion (Table 3-5).

Table 3-5. Typical Construction Equipment Vibration Levels in Peak Particle Velocity

Equipment	PPV at 25 feet (inches per second)	Building Category (Construction Vibration Damage Criteria)			
		Reinforced (Category 1) (0.5 inch per second)	Engineered (Category 2) (0.3 inch per second)	Nonengineered (Category 3) (0.2 inch per second)	Extremely Sensitive (Category 4) (0.12 inch per second)
Pile driver (impact – upper range)	1.518	50	75	100	135
Pile driver (impact – typical)	0.644	30	40	55	75
Pile driver (sonic – upper range)	0.734	30	45	60	85
Pile driver (sonic – typical)	0.170	<25	<25	<25	30
Large bulldozer	0.089	<25	<25	<25	<25

Table 3-5. Typical Construction Equipment Vibration Levels in Peak Particle Velocity

Equipment	PPV at 25 feet (inches per second)	Building Category (Construction Vibration Damage Criteria)			
		Reinforced (Category 1) (0.5 inch per second)	Engineered (Category 2) (0.3 inch per second)	Nonengineered (Category 3) (0.2 inch per second)	Extremely Sensitive (Category 4) (0.12 inch per second)
Caisson drilling	0.089	<25	<25	<25	<25
Trucks	0.076	<25	<25	<25	<25
Jackhammer	0.035	<25	<25	<25	<25
Small bulldozer	0.003	<25	<25	<25	<25

Source: FTA 2018

The distances determined indicate that for all building categories, general construction equipment must be less than 25 feet from the existing structure to cause damage.

Impact pile driving is a unique activity and its upper range has the greatest potential to cause damage to existing structures; As indicated in Table 2-1, residences would typically be considered Category 3.

3.5. Operation Sound Modeling Methodology

The following primary sources of operational noise are associated with the alternatives:

- Operations on the tipping floor (trucks dumping, front-end loaders pushing the waste to the compactor chute, recyclables getting moved around)
- Operation of two compactors in the lower floor, below the tipping floor
- Operation of HVAC systems located on the roofs of each of the buildings
- Tractor trailers hauling full trash trailers offsite
- Repositioning of empty trailers and containers
- Management of recyclables in the public recycling areas, including managing metals, plastic, and glass, baling of materials, and the loading of recyclables into transfer containers

Standard acoustical engineering methods were used in the noise analysis. The sophisticated noise model, CADNA/A (DataKustik 2023), enables one to fully model complex industrial plants. The sound propagation factors used in the model have been adopted from International Organization for Standardization (ISO) 9613-2, *Acoustics—Sound Attenuation During Propagation Outdoors* (ISO 1996). Atmospheric absorption was estimated for conditions of 10 degrees Celsius and 70 percent relative humidity (conditions that favor propagation) and computed in accordance with ISO 9613-1.

A conceptual acoustical model was developed for the future development area of each alternative. This model consists of a standard uninsulated 20 gage metal building with multiple large doors that are modeled as being open. The average sound level throughout the interior was derived from measurements of approximately 84 dBA at a similar operating facility's tipping floor (trucks dumping, front-end loader operations, back-up alarms, and non-commercial unloading activities). This sound level was modeled at the inside of all wall surfaces and throughout any modeled opening. While numerous acoustical minimization measures are available to be considered during detailed design, no such measures were incorporated into this conceptual model. Because the facility will not operate during the nighttime hours, the analysis focused on the daytime operations and criteria.

4. Affected Environment

This section describes the affected environment for the facility.

4.1. Land Use in Facility Area

For Alternatives 1A and 1B, the project area for the development is zoned P, Park/Open Space (Figure 4-1). The area to the north of the existing transfer station is currently used for recreation and is the site of a closed landfill that is owned and maintained by King County. The site is bordered to the east and west by single family homes and to the south by Bridle Trails State Park. For both Alternatives 1A and 1B, the closest residences are approximately 70 feet from potential site development area boundaries.

For Alternative 2, the site is zoned Industrial with Tourist District overlay (Figure 4-2). The site is bordered to the north, south, and east by commercial and light industrial uses. To the west is a sloped greenspace, an abandoned rail line, and residential properties. A school is located on the eastern side of Woodinville-Redmond Road NE, opposite the site. Residences are located approximately 370 feet southwest of the potential site development area boundaries.

4.2. Ambient Sound Survey

Ambient sound monitoring was conducted in the vicinity of the project at locations depicted on Figures 4-1 and 4-2. Monitoring was conducted using a 01dB Duo and Larson Davis 831, American National Standards Institute (ANSI) S1.4 Type 1 (precision) data logging sound level meter for approximately 7 days, from May 17 to 24, 2023. Weather conditions were concurrently measured with a Vaisala WXT-520 weather sensor at one location. The hourly results are tabulated in Appendix A, and summary results are presented in Table 4-1.

Table 4-1. Summary of Existing Average Daytime and Nighttime Sound Levels (dBA)

	Metric			
	$L_{2.5}$	$L_{8.33}$	L_{25}	L_{eq}
WAC Class A Daytime Limits	*75*	*65*	*70*	*60*
WAC Class A Nighttime Limits	*65*	*60*	*55*	*50*
WAC Class C Limits (Anytime)	*85*	*80*	*75*	*70*
Measured Average Levels				
Alternatives 1A and 1B				
M1 (Day)	62	58	55	56
M1 (Night)	54	52	50	50
M2 (Day)	60	58	55	55
M2 (Night)	51	49	47	47
M3 (Day)	56	52	49	50
Alternative 2				
M3 (Night)	50	47	45	46
M4 (Day)	58	55	52	52

Table 4-1. Summary of Existing Average Daytime and Nighttime Sound Levels (dBA)

	Metric			
	$L_{2.5}$	$L_{8.33}$	L_{25}	L_{eq}
M5 (Day)	53	52	50	50

Notes: Given the proposed operational hours, daytime is considered to start at 6 a.m. on weekdays and 8 a.m. on weekends, and to end at 6 p.m. While nighttime operations are not anticipated, existing nighttime sound levels are provided for completeness and considered to occur between 10 p.m. and 6 a.m. on any day. Measurements at M4 and M5 were collected for one-hour during the daytime hours.

$L_{2.5}$: 1.5 minutes in any 1-hour period
$L_{8.3}$: 5 minutes in any 1-hour period
L_{25}: 15 minutes in any 1-hour period

L_{eq}: equivalent noise level

Figure 4-1. Noise Monitoring Locations for Alternatives 1A and 1B

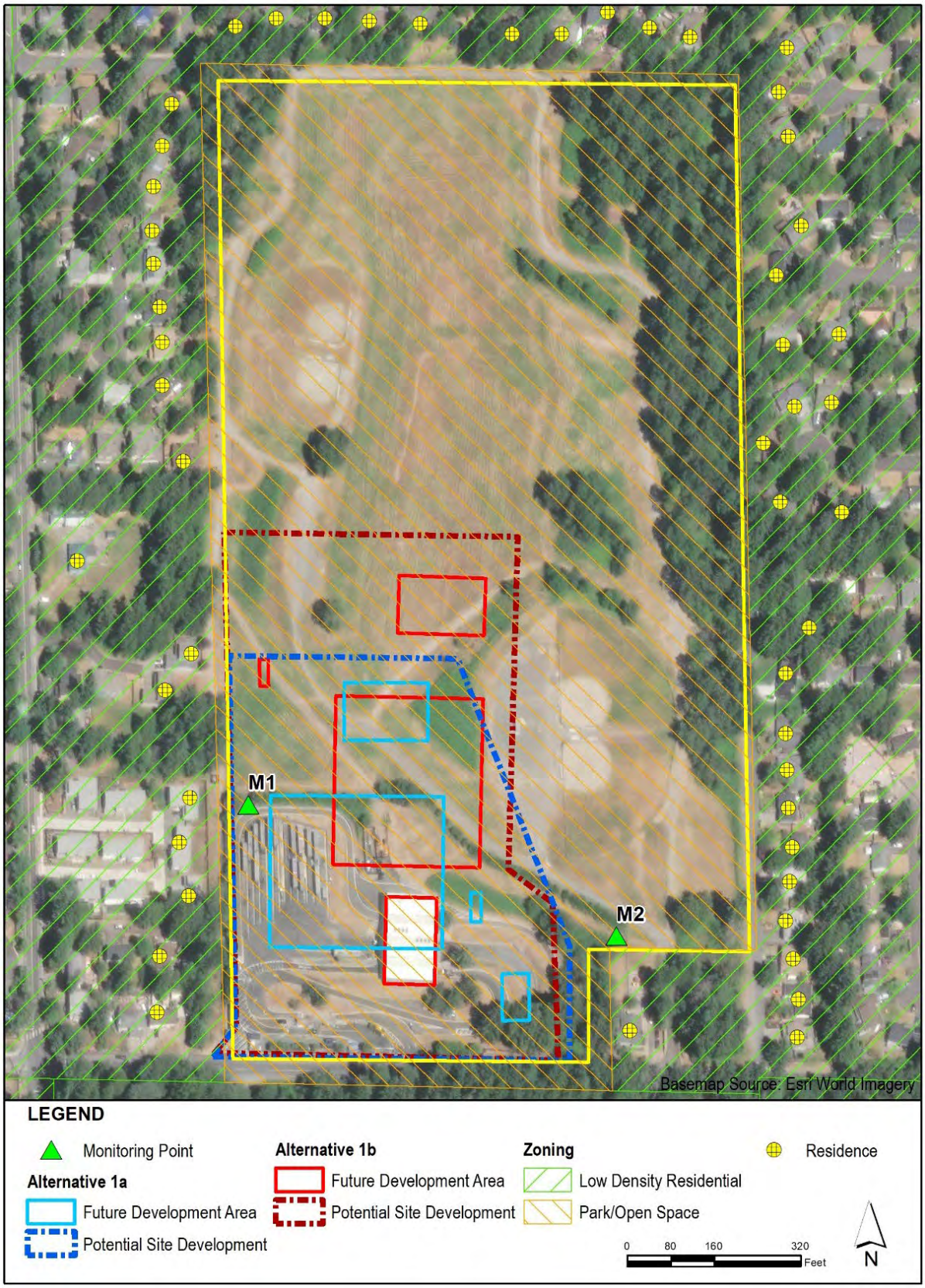
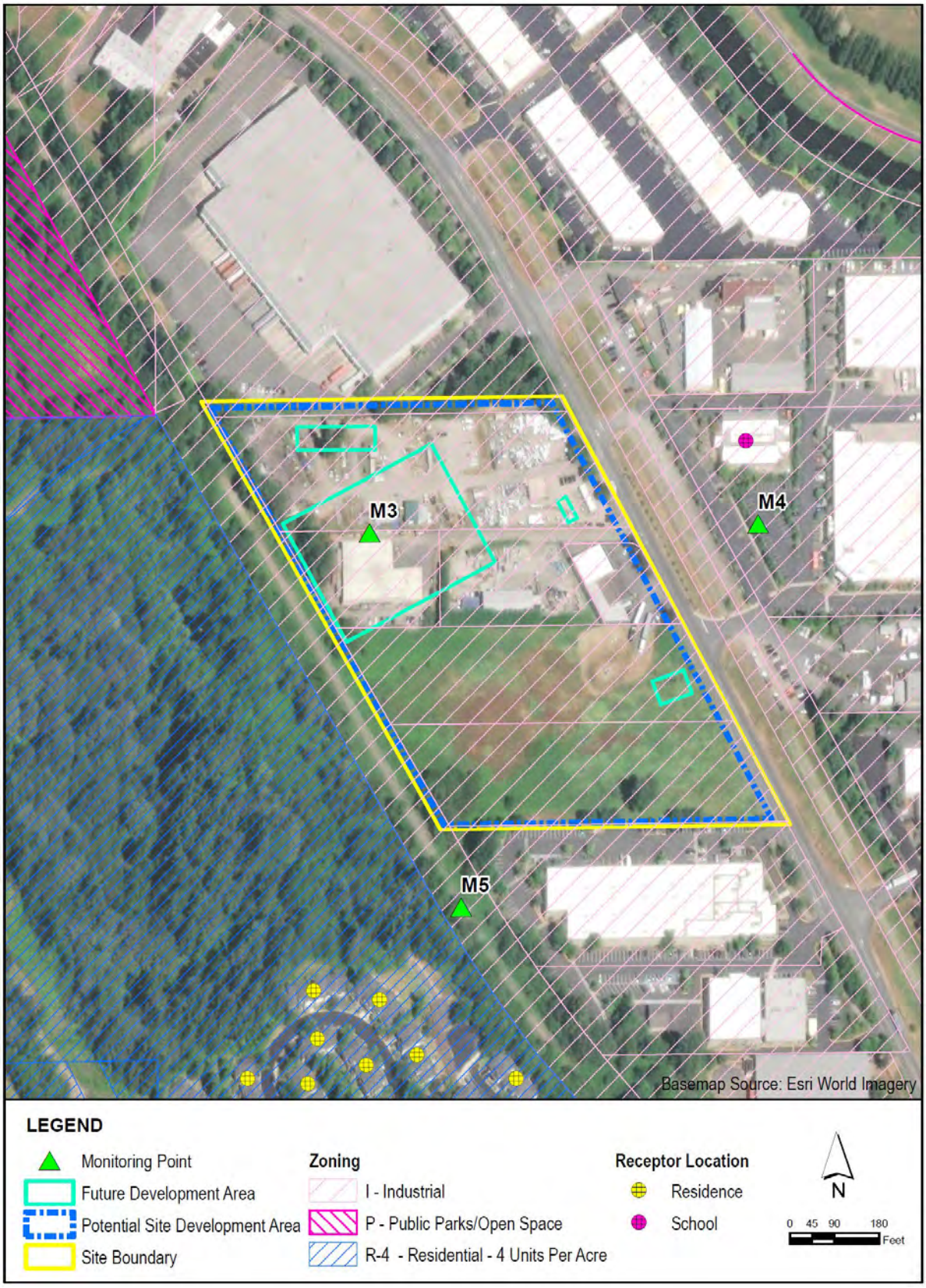


Figure 4-2. Noise Monitoring Locations for Alternative 2



4.3. Estimated Baseline Sound Levels in Proximity of Facility

Annex C of ANSI Standard S12.9-2013 (ANSI 2015) provides estimated day-night, day, and night sound levels based on land use category. These estimates can be used to provide a general indication of ambient sound in the facility study area.

Existing ambient sound levels may vary both temporally and spatially in the study area. For example, wind may result in rustling vegetation noise on one day, whereas calm conditions on another day would result in different sound levels at the same location. Seasonal activities can also result in different sound levels. Annex C ANSI Standard S12.9-2013 provides a table of approximate background sound levels based on land use and population density. The ANSI standard estimation divides land uses into six distinct categories. Descriptions of these land use categories, along with the typical day and night levels, are provided in Table 4-2.

Of the six categories, Alternative 1 falls within the Category 3, with a total of 3,400 people per square mile according to 2021 census data. The sound levels for Category 3 range between 49 and 55 dBA. Alternative 2 falls within Category 4, with a total of approximately 1,800 people per square mile. Category 4 sound levels are expected to range between 44 to 50 dBA. At times, louder or quieter periods than the levels stated could reasonably be assumed to occur. Furthermore, Annex C of ANSI Standard S12.9-2013 notes that “95% prediction interval (confidence interval) is on the order of ±10 dB.” These levels are generally in agreement with the ambient noise levels measured in the ambient sound survey (Section 4.2).

Table 4-2. A-weighted Sound Levels Corresponding to Land Use and Population Density

Category	Land Use	Description	People per Square Mile	Day (dBA)	Night (dBA)
1	Noisy commercial and industrial areas and very noisy residential areas	Very heavy traffic conditions, such as in busy downtown commercial areas; at intersections for mass transportation or for other vehicles, including elevated trains, heavy motor trucks, and other heavy traffic; and at street corners where many motor buses and heavy trucks accelerate.	63,840	66	58
2	Moderate commercial and industrial areas and noisy residential areas	Heavy traffic areas with conditions similar to Category 1 but with somewhat less traffic; routes of relatively heavy or fast automobile traffic, but where heavy truck traffic is not extremely dense.	20,000	61	54
3	Quiet commercial, industrial areas, and normal urban and noisy suburban residential areas	Light traffic conditions where no mass transportation vehicles and relatively few automobiles and trucks pass, and where these vehicles generally travel at moderate speeds. Residential areas and commercial streets and intersections with little traffic comprise this category.	6,384	55	49
4	Quiet urban and normal suburban residential areas	These areas are similar to Category 3, but for this group, the background is either distant traffic or is unidentifiable. Typically, the population density is one-third the density of Category 3.	2,000	50	44
5	Quiet residential areas	These areas are isolated, far from significant sources of sound, and may be situated in shielded areas such as a small wooded valley.	638	45	39
6	Very quiet, sparse suburban, or rural residential areas	These areas are similar to Category 4 but are usually in sparse suburban or rural areas, and for this group, few if any near sources of sound exist.	200	40	34

Source: Annex C ANSI Standard S12.9-2013

5. Impacts and Potential Minimization Measures

Sections 5.1 through 5.4 discuss potential noise impacts from construction and operation of the No Action Alternative and action Alternatives 1 and 2.

5.1. No Action Alternative

Under the No Action Alternative, no construction activities would occur, so there would be no noise generated and no noise impact.

Under the No Action Alternative, ongoing operations at the existing Houghton RTS would continue to generate noise levels similar to existing operational noise levels. The No Action Alternative would have no impact on existing ambient noise levels.

5.2. Impacts Common to All Action Alternatives

The only common potential impact across alternatives is construction. Operational impacts are site specific and discussed separately.

The Transportation Technical Report concludes that while the action alternatives will generate increased traffic volumes, the level of traffic does not result in a change in intersection operation compared to the No Action Alternative. Traffic noise levels are similarly predicted not to change substantially as detailed in Appendix B. During construction it was identified that “the increased truck volume is minimal and is expected to cause little to no impacts to traffic operations.” A doubling in traffic volumes would typically be required for there to be noticeable change in traffic noise, thus the increase in traffic noise is not anticipated to be substantial.

5.2.1. Impacts from Construction

Construction is anticipated to last approximately 30 months. Permits for construction would be required by the local jurisdiction. Construction activities are expected to be limited to the allowed hours. Work outside these hours would require additional approvals.

Heavy equipment will be used during material deliveries, grading, excavation, paving, and erection. This equipment typically generates 80 to 90 dBA at 50 feet. A model of multiple pieces of heavy equipment operating simultaneously is estimated to result in 62 to 67 dBA at 800 to 1,600 feet, respectively. The range of sound levels reflects the fact that construction work is highly variable given the dynamics of construction. The site for Alternative 1 is bordered to the north, east, and west by single family homes. For both Alternatives 1A and 1B, the closest residences are 120 feet from conceptual building footprints. The sound level at this distance as determined by the methodology described in Section 3.3 would be approximately 81 dBA. The closest noise receptors to Alternative 2 are a school approximately 300 feet from conceptual building footprints and a neighborhood with residences approximately 720 feet from the conceptual building footprints. General construction noise is modeled to be 74 dBA at the school and 68 dBA at the residences. Typical construction equipment would need to be operated closer than 25 feet of existing structures to present a vibration risk.

Pile driving is a unique construction activity that is limited to a portion of the construction period and conducted during daytime hours. Sound levels from pile driving may vary and are predicted to range between an average of 88 to 94 dBA at a distance of 50 feet, decreasing with increasing distance. Vibrations from pile driving activities also decrease with increasing distance. For a typical residential structure, vibration impacts from pile driving are not anticipated at distances beyond 100 feet.

5.2.2. Common Construction and Operational Minimization Measures

Noise-attenuating design features are available to ensure a substantial noise reduction and that regulatory compliance is achieved. Noise reduction measures that may be incorporated into the project design to reduce construction and operational noise include the following:

- Evaluate potential for quieter construction methods to satisfy design and engineering requirements (e.g., consider feasibility of alternatives to affect pile driving).
- Evaluate alternative pile installation methods if piles are required within 200 feet of existing residences.
- Evaluate site specific appropriateness of vibration monitoring during pile driving activities within 200 feet of sensitive receptors. Additionally consider site specific appropriateness of pre- and post-pile driving inspections of buildings within 200 feet of pile driving.
- Radios that can be heard offsite should not be used before 7:00 a.m. and be no louder than necessary.
- Take care when dropping materials from a height, for example, into or out of a truck or when loading or unloading scaffolding.
- Locate noisy equipment so that its impact on neighboring premises is minimized (whether by maximizing the distance to the neighboring premises or using existing structures or elevations to create sound barriers).
- Shut or throttle down equipment (such as backhoes, cranes, bobcats, loaders, and generators) whenever they are not in actual use.
- Ensure that noise reduction devices, such as mufflers, are fitted and operating effectively.
- Locate material stockpiles and staging areas, as well as maintenance/equipment staging and parking areas, as far as feasible from noise-sensitive residential and park receptors.
- Prepare a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, construction schedule posting or notification to the community, and designation of a noise disturbance coordinator prior to the start of construction who would respond to neighborhood complaints during the construction timeline.
- Notify neighbors located adjacent to the construction site of the construction schedule.
- Designate a noise disturbance coordinator that will be responsible for responding to noise complaints during the construction phase. Clearly post the name and phone number of the noise disturbance coordinator at construction areas and on all advance notifications.
- Develop a reporting program that documents complaints received, actions taken to resolve problems, and effectiveness of these actions.
- Hold a preconstruction meeting with the job inspectors and the general contractor/onsite project manager to confirm that the noise minimization and practices (including construction hours, construction schedule, and noise coordinator) are understood and implemented.
- Incorporate sound-attenuating design features or enclosures for the compactor hydraulic power unit and radiator to reduce offsite sound emissions.
- Install absorptive acoustical treatment within the transfer station building to reduce interior sound levels.
- Incorporate sound barrier walls (or other appropriate noise shields) near transfer station building openings, where needed.
- Design onsite traffic routes to minimize the need for reversing and back-up alarms.
- Ensure all onsite equipment is fitted with adequate exhaust-muffling devices.
- Minimize idling duration of onsite operations vehicles.
- Use rubber-tired vehicles in lieu of track loaders and dozers.
- Install ambient-sensing broadband back-up alarms on all equipment that remains onsite, such as goat trucks (small diesel trucks used to move trailers around the site) and loaders.

- Incorporate silencers and acoustical louvers into the building ventilation design.
- Develop interior spaces or enclosures limiting exterior noise-generating activities to low-speed truck and vehicle movements.

5.3. Alternative 1

5.3.1. Impacts from Operation

A conceptual model for Alternatives 1A and 1B was developed as described in Section 3.5. The resulting sound contours are presented on Figures 5-1 and 5-2. As shown on Figures 5-1 and 5-2, the residential daytime sound limit of 60 dBA is predicted to be complied with during operations.

5.3.2. Minimization Measures

Section 5.2.2 identifies the common minimization measures available to be incorporated during project design to ensure the Project complies with the applicable standard and no additional minimization measures are required.

5.4. Alternative 2

5.4.1. Impacts from Operation

A conceptual model for Alternative 2 was developed as described in Section 3.5. The resulting sound contours are presented on Figure 5-3. As shown on Figure 5-3, the residential daytime sound limit of 60 dBA is predicted to be complied with during operations.

5.4.2. Minimization Measures

Section 5.2.2 identifies the common minimization measures available to be incorporated during project design to ensure the Project complies with the applicable standard and no additional minimization measures are required.

Figure 5-1. Alternative 1A Noise Contours

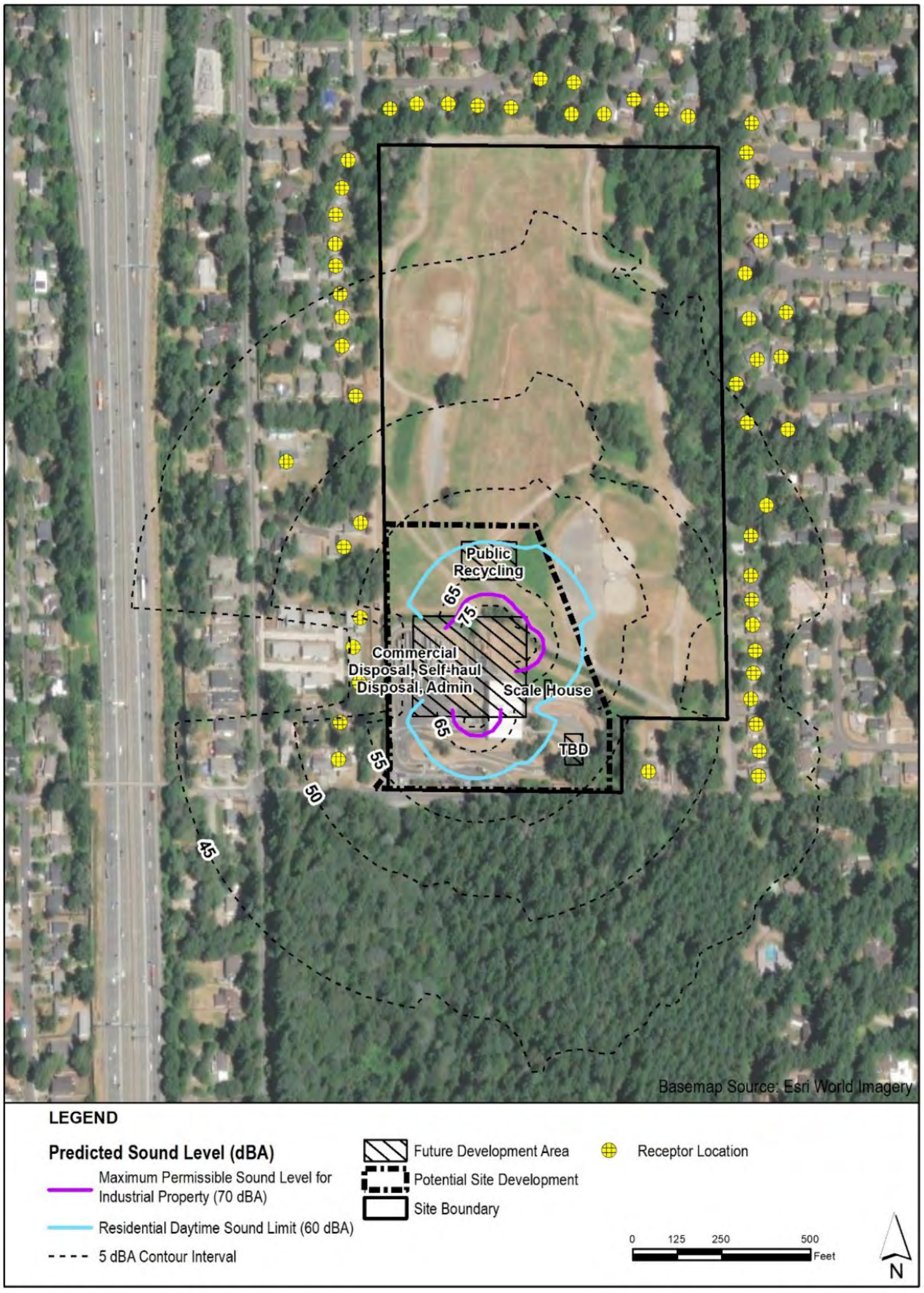


Figure 5-2. Alternative 1B Noise Contours

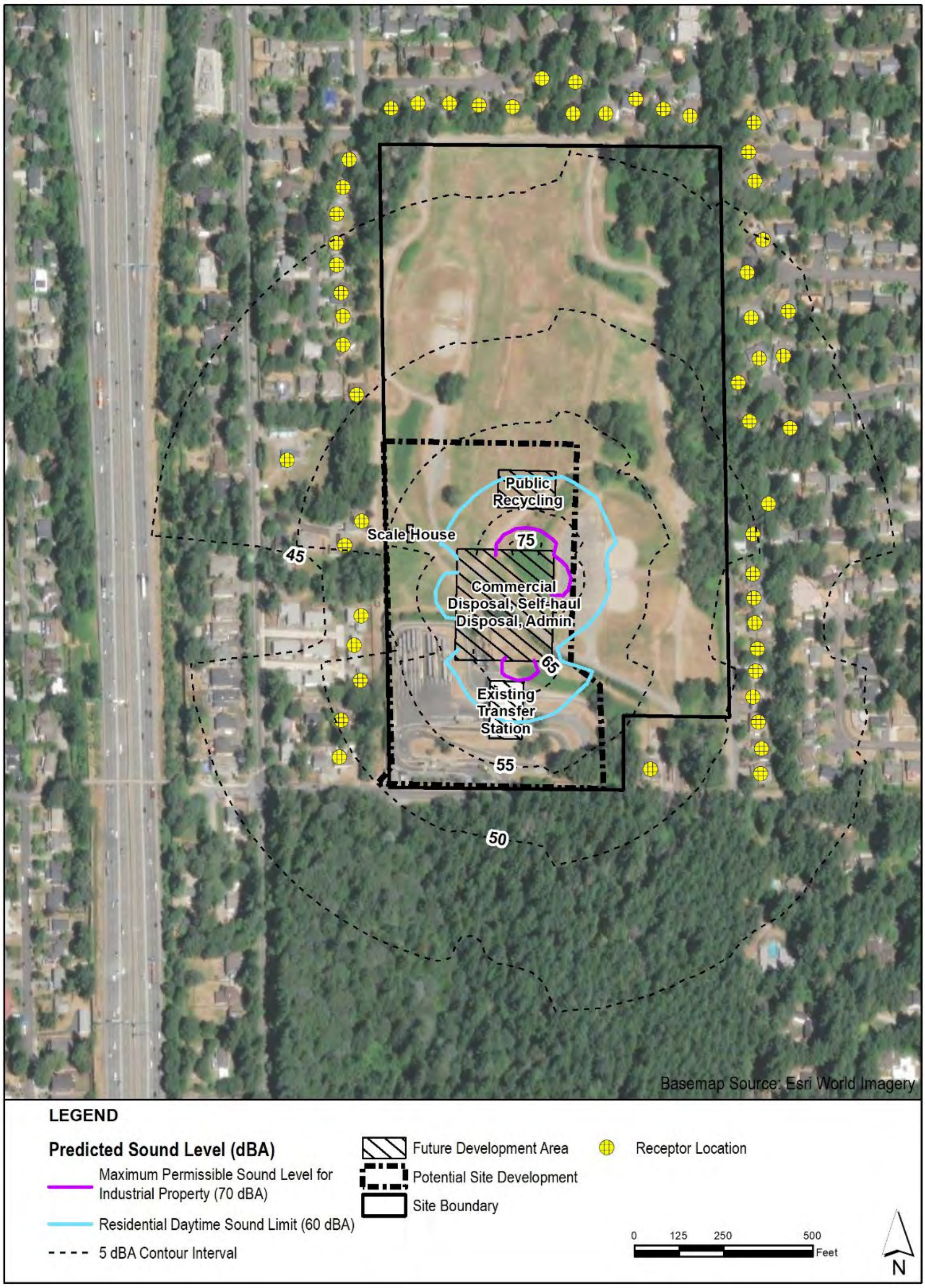
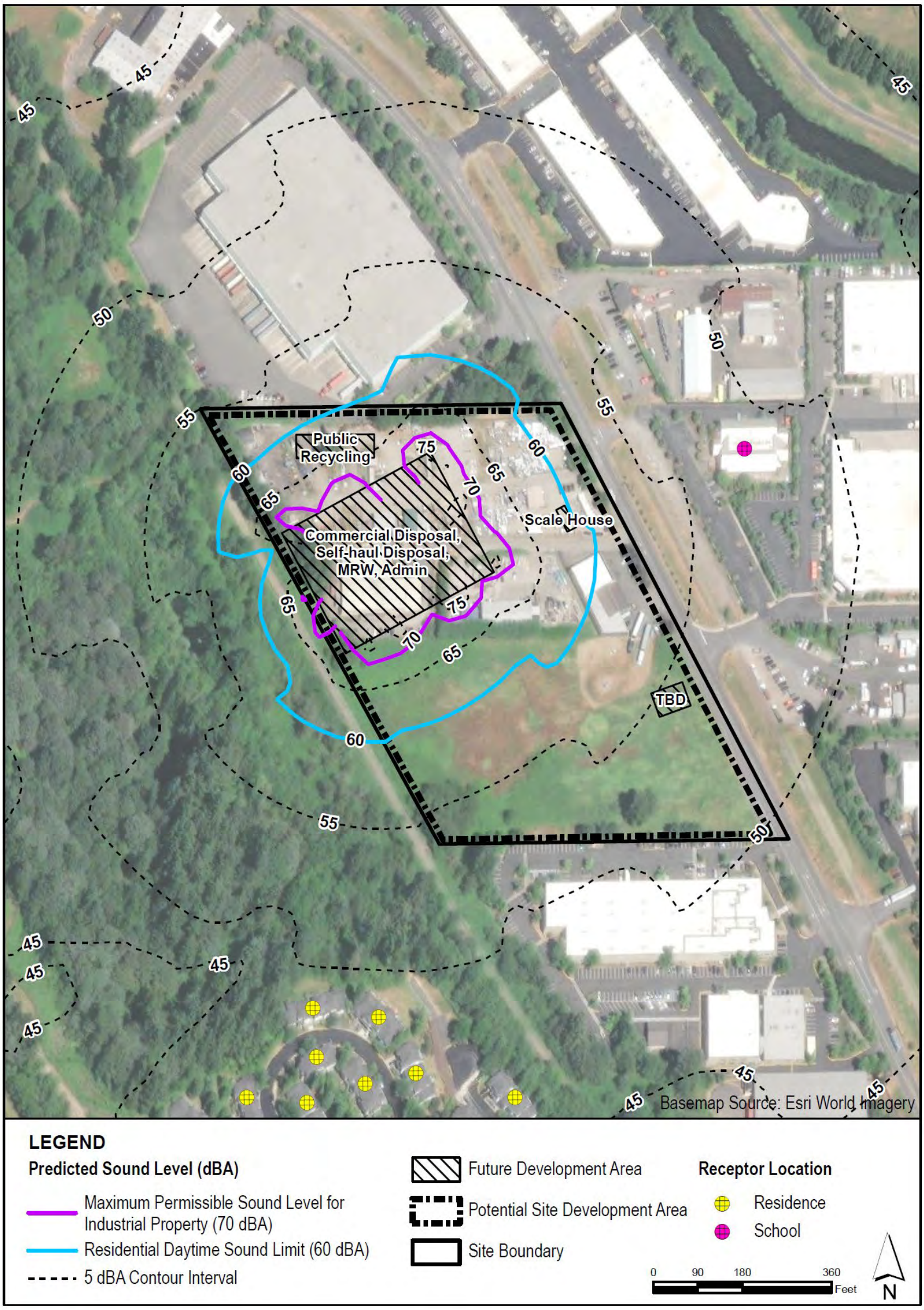


Figure 5-3. Predicted Sound Level for Operations at Alternative 2



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Appendix A
Monitoring Data Tables

Table A-1. Hourly Noise Measurements at Noise Monitoring Location M1

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
5/17/2023 11:00	55	60	58	55	N	
5/17/2023 12:00	55	61	58	55	N	
5/17/2023 13:00	64	66	58	54	N	
5/17/2023 14:00	62	69	61	56	N	
5/17/2023 15:00	56	62	58	56	N	
5/17/2023 16:00	55	61	56	55	N	
5/17/2023 17:00	53	58	55	53	N	
5/17/2023 18:00	55	61	57	54	N	
5/17/2023 19:00	57	58	54	53	N	
5/17/2023 20:00	55	60	57	55	N	
5/17/2023 21:00	55	57	56	56	N	
5/17/2023 22:00	54	56	55	55	N	
5/17/2023 23:00	52	54	53	52	N	
5/18/2023 0:00	50	53	51	50	N	
5/18/2023 1:00	47	50	49	48	N	
5/18/2023 2:00	47	50	49	48	N	
5/18/2023 3:00	48	52	50	49	N	
5/18/2023 4:00	55	60	59	55	N	
5/18/2023 5:00	56	61	59	56	N	
5/18/2023 6:00	56	62	58	54	N	
5/18/2023 7:00	83	92	84	57	N	Lawn maintenance conducted near monitor during this period. Eliminated from dataset.
5/18/2023 8:00	70	77	59	55	N	Lawn maintenance conducted near monitor during this period. Eliminated from dataset.
5/18/2023 9:00	54	60	57	55	N	
5/18/2023 10:00	55	61	58	56	N	Partial reading eliminated from dataset.
5/18/2023 11:00	60	63	60	56	N	
5/18/2023 12:00	58	63	59	57	N	
5/18/2023 13:00	56	62	59	55	N	
5/18/2023 14:00	55	60	57	54	N	
5/18/2023 15:00	55	62	58	55	N	
5/18/2023 16:00	53	60	56	53	N	
5/18/2023 17:00	52	58	54	52	N	
5/18/2023 18:00	56	60	57	55	N	
5/18/2023 19:00	54	57	56	54	N	
5/18/2023 20:00	55	60	57	53	N	
5/18/2023 21:00	53	56	54	52	N	
5/18/2023 22:00	51	55	52	51	N	
5/18/2023 23:00	49	51	50	49	N	

Table A-1. Hourly Noise Measurements at Noise Monitoring Location M1

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
5/19/2023 0:00	47	50	49	48	N	
5/19/2023 1:00	45	48	47	46	N	
5/19/2023 2:00	45	47	46	45	N	
5/19/2023 3:00	47	49	47	46	N	
5/19/2023 4:00	53	61	57	52	N	
5/19/2023 5:00	54	59	56	53	N	
5/19/2023 6:00	54	58	55	54	N	
5/19/2023 7:00	61	72	60	55	N	
5/19/2023 8:00	61	71	65	58	N	
5/19/2023 9:00	57	62	58	56	N	
5/19/2023 10:00	57	62	59	56	N	
5/19/2023 11:00	55	61	57	54	N	
5/19/2023 12:00	59	65	59	56	N	
5/19/2023 13:00	57	64	58	55	N	
5/19/2023 14:00	56	62	59	56	N	
5/19/2023 15:00	60	69	62	57	N	
5/19/2023 16:00	56	61	58	56	N	
5/19/2023 17:00	62	70	63	57	N	
5/19/2023 18:00	56	59	56	55	N	
5/19/2023 19:00	56	58	57	56	N	
5/19/2023 20:00	56	61	59	56	N	
5/19/2023 21:00	56	60	57	56	N	
5/19/2023 22:00	54	57	56	55	N	
5/19/2023 23:00	52	53	53	52	N	
5/20/2023 0:00	50	52	52	51	N	
5/20/2023 1:00	49	52	51	49	N	
5/20/2023 2:00	49	57	50	48	Y	
5/20/2023 3:00	50	53	52	50	Y	
5/20/2023 4:00	57	68	59	54	N	
5/20/2023 5:00	56	61	59	56	N	
5/20/2023 6:00	64	71	68	64	N	
5/20/2023 7:00	66	74	67	62	N	
5/20/2023 8:00	54	58	56	54	N	
5/20/2023 9:00	56	62	57	55	N	
5/20/2023 10:00	55	61	58	55	N	
5/20/2023 11:00	56	61	57	54	N	
5/20/2023 12:00	54	60	56	54	N	

Table A-1. Hourly Noise Measurements at Noise Monitoring Location M1

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
5/20/2023 13:00	55	60	57	54	N	
5/20/2023 14:00	56	60	58	56	N	
5/20/2023 15:00	57	61	58	57	N	
5/20/2023 16:00	56	61	58	56	N	
5/20/2023 17:00	56	60	57	55	N	
5/20/2023 18:00	56	58	58	57	N	
5/20/2023 19:00	56	59	58	57	N	
5/20/2023 20:00	56	58	57	56	N	
5/20/2023 21:00	57	61	57	56	N	
5/20/2023 22:00	55	57	56	55	N	
5/20/2023 23:00	52	54	53	53	N	
5/21/2023 0:00	48	52	50	49	N	
5/21/2023 1:00	45	48	47	46	N	
5/21/2023 2:00	45	48	47	45	N	
5/21/2023 3:00	45	48	47	46	N	
5/21/2023 4:00	56	62	59	54	N	
5/21/2023 5:00	54	61	58	52	N	
5/21/2023 6:00	52	58	53	51	N	
5/21/2023 7:00	52	55	54	53	N	
5/21/2023 8:00	53	58	55	54	N	
5/21/2023 9:00	55	60	57	54	N	
5/21/2023 10:00	56	60	57	55	N	
5/21/2023 11:00	59	66	60	57	N	
5/21/2023 12:00	57	60	58	57	N	
5/21/2023 13:00	57	61	59	57	N	
5/21/2023 14:00	56	60	58	56	N	
5/21/2023 15:00	56	60	58	56	N	
5/21/2023 16:00	55	61	58	55	N	
5/21/2023 17:00	53	58	55	53	N	
5/21/2023 18:00	56	59	58	57	N	
5/21/2023 19:00	58	59	59	58	N	
5/21/2023 20:00	57	59	58	57	N	
5/21/2023 21:00	53	56	55	54	N	
5/21/2023 22:00	50	53	51	50	Y	
5/21/2023 23:00	48	50	49	48	Y	
5/22/2023 0:00	46	48	47	46	Y	
5/22/2023 1:00	44	47	46	44	N	

Table A-1. Hourly Noise Measurements at Noise Monitoring Location M1

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
5/22/2023 2:00	43	46	45	44	N	
5/22/2023 3:00	45	48	47	45	N	
5/22/2023 4:00	54	61	58	53	N	
5/22/2023 5:00	54	59	57	54	N	
5/22/2023 6:00	53	56	55	54	N	
5/22/2023 7:00	53	55	53	52	N	
5/22/2023 8:00	55	59	57	55	N	
5/22/2023 9:00	57	60	58	57	N	
5/22/2023 10:00	57	61	58	57	N	
5/22/2023 11:00	58	63	60	58	N	
5/22/2023 12:00	58	63	61	58	N	
5/22/2023 13:00	58	64	60	57	N	
5/22/2023 14:00	60	66	60	58	N	
5/22/2023 15:00	57	62	59	57	N	
5/22/2023 16:00	59	63	59	55	N	
5/22/2023 17:00	56	61	58	56	N	
5/22/2023 18:00	57	60	58	57	N	
5/22/2023 19:00	55	59	57	55	N	
5/22/2023 20:00	55	60	58	55	N	
5/22/2023 21:00	54	59	56	53	N	
5/22/2023 22:00	51	55	52	51	N	
5/22/2023 23:00	50	53	51	50	N	
5/23/2023 0:00	47	51	49	48	N	
5/23/2023 1:00	47	50	48	47	N	
5/23/2023 2:00	44	47	46	45	N	
5/23/2023 3:00	46	49	48	47	N	
5/23/2023 4:00	56	62	59	55	N	
5/23/2023 5:00	58	64	61	57	N	
5/23/2023 6:00	54	56	55	54	N	
5/23/2023 7:00	53	58	54	53	N	
5/23/2023 8:00	56	61	58	56	N	
5/23/2023 9:00	63	72	69	62	N	
5/23/2023 10:00	57	60	57	54	N	
5/23/2023 11:00	56	62	58	55	N	
5/23/2023 12:00	56	62	59	55	N	
5/23/2023 13:00	57	64	60	55	N	
5/23/2023 14:00	55	59	56	54	N	

Table A-1. Hourly Noise Measurements at Noise Monitoring Location M1

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
5/23/2023 15:00	56	62	59	55	N	
5/23/2023 16:00	54	60	56	53	N	
5/23/2023 17:00	54	58	55	54	N	
5/23/2023 18:00	54	59	56	54	N	
5/23/2023 19:00	53	55	54	53	N	
5/23/2023 20:00	53	56	54	53	N	
5/23/2023 21:00	55	60	56	55	N	
5/23/2023 22:00	52	56	54	52	N	
5/23/2023 23:00	50	54	52	51	N	
5/24/2023 0:00	48	52	49	48	N	
5/24/2023 1:00	45	49	47	46	N	
5/24/2023 2:00	45	48	47	46	N	
5/24/2023 3:00	45	48	47	46	N	
5/24/2023 4:00	56	64	59	55	N	
5/24/2023 5:00	55	61	58	55	N	
5/24/2023 6:00	52	55	54	53	N	
5/24/2023 7:00	53	57	54	53	N	
5/24/2023 8:00	54	59	57	55	N	
5/24/2023 9:00	55	61	58	55	N	
5/24/2023 10:00	56	61	58	56	N	
5/24/2023 11:00	55	61	58	55	N	
5/24/2023 12:00	62	66	60	57	N	
5/24/2023 13:00	57	61	59	57	N	
5/24/2023 14:00	56	61	58	56	N	
5/24/2023 15:00	56	62	59	55	N	

Table A-2. Hourly Noise Measurements at Noise Monitoring Location M2

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
5/17/2023 12:00	55	61	58	55	N	
5/17/2023 13:00	55	61	58	55	N	
5/17/2023 14:00	56	60	58	56	N	
5/17/2023 15:00	55	60	58	56	N	
5/17/2023 16:00	57	65	60	57	N	Partial reading eliminated from dataset.
5/17/2023 17:00	53	59	56	53	N	
5/17/2023 18:00	53	58	55	53	N	
5/17/2023 19:00	52	57	54	52	N	
5/17/2023 20:00	52	56	53	52	N	
5/17/2023 21:00	51	53	53	52	N	
5/17/2023 22:00	50	53	52	50	N	
5/17/2023 23:00	47	50	49	48	N	
5/18/2023 0:00	45	50	47	45	N	
5/18/2023 1:00	44	49	47	45	N	
5/18/2023 2:00	44	48	47	45	N	
5/18/2023 3:00	46	49	47	45	N	
5/18/2023 4:00	49	54	52	50	N	
5/18/2023 5:00	54	59	57	54	N	
5/18/2023 6:00	53	59	57	54	N	
5/18/2023 7:00	64	66	66	65	N	
5/18/2023 8:00	57	63	60	58	N	
5/18/2023 9:00	57	64	61	58	N	
5/18/2023 10:00	57	63	60	58	N	
5/18/2023 11:00	65	68	61	57	N	Lawn maintenance conducted near monitor during this period. Eliminated from dataset.
5/18/2023 12:00	65	71	63	57	N	Lawn maintenance conducted near monitor during this period. Eliminated from dataset.
5/18/2023 13:00	55	60	58	55	N	
5/18/2023 14:00	55	60	58	56	N	
5/18/2023 15:00	54	59	57	55	N	
5/18/2023 16:00	53	59	56	53	N	
5/18/2023 17:00	55	63	58	54	N	
5/18/2023 18:00	58	66	61	58	N	
5/18/2023 19:00	56	64	59	56	N	
5/18/2023 20:00	52	59	56	53	N	
5/18/2023 21:00	49	54	51	48	N	
5/18/2023 22:00	47	53	49	47	N	
5/18/2023 23:00	44	47	45	44	N	
5/19/2023 0:00	43	46	45	44	N	
5/19/2023 1:00	42	45	44	43	N	

Table A-2. Hourly Noise Measurements at Noise Monitoring Location M2

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
5/19/2023 2:00	41	44	43	42	N	
5/19/2023 3:00	45	45	44	42	N	
5/19/2023 4:00	52	60	56	50	N	
5/19/2023 5:00	53	60	57	53	N	
5/19/2023 6:00	53	58	57	53	N	
5/19/2023 7:00	56	61	59	56	N	
5/19/2023 8:00	55	60	58	56	N	
5/19/2023 9:00	57	61	59	58	N	
5/19/2023 10:00	56	62	60	57	N	
5/19/2023 11:00	55	61	58	55	N	
5/19/2023 12:00	57	63	61	59	N	
5/19/2023 13:00	54	58	56	54	N	
5/19/2023 14:00	57	61	59	58	N	
5/19/2023 15:00	56	61	59	57	N	
5/19/2023 16:00	55	60	58	56	N	
5/19/2023 17:00	55	59	57	55	N	
5/19/2023 18:00	53	56	55	53	N	
5/19/2023 19:00	51	54	52	51	N	
5/19/2023 20:00	51	55	53	52	N	
5/19/2023 21:00	51	53	52	51	N	
5/19/2023 22:00	50	54	52	50	N	
5/19/2023 23:00	46	49	48	46	N	
5/20/2023 0:00	45	49	46	45	N	
5/20/2023 1:00	43	46	45	44	N	
5/20/2023 2:00	44	52	44	42	Y	
5/20/2023 3:00	45	50	46	45	Y	
5/20/2023 4:00	49	54	52	50	N	
5/20/2023 5:00	58	59	57	54	N	
5/20/2023 6:00	54	59	57	54	N	
5/20/2023 7:00	54	60	58	54	N	
5/20/2023 8:00	55	61	59	55	N	
5/20/2023 9:00	54	60	57	54	N	
5/20/2023 10:00	55	60	57	54	N	
5/20/2023 11:00	54	60	57	53	N	
5/20/2023 12:00	53	58	55	53	N	
5/20/2023 13:00	54	60	57	54	N	
5/20/2023 14:00	55	61	57	55	N	
5/20/2023 15:00	54	58	56	55	N	

Table A-2. Hourly Noise Measurements at Noise Monitoring Location M2

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
5/20/2023 16:00	55	61	56	53	N	
5/20/2023 17:00	54	59	57	54	N	
5/20/2023 18:00	53	57	55	53	N	
5/20/2023 19:00	52	57	54	52	N	
5/20/2023 20:00	51	55	53	51	N	
5/20/2023 21:00	50	55	51	50	N	
5/20/2023 22:00	50	54	52	50	N	
5/20/2023 23:00	47	52	48	47	N	
5/21/2023 0:00	44	50	46	44	N	
5/21/2023 1:00	40	43	42	41	N	
5/21/2023 2:00	40	43	42	41	N	
5/21/2023 3:00	41	44	43	41	N	
5/21/2023 4:00	52	60	58	52	N	
5/21/2023 5:00	53	60	58	53	N	
5/21/2023 6:00	51	58	56	51	N	
5/21/2023 7:00	53	59	57	53	N	
5/21/2023 8:00	53	59	57	53	N	
5/21/2023 9:00	52	57	55	52	N	
5/21/2023 10:00	54	60	57	54	N	
5/21/2023 11:00	54	59	57	54	N	
5/21/2023 12:00	55	59	57	55	N	
5/21/2023 13:00	55	59	58	55	N	
5/21/2023 14:00	54	58	56	54	N	
5/21/2023 15:00	55	60	57	54	N	
5/21/2023 16:00	53	59	56	53	N	
5/21/2023 17:00	51	56	53	50	N	
5/21/2023 18:00	51	56	53	51	N	
5/21/2023 19:00	53	56	54	53	N	
5/21/2023 20:00	51	56	53	51	N	
5/21/2023 21:00	49	52	51	50	N	
5/21/2023 22:00	46	50	48	46	Y	
5/21/2023 23:00	43	47	46	44	Y	
5/22/2023 0:00	41	43	42	41	Y	
5/22/2023 1:00	41	43	42	41	N	
5/22/2023 2:00	38	40	39	38	N	
5/22/2023 3:00	40	42	41	39	N	
5/22/2023 4:00	60	69	65	58	N	
5/22/2023 5:00	54	61	58	54	N	

Table A-2. Hourly Noise Measurements at Noise Monitoring Location M2

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
5/22/2023 6:00	53	60	58	52	N	
5/22/2023 7:00	52	59	57	52	N	
5/22/2023 8:00	55	60	58	55	N	
5/22/2023 9:00	56	61	59	57	N	
5/22/2023 10:00	56	61	59	57	N	
5/22/2023 11:00	57	61	59	57	N	
5/22/2023 12:00	57	62	60	57	N	
5/22/2023 13:00	56	61	59	57	N	
5/22/2023 14:00	56	62	59	56	N	
5/22/2023 15:00	56	61	58	56	N	
5/22/2023 16:00	55	61	58	55	N	
5/22/2023 17:00	54	60	57	55	N	
5/22/2023 18:00	56	61	58	56	N	
5/22/2023 19:00	55	59	57	55	N	
5/22/2023 20:00	53	59	56	53	N	
5/22/2023 21:00	49	54	51	49	N	
5/22/2023 22:00	48	53	49	48	N	
5/22/2023 23:00	46	49	48	47	N	
5/23/2023 0:00	44	47	45	44	N	
5/23/2023 1:00	44	46	44	43	N	
5/23/2023 2:00	39	42	41	40	N	
5/23/2023 3:00	41	43	43	42	N	
5/23/2023 4:00	55	64	60	50	N	
5/23/2023 5:00	54	60	58	54	N	
5/23/2023 6:00	53	59	57	53	N	
5/23/2023 7:00	53	60	56	53	N	
5/23/2023 8:00	55	61	58	56	N	
5/23/2023 9:00	55	61	59	55	N	
5/23/2023 10:00	56	61	59	56	N	
5/23/2023 11:00	57	64	61	57	N	
5/23/2023 12:00	56	61	59	56	N	
5/23/2023 13:00	56	63	59	56	N	
5/23/2023 14:00	54	61	58	54	N	
5/23/2023 15:00	56	63	59	56	N	
5/23/2023 16:00	55	62	58	53	N	
5/23/2023 17:00	54	60	57	53	N	
5/23/2023 18:00	55	64	57	53	N	
5/23/2023 19:00	50	55	53	50	N	

Table A-2. Hourly Noise Measurements at Noise Monitoring Location M2

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
5/23/2023 20:00	50	54	50	49	N	
5/23/2023 21:00	50	52	52	51	N	
5/23/2023 22:00	48	53	50	48	N	
5/23/2023 23:00	47	53	49	47	N	
5/24/2023 0:00	45	51	47	44	N	
5/24/2023 1:00	40	44	42	41	N	
5/24/2023 2:00	41	46	42	41	N	
5/24/2023 3:00	41	43	43	41	N	
5/24/2023 4:00	59	69	63	57	N	
5/24/2023 5:00	53	60	58	53	N	
5/24/2023 6:00	51	57	54	51	N	
5/24/2023 7:00	53	60	57	53	N	
5/24/2023 8:00	56	62	59	56	N	
5/24/2023 9:00	55	61	59	56	N	
5/24/2023 10:00	57	61	60	58	N	
5/24/2023 11:00	56	62	59	56	N	
5/24/2023 12:00	58	62	60	58	N	
5/24/2023 13:00	57	61	59	57	N	
5/24/2023 14:00	61	70	61	57	N	

Table A-3. Hourly Noise Measurements at Noise Monitoring Location M3

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
05/17/2023 13:00	52	59	52	47	N	
05/17/2023 14:00	51	59	54	50	N	
05/17/2023 15:00	62	69	67	64	N	
05/17/2023 16:00	48	51	50	48	N	
05/17/2023 17:00	47	50	48	46	N	
05/17/2023 18:00	48	56	49	46	N	
05/17/2023 19:00	49	55	54	49	N	
05/17/2023 20:00	53	56	55	51	N	
05/17/2023 21:00	47	49	48	47	N	
05/17/2023 22:00	46	49	48	47	N	
05/17/2023 23:00	45	47	46	45	N	
05/18/2023 00:00	43	46	44	43	N	
05/18/2023 01:00	41	44	43	42	N	
05/18/2023 02:00	40	43	42	41	N	
05/18/2023 03:00	43	52	45	42	N	
05/18/2023 04:00	54	60	59	56	N	
05/18/2023 05:00	54	60	58	54	N	
05/18/2023 06:00	54	58	57	56	N	
05/18/2023 07:00	52	58	53	50	N	
05/18/2023 08:00	48	55	51	48	N	
05/18/2023 09:00	48	54	51	46	N	
05/18/2023 10:00	50	58	53	48	N	
05/18/2023 11:00	51	60	54	48	N	
05/18/2023 12:00	50	59	53	49	N	
05/18/2023 12:45	54	66	53	49	N	Partial reading from equipment check eliminated from dataset
05/18/2023 13:00	48	55	50	46	N	
05/18/2023 14:00	47	54	51	46	N	
05/18/2023 15:00	48	55	51	47	N	
05/18/2023 16:00	48	53	50	47	N	
05/18/2023 17:00	48	55	50	48	N	
05/18/2023 18:00	50	58	52	48	N	
05/18/2023 19:00	47	52	49	47	N	
05/18/2023 20:00	53	59	53	48	N	
05/18/2023 21:00	47	52	49	47	N	
05/18/2023 22:00	46	50	48	46	N	
05/18/2023 23:00	44	47	46	45	N	
05/19/2023 00:00	41	44	43	42	N	
05/19/2023 01:00	40	43	42	41	N	

Table A-3. Hourly Noise Measurements at Noise Monitoring Location M3

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
05/19/2023 02:00	38	42	39	38	N	
05/19/2023 03:00	47	58	51	39	N	
05/19/2023 04:00	50	56	53	51	N	
05/19/2023 05:00	49	53	53	52	N	
05/19/2023 06:00	55	62	60	52	N	
05/19/2023 07:00	55	65	58	51	N	
05/19/2023 08:00	51	60	55	49	N	
05/19/2023 09:00	50	54	53	50	N	
05/19/2023 10:00	50	56	53	49	N	
05/19/2023 11:00	51	60	54	49	N	
05/19/2023 12:00	50	56	54	50	N	
05/19/2023 13:00	48	55	49	46	N	
05/19/2023 14:00	48	54	50	48	N	
05/19/2023 15:00	48	51	49	48	N	
05/19/2023 16:00	49	51	50	49	N	
05/19/2023 17:00	49	54	50	49	N	
05/19/2023 18:00	48	51	49	48	N	
05/19/2023 19:00	49	54	51	49	N	
05/19/2023 20:00	47	50	49	48	N	
05/19/2023 21:00	48	51	49	48	N	
05/19/2023 22:00	50	57	52	48	N	
05/19/2023 23:00	45	48	47	46	N	
05/20/2023 00:00	43	45	44	43	N	
05/20/2023 01:00	42	45	43	42	N	
05/20/2023 02:00	42	45	43	41	Y	
05/20/2023 03:00	55	64	60	47	Y	
05/20/2023 04:00	49	53	52	50	N	
05/20/2023 05:00	44	48	46	45	N	
05/20/2023 06:00	45	48	47	45	N	
05/20/2023 07:00	44	48	46	44	N	
05/20/2023 08:00	44	49	46	45	N	
05/20/2023 09:00	46	50	47	46	N	
05/20/2023 10:00	46	50	47	46	N	
05/20/2023 11:00	44	48	46	44	N	
05/20/2023 12:00	52	61	51	47	N	
05/20/2023 13:00	48	54	49	47	N	
05/20/2023 14:00	48	53	48	47	N	
05/20/2023 15:00	47	50	49	48	N	

Table A-3. Hourly Noise Measurements at Noise Monitoring Location M3

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
05/20/2023 16:00	50	53	48	47	N	
05/20/2023 17:00	48	54	50	48	N	
05/20/2023 18:00	47	52	49	47	N	
05/20/2023 19:00	48	51	50	48	N	
05/20/2023 20:00	48	52	49	48	N	
05/20/2023 21:00	47	49	49	48	N	
05/20/2023 22:00	47	49	48	47	N	
05/20/2023 23:00	46	49	47	46	N	
05/21/2023 00:00	60	65	48	44	N	
05/21/2023 01:00	40	44	42	41	N	
05/21/2023 02:00	38	42	39	38	N	
05/21/2023 03:00	41	50	45	38	N	
05/21/2023 04:00	53	55	53	51	N	
05/21/2023 05:00	46	52	51	44	N	
05/21/2023 06:00	42	48	44	41	N	
05/21/2023 07:00	43	47	44	42	N	
05/21/2023 08:00	45	52	51	43	N	
05/21/2023 09:00	44	49	47	45	N	
05/21/2023 10:00	47	54	49	44	N	
05/21/2023 11:00	44	50	46	44	N	
05/21/2023 12:00	45	50	47	45	N	
05/21/2023 13:00	45	51	47	45	N	
05/21/2023 14:00	45	49	46	45	N	
05/21/2023 15:00	48	53	48	45	N	
05/21/2023 16:00	44	47	46	44	N	
05/21/2023 17:00	47	51	49	48	N	
05/21/2023 18:00	48	51	50	49	N	
05/21/2023 19:00	48	51	49	48	N	
05/21/2023 20:00	53	59	57	54	N	
05/21/2023 21:00	50	54	52	51	N	
05/21/2023 22:00	48	52	51	49	Y	
05/21/2023 23:00	46	49	48	47	Y	
05/22/2023 00:00	48	56	54	47	Y	
05/22/2023 01:00	51	59	56	52	N	
05/22/2023 02:00	45	49	48	46	N	
05/22/2023 03:00	44	52	46	44	N	
05/22/2023 04:00	51	55	54	52	N	
05/22/2023 05:00	54	55	55	54	N	

Table A-3. Hourly Noise Measurements at Noise Monitoring Location M3

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
05/22/2023 06:00	55	59	58	55	N	
05/22/2023 07:00	56	60	60	58	N	
05/22/2023 08:00	57	64	60	58	N	
05/22/2023 09:00	49	57	52	48	N	
05/22/2023 10:00	51	57	54	50	N	
05/22/2023 11:00	48	55	51	48	N	
05/22/2023 12:00	49	57	53	49	N	
05/22/2023 13:00	52	59	55	50	N	
05/22/2023 14:00	52	57	53	52	N	
05/22/2023 15:00	49	53	51	49	N	
05/22/2023 16:00	49	55	52	48	N	
05/22/2023 17:00	49	56	51	48	N	
05/22/2023 18:00	49	56	50	48	N	
05/22/2023 19:00	49	56	51	48	N	
05/22/2023 20:00	50	56	52	48	N	
05/22/2023 21:00	47	52	49	47	N	
05/22/2023 22:00	46	53	47	45	N	
05/22/2023 23:00	42	45	44	43	N	
05/23/2023 00:00	41	43	42	42	N	
05/23/2023 01:00	41	44	42	41	N	
05/23/2023 02:00	40	44	41	40	N	
05/23/2023 03:00	41	47	44	42	N	
05/23/2023 04:00	51	55	53	52	N	
05/23/2023 05:00	53	57	55	53	N	
05/23/2023 06:00	54	62	56	53	N	
05/23/2023 07:00	50	58	51	49	N	
05/23/2023 08:00	56	61	59	58	N	
05/23/2023 09:00	53	59	57	51	N	
05/23/2023 10:00	51	56	53	50	N	
05/23/2023 11:00	50	56	51	46	N	
05/23/2023 12:00	49	56	51	48	N	
05/23/2023 13:00	49	57	54	48	N	
05/23/2023 14:00	54	63	59	50	N	
05/23/2023 15:00	63	67	66	64	N	
05/23/2023 16:00	58	62	62	58	N	
05/23/2023 17:00	52	55	50	48	N	
05/23/2023 18:00	49	56	50	49	N	
05/23/2023 19:00	48	53	50	48	N	

Table A-3. Hourly Noise Measurements at Noise Monitoring Location M3

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
05/23/2023 20:00	51	57	53	51	N	
05/23/2023 21:00	47	49	47	46	N	
05/23/2023 22:00	46	48	47	46	N	
05/23/2023 23:00	43	46	45	44	N	
05/24/2023 00:00	42	45	44	43	N	
05/24/2023 01:00	41	43	42	41	N	
05/24/2023 02:00	40	42	41	40	N	
05/24/2023 03:00	42	46	44	42	N	
05/24/2023 04:00	52	56	54	53	N	
05/24/2023 05:00	53	56	55	53	N	
05/24/2023 06:00	55	60	59	57	N	
05/24/2023 07:00	61	68	62	61	N	
05/24/2023 08:00	47	51	50	47	N	
05/24/2023 09:00	47	52	49	47	N	
05/24/2023 10:00	50	56	53	50	N	
05/24/2023 11:00	49	52	50	49	N	
05/24/2023 12:00	51	58	56	51	N	
05/24/2023 13:00	55	63	60	51	N	
05/24/2023 14:00	49	55	52	49	N	
05/24/2023 15:00	50	56	50	48	N	
05/24/2023 16:00	51	59	53	50	N	
05/24/2023 17:00	52	59	53	49	N	
05/24/2023 18:00	48	51	49	48	N	
05/24/2023 19:00	49	54	51	49	N	
05/24/2023 20:00	49	51	50	49	N	
05/24/2023 21:00	51	57	52	49	N	
05/24/2023 22:00	46	49	48	47	N	
05/24/2023 23:00	45	48	47	46	N	
05/25/2023 00:00	43	46	45	44	N	
05/25/2023 01:00	41	45	44	42	N	
05/25/2023 02:00	41	44	43	41	N	
05/25/2023 03:00	42	47	45	42	N	
05/25/2023 04:00	52	55	54	53	N	
05/25/2023 05:00	54	56	55	55	N	
05/25/2023 06:00	57	62	59	56	N	
05/25/2023 07:00	53	58	54	50	N	
05/25/2023 08:00	49	56	52	49	N	
05/25/2023 09:00	48	53	50	48	N	

Table A-3. Hourly Noise Measurements at Noise Monitoring Location M3

Noise Assessment, Northeast Recycling and Transfer Station Project

Date and Time	Leq	L2.5	L8.33	L25	Rain (Y/N)	Notes
05/25/2023 10:00	48	52	49	48	N	
05/25/2023 11:00	47	51	49	47	N	

Appendix B
Traffic Noise Levels

Subject	**Noise Levels Associated with Transfer Station Truck Traffic**
Project Name	Northeast Recycling and Transfer Station Project (E00633E19)
To	Mary O'Hara, Project Manager/King County
From	Melissa Wu, Project Manager/Jacobs
Prepared by	Rachel Saunders and Mark Bastasch/Jacobs
Reviewed by	Evan Griffiths, Assistant Project Manager/Jacobs
Date	February 28, 2025

Introduction

The King County Department of Natural Resources and Parks, Solid Waste Division, is considering two action alternatives (Alternatives 1 and 2) in addition to the No Action Alternative for a new Northeast Recycling and Transfer Station (NERTS), to be located in the northeastern Lake Washington area of King County. This memorandum is an addendum to the NERTS Noise Assessment. It responds to public comments received on the Draft Environmental Impact Statement and summarizes the potential noise levels from vehicle traffic associated with the alternatives under consideration. This memorandum summarizes predictions of expected future vehicle traffic noise levels for both the No Action Alternative and action Alternatives 1 and 2.

Methodology and Results

The Washington State Department of Transportation recommends that the modeling of traffic noise be performed using the Federal Highway Administration Traffic Noise Model (TNM). The TNM was developed to predict hourly equivalent continuous sound levels, or L_{eq} values, for free-flowing traffic conditions and is accurate within ± 3 A-weighted decibels (dBA). Typically, 3 dBA is considered the threshold of a perceivable sound, 5 dBA is considered a clearly noticeable sound, and 10 dBA is considered a doubling in sound.

The TNM was used to estimate opening year (2029) and future (2040) noise levels associated with the NERTS project. The Federal Highway Administration TNM calculated sound levels for the roads of interest on 50-foot offsets and up to 500 feet from the edge of pavement on each side of the road (e.g., north and south) for each of the roads included in this screening. The roads that were evaluated were selected as being the most likely to carry traffic to and from NERTS. Each alternative was evaluated separately. Traffic data and truck percentages were provided by Parametrix (2024).

The peak traffic levels associated with opening year (2029) and Year 2040 are shown in Table 1. The data provided in Table 1 were included in the Parametrix report for estimating traffic volumes associated with each alternative location for the same 2 years (Parametrix 2024).

The traffic volume was modeled to determine the impact of the noise, if any, from the operation of NERTS in 2029 and 2040. The modeled data were compared to the amount of modeled noise created by existing traffic on the roads at each alternative location. The model assumed that traffic was traveling at 35 miles per hour, based on the existing speed limit (Parametrix 2024).

Table 1. Traffic

Road	Direction	Opening Year (2029) No Action Alternative Peak Hour			Opening Year (2029) Action Alternative Peak Hour			2040 No Action Alternative Peak Hour			2040 Action Alternative Peak Hour		
		Autos (vph)	Medium Trucks (vph)	Heavy Trucks (vph)	Autos (vph)	Medium Trucks (vph)	Heavy Trucks (vph)	Autos (vph)	Medium Trucks (vph)	Heavy Trucks (vph)	Autos (vph)	Medium Trucks (vph)	Heavy Trucks (vph)
Alternative 1													
116th Ave NE: between I-405 ramps and NE 60th St	NB	445	10	17	459	11	16	528	12	17	542	13	16
116th Ave NE: between I-405 ramps and NE 60th St	SB	220	5	17	234	6	16	259	6	17	273	8	16
NE 60th St: between 116th Ave NE and 122nd Ave NE	NB	132	9	18	146	10	17	151	10	18	165	11	17
NE 60th St: between 116th Ave NE and 122nd Ave NE	SB	126	5	18	140	6	17	150	6	18	165	6	17
Alternative 2													
Woodinville-Redmond Rd: between NE 145th St and NE 175th St	NB	477	17	6	506	17	13	567	20	7	596	20	14
Woodinville-Redmond Rd: between NE 145th St and NE 175th St	SB	299	11	1	326	11	13	361	13	1	386	13	13
NE 145th St: between Woodinville-Redmond Rd and NE 148th St	EB	742	18	0	766	18	5	889	21	0	913	21	5
NE 145th St: between Woodinville-Redmond Rd and NE 148th St	WB	460	14	1	482	14	6	548	16	1	570	16	6
Woodinville-Redmond Rd: between NE 124th St and NE 145th St	NB	1287	56	12	1307	56	15	1539	67	15	1559	67	18
Woodinville-Redmond Rd: between NE 124th St and NE 145th St	SB	609	40	1	631	40	4	736	48	1	758	48	4
NE 175th St: between Woodinville-Redmond Rd and 131st Ave NE	EB	1111	40	14	1140	40	24	1325	47	17	1354	47	27
NE 175th St: between Woodinville-Redmond Rd and 131st Ave NE	WB	741	26	2	762	26	12	886	31	3	907	31	13

I = Interstate
EB = eastbound
NB = northbound
SB = southbound
vph = vehicles per hour
WB = westbound

Based on TNM model output, the difference in noise levels between 2029 conditions and 2040 are minor and would be considered less than the typical threshold of perceptible difference (3 dBA). Table 2 shows noise level results. The model was completed along 50-foot offsets (e.g., NB 50, NB 100, NB 150, NB 200, NB 250, NB 300, NB 350, NB 400, NB 450, NB 500) for both sides of each road section listed in Table 1, whether north and south or east and west. These offsets were extended to 150 feet (e.g., NB 150) from each road section.

As shown in Table 2, the level of noise is higher closer to the road (e.g., 50 feet), where the truck traffic is located, and then declines farther away from the road (e.g., 500 feet), because the noise has to travel farther and it is attenuated.

The data only represent the level of noise associated with the vehicle traffic traveling to and from the transfer station. It does not take into account other sound emissions in the area, such as I-405 in the case of 116th Avenue for Alternative 1, or other vehicle traffic or other noises that may be present.

Table 2. Noise Level Results

Receiver	2029 No Action Alternative (dBA)	2029 Action Alternative (dBA)	Difference (Action and No Action) (dBA)	2040 No Action Alternative (dBA)	2040 Action Alternative (dBA)	Difference (Action and No Action) (dBA)
Alternative 1						
116th Avenue NE: between I-405 ramps and NE 60th Street						
NB 50	63	63	0	64	64	0
NB 100	59	59	0	59	59	0
NB 150	55	55	0	56	56	0
NB 200	53	53	0	53	53	0
NB 250	51	51	0	51	51	0
NB 300	50	50	0	50	50	0
NB 350	48	48	0	49	49	0
NB 400	47	47	0	48	48	0
NB 450	46	46	0	47	47	0
NB 500	45	45	0	46	46	0
SB 50	63	63	0	63	63	0
SB 100	58	58	0	58	58	0
SB 150	55	55	0	55	55	0
SB 200	53	53	0	53	53	0
SB 250	51	51	0	51	51	0
SB 300	49	49	0	50	50	0
SB 350	48	48	0	48	48	0
SB 400	47	47	0	47	47	0
SB 450	46	46	0	46	46	0
SB 500	45	45	0	46	46	0
NE 60th Street: between 116th Avenue NE and 122nd Avenue NE						
EB 50	60	60	0	60	60	0
EB 100	56	56	0	56	56	0
EB 150	53	53	0	53	53	0
EB 200	51	51	0	5	5	0
EB 250	49	49	0	50	50	0
EB 300	48	48	0	48	48	0
EB 350	47	47	0	47	47	0
EB 400	46	46	0	46	46	0

Table 2. Noise Level Results

Receiver	2029 No Action Alternative (dBA)	2029 Action Alternative (dBA)	Difference (Action and No Action) (dBA)	2040 No Action Alternative (dBA)	2040 Action Alternative (dBA)	Difference (Action and No Action) (dBA)
EB 450	45	45	0	45	45	0
EB 500	44	44	0	45	45	0
WB 50	60	60	0	60	60	0
WB 100	56	56	0	56	56	0
WB 150	53	53	0	53	53	0
WB 200	51	51	0	51	51	0
WB 250	49	49	0	49	49	0
WB 300	48	48	0	48	48	0
WB 350	47	47	0	47	47	0
WB 400	46	46	0	46	46	0
WB 450	45	45	0	45	45	0
WB 500	44	44	0	44	44	0
Alternative 2						
Woodinville-Redmond Road: between NE 145th Street and NE 175th Street						
NB 50	62	63	1	63	64	1
NB 100	58	59	1	58	59	1
NB 150	54	56	2	55	56	1
NB 200	51	53	2	52	54	2
NB 250	49	51	2	50	52	2
NB 300	47	49	2	48	50	2
NB 350	46	48	2	47	49	2
NB 400	45	47	2	45	47	2
NB 450	44	46	2	44	46	2
NB 500	43	45	2	44	46	2
SB 50	62	64	2	63	64	1
SB 100	57	59	2	58	59	1
SB 150	53	55	2	54	56	2
SB 200	51	53	2	52	54	2
SB 250	49	51	2	49	51	2
SB 300	47	49	2	48	50	2
SB 350	46	48	2	46	48	2
SB 400	45	47	2	45	47	2
SB 450	44	46	2	44	46	2
SB 500	43	45	2	43	45	2
NE 145th Street: between Woodinville-Redmond Road and NE 148th Street						
WB 50	63	64	1	64	65	1
WB 100	58	59	1	59	60	1
WB 150	54	55	1	55	56	1
WB 200	52	53	1	53	54	1
WB 250	50	51	1	50	51	1
WB 300	48	49	1	49	50	1
WB 350	46	47	1	47	48	1
WB 400	45	46	1	46	47	1
WB 450	44	45	1	45	46	1

Table 2. Noise Level Results

Receiver	2029 No Action Alternative (dBA)	2029 Action Alternative (dBA)	Difference (Action and No Action) (dBA)	2040 No Action Alternative (dBA)	2040 Action Alternative (dBA)	Difference (Action and No Action) (dBA)
WB 500	43	44	1	44	45	1
EB 50	63	64	1	64	65	1
EB 100	58	59	1	59	60	1
EB 150	55	56	1	55	56	1
EB 200	52	53	1	53	54	1
EB 250	50	51	1	50	51	1
EB 300	48	49	1	49	50	1
EB 350	46	47	1	47	48	1
EB 400	45	46	1	46	47	1
EB 450	44	45	1	45	46	1
EB 500	43	44	1	44	45	1
Woodinville-Redmond Road: between NE 124th Street and NE 145th Street						
NB 50	65	65	0	66	66	0
NB 100	60	60	0	61	61	0
NB 150	56	56	0	57	57	0
NB 200	54	54	0	55	55	0
NB 250	52	52	0	53	53	0
NB 300	50	50	0	51	51	0
NB 350	49	49	0	50	50	0
NB 400	48	49	1	49	49	0
NB 450	47	47	0	48	48	0
NB 500	46	46	0	47	47	0
SB 50	64	64	0	65	65	0
SB 100	59	59	0	60	60	0
SB 150	56	56	0	57	57	0
SB 200	53	53	0	54	54	0
SB 250	51	51	0	52	52	0
SB 300	50	50	0	51	51	0
SB 350	49	50	1	49	49	0
SB 400	48	48	0	48	48	0
SB 450	47	47	0	47	47	0
SB 500	46	47	1	46	46	0
NE 175th Street: between Woodinville-Redmond Road and NE 131st Street						
WB 50	66	67	1	67	68	1
WB 100	61	62	1	62	63	1
WB 150	57	58	1	58	59	1
WB 200	55	56	1	56	57	1
WB 250	53	54	1	54	55	1
WB 300	51	52	1	52	53	1
WB 350	50	51	1	50	51	1
WB 400	48	49	1	49	50	1
WB 450	47	48	1	48	49	1
WB 500	47	48	1	47	48	1
EB 50	66	67	1	66	67	1
EB 100	61	62	1	61	62	1

Table 2. Noise Level Results

Receiver	2029 No Action Alternative (dBA)	2029 Action Alternative (dBA)	Difference (Action and No Action) (dBA)	2040 No Action Alternative (dBA)	2040 Action Alternative (dBA)	Difference (Action and No Action) (dBA)
EB 150	57	58	1	58	59	1
EB 200	55	56	1	55	56	1
EB 250	52	53	1	53	54	1
EB 300	51	52	1	52	53	1
EB 350	49	50	1	50	51	1
EB 400	48	49	1	49	50	1
EB 450	47	48	1	48	49	1
EB 500	46	47	1	47	48	1

Each road was analyzed on its own. For Alternative 1, 116th Avenue NE between I-405 ramps and NE 60th Street, and NE 60th Street between 116th Avenue NE and 122nd Avenue NE, the truck percentage was slightly higher under the No Action Alternative than the action alternatives. For this reason, the levels are slightly higher for the No Action Alternative than for the action alternatives. However, the difference is so small that the two sound levels would be considered identical.

For Alternative 2, the action levels are slightly higher than the No Action Alternative levels. As with Alternative 1, all differences under Alternative 2 would be so small that the sound levels would not be perceptible. The largest difference between the action alternatives and the No Action Alternative is 2 dBA, which is barely perceptible to the human ear.

Reference

Parametrix. 2024. Transportation Technical Report, Northeast Recycling and Transfer Station Project. January.